

Involving the users remotely: an exploratory study using asynchronous usability testing.

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Abstract. Open Educational Resources (OER) are increasingly used in the higher education landscape as a solution for a variety of copyright, publishing and cost-prohibiting issues. While OERs are becoming more common, reports of usability tests that evaluate how well learners can use them to accomplish their learning tasks have lagged behind. Because both the researchers and the learners in this study use resources and tools remotely, asynchronous usability testing of a prototype OER and MOOC online guide was conducted with an exploratory group of users to determine the guide's ease of use for two distinct groups of users: Educators and Learners. In this article, we share the background and context of this usability project, suggest best methods for asynchronous remote usability testing, and share challenges and insights of the process and results of the testing.

Keywords: asynchronous, remote usability testing, user centered, usability, open educational resources, OER, MOOC, LibGuides

1 Introduction

When a service or resource is designed for users in a specific learning context such as a university, facilitating users' ability to learn and accomplish tasks using the service or resource must be one of the main design goals. Usability testing is especially important when the context for learning is an active process, meaning the users are involved in the process. The value of digital libraries and services according to Xie has to be judged by users, according to their knowledge, experiences, and the task requiring the service [1]. As Krauss states in his *Methodology for remote usability activities* article [2], to create high ease of use an iterative process of design, evaluation, and redesign must occur. If tools or resources for learning are to have value for users and to be judged useful, the users' input must be incorporated into the development process.

Like many American public universities, the University of North Carolina at Greensboro (UNCG) has been expanding its online courses and

programs as well as its online services and support to offer more inclusive opportunities for students to achieve success. The use of OER (open educational resources) in university courses at the time of writing was unknown – certainly some instructors were using OER but there was no way to determine who or in what courses. In the Fall of 2014 there was a campus push for more Open Access initiatives, including the announcement of up and coming 2015 mini-grant opportunity for faculty to modify their course to include OERs, open access, or library licensed materials

(<http://scholarlycommuncg.blogspot.com/2014/12/open-education-initiative-mini-grants.html>). Starting in 2013 the discussion to start offering MOOCs - massive open online courses - at UNCG began, with the translating of two currently successful online courses into MOOCs (Web Design and Usability as well as Soul and the Search for Meaning - <http://moocs.uncg.edu/>) in 2014, promoted especially to the UNCG alumni. Over the past few years, there has been many more faculty training events and fellowships focusing on online teaching as it continued to grow on campus - and globally. These events and workshops provided educators with tips for design, best practices, support, demonstrations of technologies and methods, and include hands-on sessions with experts.

As a result of these trainings and events, issues appeared: instructors struggling to shift their physical materials they have always used in face-to-face classes, into a digital format - often not easily transferable to an online environment (especially with videos). Instructors also wanted to use more open source options that were freely available and easier for their students to access – saving the students money on high textbook costs as well. It became clear that an OER guide on how to navigate these resources was needed for learners, educators, and support staff, such as librarians and instructional designers, at The University of North Carolina at Greensboro (UNCG). The campus was already discussing implementing its first MOOC, along with a push for more open access to resources, especially as textbook prices for students have skyrocketed. The explanatory guide was created using the content management system LibGuides because it was already used by UNCG librarians and was familiar to the campus community. MOOCs were also a natural fit with OER using those types of resources within a MOOC, hence a guide examining both these concepts made sense. The guide was developed by investigating user needs, existing guides, and shared best practices, thereby allowing users to find up-to-date, useful, and applicable information on OERs and the new educational phenomenon of MOOCs. Through a virtual only internship, a Digital Libraries Learning (DILL - <http://dill.hioa.no/>) master's student became a virtual member of the UNCG libraries team for the research, design, and creation of this library guide. After mapping out the content to include in the guide, it was decided to have the home tab covering the basics of “What are OER?”, as well as a tab for Learners (the what and why of OER for learners), a tab for Educators (the what and why OER for educators), a MOOCs and OER tab, and finally a “How to support OER” tab covering background info and resources with librarians and instructional designers in mind.

To test the usability of this guide, participants were solicited from a variety of disciplines, and represented both learners and instructors. Since this study's researchers were not co-located (the librarian being physically in North Carolina and the virtual intern living in Parma, Italy) and because the end users would not all be on UNCG's physical campus, asynchronous virtual usability testing methods were chosen. Participant usability testers included faculty who took the online teaching training sessions at UNCG as well as graduate and undergraduate students who worked at or used the Digital Media Commons, a place where both on campus and online student visit for help creating multimedia assignments.

Once it was determined that the main users of such a guide would be learners, educators, and support staff (librarians and instructional technologists), the main research question to answer was whether these intended users of the OER and MOOC guide at UNCG considered the guide useful and applicable in their completely their necessary tasks. The key in this study was reviewing the ease of navigation for users looking for OER or MOOC information, completing tasks requiring finding OERs or MOOCs, and seeking support in creating their own. Therefore, the aim was to understand to what extent the guide prototype was suitable to fulfill such users' needs in terms of their satisfaction about content structuring, navigation, labeling and content availability and quality as related to the tasks they have to fulfill. To get to such an understanding, starting from a list of suitable users' tasks, the process included:

- investigating how prospective users perceive the logical relationships among the various sections and elements of the guide;
- examining the suitability of the contents included in the guide for answering the user's needs related to the specific tasks;
- exploring users' perceptions and perceived information needs about Open Educational Resources and MOOCs.

User-centered design usually consists of different steps, starting with analysis of users and context, continuing onto the information architecture, analysis and design, followed by evaluation, which leads to implementation, and ending with usability testing. This paper concentrates on the testing and evaluation phase of the prototype, which was performed iteratively and simultaneously with final implementation and public use. The methods included both usability testing and a questionnaire to investigate user perceptions about the usefulness of the content and the service aspect of the guide. The project goal was that the process might lead to an improvement of the guide prototype.

2 Literature Review: Asynchronous Remote User Experience Evaluation

User-centered design, according to the Usability Professional Association, is “an approach to design that grounds the process in information about the people who will use the product” [3]. Rubin & Chisnell [4] look at user-centered design as a philosophy placing the user at the center of the focus. The involvement of users who are both interested in the content and interacting with the system or interface is one of the main characteristics in defining user experience [4], as long as it is observable or measurable. Investigating a system from a user experience perspective is different from simply investigating attitudes and preferences, because behavior is considered. Moreover, Tullis & Albert [5] define usability as the ability of the user to use – or apply - something to carry out a task successfully proposing this comprehensive dimension of user experience considers perceptions raised by the interaction with the system. User experience as a comprehensive notion is confirmed in the definition by Alben [6], which underlines a need to consider feelings, purposes, and the context of use. This is also consistent with Hassenzahl & Tractinsky’s [7] definition, which includes the user's internal state (expectations, need, and motivation), the system features (including usability and functionality), and the context of the interaction.

Usability testing has become a programmatic step in the development of websites in some academic institutions and libraries, that makes it possible to make a website or a service suitable for its prospective users based on their needs. As De Troyer & Leune [8] have argued about websites, “users usually visit websites with questions in mind. The web site should anticipate the user's questions and answer them.” Therefore it is of major importance to apply user-centered design and “concentrate on the potential users.”

In the library and information sciences literature several usability studies have been reported on the LibGuides system. One study conducted usability testing of LibGuides at the University of Washington Libraries with the goal of verifying the effectiveness and usefulness of the guide [9]. Another study by Dalton and Pan of University College Dublin Library, Ireland, focused on the effectiveness and suitability of LibGuides for delivering information literacy support from both an administrative and end-user perspective [10]. Another study on how patrons interacted with Libguide was completed by Metropolitan State University [11]. From reviewing these studies, it appears users most often have difficulties in using Libguides due to librarian jargon, clutter and inconsistencies as well as simply having trouble finding the guide. These issues are a main reason why the study did not include librarians as a testing group. Our study testing the OER and MOOC Libguide hoped to determine how we could improve in these areas and applying some of the guidelines from the University of Washington study as well.

Much has been written on synchronous remote usability testing methods, but little has been reported on asynchronous processes. As Andreasen et. al. state, “Asynchronous testing indicates the testers are separate from the evaluator both temporally and spatially” [12]. By contrast, synchronous remote testing is conducted in real time with the evaluator and tester in

different locations, using web conferencing, video streaming software to communicate and manage the process live.

Krauss provides a survey of various types of remote usability testing and tools used in the process, stating benefits of remote usability work in general such as [2]:

- users are more comfortable conducting testing work in their own environment;
- testing in their own environment is also how they normally use that particular resource making it a more natural situation;
- there are no geographic restrictions limiting who can take part in testing;
- more diverse groups of users can test ;
- there is an added cost savings benefit since participants do not have to travel to a location and possibly be given a stipend or compensation for their time;
- there is also cost savings associated with maintaining a lab space if the testing were done in person.

Andreasen et. al. [12] give a systematic comparison of testing three methods for remote usability testing, including real-time synchronous testing with monitors spatially separate from the tester, and two asynchronous methods. The results indicate that the asynchronous methods are more time consuming for the testers and identify fewer problems, but they also note that this method is low cost for the evaluators, relieves the evaluators from a large amount of work, allows more flexibility in time and location, and allows more data gathering from a wider range of users [12]. In contrast, Alghamdi et. al. [13] conducted a comparison study of both synchronous and asynchronous remote usability testing of a website, discovering that though the synchronous testers found more usability issues and were more successful in completing the tasks, the asynchronous testers were quicker in completing the tasks and showed a higher satisfaction in the remote testing method.

Symonds, who examines a case study of asynchronous remote usability testing using a survey tool to evaluate a digital collections website, states this method was used to save time and money [14]. In addition, Martin et. al., in comparing an asynchronous remote usability evaluation of a website to a traditional laboratory testing, concluded that for a website or, in our case, an online resource guide, usability testing can be a more cost-effective method than laboratory testing despite the drawbacks [15].

Dray and Siegel note that asynchronous methods are less intrusive to the user, another added benefit [16]. Thomsett-Scott also commented on the benefit that asynchronous testing is less intrusive to shy participants or those who are more anxious having someone watching them, as well as the fact that the users are more comfortable testing in their own natural environments [17]. Bastein confirms that an asynchronous approach allows the recording of larger groups of users and more data collection, another added benefit to asynchronous testing [18].

There are several challenges and drawbacks to remote asynchronous usability testing described in the literature. Thomsett-Scott notes the need for users to have a high-speed internet connection, issues with unexpected technology failures or interruptions when not in a lab setting, and the lack of observational data [17]. Dary and Siegel also comment on the inability to collect observational data, and that cultural differences could also affect the study as they are less noticeable in remote testing and could lead to misinterpretation of tasks or results [16]. Bastien confirms this finding as well, indicating a clear drawback of the asynchronous approach is that it does not allow for observational data and recordings of spontaneous verbalizations during the remote test sessions [18].

3 Methodology

Because user experience is such a multi-faceted concept, the authors of this paper decided not only to include usability testing, but also to investigate users' perceptions about the service in their specific context to serve their task, by means of a path that included a pre- and post-survey. As Bastien states, "User-based evaluations are usability evaluation methods in which users directly participate." [18] For this study we chose to focus on user-centered design as a method to consider the viewpoint of users, and how resources or services can be tailored to support users, as well as to achieve higher usability and satisfaction. In this research the starting point was therefore the identification of possible users, along with user tasks that might be conducted using a guide. A user-centered approach was adopted and applied. This approach was a combination of formative and summative techniques: a formative, or a continuous process, was used from the beginning of the guide creation with the mapping out of content into sections or tabs and designing the prototype guide; then the summative testing began as it was tested with participants; finally a more formative process went into the guide using the data collected to improve it.

In addition, because of the disadvantages to the asynchronous method of remote usability testing, we added in a questionnaire that allowed users to report critical incidents they discovered and to share thoughts and problems they found. This method provided more insight from users and potentially identified more problems that might have been missed through our testing. Issues such as users getting lost, having too many windows open, getting confused as to where to go next, and getting distracted leading to non-completion [14] are drawbacks as well, but we determined the benefits in our case outweigh these negatives. The guide under consideration is meant to be used remotely, when needed, as needed, by users. Because the authors were geographically and temporally dispersed as well, rather than trying to arrange users to test our guide at a specific time and place, asynchronous testing allowed them the flexibility to do so on their own schedule.

3.1 Participant Recruitment

The main user groups for this study were learners and educators. The user groups considered in the evaluation tasks were representative of these target groups:

- Educators who are interested in using innovative methods in their courses to improve learning, especially digital tools. Specifically, for this usability study the focus is on educators whose task is creating a course or revising or redesigning it, e.g., to apply for a grant or to improve learning using Open Educational Resources and/or online available tools.
- Learners who used the Digital Media Commons at UNCG who might work in a group, find, share and create OERs for use by their peers or even teachers.

Because this was an exploratory study, purposive sampling was considered suitable, given the case characteristics and because one of the authors had a position that allowed her to identify the most willing and information-rich subjects from both the educator and student worker pool, and therefore a sample of convenience was chosen. This exploratory research was carried out among prospective users of the OER and MOOC guide, which included undergraduate and graduate student users of the Digital Media Commons, and faculty members who had participated in training in online pedagogies. Students were recruited through digital signage throughout the library and specifically in the library's Digital Media Commons area. However, the main volunteers were students already working in that department and their friends and classmates. These students, typically undergraduates, came from a variety of majors including Media Studies, Digital Art, Sociology, and Library and Information Studies (graduate students). The student workers often seek out open access or creative commons materials to use in their design work, or when assisting other students and faculty at the desk, though in casual conversation most did not know the term Open Educational Resources when they were first recruited. Twelve student participants were enrolled in the study. Several of the student participants were considering taking a MOOC to expand their learning beyond what UNCG could offer, and one student was currently enrolled in a MOOC. These student participants appeared to match our sample requirements targeting users or learners who might find an OER or MOOC guide useful.

The faculty participants were recruited from the pool of participants who had been involved in teacher trainings. These educators were looking for new methods and ways to improve their teaching and the resulting learning of their students, and were often open to new ideas for creating a more open, accessible academic environment. This sampling of educators appeared to be a natural representation of an educator group who might be interested in creating and using OER and MOOCs. Fourteen educators were recruited and participated in the testing. Once the volunteer testers agreed to participate,

and the campus' Institutional Review Board determined it was okay to proceed, an e-mail was sent to all of the participants with the detailed steps and a deadline for completion.

Librarians were not considered as a testing group in this phase, though they will be users of this guide. As stated in the literature review, librarian jargon and terminology could be a major issue of the guide's ease of navigation and use. The audience for the guide is mainly for learners and educators though librarians could fall into either of those categories. A heuristic evaluation by librarians was already present in the process anyway, since one author was a professional librarian and, informally, a few other librarians at her institution were asked to take a glance at the Libguide.

3.2 Email to participants

To simplify the testing for this asynchronous study, each participant was emailed a personal but scripted email with step-by-step directions on the process. Outlined in the email was the basic information on what was expected, including a deadline to complete and contact information if there were questions. Participants were asked first to fill out a pre-survey before looking at the guide or any of the following tests. Then the participants were asked to complete a card sorting activity, a navigational menu test, followed by a post survey including a link to the live OER and MOOC Libguide to help with open ended questions. The following sections explain the various pieces of the process.

3.3 Pre-Survey

In order to investigate the suitability of the content included in the guide, whether the information provided in the guide met target users' needs, and to investigate users' perceptions and perceived information needs about OERs and MOOCs, pre and post surveys were administered. A questionnaire was designed to collect as much data as possible, including hints, suggestions, and perceptions from the participants. The questionnaire was delivered online Using the survey tool Limesurvey, as this software allows for easy collection of data and export of the collected data as .csv, .xls and/or pdf. It also allows for creating surveys with already-created graphics. The survey was anonymous, and the records kept of the survey responses did not contain any identifying information about respondents.

A different pre-survey was submitted to each user group (one for educators and one for learners) in the form of a questionnaire using Limesurvey software. The learner's questionnaire began with the statement "As a learner you might have to carry out some activities involving Open Educational Resource. To which extent do you think you could be involve in the following activities?"

- finding OER to use to support learning
- finding OER to use to modify and reuse

- finding MOOCs to participate in
- creating my own MOOC for my courses

In order to have a more comprehensive approach, the decision to include open-ended and affective feedback from users [19], including feelings and expectations [7] about their experience was also asked to both group through open ended questions. The learners were asked: “Which kind of information useful for LEARNERS would you expect to find in a guide about Open Educational Resources and MOOCs.”

The educator’s questionnaire began with the statement “As an educator you have to carry out some activities involving Open Educational Resources. To which extent do you think you could be involved in the following activities?”

- finding OER to use and share with students
- finding OER to use to modify and reuse
- creating my own OER to support teaching
- finding MOOCs to participate in
- finding MOOCs to use as an example
- creating my own MOOC for a course

The educators were also asked open ended questions about other activities involving OER and MOOCs they might be involved in as well as “which kind of information useful for EDUCATORS would you expect to find in a guide about Open Educational Resources and MOOCs?” The following figure (Fig. 1) shows the concept map used to determine the potential tasks for the educator group:

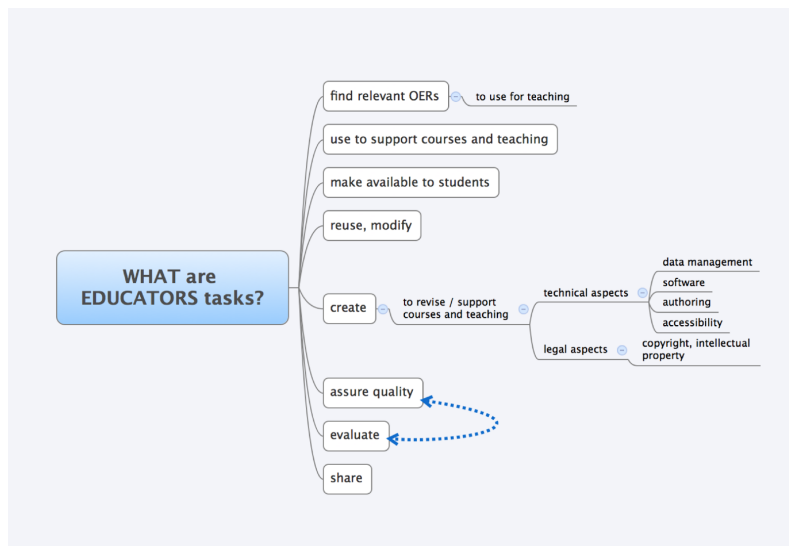


Figure 1: Concept map of educator’s potential tasks

3.4. Card Sorting

Card sorting is a way to learn how prospective users perceive the logical relationships among the various labels and elements [5] and to allow input by users about how to organize a website or an online service. The technique is usually applied as a design tool for organizing labels in menu trees: “the card sort analysis can be used to improve navigation, site maps, page organization, page layouts, page flows and process, copy organization, and to reduce clutter. Card sort analysis can also be used to identify (...) priorities and use the terminology your users would use” [20]. In addition, the classification emerging from card sorting could help define the hierarchical structure of the navigation menu [21]. For this study card sorting was done after a first generation of the prototypical information architecture was established. We had already found benchmarks from existing guides on similar topics, and the researchers decided to apply the findings from the card sort to the guide after the testing. Testers reviewed a prototype of the guide during the process, which helped make the card sorting easier. An open card-sorting approach was used, which allowed users to choose and name further categories that the researchers did not anticipate. As suggested by Nielsen [22], a card sort should serve to verify whether the labels and content structure that has been considered for the guide corresponds to users’ mental models of such an information space, and to possibly give alternatives and inspiration for the final names and labels.

The traditional approach to card sorting consists of observing users while they handle paper cards and order them in piles of correlated elements. Though recognized to be an efficient approach, this traditional method also requires face-to-face interactions, which can be time consuming and costly [23]. Because the two researchers were geographically separated, the decision was made to host a virtual-only remote usability test.

After evaluating free alternatives, ConceptCodify (<http://conceptcodify.com/>), was chosen for the following reasons:

- it is free;
- there is no limitation of the number of users (Websort is free but the free version is limited to 10 users);
- it is possible to invite participants with a simple URL, without needing to create user accounts;
- it gives users the opportunity to create and name their own categories;
- it offers tools for transformative analysis of results.

One limitation of ConceptCodify was that it does not allow for changing label names individually but only category names. Participants were asked to do the card sorting on their own using the online tool. The users were asked to:

- Define the labels (and therefore the cards) to be sorted.

- Sort the cards in “piles,” placing cards that seem similar in the same pile, using given areas though they user could create their own if they did not see that the cards fit.
- Create and name categories.

3.5 Navigation Menu Testing

Ardito mentions the ISO 9241 standard definition of usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” [24]. He explains further, if the users – our learners or educators – find the navigation unusable, too rigid, or too unpleasant they get frustrated and go away [24]. Hence testing these groups to find navigational issues up front will provide a better, more useful tool.

Navigation menu testing, which is also called “tree testing” [25], is a usability technique to assess the structure of the information hierarchy and the appropriateness of the navigation labeling, making it possible to evaluate whether users can easily find to achieve certain tasks. Navigation menu testing consists of recreating the textual structure of the digital service or website and assigning users tasks to be accomplished by finding information through the reconstructed menu. The system collects and presents the choices made by users and records the overall success rate. The tool Plainframe (now Optimal Workshops - http://www.optimalworkshop.com/?uxp_welcome=1) was chosen for navigation menu testing, because it allows for online and remote testing. PlainFrame permits the creation of interactive navigation menus and feedback gathering.

We transposed the menu taxonomy of the OER guide to the navigation menu testing platform. This resulted in a tree with 39 nodes: 5 were starting points (branches) and 34 were leaves. The depth was limited to 3 levels. Users were given scenarios in which they had to accomplish certain tasks and were asked what they would click on the menu to find useful information; different scenarios were imagined for Educators and Learners.

For educators, we provided a scenario in which participants had to apply for a grant to help them redesign their online course(s) in an innovative way, only including Open Educational Resources. We established four tasks:

1. You have to find the right Open Educational Resources for your course. How would you go about finding useful information to fulfill your task?
2. You have already found some useful OER resources, but you have to modify them to adapt them for your reuse. You need to have some further information about how to modify and reuse OERs. How would you find useful information for you to fulfill your task?
3. You have already found some useful OER resources, but there are some learning outcomes and topics which are not covered by the resources you found, and so you decided to create your own open educational resources. You therefore need to collect some further information about how to create OERs. How would you find useful

information for you to fulfill your task?

4. In order to win the grant, you believe that you should also redesign the concept of your course and are willing to create a MOOC-like course for your students. You need to collect some further information about MOOCs and how other universities faced it. How would you find useful information for you to fulfill your task?

For learners, we provided a scenario in which they were asked to do a group project in one of their classes this semester, gathering resources to learn about that subject and sharing it with peers in their group for a further discussion. We gave them two tasks.

1. You have been asked to find only Open Educational Resources for your task. You have discovered a guide about OER and MOOCs. How would you use this guide to find useful information for you to fulfill your assignment?
2. You have found the resources, now you have to share them with your peers. You went back to the OER guide to get some support. How would you go about finding useful information for you to fulfill your task of sharing the resources with your peers?

Both groups were then redirected to a link where they were prompted with the tasks pertaining to their scenario, using the prototype guide's main headings, or labels listed, from which to choose. By clicking on any one of the headings, they saw a drop-down menu of other choices, or subcategories, found within that main heading. They had to choose the subcategory they thought was the best answer for that question.

3.6 Post-Survey

Both card sorting and navigation menu testing are mainly quantitative ways of investigating the usability of an online service. A post survey in the form of a questionnaire was administered, similar to the pre-survey using the same software and keeping the participants information anonymous. Both groups got the same questionnaire. They were asked to "Please state your level of agreement with the following statements:"

- I found the contents useful if related to the task I had to fulfill using OERs and MOOCs
- I learned a lot about OER and MOOCs from skimming the guide for this testing
- I found it easy to discover the contents I was looking for
- I would use this guide in the future with some corrections or changes
- I would use this guide in the future even without any corrections or changes

- I would recommend this guide to others

Again like the pre-surveys an open-ended question was offered asking participants to please share any suggestions that could be useful to improve the guide.

4 Findings and Discussion

4.1 Pre-Survey Analysis

As discussed in the Methodology section, the pre-survey was conducted before participants saw the guide, and the post-survey was to be completed after testing the card sorting exercise and navigation menu testing. Pre-survey feedback was received from fifteen participants (ten educators and seven learners). Both educators and learners were asked about the extent to which they might be involved in activities involving OER.

There was general agreement among educators that they were able to find OER to use in teaching as well as sharing with students (80%, 8 out of 10). A lower agreement was seen (60%, 6 out of 10) for activities involving finding MOOCs to participate in by educators. The Libguide contains a list and description of various MOOCs, which will be useful to educators using the guide. The majority of educators also showed uncertainty in these areas:

- modification and reuse of OER: never 10% | not sure 30% | maybe 30% | probably 20% | yes 10%
- creation of teachers' own OER: never 10% | not sure 30% | maybe 40% | probably 10% | yes 10%
- creation of teachers' own MOOC : never 10% | not sure 50% | maybe 30% | probably 10% | yes 0%

The Libguide contains information on modification, reuse, and creation of OER but authors should pay close attention to these areas, making sure there is adequate resource and explanation for educators on these aspects.

Responders were asked to state any further activities they might be involved in that had not been listed. Educators mentioned “activities of creation of informational materials for distance students” and the “usage of social media”, adding this to an increase of personal “knowledge about what OERs and MOOCs are and how they are and/or can be used in higher education”. As distance (online) learning is growing globally a key aspect gleaned here would be to push the OER to distance educators and learners campus wide, linking from online course guides or programs so it is more findable to this user group. When educators were asked about what information they would expect to find in the guide, they mention:

- definitions of OERs and MOOCs
- lists and directories of tools and resources, including descriptions and technical details about them ("a thorough description of the

resources, as well as their origin", "a list of creation tools", "directories of MOOCs")

- instructions about "how to access them"
- information about how tools support pedagogy
- to be informed about possible ways OERs and MOOCs can benefit teaching and learning
- to support good teaching instead of using tools just because they are "cool"
- a need for information about the "recommended use(s)" and target audience, as well as "tips" for using resources in the classroom.
- information that might help in the creation process ("direction for creating").
- more than one educator expects the guide to be built around topics in order for educators to locate resources quickly and find specific and detailed information and up-to-date research on the topics they teach.

Though most of these suggestions were already covered in the guide, a theme emerged that was not included to its fullest: information about how these OER and MOOC tools support pedagogy and their benefits to teaching and learning, with the perception that they are being promoted just because they are "cool." Reflection on how to include this information in the guide needs to be tackled but perhaps more training for educators would better promote these concepts and perceptions.

Regarding MOOCs, the authors discovered that educators expected to get direction about where to find MOOCs on the guide as well as how to judge their quality, explanations of pacing grading, and how they compare to online classes and regular classes when using this guide. Following this exploratory study, additional vetted links were added to the finding MOOCs section but the topic of judging quality and the comparison to online and regular classes needs to be further researched and added if it's even possible to find this information.

Learners appeared ready to find OERs to use to support learning (71% or 5 learners) answered maybe, probably or yes) and to share OERs (85% or 6 learners, chose maybe, probably or yes). Like the educators group, they imagined they might be involved in looking for MOOCs to participate in (85% or 6 learners chose maybe, probably or yes). More uncertainty is shown about users' own creation of OERs and MOOCs (86% or 6 learners choose non sure or maybe). As opposed to educators, learners report they might consider finding OERs to modify and reuse (about 86% or 6 learners). Answering the open ended question to list other activities not provided in the survey, one learner, reflected that the approach to sharing, modifying, and re-using OERs as reported above, "creates a collaborative educational resources that can be modified by many hands". Learners seem to be eager to share and collaborate with their peers, an aspect that should be share with other librarians and educators – along with the OER Libguide – for better use in

instructional settings and an approach to pedagogy concerning open collaborative resources.

Learners also mention the definition of OER and MOOCs and the access to open educational resources and MOOCs with a need to receive technical details, through explanations and tutorials. More Do It Yourself (DIY) style tutorials should be gathered or create and included in the OER guide to better support learners.

4.2 Card sorting - Analysis

Seven responses out of twelve were collected from learners and ten out of twelve from educators. Nielsen [26] suggests that 6-10 users are involved in card sorting to help inform design decisions indicating the card sorting part of the research project would provide useful results.

The key elements were identified using the ordering analysis, and these elements were added to our concept maps. An example for Learners is seen in Figure 2.

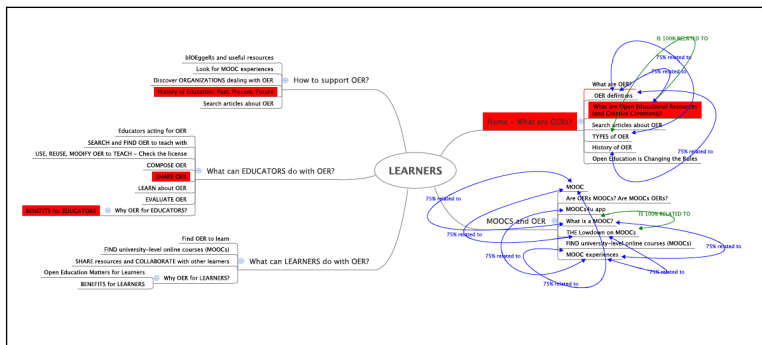


Figure 2: Concept map for learners

The results for learners indicated the first five elements were “benefits for educators”, “what are OER?”, “History of Education: Past, Present, Future”, “Share OER” and “What are Open Educational Resources (and Creative Commons)?” (See Fig. 3) For educators, the first five elements were “Benefits for Educators”, “History of Education: Past, Present, Future”, “What are Open Educational Resources (and Creative Commons)?”, Benefits for Learners” and “What is a MOOC”. Due to the limiting functionalities of using a free tool, the number of times each element was chosen could not be gleaned, but the ranking order can be seen in Figure 3 for learners group and in Figure 4 for the educators group.

Significantly, both learners and educators chose “History of Education: Past, Present, Future” and “Benefits for Educators” and “What are Open Educational Resources (and Creative Commons)?” in the first five elements. This might suggest curiosity about what Open Educational Resources and their associated benefits are, and a need for clearer understanding of what is

going on in education as the revolutionary shift to open access continues to grow, affecting the higher ed sector. Learners tended toward the “sharing” aspect of OERs, while educators seem quite interested in MOOCs. Perhaps learners who tend to share regularly themselves on social networks seek out other resources that allow that sharing to continue. Educators being pushed to teach online are seeking out how MOOCs might change the way they teach as well as pushing them out of jobs in the future if learners can learn for free online via a MOOC.

Ordering analysis		LEARNERS
Rank	Card	
1	BENEFITS for EDUCATORS	
2	What are OER?	
3	History of Education: Past, Present, Future	
4	SHARE OER	
5	What are Open Educational Resources (and Creative Commons)?	
6	Discover ORGANIZATIONS dealing with OER	
7	THE Lowdown on MOOCs	
8	COMPOSE OER	
9	Find OER to learn	
10	Look for MOOC experiences	
11	Open Education Matters for Learners	
12	FIND university-level online courses (MOOCs)	
13	EVALUATE OER	
14	Are OERs MOOCs? Are MOOCs OERs?	
15	History of OER	
16	OER definitions	
17	What is a MOOC?	
18	USE, REUSE, MODIFY OER to TEACH - Check the license	
19	Open Education is Changing the Rules	
20	BENEFITS for LEARNERS	
21	Educators acting for OER	
22	MOOCs4u app	
23	SEARCH and FIND OER to teach with	
24	MOOC experiences	
25	TYPES of OER	
26	Search articles about OER	
27	MOOC	
28	blOEGgeRs and useful resources	
29	LEARN about OER	
30	SHARE resources and COLLABORATE with other learners	

Figure 3: Ordering analysis results for Learners

The relationship ranking reveal (See Fig. 5) the similarities and connections between the labels/cards. This relationship ranking shows that some topics were considered correlated to other topics, indicating that was useful to users in the guide to put the labels under the same pile. These relationships can be applied to the design of the guide navigation, to maintain

the most important connections on the guide. The hierarchical clustering analysis was applied to elaborate on the guide structure and navigation menu and Figure 6 shows the resulting dendrogram linking the labels.

Ordering analysis		EDUCATORS
Rank	Card	
1	BENEFITS for EDUCATORS	
2	History of Education: Past, Present, Future	
3	What are Open Educational Resources (and Creative Commons)?	
4	BENEFITS for LEARNERS	
5	What is a MOOC?	
6	What are OER?	
7	History of OER	
8	Open Education is Changing the Rules	
9	LEARN about OER	
10	Look for MOOC experiences	
11	Are OERs MOOCs? Are MOOCs OERs?	
12	SHARE resources and COLLABORATE with other learners	
13	Discover ORGANIZATIONS dealing with OER	
14	Educators acting for OER	
15	SEARCH and FIND OER to teach with	
16	MOOC experiences	
17	USE, REUSE, MODIFY OER to TEACH - Check the license	
18	THE Lowdown on MOOCs	
19	MOOC	
20	FIND university-level online courses (MOOCs)	
21	Find OER to learn	
22	TYPES of OER	
23	OER definitions	
24	Open Education Matters for Learners	
25	COMPOSE OER	
26	MOOCs4u app	
27	EVALUATE OER	
28	bIOEggers and useful resources	
29	SHARE OER	
30	Search articles about OER	

Figure 4: Ordering analysis results for Educators

Relationships ranking
Limited to top 20

Similarity	Card	Card
100%	THE Lowdown on MOOCs	What is a MOOC?
100%	TYPES of OER	What are Open Educational Resources (and Creative Commons)?
75%	History of OER	OER definitions
75%	MOOC	MOOC experiences
75%	MOOC	THE Lowdown on MOOCs
75%	MOOC	What is a MOOC?
75%	MOOC experiences	MOOCs4u app
75%	MOOC experiences	THE Lowdown on MOOCs
75%	MOOC experiences	What is a MOOC?
75%	OER definitions	TYPES of OER
75%	OER definitions	What are Open Educational Resources (and Creative Commons)?
55%	Are OERs MOOCs? Are MOOCs OERs?	MOOC
55%	Are OERs MOOCs? Are MOOCs OERs?	MOOC experiences
55%	Are OERs MOOCs? Are MOOCs OERs?	THE Lowdown on MOOCs
55%	Are OERs MOOCs? Are MOOCs OERs?	What is a MOOC?
55%	BENEFITS for LEARNERS	Open Education Matters for Learners
55%	COMPOSE OER	SEARCH and FIND OER to teach with
55%	History of OER	Search articles about OER
55%	History of OER	TYPES of OER
55%	History of OER	What are Open Educational Resources (and Creative Commons)?

Figure 5: Relationship ranking results

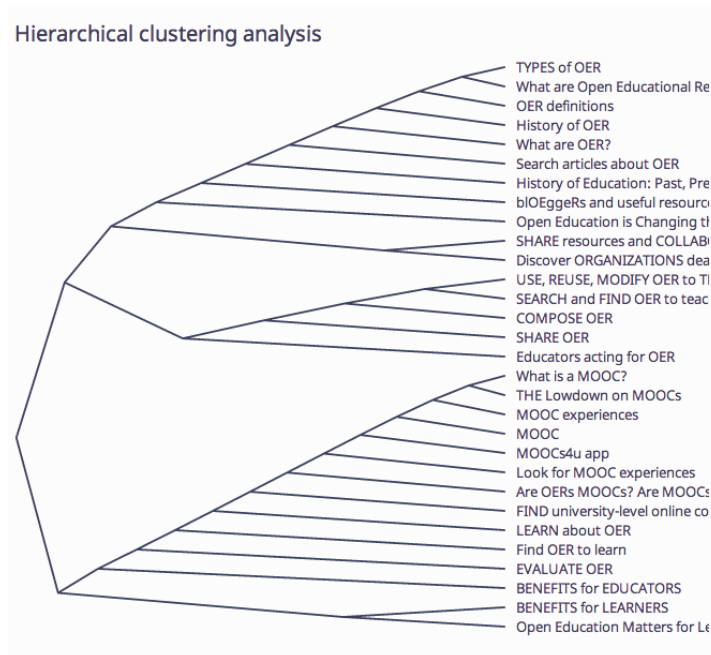


Figure 6: Resulting dendrogram of hierarchical clustering analysis

4.3 Navigation menu testing analysis

Using an open source, free tool like Plainframe has its benefits but the drawbacks included a limited number of responses allowed per account. The authors had to create various accounts with Plainframe to allow for enough responses (participants). The participants had to be grouped - unknown to them of course as they saw a personal individual email with the links - since the allotment was a max of 10 responses for each Plainframe account. Errors also occurred for a few participants who were not able to access the link as they were sent one already maxed out by mistake. These difficulties probably confused and discouraged some participants from continuing. Moreover, Plainframe completely changed their platform during the study, so that results had to be recorded before the specific platform was dismissed causing the authors to struggle with gathering all the information and then not having access to the results later on. This step of the research project showed the lowest results of any other steps due to these perceived difficulties.

Thirty-four responses were recorded among users, which translate to about eight people answering four tasks each. Even though there were more student participants, only two responses were recorded among students, as only one student performed this task. Given the low participation in this part of the test, in comparison to the whole sample, these student results are not to be considered a guide for decision-making, but the authors are including this information to help future researchers build on what we collected in hopes that trends may emerge.

Another reason for the low rate of participation in the test might also be a lack of understanding of the different objectives of card sorting and tree testing. Including an example of what tree testing and navigational testing is before having participants launch into the actual test would have been beneficial. Also the test introduction and directions written by a non-native speaker of English could have led to confusion by the students. The authors would test the directions and questions first with a willing person(s) before the actual testing would occur to alleviate any misunderstandings in the future. The issues of low results in this area also indicate how synchronous testing with a guide nearby to ask of these confusions would be beneficial as opposed to asynchronous remote testing.

For educators, for both tasks 1 and 4, only two out of eight respondents found the right way to the information; half of the respondents managed to accomplish task 2 via the menu and five out of eight managed to find the right navigation to the necessary information to satisfy task 3. The generally low rate of success in finding the right information for the task might indicate the tasks were formulated in the wrong way, or the navigation menu was confusing. Participants were given tasks and the list of labels represented matched those on the Libguide. But participants as of yet had not seen the actual Libguide - just the labels, which they had to choose using this testing tool. The authors believe that tree testing is a useful aspect for testing with users, but that the online nature, features and navigation difficulties of the

software tool itself made a difference seem with the lack of substantial results. The results for this part of the research project most likely are not correlated to the navigation features in the actual guide. Unfortunately, the quantitative approach of the tree testing does not give any insight into the reason for this. As stated above, the asynchronous remote testing did not allow for observation of the users' behavior, an issue the literature [16, 17, 18] had suggested as the main drawback to this form of testing.

4.4 Post-Survey Analysis

The post-survey was meant to investigate whether users' satisfaction with the guide's ability to help them complete the assigned tasks. Feedback was given by 15 respondents (ten educators and five learners).

- 87% of users "completely agreed" and 13% "somewhat agreed" that the content was useful for completing the assigned tasks,
- 93% declared to have learned a lot about OERs and MOOCs from skimming the guide for the testing.
- 60% found it really easy to discover the content they were looking for, while 40% agreed somewhat.
- 67% of respondents completely agree and 20% somewhat agreed with the statement that they would use the guide in the future (with some corrections or changes). Two respondents did not answer.
- 60% of respondents completely agree and 33.33% somewhat agreed with the statement that they would use the guide in the future even without any corrections or changes, while one respondent does not agree at all.
- Most respondents completely agree (93%) that they would recommend the guide to others, and one respondent (7%), somewhat agreed.

In general, the guide was considered "an outstanding resource", and a comprehensive one, with a huge amount of information, including "great information". But some changes were needed. Dealing with OERs and MOOCs together in the guide was sometimes confusing. Furthermore, it was suggested by a respondent to arrange MOOCs by subject rather than provider. Annotations – detailed descriptions on the various links and resources provided - were appreciated. Nevertheless, one respondent reported some difficulties in the navigation of all the information, and a need for a map or an overview; on the other hand, another respondent found it redundant and confusing to have the same navigation links both in the tabs and on the side in a list. Not sure if there is a better fix for this issues. A further suggestion was made to add more tabs to avoid a lot of scrolling. As updated to the guide continue, taking note of limited the scrolling and instead insert anchors and links or drop down tabs or new tabs must be considered.

Some changes as mentioned already have been made to the guide and other suggested have been noted to research and update later. Most changes

were modifying labels of boxes (shortening them or changing the verbiage to eliminate librarian jargon), shifting the labels or moving them to a better location on the guide, and adding a navigation or table of contents type box as an overview. Tabs were also updated, shortening the text and changing the verbiage to make more sense to users from their suggestions.

4.5 Overall Methodology Evaluation & Summary

Our evaluation methods of asynchronous remote testing showed positives already as well as drawbacks in each step along they way. This unique situation of the researchers being thousands of miles apart, in two difference countries, with all internship project work being done virtually, the methodology just made sense to try. Because the user group we expected most to use these resources and tools would be online users, the method of asynchronous testing seems to be appropriate. Testing users in the situation they most likely would use the tool, seemed logical. But drawbacks were definitely present. The lack of observational data was a definite a drawback in our methodology, as some of the results would have made more sense if we have seen where, and possibly inferred as to why, participant testers feel into confusion or did not finish a step or test. Having the testing group go through each testing step all on their own, with no motivation to complete then steps in order, nor to follow through until the end, can been seen in the lower response rate - especially from learners who might not be at independently driven as faculty. Using open source or free tools might seem beneficial (free!) but also proved to be problematic. The issues with using Plainframe software were obvious – lack of being able to use one account and link for all testers, as well as the complete change in their platform by the company during our time of testing caused unneeded disruptions. Another drawback was timing. The internship between the two authors was on a very limited time frame including both completion of the Libguide as well as the testing, therefore the rush to complete this testing by the authors, could be a factor in the results. With more time, participants could have been reminded to follow through on the test and given enough time to do so. Also the timing of the semester was not the best either, happening just before and during break between fall and spring semesters, over a Christmas holiday where many students were wrapping up exams and traveling for the holiday break. Finding a better time period during the year to test would have given more responses.

Being an exploratory study though, the authors believe this method was worth trying, learning from, and diving in again. MOOCs themselves are generally asynchronous; as learners and educators shift into more online learning, possibly following this concept of asynchronous learning, more asynchronous remote testing should become more commonplace and users might also be more motivated on their own to finish. It would be useful to see more asynchronous remote testing in library research and sharing of best practices as well.

Some suggested best practices for this method of testing include:

- Consider timing of the year/semester to get the most responses.
- Test our your directions text, steps and links with others first before the actual test to make sure they coherent, make sense to reader, and all links work properly.
- Make sure you personalize the emails to enough participants they are each important rather than a generic email to all.
- Try sending out the various steps one at a time, rather than all steps in one email. Users can get distracted, lost, confused and not go back to complete.
- Send reminder messages to participants to complete and always have a deadline stated.
- Spend time analyzing the software choices especially when free - free does not mean the best quality though it can still be a good choice.

Use more participants than you think necessary as asynchronous remote testing is more difficult to observe and have follow through, than observed testing.

5 Conclusion

Our research question was first to answer whether the intended users of an OER and MOOC guide would find the guide applicable to their jobs. The important research and testing goal was to study the ease of navigation in using the guide to complete an OER or MOOC related task: did users perceive the logical relationships among the various sections and elements of the guide, did they find the content suitable to fulfill their needs, and what were their general perceptions on information needs of OER and MOOCs? The authors conclude that the research goal was achieved at least in part through this exploratory study. We learned enough from these two groups of testers to make positive changes to the guide to ease navigation and add additional content suggestions. Several drawbacks were encountered from lack of responses and follow through from remote testers to lead to definitive conclusions. Being an exploratory study only, future studies could build on what we attempted and use our suggestions to improve to glean more substantial findings. The author would like to test users again through this asynchronous remote testing, improving on what we learned from this unique method of research study.

The information we gathered through this asynchronous remote usability testing method was enlightening and led to updates and changes to the guide. As stated in early sections, several changes to the guide's navigational headings, updates to content and wording, and shifting of a few boxes on the guide were completed to make it clearer for users to navigate and fulfill their needs. Many educator testers of the guide have informally commented on using it again since the testing. The page view statistics, from January 2014 (when it first went live) through October 2014, (when the authors began

writing this paper) show the guide had over 500 views. Other resource based libguides (non-course specific) during this same time period averaged a lot less hits. And yet this guide was new and not yet promoted by the library during its early stages of revisions so there are expectations that the view will rise dramatically. During open access week in October 2014 the resource was pushed out and promoted with the Scholarly Communications Guide (the two are linked), showing a third of the 500 hits came during that month alone. The most heavily viewed page was the HOME - What are OER?, with more than half the views, but the two other highly used pages were “WHAT can EDUCATORS do with OER?” and “MOOCs and OER”, indicating educators are the most likely users of the guide. This could be due to the push from the library with support from the provost’s office to create an Open Educational Initiative grant on campus. This grant will be given to faculty to create new course materials (textbooks) using only Open Educational Resources. With this in mind, numerous additional resources have been added in the e-textbook area to supply more support to these educators.

Hence, our findings do show that educators found the guide useful, and campus initiatives focused on Open Education indicate this need will only grow. Though our learners did not seem to find the guide as useful as the educators overall, perhaps our study group of learners was too small to collect adequate data to hypothesize on the results. We believe as educators push more open resources, they may push their students to use them as well. Educators are definitely users of this guide now and will be in the future. As MOOCs and online learning grows globally more asynchronous remote testing might become a mainstream concept. The iterative process of user evaluation should be conducted again for this guide or other OER and MOOC resource guides. As OERs grow our users expectations and use of OER will too. We encourage more researchers to attempt this method especially related to OER and MOOCs in higher education arena.

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