

# Open Educational Resources: From Exploration to Application

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## Abstract

Many in higher education are beginning to realize the potential when Open Educational Resources (OER) are adopted. There are gains for students in terms of cost reduction and progress towards graduation. There are gains for faculty and instructors in offering textbook cost zero classes, in taking advantage of the open licenses to localize course resources, and in exploring OER-enabled pedagogy (OP), which can be afforded by open resources. However, the full potential of OER is yet to be realized. It is possible that additional in-depth research into the areas of OER and OP might promote more extensive adoption and development and in turn provide further gains for students and faculty. The three studies that comprise this dissertation provided an overview on various aspects of OER use and development as well as on the impact they have on the student experience. The first study used an interpretive qualitative approach to provide a narrative of the experiences of university professionals developing and working with OER and OP as well as examining this process through the lens of the Unified Theory of Acceptance and Use of Technology (UTAUT) theory. The second study used an explanatory sequential mixed methods approach as it applied and extended the COUP framework to focus on cost, outcomes, use, perceptions, and engagement related to students when OER and OP were utilized. The third study also used a mixed methods approach and the UTAUT theory to explore factors that have influenced faculty who are using OER and OP in their teaching. Findings that linked the three studies reflected on the importance of sharing these resources with others, on the advantages of having control over resources for purposes of localization, and on how beneficial they can be in providing equity and access to support student progress through higher education. These findings may be used by institutions, faculty, instructors, librarians and instructional designers as they consider the adoption, creation, and application of OER.

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## Chapter 1 Introduction & Supporting Literature

This dissertation used the three-article dissertation option, which is premised on developing publishable research. It consists of this chapter (introduction), a traditional literature review found in Chapter 2, the three individual articles as Chapters 3-5, as well as a concluding Chapter 6. For this dissertation, Chapter 1 provides background information on the topic of research and discusses the structure of the dissertation in more detail. It also summarizes the conceptual framework, the methodology, rigor and limitations, and provides the definitions of terms.

### Background and Supporting Literature

Some time ago Open Educational Resources (OER) entered the educational scene, and for the last decade and a half these resources have been playing their part in promoting the expansion of quality education (Mulder, 2013). A definition of OER can be summarized as any educational resource that is freely available for anyone – teachers, students, and community members – to use and modify with no fees attached (Butcher, 2015). It is immediately apparent that the “no-cost” aspect of OER would have high appeal to students and could potentially motivate faculty to adopt such resources, not only for the benefit of their students but also for the ability to harness academic freedom. It is imperative for the future of OER that these topics be thoroughly researched, and the data shared in order to provide an in-depth understanding of different aspects of OER. How might the benefits of these resources impact student progress toward graduation, but more critically how might they impact student learning? What factors motivate faculty to adopt (or not adopt) OER? What are the experiences of those who have developed and adopted OER in higher education? The answers to these questions could potentially provide the data to spur further development and application of OER.

Research has shown that the high cost of textbooks can negatively affect a student's progress through higher education (Fischer, Hilton III, Robinson, & Wiley, 2015; Hilton III, 2016). Data from a 2016 *Student Public Interest Research Groups* (PIRGs) report indicated that there has been an increase of 73% in textbook costs in the last decade alone, which was about four times the rate of general inflation (Senack & Donoghue, 2016). The reality is that when faced with the high cost of a textbook, a student may choose to avoid buying that book because of budgetary restrictions (Prasad & Usagawa, 2014).

The literature provides a great deal of research regarding factors affecting students' experience using OER materials and their progress towards graduation. These include factors such as the cost of textbooks (Hilton III, Gaudet, Clark, Robinson, & Wiley, 2013; & Hilton III, Robinson, Wiley, & Ackerman, 2014) or output such as grades (Feldstien, Martin, Hudson, Warren, Hilton III, & Wiley, 2012; Pawlyshyn, Braddlee, Casper, & Miller, 2013). It has also been noted that students will sometimes enroll in courses, taking advantage of the drop and withdrawal dates, to see if they can manage the course without the purchase of required course materials (Gale, 2016), thereby possibly affecting course completion rates (Hilton III, Fisher, Wiley, & Williams, 2016a). Enrollment intensity might possibly be affected when OER are used. It has been hypothesized that the use of no-cost open textbooks might lighten students' financial situations enough to allow them an increased credit load, which would in turn allow faster progress to graduation (Fischer et al., 2015). Research has also examined student use of OER materials in terms of the time spent with the materials as well as the amount of the material actually used during a course (Hendricks, Reinsber, & Rieger, 2017; Lindsheild & Adhikari, 2013). Finally, much research has investigated student perceptions of the overall quality of OER and student ease of use when OER are utilized (Cooney, 2017; Everard & St. Pierre, 2014; Hilton III et al., 2013).

Though not often an area of focus for OER research - engagement within a course - could also affect student success (Webber, Krylow, & Zhang, 2013). Therefore, an additional factor explored in this research was how OER might influence student engagement. Trowler (2010) has defined engagement as

being concerned with the interaction between the time, effort, and other relevant resources regarding both the student and the institution. The intent of engagement is to create an environment that enhances student learning and, therefore, their performance, which can not only have a positive effect on student performance but on an institution's reputation as well (Trowler, 2010).

Currently there exists a tremendous amount of research on faculty adoption of technologies in higher education. An array of design frameworks and theories have identified factors that influence faculty adoption of a new innovation or technology for an even greater array of technology tools and applications (Gangwar, Date, & Ramaswamy, 2015; Slade, Dwivedi, Piercy, & Williams, 2015; Tarhini, Arachchilage, Masa'deh, & Abbasi, 2015). One area of focus in OER research has been faculty perceptions of OER. This has included faculty who have speculated on the adoption of OER (Seaman & Seaman, 2017), the practices of faculty sharing their resources (Kursun, Cagiltay, & Can, 2014; Veletsianos, 2015), and faculty who have reviewed or adopted OER (Fischer, Ernst, & Mason, 2017). However, there is somewhat limited literature analyzing the factors that have influenced faculty *who have actually adopted and applied* OER in their teaching practices. Research is somewhat limited, as well, that explores the journey of university faculty who have moved toward more open instructional practices (Nascimene & Burgos, 2016). Furthermore, some researchers are beginning to explore how shifts in pedagogy, including student involvement in resource development and contribution to OER, might impact student learning outcomes (DeRosa & Robinson, 2017). Numerous studies have addressed the benefits realized by students when OER are adopted in their courses (Bliss, Hilton III, Wiley, & Thanos, 2013a; Fischer et al., 2015; Hilton III et al., 2013; Hilton III et al., 2014); however, discussion has been limited around the impact of open pedagogy on student learning outcomes when OER and the open practices afforded by OER are harnessed (DeRosa & Robinson, 2017). Jhangiani and Biswas-Diener (2017) indicated that open educational practices (OEP) encompass a range of practices including the creation, adaptation, and adoption of OER, but also open pedagogy, open course development, open science, and

open access as well. The research in this dissertation focused on OER and OER-enabled pedagogy (OP) through the perceptions of faculty, designers, and students.

## The Problem Focus

More extensive adoption and development of OER could positively affect higher education cost savings and could promote continued education for both students in formal learning situations (Hilton III et al., 2014) and for self-learners (Kursun & Cagiltay, 2014). Research has shown that there are favorable gains by students in class completion rates, class achievement, and subsequent enrollment in classes offering OER (Fischer et al., 2015). The exploration of open pedagogy by faculty who use openly licensed OER could support the possibilities of creating new relationships between learners and the information they access within a course (DeRosa & Robinson, 2017), thereby affecting student learning. Wiley and Hilton III (2018) have attempted to clarify the concept of open pedagogy by proposing a more specific term as it relates to the use of OER: OER-enabled pedagogy. They define the term as “the set of teaching and learning practices that are only possible or practical in the context of the 5R permissions which are characteristic of OER” (Wiley & Hilton III, 2018, pg. 135). The “5R” permissions refer to the ability to retain, reuse, revise, remix, and redistribute resources that reside in the public domain or have been released under intellectual property licenses that permit their free use and repurposing (Lumen, 2017). DeRosa and Robinson stated that “open pedagogy uses OER as a jumping-off point for remaking our courses so that they become not just repositories for content, but platforms for learning, collaboration, and engagement with the world outside of the classroom” (2017, p. 117). Therefore, this research helped expand the scope of the literature, possibly informing OER policy and program development in order to potentially impact teaching and learning worldwide. The research addressed by this dissertation focused on the adoption of OER in higher education. More specifically, it investigated student and faculty perceptions, experiences, and motivation around OER and OER-enabled pedagogy and the impact OER

and OP might have on student learning. The dissertation findings are presented through a series of three chapters prepared for publication as articles in research journals.

## Structure of the Dissertation

This dissertation research took the form of three chapters: a first focusing on the experiences of university professionals developing and working with OER; a second focusing on cost, outcomes, use, perceptions, and engagement related to students when OER and OP were utilized; and a third exploring factors that have influenced faculty who had previously adopted OER and OP.

Research in Chapter 3 focused on the experiences of university faculty and staff who were involved in the development and use of an OER textbook that was created specifically for a Food Science and Human Nutrition introductory class (FSHN 185) as part of a University of Hawaii at Manoa (UHM) OER grant initiative beginning in 2017 (see <https://oer.hawaii.edu/projects/>). FSHN 185 is a course offered at UHM in the College of Tropical Agriculture and Human Resources and, on average, enrolls up to 800 students annually. This course introduces nutrition, emphasizing nutrient requirements of healthy individuals, food sources, and functions of nutrients, with an integration of Pacific-focused, natural science concepts. This course also fulfills the Diversification – Biological Sciences (DB), while the online version only also fulfilled the Hawai'i, Asia, and Pacific Issues (HAP) general education requirements. On the UHM campus, the course is usually divided into three sections, two offered in a face-to-face classroom situation, and one offered online. This research examined the perspectives of faculty and staff engaged with the development and application of the OER textbook through a qualitative interpretive research design. The study also explored the perceptions of an instructor through the transition to using an OER textbook and the addition of OP. It is hoped that the understanding gained from this study will help to fill a gap in the literature regarding developing OER and applying OER-enabled pedagogy in higher education.

An explanatory sequential mixed methods approach was employed for both Chapters 4 and 5 so that the initial quantitative data could be more fully explained by subsequent qualitative data collection. Chapter 4 focused on the student experience in the course that was modified and described earlier (FSHN 185) to include OER and OP by the faculty and staff who were examined in Chapter 3. Student perceptions were studied through an online questionnaire given to all sections over two semesters, with one of those sections also employing OP in the final semester. Follow-up interviews with a subset of students occurred following the collection of quantitative data each semester. Differences in student output, use, perception, and engagement between undergraduate students using an OER textbook and students using an OER textbook as well as engaged in OP were examined. Though Chapter 4 referred to research conducted beginning in the Fall 2017 semester, when students used a traditional textbook in the course, the major focus in this chapter was on the two subsequent semesters comparing variables between the FSHN course using an OER textbook and the same course using the OER textbook and applying OER-enabled pedagogy as well. It explored more deeply the student experience and was able to further examine issues raised in the quantitative portion of the study by collecting follow-up in-depth interview data.

Chapter 5 took a broader look at faculty nationwide who were using OER and possibly using OP in their teaching. A mixed method explanatory sequential research design was used with faculty surveyed online using a quantitative instrument and follow-up qualitative interviews. In the fifth chapter, the research explored various factors that played a role in influencing faculty adoption and application of OER and OP in their teaching. It should be acknowledged that studies have addressed reasons for non-adoption of OER by faculty. Anderson, Gaines, Leachman and Williamson (2017) found that there was no consistent understanding of OER amongst the faculty in their study. They also found that some faculty were unsure of where to locate quality OER and expressed a concern about overall quality (2017). Krelja Kurelovic (2016) also found that, though faculty at one Croatian university reported positive attitudes

towards OER, “there is actually very little sharing of teaching materials by the respondents” (p. 141).

However, this research focused on the factors motivating adoption among faculty actively using OER and possibly OP. Hopefully, the insights gained from this research would fill a gap in the literature and would potentially provide a deeper understanding of the situation as well as provide guidance and information for institutional policy and program development in support of OER implementation.

The three chapters that make up chapters three to five have been formatted to submit for publication. Therefore, each format will vary depending upon the requirements imposed by the specific publisher. The targeted publisher for Chapter 3 includes the *Journal of Librarianship and Scholarly Communication* or *Educational Technology Research and Development*. The targeted outlets for Chapter 4 included the *International Review of Research in Open and Distributed Learning* or *Open Praxis* or the *Journal of Interactive Media in Education*. Finally, the targeted outlets for Chapter 5 included the *International Review of Research in Open and Distributed Learning* or *Open Praxis* or *Open Learning: The Journal of Open, Distance and e-Learning*.

## Conceptual Frameworks

Two distinct frameworks were used in this dissertation, one for the two studies examining faculty perceptions and a second one for the research focused on student experiences. Each of these frameworks was based on existing frameworks found in the literature and then modified. The framework used for the research related to faculty perceptions was the Unified Theory of Acceptance and Use of Technology (UTAUT) created by Venkatesh, Morris, Davis, and Davis (2003). The second framework used for the research on student experiences was the COUP Framework created by the Open Education Group specifically for OER investigation (Hilton III, Wiley, Fischer, & Nyland, 2016b). This framework addresses the principal aspects of education that can be impacted using OER and focuses on “cost,” “output,” “use,”

and “perceptions.” Each of these frameworks is described next as well as how they were modified for this research.

## UTAUT Framework

The literature review in Chapter 2 acknowledges that there are numerous frameworks and theoretical models that could be applied to describe user acceptance of technologies. Many studies have focused specifically on higher education faculty and have examined combinations of variables that influence decisions to adopt and implement technology for instruction. For example, Buchanan, Sainter, and Saunders (2013) conducted research investigating factors affecting faculty use of learning technologies in a United Kingdom (UK) university. They perceived the UTAUT framework (see Figure 1.) as one model that incorporates characteristics important for faculty acceptance of technology and was used as their preferred model.

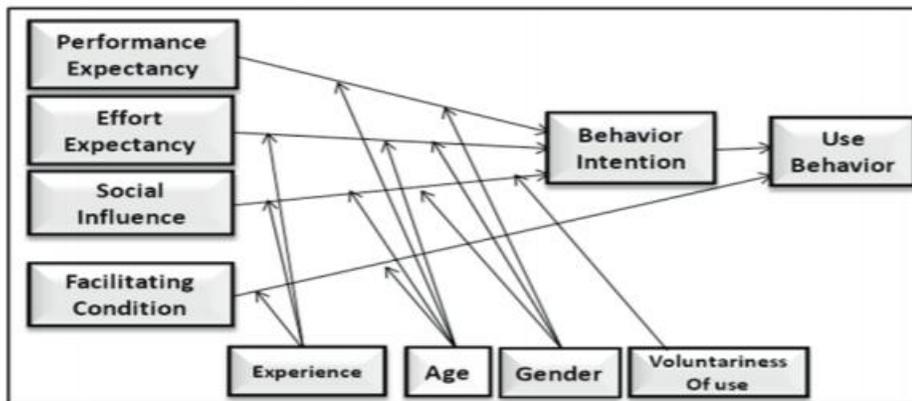


Figure 1. Unified Theory of Acceptance and Use of Technology Model (UTAUT)

Dulle and Miishi-Majanja (2011) concurred and claimed that the UTAUT model contributes to a better understanding of factors leading to technology acceptance and use than other models. The model was crafted based upon the conceptual and empirical similarities among eight different diffusion and adoption of innovation models (Dulle & Minishi-Majanja, 2011). It is premised on four core constructs, which directly determine the intention to adopt a specific technology - performance expectancy, effort

expectancy, social influence, and facilitating conditions - and incorporates four moderators of gender, age, experience, and voluntariness of use. The original UTAUT model included two additional constructs – attitude and Internet self-efficacy - and two additional moderators – awareness and position (Venkatesh, et al., 2003). The research for Chapter 3 and Chapter 5 was based on the UTAUT framework. It incorporated the two additional constructs (attitude and Internet self-efficacy) as Dulle and Minishi-Majanja (2011) reported that the effects of these constructs have been reported in research on open access in other studies.

In a literature review of studies conducted applying UTAUT, researchers found that of the 484 authors whose studies were reviewed, 98% had an academic background (Williams, Rana, & Dwivedi, 2015). The authors indicated the appropriateness of the model for educational research, including research regarding OER. Indeed, there are several OER studies that have used the UTAUT framework (Dulle & Minishi-Majanja, 2011; Kandiero, 2015; Li, Yuen, & Wong, 2014; Mtebe & Raisamo, 2014; Percy & Van Belle, 2012). Percy and Van Belle discussed how UTAUT has proved to be a consistent model with high validity and reliability ratings (2012), and Li et al. (2014) applied this model because of its robustness and validity in predicting the acceptance of new technologies as compared to other models.

In the research that resulted in Chapters 3 and 5, the UTAUT was modified and expanded to include six constructs: attitude, performance expectancy, effort expectancy, social influence, computer self-efficacy, and facilitating conditions (see Figure 2.). Though traditionally this model has primarily been used to frame research exploring the potential use of a technology, it is an appropriate model, as well, to provide structure when exploring and describing the actual technology adoption process.

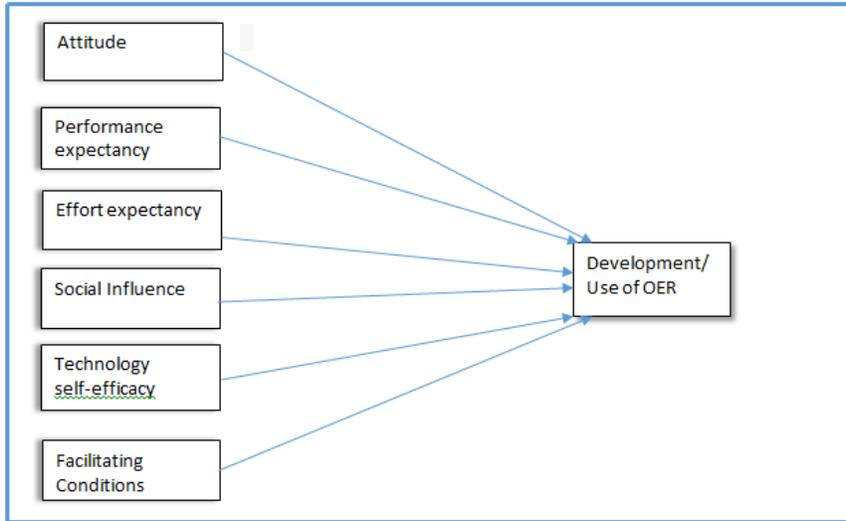


Figure 2. Modified UTAUT Framework

## COUP Framework

The framework used in the student research was modified from the existing COUP framework (Hilton III, Wiley, Fischer, & Nyland, 2016b). Many questions about the impact of OER adoption have been highlighted by the Open Education Group (Hilton III, Wiley, Fischer, & Nyland, 2016b), which created the framework specific for OER investigation. The COUP Framework addresses the principal aspects of education that can be impacted by the use of OER (Bliss, Robinson, Hilton III, & Wiley, 2013b; Hilton III et al., 2016a; Open Education Group, n.d.) and focuses on the issues of “cost,” “output,” “use,” and “perceptions.” “Cost” refers to the cost savings students could experience if an OER is used to replace a traditional textbook. “Outcomes” are sometimes referred to as course “throughput rates” and involve outcomes such as grades, withdrawal and completion rates, and enrollment intensity. “Use” refers to how much time a student spends using the resource as well as the proportion of the resource that is used while completing course studies. “Perception” refers to thoughts about the quality of the material and also about how easy the resource is to use. Though this framework has gone far to address questions about the impact of OER adoption, the literature might be enhanced by considering an additional factor.

The concept of “engagement” could be addressed to create a richer picture, especially appropriate to the discussion of exploring open pedagogies using OER. Though the overall concept of engagement encompasses a number of purposeful activities, the activity of focus that is appropriate for a discussion of OER is the use of instructional resources to impact student engagement in their learning (Hu & Kuh, 2002). Therefore, after a positive discussion in 2017 with Hilton III (one of the authors of the COUP framework) on extending the original COUP framework, I added the construct of engagement to this research. It was my hope that the findings of this study would validate the need to include the construct of engagement in further research on OER. Richer data might be gathered in using this extended framework, one which includes the construct of engagement as depicted in Figure 3.

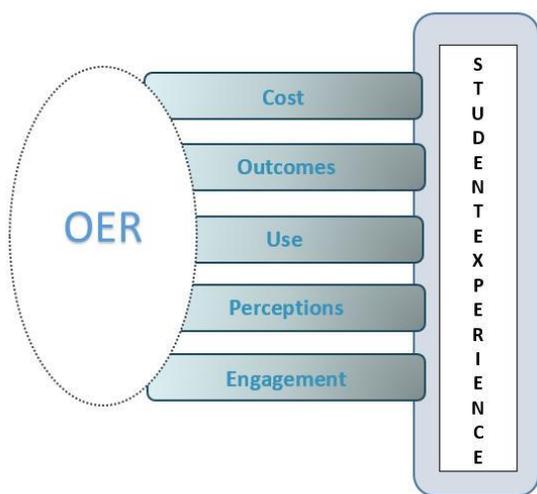


Figure 3. Modified COUPE Framework

In support of the extension of the original COUP framework to include the construct of engagement, the literature review in Chapter 2 discusses the intersection of OER with engagement. The review presented how one U.K. institution conducted a study that indicated a positive correlation between student academic engagement and individual student learning (Trowler & Trowler, 2010). Other researchers have discussed how learning engagement positively correlates with accomplishing learning outcomes (Carini, Kyuh, & Klien, 2006; Lu & Churchill, 2014). Fredricks, Blumenfeld, and Paris (2004) also

discussed how a student who is engaged will more likely demonstrate increased performance on learning tasks while also demonstrating their commitment to learning in multiple ways. More specific to OER research, in a 2017 study at New York City College of Technology, Cooney found that students reported an increase in satisfaction with their learning experience and in their engagement with course lessons when using an OER rather than a traditional textbook in their Health Psychology course. As Gunuc (2014) found, there is a significant relationship between a student's academic achievement and student engagement, and students with a high level of engagement have higher levels of academic achievement. Several studies specific to OER have found that students reported an increase in satisfaction with learning and engagement in courses when using OER (Cooney, 2017; Rowell, 2015).

Since OER carry with them the licenses to support the ability to retain, reuse, revise, remix and redistribute the resources, they can become versatile learning objects in support of faculty taking advantage of open practices, such as pedagogical shifts, in order to engage students in the revision and remixing process. In a paper discussing a move from using open resources to the exploration of open pedagogy, DeRosa and Robinson (2017) discussed how faculty who use openly licensed resources can explore the possibilities of creating new relationships between learners and the information they access within a course. They stated that when students are exposed to the use and reuse of learning resources, they begin to develop a new relationship with resources, one which becomes even stronger if faculty involve their students in the critique and contribution to the body of knowledge with which they are engaged (DeRosa & Robinson, 2017).

I believe that richer data can be gathered when using the extended framework, one which includes the construct of "engagement," and when applying a treatment where students become active in course resource development. Therefore, in Chapter 4, I proposed to extend the COUP framework to include the construct of "engagement" and then to examine the data in two different undergraduate groups: the first using an OER textbook and the second using an OER textbook with the addition of the

application of OER-enabled pedagogy, whereby curricular activities were added that included student participation in OER development for the course. Data from a related study of an earlier control group (where students in an FSHN 185 course used a traditional textbook) was referenced to help provide context.

## Research Questions

The set of research questions in the three chapters all focused on experiences related to OER and OP from the perspectives of different audiences. In the third chapter, one research question was addressed by the interview data collected from participants involved in the development of and instruction with the OER used for an undergraduate class.

RQ#1. What are the perceptions and experiences of faculty and staff in the development of an OER, in instruction introducing the OER, and in the application of OER-enabled pedagogy in an undergraduate course?

The fourth chapter focused on two research questions. The first research question and corresponding hypotheses were addressed by the quantitative phase of the study, while research question two was addressed by the data collected in the qualitative phase.

RQ #1. What are the differences in cost, outcomes, use, perception, and engagement between undergraduate students who use an OER textbook and students who use an OER textbook and engage in OP through contributing information to an OER textbook as part of their coursework?

H#1: The use of OER and OP will positively affect student costs.

H#2: The use of OER and OP will positively affect student outcomes.

H#3: The use of OER and OP will positively affect student use of resources.

H#4: The use of OER and OP will positively affect student perceptions of the resources.

H#5: The use of OER and OP will positively affect student engagement with the resources.

RQ#2. What insights can be learned from students who experience OER and OER-enabled pedagogy in an undergraduate course regarding outcomes, use, perception, and engagement?

The fifth chapter addressed research questions based on the constructs from the UTAUT model and explored 1) individual attitudes about the use of OER and OP (attitudes), 2) how individuals believed that OER have helped them perform in their job (performance expectancy), 3) the degree of ease or difficulty associated with using OER in their instruction (effort expectancy), 4) what individuals felt they could do with the technology skills they had acquired (technology self-efficacy), 5) the degree to which the faculty perceived that others think it was important that they used OER (social influence), and 6) the extent to which the faculty perceived that the technical and organizational infrastructure to adopt OER were available (facilitating conditions).

The first research question was addressed by the quantitative phase of the study, while research question number two was addressed through the data collection in the qualitative phase of the study.

RQ#1. What are the factors that have informed the decision to adopt OER and OP by higher education faculty?

RQ#2. What are the perceptions pertaining to OER and OP adoption by higher education faculty who have already adopted OER?

## Research Designs and Methodology

This section focuses on the design and methodology for the three chapters. It focuses, as well, on the participants and instrumentation, and provides an overview of the data collection process. The utmost consideration was given to the protection of the participants during all phases of this dissertation research. Participation was voluntary, and participants were informed about the study's purpose, benefits, and risks, as well as the handling and storage of data. Prior IRB approval was sought and granted, and consent secured from each participant (see Appendices A through E). The IRB exempt status was secured prior to data collection for this dissertation. For all three chapters, hard copy study data were kept in a secured location. Electronic data were encrypted on a password-protected computer, and, as per the UH Human Studies Program Record Keeping Policy (11-20-2012), records will be held for at least three years after completion of the research (Record Keeping Policy, 2012). Design and methodology are addressed next for each of the three chapters.

### Chapter 3

Chapter 3 used a basic qualitative interpretive design. Qualitative data were gathered through semi-structured interviews with the faculty, the OER technologist, the resource developers, and instructors who had been involved in the OER development for FSHN 185 and who had introduced the resource in instruction. It was hoped that data from this chapter would shed light from a unique perspective on the process of developing OER, transitioning from using traditional textbooks to OER, and then to applying OP, while exploring both challenges and perceived benefits.

**Participants.** Two faculty members were involved in securing a UHM OER Initiative Grant (<http://oer.hawaii.edu/projects/>) beginning in 2017. Two resource developers and one OER technologist were involved in the actual development of the resource, which was later introduced into the course by numerous instructors. These participants were interviewed using a protocol appropriate to their role. Faculty were involved in initiating the project, organizing it, and guiding the overall development of the

textbook. The OER technologist helped to guide and to provide support throughout the entire developmental process. Graduate assistants (GAs) were hired as resource developers and worked on creating detailed information within the text under the guidance of the faculty and an OER technologist. Instructors implemented the OER textbook. One instructor also experimented with implementing OP activities during the final semester of the study.

**Consent process.** Though faculty, technologist, resource developers, and instructors were aware that research related to FSHN 185 was ongoing over the semesters as they had been involved in numerous planning meetings, a formal email invitation was sent to those participants requesting participation (see Appendix F).

For the face-to-face interviews with the participants, a signed consent was collected before the interview commenced. Participants agreed to not only take part in the research but also agreed to an audio recording of the interview (see Appendix A). The consent form followed the UHM IRB protocol.

**Instrumentation.** One overall instrument was used for this study. It encompassed the four different roles represented by the participants with varying semi-structured interview questions as appropriate to each role (see Appendix G). The instrument included a guiding interview protocol.

Questions used for the interviews were developed through reviewing numerous sources (Dulle & Minishi-Majanja, 2011; Jung & Hong, 2016; Kandiero, 2015; Li, Yuen & Wong, 2014; Mtebe & Raisamo, 2014; OER Hub. n.d.; Venkatesh et al., 2003) and selecting questions most appropriate to this research (see Table 1). The questions for this research referenced those developed by Jung and Hong (2016), general OER research questions developed by the OER Hub, a unit in the Institute of Educational Technology at The Open University, and questions focusing on the constructs of the UTAUT framework referenced from the work of Dulle and Minsih-Majana (2011) and Venkatsh et al. (2003). Permissions were sought and given for adapting questions as necessary for this research (see Appendix H & I);

however, most questions carried Creative Commons licenses allowing for unrestricted reuse designated as CC-BY (Creative Commons – Provide attribution only).

Table 1

Summary of Source for Question Development for Chapter 3 Pertaining to OER Development of FSHN 185

Source	Focus of Research	Focus for Question Development	Permissions
Dulles & Minishi-Majanja, 2011	Analyzing the acceptance and usage of open access within public universities in Tanzania	Constructs: <ul style="list-style-type: none"> <li>•Attitude</li> <li>•Performance Expectancy</li> <li>•Effort Expectancy</li> <li>•Social Influence</li> <li>•Internet Self-efficacy</li> <li>•Facilitating Conditions</li> </ul>	Granted through personal correspondence
Jung & Hong, 2016	Instructional priorities for adopting OER	Constructs: <ul style="list-style-type: none"> <li>•Effectiveness</li> <li>•Efficiency</li> <li>•Appeal</li> <li>•Extension</li> </ul>	Published with CC-BY
OER Hub	Database of shared OER-related survey questions	<ul style="list-style-type: none"> <li>•Demographics</li> </ul>	Published with CC-BY
Venkatesh et al., 2003	Formulate a unified model that integrates elements across eight models of technology use and acceptance	Constructs: <ul style="list-style-type: none"> <li>•Performance Expectancy</li> <li>•Effort Expectancy</li> <li>•Social Influence</li> <li>•Facilitating Conditions</li> </ul>	Granted through personal correspondence

**Data collection and analysis.** Data collected through the interview process were analyzed thematically. Interviews were audio recorded and transcribed professionally (see Appendix J for the Client Non-disclosure Agreement). Participants reviewed and approved the transcription (see Appendix K for email to participants). Data were analyzed thematically using a code recode process. These codes were

then categorized thematically, referring to but not restricted by the UTAUT framework. In this way rich, detailed, and complex data could be revealed (Braun and Clarke, 2006). Findings appear in the chapter organized first by the experience of implementing, developing, and instructing with the OER and then through the lens of the UTAUT framework and other concepts as applicable.

## Chapter 4

A mixed methods explanatory sequential design was conducted in three stages, covering three semesters at the University of Hawai'i at Mānoa. The overall research primarily used a quantitative survey approach and was appropriate for collecting data from a large number of participants (Dillman, Smyth, & Christian, 2014). However, the final two stages of the study, which were the foci of Chapter 4, applied a mixed method approach by adding qualitative data collection through face-to-face interviews with randomly selected students in FSHN 185. This approach allowed the analysis of a more complex subject and captured more variables than a strictly quantitative approach (Yin, 2014).

The initial stage gathered quantitative data based on the original COUP framework extended to include the construct of “engagement.” As shown in Table 2, these data were collected through an online questionnaire delivered to all three sections of the undergraduate FSHN 185 course in the Fall 2017 semester. All sections of FSHN 185 in Fall 2017 used a traditional textbook. (Though these data were not the foci of the research in Chapter 4, the data collected at this stage of the study helped inform the research for the second and third stages.) The second and third stages took place in the subsequent Spring 2018 and Fall 2018 semesters using the same questionnaire within all three of the FSHN 185 course sections, with the addition of more extensive demographic data.

Qualitative data were gathered through face-to-face semi-structured interviews with students in both Spring and Fall 2018 semesters. Semi-structured interview questions were based on the constructs from the COUP framework (Bliss et al., 2013b) with the added construct of “engagement” to collect more detail about the student experience. These data were collected via face-to-face semi-structured

interviews with randomly selected students who were enrolled in FSHN 185 during the last two semesters of the study. Table 2 summarizes the stages of data collection.

Table 2

*Organization and Timeline of Data Collection for Chapter 4 from Students in FSHN 185*

<b>Stages of the Study</b>	*Stage 1 - Semester 1 Fall 2017	Stage 2 - Semester 2 Spring 2018	Stage 3 - Semester 3 Fall 2018
<b>Textbook/ Activity</b>	*Traditional Textbook	OER Textbook	OER Textbook + OP Activity
<b>Instrument</b>	*Survey	Survey & Interviews	Survey & Interviews
<b>Data Collected</b>	*Quantitative	Quantitative & Qualitative	Quantitative & Qualitative
<b>Participants</b>	*FSHN 185 students – all sections take survey (n=293)	FSHN 185 students – all sections take survey (n=289); one section of students are focus of this research (n=114); interviewed (n=9)	FSHN 185 students – all sections take survey (n=286); two sections of students are focus of this research (n=210); interviewed (n=11)
*Data not included in the data analysis for chapter 4			

In the third stage, the OER textbook was used with the addition of introducing an assignment requiring a student investigation of materials that would later be used to supplement or enhance the OER textbook. The assignment entailed students conducting research in the field of food science and human nutrition. Students were made to understand that they were responsible for exploring current research related to a course concept that would later be developed more fully and for finding an appropriate article in their interest area under the theme of “Health at Any Size.” This article would then potentially be used as a resource added to future versions of the OER textbook, essentially ensuring that students’ work would then become a part of the course resource in the future. Students were introduced to the concepts of OER and OP and to how their assignment contribution would help to enrich the OER textbook.

This overall study was a collaborative effort, working with faculty, technologist, resource developers, and instructors responsible for FSHN 185. I worked most closely with Dr. Marie K. Fialkowski Revilla throughout the entirety of the study. I also worked closely with Jennifer Draper, an instructor for the specified sections of FSHN 185, in the semester where OP was utilized in the course. My role was to develop the project plan, the quantitative survey instrument used for the three stages, the student interview protocol for the second and third stages, and collect the data for all phases of the study. The first and second phases resulted in a subsequent article with Dr. Fialkowski Revilla acting as first author and taking the lead in the data analysis and composition of the article. For Chapter 4 of my dissertation, my role was to develop the research proposal, seek IRB approval, as well as to collect and analyze the data. Because this work represented my dissertation research, I am first author on the resulting chapter.

**Participants.** The target population for the quantitative portion of this study was students enrolled in an introductory undergraduate FSHN course at UHM. The study population was selected because the professors responsible for the course had made the decision to transition from a traditional course textbook to an OER textbook, which they developed during the time frame of this dissertation. Approximately 300 students enroll in three sections of this course every semester at UHM, and these students were given the opportunity to participate in the online survey.

For the last two stages of the study, which involved additional qualitative data collection, students were randomly selected from the enrollment lists from specified sections of FSHN 185. These sections were selected because the instructor expressed interest in participating in the OER and the OER plus OP aspects of the study. The selection process involved identifying every tenth student on the enrollment list, who then received an email invitation to participate in an interview. If invitations were declined or no response was received, the process was repeated by identifying every ninth student on the list, etc. Selection continued in this manner until enough participants had been interviewed to reach a saturation point in the data collection.

**Consent process.** Students were introduced to the research via an email during each semester of the study (see Appendix L). The consent form format for the online survey and for the face-to-face interviews followed the UHM IRB protocol. For student participation in the online survey, consent was acknowledged through reading the introduction to the survey (see Appendix B). Students could not continue with the survey if they did not consent to participate.

A different set of email invitations and consent forms were used for the qualitative portion of the study. An email was sent to students who were randomly selected to participate in the interview (see Appendix M). Benefits and risks of participation in the interview were addressed and compensation in the form of a gift card to Jamba Juice or Starbucks was also offered. Those students who accepted the invitation confirmed through email and set up an interview appointment time convenient for them. For the face-to-face student interview, a signed consent was collected before the interviews commenced, with participants also agreeing to an audio recording of the interview (see Appendix C).

**Instrumentation.** Two instruments were used for this study: a) an online survey developed for the initial study, which was used throughout the three phases (see Appendix B), and b) a semi-structured student interview protocol (see Appendix N). The online survey was developed and implemented using the Qualtrics software.

Questions from a Bliss, Robinson, Hilton, and Wiley (2013b) survey provided a framework for survey development. This 2013 survey examined perceptions of community college faculty and students in regard to the cost and quality of open textbooks. The survey was used for Project Kaleidoscope (PK), which brought together eight community colleges serving at-risk students across California, Nebraska, and New York. PK focused on supporting institutional adoption of OER (Bliss et. al, 2013b). The article and survey questions were released under a CC BY license, supporting open access and use of the material by other researchers. The questions for the quantitative data collection through this survey are based on the COUP constructs as outlined by the Open Education Group (n.d.). These constructs focus on measuring

the impact of OER adoption on cost by looking at how much money is saved by the OER adoption. The concept of student outcomes is measured in terms of how students' final grades differ when faculty assign OER instead of commercial textbooks and when faculty use OER and OP in combination. In addition, student outcomes can also be measured by looking at enrollment intensity by asking how students' enrollment in terms of credits might differ when faculty utilize OER instead of commercial textbooks. Another COUP measurement of the impact of OER adoption focuses on how a student's use of resources might differ between traditional learning resources and OER. "Use" looks at both the amount of time a student spends using a resource and the proportion of the resource they use. The final COUP construct that is traditionally measured is that of perceptions of the OER. For this project, student perception was measured in terms of the quality of the OER and the ease of its use as well as the perception of OP. A great deal of research has been conducted based on the COUP framework and has been examined in a recent literature review that focused on perceptions and efficacy of OER (Hilton III, 2016). For this research, questions constructed to collect data on engagement were also added to extend the framework.

As suggested by Bliss et al. (2013b), the survey collected demographic data in terms of gender, cumulative college GPA, course load, receipt of Pell Grants, how often textbooks are purchased, and average expenditure on textbooks per semester. Questions regarding income level and ethnicity were added to the Chapter 4 survey. Questions collecting data on "use" and "perceptions of quality" were also patterned on the work of Bliss et al. (2013b). Permission to adapt questions from the original COUP framework and the Bliss research did not need to be obtained as both works were licensed under a CC-BY license, promoting open use. Therefore, survey questions from the Bliss et al. (2013b) survey were used, with the addition of questions addressing student engagement.

Questions addressing "student engagement" were based on the work of Fredericks, Blumenfeld, and Paris (2004). The three constructs that measure student engagement as outlined by Fredericks et al.

(2004) are behavioral, emotional, and cognitive aspects of engagement (Fredericks et al., 2004; Fredericks, 2011). Behavioral engagement encompasses the idea of participation, both academic and social; while emotional engagement reflects an interest in and willingness to do work; and finally, cognitive engagement draws on the idea of thoughtfulness and a willingness to tackle difficult skills (Fredericks et. al., 2004). Shernof, Ruzek, Sannella, Schorr, Sanchez-Wall and Bressler (2017) developed a scale to measure student engagement reflecting the work of Fredericks et al. (2004) and applied it in their research. The Shernof et al. (2017) research variables and items were used as a resource in developing the questions pertaining to student engagement for the quantitative survey in Chapter 4. The variables of “interest,” “challenge,” “relevance,” and “participation” were the core variables used in order to operationalize the questions for the instrument (Shernof et al., 2017), though the questions developed for this research were modified for appropriateness to the context. This scale was selected because of its currency and because the context for the research was an institution of higher education. Other literature and assessment tools were reviewed (Coates, 2005; Garrett, 2011; Mandernach, 2015; NSSE, 2016) but the focus and context of the Shernof et al. (2017) research seemed to fit the current context most appropriately. The work of these authors is published using the Open Access CC-BY license, thus allowing for reuse and modification of their scale.

**Data collection and analysis.** Quantitative data were collected from the students enrolled in FSHN 185 anonymously via an online survey for all three stages of the study (see Appendix B), though data for Chapter 4 were taken from stages two and three. Students were directed to an online survey via a message in the Lulima Course Management System, which introduced them to the survey and requested consent (see Appendix O). Face-to-face interviews were conducted with students in the second and third stages of the study. Earlier in the course, students were apprised through an email of the potential for being randomly selected to receive an invitation to participate in a face-to-face interview

later in the semester (see Appendix L). Interviews were recorded, with student consent (see Appendix C), transcribed, and thematically analyzed.

Data on cost savings were gathered from information about the cost of the traditional textbook and the number of students enrolled in the courses. Information on the aspect of cost was gathered from the course instructor. A simple calculation was made of the cost of the textbook multiplied by the number of students taking the class to determine savings. For student outcomes, the following analyses were conducted: final grades were numerically converted and results compared from the two semesters using ANCOVA analysis; course throughput rates (CTR); percentage of students dropping the course, percentage withdrawing from the course, and percentage of students receiving a final grade of C or better) were analyzed by calculating this information, multiplying the three values together for each stage, and conducting a z-test of proportions to determine if the CTR differ significantly from each semester (Open Education Group, n.d.). Grading for the FSHN 185 course was calculated by criterion grading. Usage data, which analyzed both the time spent using the content and the amount of content used as reported by students on the survey, was analyzed by conducting an ANCOVA between the two semesters for each variable. Responses from the questions organized for the constructs of perception and engagement were aggregated using descriptive statistics.

The qualitative data collected through the interview process was analyzed thematically. Interviews were audio recorded, and the recordings were transcribed professionally (see Appendix J for the Client Non-disclosure Agreement). Participants reviewed and approved the transcription (see Appendix K for email to participants), and the data were loaded into a web application for mixed methods research. Passages in the text were identified and coded by idea, which was a way of categorizing or indexing the text thematically to establish a framework of concepts. Braun and Clarke (2006) relay that this type of thematic analysis is a very flexible and useful research tool and can be applied in order to provide rich, detailed, and complex data.

Student data collected in the qualitative phase of the study helped to explain and give richer insight into the data collected during the quantitative phase. The qualitative data helped to answer questions raised through the quantitative data collection and analysis process.

## Chapter 5

The study for this chapter also was built upon a mixed methods approach. I was the sole researcher on this study. An explanatory sequential mixed method design was employed to address the research questions. This particular research approach was used in order to gather general data from a larger population of faculty in higher education across the U.S. and then to focus more specifically on the perceptions of those factors influencing the adoption of OER and the possible application of OP with a smaller sample.

**Participants.** Participants were identified by colleagues across the U.S. who were working in the area of Open Education (see Appendix P). Faculty were identified as being someone already using OER and possibly someone who was applying OER-enabled pedagogy or OP in their instruction. A number of U.S. university OER representatives were contacted to assist in identifying participants. Potential participants were identified by members of the Open Education Research Fellowship community (see <http://openedgroup.org/fellowship>), by members of the LibOER listserv, or by members of the Greater Western Library Alliance (GWLA) Scholarly Communication Task Force via email (see Appendix P). A list of 1,000 names and email addresses was collected of qualifying faculty and used for both the quantitative and the subsequent qualitative research. An introductory email with a link to the survey was sent to the identified faculty (see Appendix Q) for the quantitative data collection. The email introduction outlined the eligibility criteria: faculty who were teaching in a higher education institution in the U.S. at either the undergraduate or the graduate level and who had already adopted OER and who may have been applying OP in their instruction. Qualtrics, the survey platform used for this research data collection, provided a sample-size calculator and indicated that for the population size of 1,000 faculty (with a 5% margin of

error and at 95% confidence level), the ideal sample size should be 278. Data were collected via the online survey from 283 respondents.

In addition to the quantitative data collection, faculty were invited to take part in a semi-structured interview (see Appendix R). These interviews explored perceptions pertaining to OER and OP adoption more deeply than was possible on the quantitative survey and followed a protocol (see Appendix S). Interviews took place either face-to-face or via phone when an in-person visit was not feasible. A purposive sampling approach was employed.

I visited several states during the summer of 2018 in conjunction with attending a conference. There were potential participants on my faculty list from those states, so I contacted them via an email letter of introduction with an invitation to interview (see Appendix R). In addition, participants completing the quantitative online survey were invited to participate in an interview and were asked to contact me via my email address, provided at the end of the survey if interested. The exact number of interviewees was not determined in advance, as the number was determined when a saturation point in the data collection and analysis was reached (Fusch & Ness, 2015). Guest, Bunce, and Johnson (2006) suggested that saturation can take place within the first twelve interviews. The target sample size was approximately 10-15 participants. The 15 faculty who participated in the qualitative portion of the study had also participated in the quantitative portion.

**Consent process.** Faculty were contacted via email and introduced to this research project (see Appendix Q). They were invited to complete the online survey (see Appendix D) and were advised that they could possibly be contacted in the future with a request for a voluntary interview. Within the introductory email, a link was provided to the survey. When a participant followed the link to the survey, they were presented with a more in-depth introduction to the research and a consent form as part of the introduction. By choosing to continue with the survey, they acknowledged consent to participate.

A different set of email invitations and consent forms were used for the interviews. Faculty selected to participate in the interview were sent another email invitation (see Appendix R). The date, time, and place of the interview were established by the participant. Consent for the interview was either secured in writing at the beginning of the interview for the face-to-face sessions or via email for phone interviews (see Appendix E).

**Instrumentation.** Two instruments were used for this study: a) an online survey used for quantitative data collection (see Appendix D), and b) a semi-structured interview protocol used for qualitative data collection (see Appendix S).

Both the quantitative and qualitative designs for this research were constructed on the foundation of the four main constructs supporting UTAUT research, with the addition of two constructs sometimes measured using UTAUT. As mentioned previously, these were performance expectancy, effort expectancy, social influence, and facilitating conditions, with attitude and Internet (or computer) self-efficacy included. Venkatesh et al. (2003) defined “Performance Expectancy” as the degree to which an individual believes that using the system will help him or her to attain gains in job performance. It was based on constructs from the models mentioned previously and included perceived usefulness, extrinsic motivation, job-fit, relative advance, and outcome expectations (Venkatesh et al., 2003). These authors indicated that Performance Expectancy is the strongest predictor of intention to use new technology. “Effort Expectancy” is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003). The founding constructs captured within this concept are perceived ease of use, complexity, and ease of use. Venkatesh et al. (2003) reported that this construct is significant in both voluntary (as it would apply to this research) and mandatory contexts but is only significant during the initial use or exploration of the technology. “Social Influence” is the degree to which an individual perceives that important others believe he or she should use the new system and is represented by subjective norm, social factors, and image in earlier technology models (Venkatesh et al., 2003). This construct

acknowledges that an individual's behavior is ultimately influenced by their perception of how others in their sphere of influence will view them as a result of their use of a particular technology (Venkatesh et al., 2003). These researchers tell us that this construct is not as significant in voluntary contexts but operates by influencing perceptions about the technology. "Facilitating Conditions" are the degree to which an individual believes that the organizational infrastructure and the technical infrastructure both exist in order to support the use of the technology and includes perceived behavioral control and compatibility (Venkatesh et al, 2003). Finally, two constructs were added from the original UTAUT model, those of attitude and computer self-efficacy (Dulle & Minishi-Majanja, 2011; Venkatesh et al., 2003). "Attitude" refers to an individual's positive or negative feelings related to the technology, and "Computer self-efficacy" is the confidence that is demonstrated in making decisions about use of computer resources (Yusoff, 2009). These two constructs were dropped in later models of UTAUT because it was determined that they may not influence behavioral intention. Because this research was not concerned with intention but with actual use and because others researching the topics of the use of open resources and OER have included one or both of those constructs (Dulle & Minishi-Majanja, 2011; Percy & Van Belle, 2012), this research included questions in the instruments based on those constructs.

Prior research applying the UTAUT framework to examine influencing factors pertaining to OER adoption helped to guide question formation as well. For example, the work of Mtebe and Raisamo (2014) applied the UTAUT to query faculty about their intentions to adopt OER. Survey questions used for their study were published as an appendix in their research and were licensed using CC-BY to promote reuse. Likewise, Dulle and Minishi-Majanja (2011) conducted an Open Access adoption study applying UTAUT. Permission was sought and given for adapting questions as necessary for this research (see Appendix H). Of course, all of these operationalized questions were based off of the original UTAUT research (Venkatesh et al., 2003) and permission was also sought and granted from this work (see Appendix I). A seven-point Likert scale was used to record responses on the survey. In addition, several

demographic questions were added. The online survey was developed and delivered using the Qualtrics platform, which also collected data and provided reports and elementary analysis.

A protocol was developed for the interview (see Appendix S). Questions for the interview were also based on questions from UTAUT research (Dulle & Minishi-Majanja, 2011; Kandiero, 2015; Li et al., 2014; Mtebe & Raisamo, 2014; Percy & Van Belle, 2012).

**Data collection and analysis.** Data were collected via an online questionnaire and via face-to-face and phone interviews. Participants were contacted via email for the quantitative and qualitative sections of the research. An online survey collected quantitative data, and interviews were arranged either through face-to-face contact or through phone conversations for qualitative data collection. Interviews for those volunteering to participate were recorded with participant permission, then transcribed, and thematically analyzed.

Data from the quantitative survey were recorded using an ordinal scale of measurement through the application of a 7-point Likert scale, and responses from the survey were aggregated using descriptive statistics. Descriptive analytics rather than predictive analytics were used because this research focused, not on predicting if a technology would be used, but on those factors that played a role in motivating adoption that had already taken place. Central tendency was determined using median, and the frequency or percentages of the responses were used in order to build a picture and describe the variables that influenced OER or OP adoption by faculty.

Interviews were audio recorded and sent to a professional transcription service (see Appendix J). The researcher reviewed the transcripts, comparing them to the original audio recording to validate accuracy. Once the accuracy of those transcriptions was confirmed by the individual participant (see Appendix T), the data were exported into NVivo, a qualitative data analysis tool, for coding, categorizing, and thematic analysis. This data enhanced information reported from the quantitative data by adding richness and insight and have helped to answer questions raised in the quantitative data collection phase.

Comments from the qualitative data were identified during analysis and highlighted to later include in the “Results” section of the article. In this way, the words of the faculty were used to deepen understanding and give voice to the participants (Corden & Sainsbury, 2006).

## Rigor

Because the research for this dissertation used quantitative, qualitative, and mixed methods research approaches, rigor was addressed in a variety of ways. Strategies to enhance rigor for each research approach are described next, first looking at the quantitative research and then reviewing strategies used for the qualitative aspects, and finally addressing additional elements of rigor in mixed methods research.

### Quantitative Research

There are several ways that rigor was addressed in the study that collected student survey data. The questions used to collect data in the quantitative portion of the research in Chapter 4 were patterned after questions used in other studies applying the COUP framework (Bliss et al., 2013b; Feldstein et al., 2012; Hilton III & Bliss, 2013; Hilton III et al., 2013; Pitt, 2015) lending to the appropriateness of the instrument (Leung, 2015) and to its generalizability (Shenton, 2004). Content and face validity were addressed through the careful selection of the items included in the survey and through an examination and review of the survey by content experts (Foxcroft, Paterson, le Roux, & Herbst, 2004). The survey was pretested using two subject matter experts to help evaluate in advance potential question confusion (Presser, Couper, Lessler, Marin, Martin, Rothgeb, & Singer, 2014) and was later pre-tested with the target population. Questions and information causing confusion were modified and then retested using a cognitive interview with another subject matter expert. Furthermore, for reproducibility, the processes within the study were outlined in such a way as to enable future researchers to repeat the study, as recommended by Shenton (2004). Maximizing the validity or trustworthiness of this research is desirable

in order to ensure generalizability (Goglafshani, 2003) and was sought by describing the study's general methods and procedures as clearly as possible (Miles, Huberman, & Saldana, 2014; Shenton, 2004).

Strategies also were used to control for extraneous variables that could impact the study. The student populations were analyzed through demographic data. The student populations in the various semesters were as equivalent as possible, meaning that the only differences between the groups were the type of resource used and the pedagogical approach as applied to the resource (Open Education Group, n.d.). Two of the three semesters were taught by the same three instructors in the same mode. For this research, one course section for all stages of the study was taught by the same instructor. Demographic data were collected each semester in order to identify confounding variables that might affect the data. This demographic data included information on grade point average (GPA), on whether a student was receiving scholarship or Pell Grant funding, gender, and age. These confounding variables were considered during data analysis.

For the quantitative survey used to gather data from the national sample of faculty, construct validity was not tested directly; however, questions were developed using validated instruments (Sundaravej, 2010). The Mtebe and Raisamo (2014a) study questions provided the basis for the questions developed for this study. The instrument used by those researchers, which was developed using the main constructs in the UTAUT model to investigate instructors' intention to adopt and use OER, was determined reliable using Cronbach's alpha measures (Mtebe & Risamo, 2014a). Minor changes were made to fit the academic context in which the study was conducted (Akbar, 2013). Questions were reviewed by two subject matter experts, which helped to support validity (Foxcraft et al., 2004). Demographic data were collected in order to identify variables that might have affected the data.

## Qualitative Data

All three chapters included qualitative data collected from interviews. Similar strategies to enhance rigor were used in all three.

Dependability in qualitative research refers to the consistency of findings. With a single researcher, dependability can be maintained if the researcher observes the same or similar phenomenon at different times to arrive at a similar conclusion (Pelz, n.d.). Adequate details were presented about the context, including the social context, in order to allow readers to independently authenticate interpretive inferences, thus promoting dependability (Darke, Shanks, & Broadbent, 1998).

Credibility can be maintained if readers find the research to be believable, which can depend more on the richness of the information rather than on the amount of data gathered (Lincoln & Guba, 1985). Meticulous data management was maintained in this research: verbatim transcription of interviews, accurate records of contacts and interviews, and records that could allow an independent audit if needed (Pelz, n.d.).

Confirmability refers to how the research findings are supported by the data (Lincoln & Guba, 1985). It can be demonstrated in terms of “inter-subjectivity,” which can be achieved if research participants generally agree with the findings of the study (Pelz, n.d.). One standard that must be considered - “neutrality” - addresses whether the researcher has prior assumptions. These assumptions may bias the implementation of the study or data interpretation (Curry & Nunez-Smith, 2015). A research journal was maintained throughout the study in order to help address bias. In addition, participants confirmed the accuracy of the interview transcripts and were encouraged to review the research paper and provide feedback. Rajendran (2001) remarked that researchers need ways to guard against their own biases and suggested written reflections in terms of field notes, respondent validation for interviews, and a clear definition of terms established before quantitative or qualitative research is initiated. All of these methods were employed during this research in an effort to limit bias.

Miles, Huberman, and Saldana (2014) indicated that a study must demonstrate transferability: the extent to which the findings can be transferred or generalized to other contexts. Miles et al. (2014) recommend making clear the characteristics of the original sample of participants and setting and by

making clear how the findings could be tested further and be replicated in other studies to assess robustness. Transferability can be enhanced if a researcher supplies a highly detailed description of the context and methods for the study (Lincoln & Guba, 1985). Finally, Miles et al. (2014) indicated that a study must demonstrate utilization, application, or action orientation by providing worthwhile and usable knowledge that can positively affect the lives of others.

## Mixed Methods Research

In the two studies using mixed methods research, credibility was increased through triangulation with the quantitative and qualitative data, through reporting the findings in a clear, coherent and systematic manner, and through descriptions that are context-rich (Miles et al., 2014; Shenton, 2004). Patton (2002) advocates the use of triangulation as it can strengthen a study through the combination of methods, thus improving the overall reliability and credibility.

Mixed methods research requires applying a set of standards specific to that approach (Curry & Nunez-Smith, 2015). Therefore, this research also considered “veracity” or the degree to which the results were reported accurately and precisely (Curry & Nunez-Smith, 2015). The use of triangulation, sampling to the point of saturation, participant confirmation, controlling for confounding variables and developing the instrument through feedback and alignment with tested instruments helped to support veracity (Curry & Nunez-Smith, 2015).

The second mixed method standard is “consistency,” which is addressed through dependability and repeatability (Curry & Nunez-Smith, 2015). Pilot testing and close documentation of the research process helped to address consistency in this research. “Applicability” was addressed by providing enough information for others to evaluate the degree to which their own research setting is similar to the context of this study (Curry & Nunez-Smith, 2015).

## Limitations

A main limitation of qualitative research is generalizability to other situations (Mack, 2010), especially when the qualitative research relies on volunteer participants. Volunteer bias could have affected this research as all interview participants were volunteers. Participants who volunteer to be interviewed may be different in some way from the general population (Salkind, 2010). Therefore, the data may not be representative of the broader population, which might challenge external validity. Finally, the number of participants interviewed for each chapter was small, and this can affect the generalizability of the findings (Leung, 2015). However, as mentioned, this research was well documented, which can boost reliability through replication. Another limitation is that of subjectivity in interpretation of qualitative data; however, some researchers posit that all research is subjective as no researcher can totally divorce him or herself from their own perspective (Mack, 2010).

## Definition of Key Terms

**Attitude** - An individual's overall affective reason to using a system (Venkatesh et al., 2003).

**Effort Expectancy** - The degree of ease associated with the use of a system (Venkatesh et al., 2003).

**Engagement** - The quality of effort students themselves devote to educationally purposeful activities that contribute directly to desired outcomes (Hu & Kuh, 2002).

**Extrinsic Factors – Those factors that** govern through the prospect of instrumental gain and loss, such as incentives (Cerasoli et al., 2014)

**Facilitating Conditions** – The degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003).

**Internet /technology self-efficacy** – What individuals believe they can do with technology skills they have already acquired (Venkatesh et al., 2003).

**Intrinsic Factors** – Those factors that govern for their very own sake, such as task enjoyment or the need to share, not being instrumental toward some other outcome (Cerasoli et al., 2014)

**Localization** – The process of taking OER developed for one context and adapting the resources for other contexts (Wiley, Bliss, & McEwen, 2014).

**Open Educational Resources (OER)** – Teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others” (Hylén, 2007a).

**Open Pedagogy (OP)** – A pedagogical approach in which students are not just consumers of content but active and visible participants in the construction of knowledge (DeRosa & Robinson, 2017).

**Open Educational Practices (OEP)** – The creation, use, and reuse of OER, the use and contribution to open access scholarship, to open data, open courseware, and the use of open pedagogies and open practices of sharing as well (Cronin, 2017).

**Outcomes** – For this study, this references a student’s course grade, a rate of withdrawal from courses after they have begun, and the intensity of enrollment or the number of courses taken within a semester or term

**Perception** – As applied to this study, this references a student or faculty’s mental impression of an OER regarding its quality and to its ease of use (Open Education Group, n.d.).

**Performance Expectancy** - The degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003).

**Social Influence** - The degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh et al., 2003).

**Usage** – For this study, this term has two applications: 1) the amount of material that is used within a textbook, and 2) how often the textbook is used for course study (Open Education Group, n.d.).

## Concluding Thoughts

The many benefits of OER are well documented: lowering of educational costs for students and programs, a positive impact on student success and retention, providing access to educational resources on a global scale, increasing the reputation of an institution, and promoting collaboration in teaching and learning practices. Though many benefits of adopting and developing OER exist and though there is a great deal of current national and international attention to this phenomenon, the uptake of OER by many instructional faculty members has been slow.

This research explored numerous aspects of OER. Chapter 3 described the process of developing and adopting OER and OP from the perspectives of faculty and staff involved in the process at one institution through an interpretive research approach. Chapter 4 took a mixed methods approach that examined the cost, outputs, usage, perceptions, and engagement related to undergraduate students using OER textbooks and participating in OER-enhanced pedagogy. Chapter 5 also employed a mixed methods design that examined those factors that had influenced instructional faculty who had adopted and developed OER and possibly OP in their instruction. This research has filled a gap in the literature and potentially has informed and impacted the adoption of OER at both an individual instructional level as well as an institutional level.

Chapter 2 will more fully explore the literature related to OER and OP and to the conceptual frameworks used in the three chapters. Chapter 2 will be followed by each of the three articles (Chapters 3, 4, and 5). The dissertation will then put forth overall conclusions resulting from the three studies taken together with implications for instructors, designers, and future research.

## Chapter 2. Literature Review

*“Openness is the breath of life for education and research. Resources created by educators and researchers should be open for anyone to use and reuse. Ultimately this argument resonates with the Universal Declaration of Human Rights, which states: ‘Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages’” (United Nations, 1948, Art. 26, para. 1).*

*D’Antoni and Savage, 2009*

### Topic of Study

This literature review provided a background on the development of open educational resources (OER), exploring areas such as benefits and challenges facing OER development, factors that motivate faculty to adopt and create OER, and finally implications of OER-enabled pedagogical use in higher education. This review has created the context in which to place two studies on the topic: one study that examined the impact of OER-enabled pedagogy on student course cost, outcomes, usage, perceptions, and engagement; and one study that examined factors that have motivated faculty who had chosen to adopt OER to support their instruction.

In order to traverse the body of literature regarding the adoption and development of OER in higher education, a number of questions have helped to guide this review:

- How has the cost of textbooks driven the OER movement?
- What are the various benefits of OER to students, faculty, and institutions?
- How does the actual use of OER compare to the use of traditional textbooks?
- What are faculty and student perceptions of OER, especially in comparison to traditional textbooks?
- What are the challenges confronting the development and expansion of OER in higher education?
- What are the various factors motivating faculty to adopt and create OER?

- How can the use of OER affect pedagogy in higher education?
- What conceptual frameworks might be used to explore OER use in higher education?

## Introduction and Background

For decades “openness” has played an important role in education, and in fact, the academic environment has historically spawned many open movements. Traces of “openness” in education can be found going back to the late middle ages long before education became institutionalized (Peter & Deimann, 2013). Currently open courses such as massive open online courses (MOOCs; Peter & Diemann, 2013), open courseware (Weiland, 2015), open educational practices (Mossley, 2013), open access publishing that endeavors to provide global access to scholarly research (Velestianos, G., 2013), open data (Atenas, havermann, & Priego, 2015; d’Aquin, 2016), and open source software platforms (Murphy, Buffardi, Dehlinger, Lambert, & Veilleux, 2017) exemplify this movement.

For the last decade and a half, Open Education Resources (OER) have been playing a role in the education landscape as well. In a 2010 chapter entitled *Building Open Learning as a Community-Based Research Activity*, Thille indicated that OER enable the democratization of educational resources through providing global access. OER are increasingly becoming a universal asset and considered resources that can impact the expansion of quality education at a global level (Mulder, 2013).

OER are defined as “teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others” (Hylén, 2007a). These are resources that can be formatted as books, book chapters, full courses, course materials, streaming videos, texts, and any tools or materials used to support free access to knowledge. Through the literature, nuances of the definition have been traced and dissected into individual phrases to piece together the whole, incorporating concepts of “open,” “educational

resources,” and those Creative Commons licenses needed for free access and flexibility of use: reuse, revise, remix, and redistribute (Wiley et al., 2014). But in its most basic form, an OER is any educational resource that is freely available for anyone – teachers and students and community members – with no fees attached (Butcher, 2015). However, it is important, as well, to clarify what OER are *not*. They are not general digital resources (Belikov & Bodily, 2016), nor are they digital resources with copyright restrictions. OER must either reside in the public domain or must carry the Creative Commons licenses mentioned above to support the flexibility of reuse. In this way, the materials are free to use without licensing restrictions (Wiley et al., 2014).

There is growing evidence identifying the benefits of global access to quality educational resources. Much literature outlines the motivating factors that drive the continued development of OER - factors that have ignited an increase in interest at the state (Texas Higher Education Coordinating Board, 2014), national (Fox, 2015; Achieving the Dream, 2017), and international levels (Hu, Li, Li, & Huang, 2015; Hylén, 2007b; Mulder, 2013). These factors are explored in the next several sections of this literature review and examine the impact OER can have on postsecondary students, faculty, and institutions of higher education. In addition, this review examines student use and perceptions of OER, the challenges that arise in the development of OER, factors that motivate the adoption of OER, and how OER might enable open pedagogy. Finally design frameworks that might support research in this area are explored.

## OER Impact on Postsecondary Students

The literature provides rich evidence on how OER can impact postsecondary students and their progress toward graduation. This section of the literature review discusses how OER can impact the cost of college as well as student outcomes such as grades, course completion rates, and enrollment intensity.

**College costs.** One of the salient factors driving the OER movement is that textbook prices have soared over the years, a fact which was highlighted in a recent Student Public Interest Research Groups (PIRGs) report (Senack & Donoghue, 2016). The data from this report indicated that there has been an increase of 73% in textbook costs in the last decade alone, which is at about four times the rate of general inflation (Senack & Donoghue, 2016, Executive Summary section). This realization, paired with recent findings that an undergraduate student in a public institution of higher education needs to budget from \$1,230 to \$1,390 a year for textbooks and supplies, poses a significant challenge for a student's college budget (College Board, 2016). In fact, the cost burden can be especially felt by students at community colleges, for in this environment the cost of textbooks often rivals that of tuition (Allen, 2013). Taking a slightly different perspective regarding students securing resources for their college courses, it is interesting to note a recent study that focused on student practices in accessing learning resources. The study, a multi-country research project, found that legal frameworks do not necessarily guide actual student practices when it comes to accessing learning resources (Czerniewicz, 2016). The author of this study recommended that higher education authorities should closely look at changing publishing models so that learning resources are cheaper and easier for students to use (Czerniewicz, 2016).

In light of these recent reports addressing college costs over the last few years, a great deal of research has reported on the benefits of lowered educational costs when utilizing OER in college courses (Bliss et al., 2013a; Hilton III et al., 2013; Hilton III et al., 2014). Additional research has focused on less-obvious areas on OER impact, such as course completion rates (Hilton III, et al., 2013) and enrollment intensity (de los Arcos, Farrow, Perryman, Pitt, and Weller, 2014; Fischer et al., 2015). This section explores the influence of OER and their benefits not only on educational costs but also on how they impact student learning outcomes.

Numerous studies have examined the cost savings to students through the adoption of OER, an adoption process that has shown no signs of negative impact on student learning (Hilton III & Wiley,

2011). The Kaleidoscope Open Course Initiative (KOCI), which included seven colleges or community colleges across the U.S., collaborated in selecting sections of courses with which traditional textbooks were replaced with open textbooks; therefore, for each course some sections adopted open textbooks while others did not. Though the study broke down the textbook costs for all courses within the study, the overall results indicated that over two semesters, students enrolled in the courses adopting open textbooks potentially saved a total of \$338,337.74 (Hilton III et al., 2014). When the amount that could have potentially been saved (if all classes had used OER) was added to the amount actually saved by the students using the OER, a cost savings of over one million dollars could have been realized for one academic school year (Hilton III et al., 2014). A Scottsdale Community College (SCC) study reported a large costs savings, as well, for five different mathematics courses adopting open textbooks, affecting over 2,000 students. For one semester alone, the resulting savings to SCC students was reported as \$255,375 (Hilton III et al., 2013). Savings were also reported in a study at the City University of New York (CUNY). Its Borough of Manhattan Community College faculty had converted numerous course textbooks to OER, teaching approximately 175 sections of zero-textbook-cost courses. This conversion resulted in an annual savings of approximately \$450,000 and affected more than 4,000 students (CUNY, 2017). The CUNY finding aligned with the estimated annual undergraduate textbooks costs mentioned earlier in the College Board report (2016.) Through a special Student PIRG report, Allen indicated that the Open Course Library, an OER initiative launched by the Washington State Board of Community and Technical Colleges, saved students \$5.5 million in the first two years alone (2013). In a recent media release by the University of Oklahoma Libraries, it was reported that their Alternative Textbook Grant had saved their students \$1,631,935 in textbook costs over the last four years (University of Oklahoma Libraries, 2017.) Numerous other studies and reports have also focused on textbook costs and the cost savings to students afforded by OER adoption (Daly, Glapa-Frossklag, Gaudet, & Illowsky, 2013; Florida Virtual Campus, 2016; Green, 2013; Hendricks et al., 2017; Hilton III & Wiley, 2011; Kestenbaum, 2014). In looking toward the future, it

has been estimated that OER could potentially save students across the US more than \$1 billion per year (Senack, 2015). In addition, various recent reports and articles support the realization of notable savings to students when OER are implemented (Jhangiani, Pitt, Hendricks, Key, & Lalonde, 2016; Klein, 2016; Ruth & Boyd, 2016).

The zero cost of a textbook not only directly affects a student's budget, but it can impact less-obvious aspects of a student's life. Research shows that, when faced with the high cost of textbooks, a student may choose to avoid buying a book because of budgetary restrictions (Prasad & Usagawa, 2014). A 2014 Student PIRGs report, surveying over 2,000 students from 150 different U.S. universities, found that 65% of students indicated that they had chosen not to purchase a textbook because it was too expensive and that 94% of these students had concerns that doing so would negatively affect their course grade (Senack, 2014). Earlier reports indicated that only 47% of students surveyed were regularly purchasing the textbooks required for their courses (Feldstein et al., 2012). More recent studies concur. Data recorded in the 2016 Florida Virtual Campus survey – a survey conducted at all 40 of Florida's public postsecondary institutions - indicated that 66.6% of the student respondents did not purchase a required textbook for a course. In a 2017 Student Textbook survey of undergraduates at the University of Hawai'i at Mānoa, 82% of respondents indicated that they had chosen not to purchase required textbooks at one time or another in their student career, while 52% of those students reported that by doing so, their performance was slightly affected or significantly (13%) affected (Tillinghast, 2017). These findings are very similar to those reported in a survey of Brigham Young University students. Those survey results indicated that 86% of students had delayed purchasing a textbook for a course because of cost, and that of those students, 52% believed that this delay had negatively affected their grade (Martin, Belikov, Hilton III, Wiley, & Fischer, 2017).

It is noteworthy to add findings from the 2017 Brigham Young University study just referenced. These researchers asked students for their perceptions of textbook costs and the impact the costs have

on their budget. They found that students did not appreciate the high cost of textbooks, and students provided a high volume of negative to extremely negative responses (91.2%), which indicated that “many students feel like they are being exploited in the system of higher education” ( Martin et al., 2017, p. 87).

Hilton III et al., (2016a) discussed a number of factors related to OER that have an impact on student success. The outcomes, which are discussed in the next section, are sometimes referred to as course ‘throughput rates’ and involve outcomes such as grades, withdrawal and completion rates, and enrollment intensity (Hilton III et al., 2016a).

**Grades.** In order to determine if the adoption of open textbooks has affected various facets of student learning outcomes, a wide variety of research has been conducted. One area of focus in student learning outcomes is on grades. Research in this area has examined how students, who are using traditional texts, have compared with students, who are using open textbooks, in terms of student performance measures such as overall course grades and final examination scores. Keep in mind that non-significant results are important as they indicate student grades are comparable whether using a traditional textbook or an OER textbook (Croteau, 2017) but with the benefit of cost savings to the student.

In their 2012 study mentioned above, Feldstein et al. found statistical significance in higher grade rates and lower failing rates in courses using OER as compared to those related courses not using open textbooks. Data from the previously-mentioned SCC study indicated that student grades – measured by the rate at which students passed the class with a C grade or better – did not appear to vary between semesters before and after an open mathematics textbook was introduced (Hilton III et al., 2013). Similar findings were noted in the Pawlyshyn et al., (2013) research, which reported modest rate gains in student grades when OER were used instead of traditional materials. In 2015, another OER national study was conducted by Fischer et al. with over 4,000 undergraduate students finding slightly mixed results. Students in this study were enrolled in 15 courses in ten colleges across the U.S. The study analyzed both

control group courses using traditional textbooks and treatment group courses using OER. The data collected indicated mixed results: no significant difference was found in ten courses; higher grades were recorded in four courses using the OER; and one course reflected higher grades in the control group (2015). In a slightly different study context, Allen, Guzman-Alvarez, Molinaro, and Larsen (2015) found that there was no significant difference in average course grades between a ChemWiki course divided into control and treatment groups with some students using a commercial textbook and some using OER (p. 5). Gale, when researching the impacts of OER on student outcomes at Virginia Community College System (VCCS), found that OER did not affect student performance in the study population (2016). The Affordable Learning Georgia initiative at Georgia Tech College is well known in OER circles and has produced data from several studies in similar contexts over the years. In the 2014 iteration of the study, Croteau found that, though there were some individual differences in grades when OER were implemented, the overall results were not statistically significant (2017). A follow-up 2016 study with the same initiative also found that there were no significant differences in final course grades from the fall 2014 semester through the spring 2016 semester at the Georgia Tech College (Choi & Carpenter, 2017). In regard to faculty reporting general impressions of student progress, in a 2016 study, researchers reported that faculty perceptions were that student learning was somewhat better using open materials at Kansas State University (Delimont, Turtle, Bennett, Adhikari, & Lindshield, 2016). Faculty felt that student performance ranged from neutral to somewhat better when using OER compared to students using traditional materials (Delimont et al., 2016). The Hendricks et al. study at a large Canadian university also indicated that there were no significant changes in grade distributions between semesters in courses that introduced open textbooks (2017). Jung, Bauer, and Heaps (2017) reported on data collected from a study of various higher education institutions around the world that use open textbooks from OpenStax (see <https://openstax.org/>). They found that 68% of faculty perceived that their students were as equally prepared for their course using open textbooks compared to using traditional textbooks, that 20%

reported their students being more prepared, with only 5% reporting they believed their students were less prepared (Jung et al., 2017). Finally, in a literature review assessing OER programs in existence through September 2015, Hilton III discussed 16 studies synthesizing information on the efficacy and perceptions of OER (2016). From the synthesis, the author concluded that OER doesn't appear to negatively influence student learning and therefore "one must question the value of traditional textbooks" (Hilton III, 2016). Besides the impact of OER on grades, research has also examined other aspects of throughput rates.

**Course completion.** Regarding throughput, one focus of research has reviewed rates of course completion. Students will sometimes enroll in courses, taking advantage of the drop and withdrawal dates, to see if they can manage the course without the purchase of required course materials (Gale, 2016). If they are unsuccessful in using alternative materials, they then have the ability to drop the course. One hypothesis that has been explored is that the availability of OER for courses might reduce withdrawal rates and increase course completion rates (Gale, 2016).

The aforementioned SCC study found that, with the exception of one mathematics class, there were no significant differences in the completion rates with the remaining six classes studied (Hilton III, et al., 2013). Lower withdrawal rates from courses using free digital textbooks were reported in the Feldstein et al. study at Virginia State University School of Business (2013). The Fischer et al. study also found that when comparing completion rates between the control and treatment groups, there was almost no significant rate difference (2015). However, in the 2016 study at VCCS, Gale reported that students withdrew from OER sections at a higher rate than from non-OER sections of courses, though no possible explanation was provided. One student survey administered to higher education students enrolled in Florida colleges and universities indicated that students have either dropped a course initially (26.1%) or have withdrawn at a later time (20.7%) due to the cost of required textbooks (Florida Virtual Campus, 2016). Sixteen percent of the students in the Hendricks et al. study of students at a Canadian

university reported having dropped or withdrawn from at least one course during the university experience because of the cost of textbooks (2017). Besides these aspects of throughput rates, enrollment intensity is also an area of focus when studying OER impact on study success.

**Enrollment intensity.** Another area of impact on student learning outcomes when OER are used is in the area of enrollment intensity. It has been hypothesized that the use of no-cost open textbooks might lighten a student's financial situation enough to allow them an increased credit load, which would in turn allow faster progress to graduation (Fischer, et al., 2015).

In their multi-institutional study, Fischer et al. tracked the difference between the control and treatment groups' credit loads for two semesters: the fall semester mean load was significantly higher for the treatment group – the group using the OER - while the winter semester data, which controlled for the effects of credit load in the previous fall semester, also showed a significant difference between the groups, once again with a higher load for the treatment group (2015). The Florida Virtual Campus report also indicated that the cost of required textbooks caused students to take fewer courses (47.6%) and to simply not register for a specific course (45.5%) because of textbook costs (2016). Gale found mixed results in a study at VCSS (2016). Enrollment rates varied with courses, and it was concluded that there was not a significant difference between the same courses in which OER were utilized and those using traditional textbooks (Gale, 2016). Researchers Hendricks et al., in their study at a large Canadian university, found that 19% of the students indicated that they had taken fewer courses than they would have liked due to the cost of textbooks (2017). This trend was also reported by Martin et al. in their study at Brigham Young University but at a rate of 33.28% (2017). Robinson, too, found in a study at the Central Virginia Community College that when OER courses were offered, there was a significantly higher enrollment compared to courses offering traditional textbooks (2015).

Overall, it is recommended that future studies should isolate exactly which factors coincide with efficacy rate (Croteau, 2017). Studies should also investigate the comparison of efficacy when students

are randomly assigned to open and traditional textbooks and explore how students actually use an OER as opposed to traditional textbooks (Hilton, 2016).

The next section of this literature review explores a broader impact of OER. It moves from OER development affecting students and provides an exploration of OER use from the perspective of faculty.

## OER and Postsecondary Faculty

One natural question that is always raised when discussing any open education trend asks, “Why would anyone want to give away anything for free?” The answer to this question, especially as it pertains to instructors or researchers, has been less well-researched than other aspects of the OER development.

Hylen reported that findings from a 2007 Organization for Economic Co-operation and Development (OECD) report indicated that the most reported motive for faculty involvement with OER was to have access to resources as well as to have more flexible materials (2007b). Choi and Carpenter wrote that in general, OER - as they are being developed and later reused - benefit from the ‘wisdom of the crowd’ (2017). They found that the “collective knowledge and experience of a group of experts contribute greater diversity and depth to the learning materials than any single person could” (2017, p. 686) thus making available globally more high-quality teaching materials. In addition, from research conducted in the U.K., Brent, Gibbs, and Gruszczynska (2012) summarized that an increased awareness in sharing OER might be due to a growing interest in more transparency of sharing quality materials, a need to challenge the commercial publishers who represent a monopoly on scientific knowledge, and a response to a growing interest by the public in lifelong learning. Alevizou also mentioned that ‘transparency’ enabled by the use of open practices and harnessing the collective wisdom of a larger community of educational practice were important (2012).

The OECD report also listed the following as incentives for individuals putting effort into finding and developing OER: the altruistic idea of sharing as an academic value; personal gain through enhanced reputation; gaining publicity or reaching the education market more quickly; and sharing because it may

be easier to do so than to try and keep the resource closed (OECD, 2007). Some of these same benefits have been noted in the existing literature on this topic (D'Antoni, 2009; Hodgkinson-Williams, 2010). When exploring the role of OER in The Open University, Gourley and Lane observed and reported on benefits to educators working with OER, which, in addition to the benefits mentioned above, also included collaboration with others in developing new OER, as well as contributing to research into aspects of OER, such as effectiveness and application (2009). They also pointed out that there is benefit to an educator in terms of freeing up time to engage with students more when time is not needed to devote to developing resources (Gourley & Lane, 2009). Other research applied the Social Exchange Theory to determine factors influencing faculty decision to share their teaching resources (Van Acker, van Buuren, Krijns, & Vermeulen, 2013). These researchers found that altruism was positively correlated with the intention to share OER as was the confidence that other instructors would in turn share their educational resources as well (Van Acker et al., 2013.)

Atenas and Havemann (2014) gave a word of caution with a reminder that the “opening up” process is a work in progress. They stated that, though the sharing of research output has been part of the culture of the scholarly process, the open sharing and remixing of learning materials is a newer concept and not so straightforward as it may seem (Atenas & Havemann, 2014). Cox (2013) also discussed how the rules governing promotion in the institution are a concern by faculty in that OER must be viewed as a valid contribution for promotion.

The question raised in the opening paragraph of this section can be asked about institutions, as well as about institutional involvement in programmatically supporting the creation and development OER – only to give away educational content. This aspect of OER growth is explored in the next section.

## OER and the Postsecondary Institution

OER development encounters challenges at different levels precisely because it presents the possibility of transformative change that can certainly be felt at the institutional level (Mossley, 2013).

Mossley identified a number of benefits that can be afforded to institutions developing OER programs: the production of generic resources that can be used throughout the institution, marketing appeal to potential students, presenting students with better choices, increased student satisfaction in their educational experience, more control over intellectual property, and community building (2013).

Hylen (2007b) thoroughly addressed the question of why institutions would want to give away content by outlining five arguments from an institutional point of view for involvement in OER. The first is the altruistic argument that sharing knowledge is not only a good thing but something that academics just do (Hylen, 2007b.). This is also in alignment with a general governmental perspective that sees OER as helping to advance knowledge by providing information for the benefit of all (Hodgkinson-Williams, 2010). This concept aligned with the Algers and Silva-Fletcher (2015) study, which found that the most important incentive for the creation of OER was the desire to share for the benefit of others. In addition, Van Acker et al. (2013) found that both altruism and the perceived added value of the resource contribution were important factors determining instructors' intention to share OER.

Hylen continued by mentioning that through allowing for the free sharing and reuse of OER, taxpayers dollars are more thoroughly leveraged (2007b) a concept reported by Annand as well (2015). A report issued by the Centre for Educational Research and Innovation addressed this idea as well, stating that wider circulation and reuse of learning resources and tools, which have been developed using taxpayer's money, should be of concern to policy makers, institutions, and funding bodies (OECD, 2007).

A third point that Hylen made was that by institutions sharing these resources widely there is an overall cut in the costs of content development (2007b). D'Antoni also agreed that the cost of content development could be reduced, while improving the content, when the work of resource development is shared (2009, p. 6). The Algers and Silva-Fletcher (2015) study as well as the 2014 Babson Report found that the potential for reducing costs was an important factor in the decision to develop OER programs (Allen & Seaman, 2014).

Hylen put forward a fourth argument, which is that producing and sharing OER is a good marketing strategy, and an institution involved in this activity will receive positive attention (2007b). This is exemplified by MIT, which has received positive International attention for their OpenCourseware initiative over the years (Caudill, 2011; DeSantis, 2012; Hodgkinson-Williams, 2010). In the 2009 report assessing the role of OER at The Open University in the United Kingdom, one of the reported benefits was that OER development could generate substantial international attention for the university among individuals and institutions, and in fact reported that 69% of the visitors to their site came from outside of the UK (Gourley & Lane).

Hylen's fifth and final argument was that institutions might gain by using the business model of offering free content "as a way of lowering the threshold for new students that still would need to pay for tutoring and accreditation" (2007b, n.p.). He pointed out that there is increased competition in higher education, especially with expanding globalization (2007b), and D'Antoni concurred and added that institutions need to identify new cost-recovery models (2009, p. 6) to stay competitive. Johansen and Wiley (2010) put forth a model for increasing enrollment in distance education courses using open resources. Increased enrollment, and therefore increased income, was one of the benefits listed by Gourley and Lane when OER were strategically increased at The Open University (2009). This concept was echoed in a study by Murphy that concluded institutions may be motivated to support OER advancement in order to provide higher quality education for previously disadvantaged students (2013).

Additionally, OER development can enhance strategic initiatives and potential support through international attention, as well as improved public relations and improved relationships with strategic partners (Wiley, Bliss, & McEwen, 2014). Hodgkinson-Williams also pointed out that by an institution supporting and providing open resources, it might attract alumni (2010), which could lead to additional future financial support. In addition, Algers and Silva-Fletcher's (2015) research at institutions across

Europe indicated that OER development was viewed as one way to stimulate improvement at the institutional level as well as supporting the concept of lifelong learning and reaching new target groups.

## Student Use of OER

When reviewing the literature on OER, it becomes evident that historically the ‘use’ aspect of OER has been the least studied aspect in this area of research (Hilton III et al., 2016b). One will find that the topic has been approached in two ways: “use” as in how students actually use the material; and “use” as in how faculty and students apply the licenses to openly reuse and remix the OER materials. The later application of “use” will be addressed in a subsequent section. This section of the literature review looks at how students use OER, often through self-reported data, regarding how much time a student spends using the resource and the proportion of the resource that they use while completing their course studies.

One of the first studies conducted to understand facets of student use of OER was conducted by Bliss et al. in 2013b. This research reported on almost 500 community college students in eight community colleges in courses that had replaced traditional textbooks with open textbooks in the Project Kaleidoscope initiative. The data indicated that there was no significant difference in reported time spent with the texts between the courses using traditional textbooks and the courses using OER (Bliss et al., 2013b). Students reported typically using the textbook 2-3 times per week or more. Lindshield and Adhikari found similar results in their study at Kansas State University using an open textbook (2013). The Hendricks et al. (2017) study reviewed student usage of two different textbooks offered in different sections of an introductory physics class at a Canadian university. The researchers found that 55% of the students typically use their textbooks two to three times a week, which was reported for use of both traditional and OER textbooks for one course (2017). It is interesting to note that when asked why students don’t use textbooks, students responded that “one can get all the information one needs from class, and much of the material in textbooks is not relevant to exams” (Hendricks et al., 2017, p. 90).

What is interesting in this study is that 8% of the students who used a traditional textbook reported that much of the material was not relevant to the exams but only 3% of students using the open textbook for the same course made this same claim. The researchers speculated that the results might be due to the instructor taking advantage of the open licensing to customize sections of the open textbook to make it more relevant to the course (Hendricks et al., 2017). Another study conducted in 2012 at the Virginia State University School of Business tracked downloaded files of course resources. This information, along with self-reporting through a questionnaire, helped provide data suggesting that the online open textbook was found to be slightly more useful than the traditional textbooks (Feldstein et al., 2012). The ChemWiki study mentioned previously also collected data that indicated a slight increase (0.4 hours more a week) in textbook usage when using an open text as compared to a traditional text for chemistry classes. The researchers mentioned that this increase could be due to a range of possibilities that were not explored (Allen et al., 2015). Finally, in the global study of the OpenStax textbooks, Jung et al. (2017) found that 50% of the faculty reported that their students used the open textbooks as often as their traditional textbooks and that 28% of the faculty members thought that students used the open textbooks even more often than traditional textbooks.

In moving from the specific areas of throughput rates and usage of OER, there has also been a great deal of research conducted around perceptions of OER. This research has recorded the perceptions of both faculty and students and will be discussed in the following section.

## Perceptions

Perceptions around the quality and ease of use of the material have a definite impact on the adoption of OER, especially as they apply to faculty. This is one area on the topic of OER that has been the most heavily studied. Some studies have focused on the overall perception of OER materials, without breaking the concept down into the two constructs just mentioned. One such study conducted at Scottsdale Community College found, in regard to an open mathematics textbook, that 83% of the

students were generally satisfied with the OER text, though a small percent reported using other resources to supplement the text (Hilton III et al., 2013). In the same study, faculty generally reported that they viewed the material positively (Hilton III et al., 2013). Everard and St. Pierre, in a study of undergraduates using OER in Management Information Systems classes in two U.S. universities, reported that students perceived the open textbooks were as good or better than the traditional textbook (2014). Students in this study also commented that, when the quality of the material is generally the same, it is frustrating to take classes where they have to buy a textbook that is then only partially used for the course (Everard & St. Pierre, 2014). Finally, in a recent study of college students' perceptions of a collection of curated OER for a health psychology class, the researcher reported that students preferred the curated OER materials to the traditional textbook (Cooney, 2017).

**Ease of use.** One study found that the perception of ease of use was a critical component in the adoption of OER (Kelly, 2014). In a path analysis of educator perceptions of OER, Kelly's research indicated that "OER must be considered easy to use or the perceived utility of the resource will be negatively impacted" (2014, p. 37). Petrides, Jimes, Middleton-Detzner, Walling, and Weiss reported on a follow-up study from a Community College Open Textbook Project (CCOTP) in 2011. These researchers used a mixed methods study, interviewing both faculty and students who had used open textbooks for certain courses. Ease of use emerged as one factor influencing open textbook adoption and use by both faculty and students, with 65% of the students preferring the open textbook because of this factor (Petrides et al., 2011). In the study mentioned earlier by Feldstein et al., these researchers found that almost 68% of the students felt that the open textbook used in the study was more useful than a traditional paper textbook (Feldstein et al., 2012). In the 2013 Project Kaleidoscope study, 52% of the students reported liking the online format of the OER more than a traditional textbook, while 17% liked the format less, and 31% indicated they had no preference in format (Bliss et al., 2013b). Finally, in additional research reported for the Kansas State University Open/Alternative Textbook Initiative,

researchers found that students felt the OER textbooks were somewhat easy to use and that only 2.6% of the students indicated that the resources were inconvenient to access (Delimont et al., 2016).

**Quality.** Numerous studies have indicated that students and faculty generally feel that the quality of OER is equal to or better than that of purchased resources (Atenas, Havemann, & Priego, 2014; Bliss et al., 2013a; Bliss et al., 2013b; Delimont et al., 2016; Everard & St. Pierre, 2014) or that students do not generally perceive a difference in quality of OER as compared to traditional textbooks (Croteau, 2017). In the study at Georgia Tech College, students reported that they not only appreciated the cost savings, but they also reported that the “free materials from different sources gave them more ‘perspective’ than they would get from a textbook” (Choi & Carpenter, 2017, p. 692). Though the authors reported that the small sample size and restriction of the study to one course at one university in Canada were limitations of the study, Hendricks et al. (2017) also reported that 72% of the students claimed that the quality of the textbook was about the same, while 21% reported that it was better than traditional textbooks in other courses. The Petrides et al. (2011) CCOTP study mentioned previously also found that the perceived quality of the content to be an influencing factor on OER adoption and that this perception was derived from various sources: “recommendations from trustworthy faculty colleagues, a personal relationship with the author, and a first-hand review of the textbook to determine its quality and pedagogical approach” (p. 43). The Project Kaleidoscope study by Bliss et al. (2013a) also looked at the quality of various OER introduced in the eight community colleges from both student and faculty perspectives. Though the faculty sample size was small, the response indicated that the material quality was similar to traditional textbooks used previously. Among the students, 56% reported that the material was about the same quality, while 41% rated the OER as better than the quality of the texts in other courses (Bliss et al., 2013a). In the literature review by Hilton III (2016), the author warned that in regard to student perceptions of the quality of OER, it may be that the cost-savings or convenience would influence student perceptions. However, the author reported that “roughly half of students found OER to

be comparable to traditional resources, a sizeable minority believed they were superior, and a small minority found them to be inferior” (Hilton III, 2016). Regarding faculty perceptions, Hilton III reported that within the nine studies that focused on the perception of OER, there was no perception that OER were less likely to support student learning (2016). The author reported that in one study some faculty felt that traditional resources had a higher trust factor, though nearly two-thirds reported the quality of OER was comparable to traditional materials (Hilton III, 2016). The Jung et al. study found that of the faculty using the OpenStax textbooks, 62% reported that open textbooks were of about the same quality as traditional textbooks, whereas 19% reported them being of better quality (2017). This same study also conducted a deeper analysis to identify the factors that contributed to the perception of quality. They found that cost and affordability were ranked the highest in importance, followed by content quality, then content difficulty, readability and scope and sequence (Jung et al., 2017). Finally the national report entitled *Opening the Textbook: Educational Resources in U.S. Higher Education, 2015-16* indicated that faculty at that time were focusing more on the quality of OER and less on issues such as licensing (Allen, Seaman, Poulin, & Straut, 2016).

Though both student and faculty perceptions are generally positive regarding quality and ease of use of OER, there are still many challenges confronting more extensive adoption of these resources. Some of the more salient challenges are addressed in the next section of this literature review.

## Challenges

Though OER have slowly been developing over the last decade and a half, the uptake has been slowed by numerous challenges. In fact, barriers are many. This section summarizes some of the main challenges in the wide-spread development of OER, including the overall awareness of these resources, copyright and licensing challenges, concerns over quality of the materials, limitations due to time constraints, the need to localize materials, technology issues, and the challenge of identifying and implementing a sustainable model in support of OER.

In a 2015 blog post, Wiley discussed that raising awareness of OER among faculty is critical because awareness is “the single biggest barrier to OER adoption” (n.p.). This matter becomes pressing when one considers the data on faculty awareness of OER. The 2016 Babson Survey reported that 58% of faculty respondents were generally unaware of OER and that only 6.6% reported that they were “very aware” (Allen & Seaman, 2016, p.12). At the University of Hawaii, faculty awareness of OER was reported at 50%, though 36% were not at all familiar with OER (Tillinghast, 2015). A higher faculty awareness rate was reported by Mtebe and Raisamo (2014b), who found that in Tanzania higher education more than two-thirds of respondents to a research survey indicated they were aware of OER, 27% were not aware of OER, and that the majority had rarely or never used OER in their courses. The disparity between awareness and use of OER begs further investigation. In fact, in a cross-U.S. survey of faculty, Belikov and Bodily (2016) found that 36.7% of the respondents reported needing further understanding of OER and that almost 13% confused OER with general digital resources. It is important to contemplate how the rate of awareness might fluctuate depending upon the academic culture, including awareness as per global location. For example, Hassall and Lewis (2017) found that faculty in physiology and medical education in a United Kingdom university reported that awareness of OER was not a barrier to the use of OER in their teaching. This research reported that the awareness of OER was almost universal among the participants (Hassall & Lewis, 2017). Therefore, it might be of interest to identify rates of global awareness and subsequently identify those factors contributing to the level of awareness in locations across the globe.

**Copyright and open licensing.** In an important early study on this topic, Hylén outlined numerous challenges in the adoption and use of OER (2007b). The first challenge was identified as the lack of awareness of copyright issues. The potentially confusing environment regarding copyright and licensing opportunities is due largely to the changing nature of publishing and production tools afforded by the Internet (Hylén, 2007b). Historically, faculty would create a physical object such as a book or article and then develop a relationship with a publisher and sign copyright over to the publisher – even without

full understanding of the implications of the relationship into which they were entering. A 2003 Rights Metadata for Open Archiving (RoMEO) report indicated that 41% of authors might assign their copyright to publishers without fully understanding all the implications of doing so (Gadd, Oppenheim, & Proberts, 2003a). However, in the digital realm, faculty and researchers can participate in and control the licensing procedures of objects they create through the application of Creative Commons licenses (see <https://creativecommons.org/licenses/>). These licenses allow material to potentially be readily re-used in a variety of learning environments (Caswell, Henson, Jensen & Wiley, 2008). Dealing with these new licensing options can result in a cumbersome process in which faculty and researchers might be unwilling or unprepared to participate (Helen, 2007b). The most recent Babson Survey reported that only 38% of faculty were 'aware or very aware' of current Creative Commons licensing options (Allen & Seaman, 2016). A recent study found that faculty in a United Kingdom university also expressed concerns about the copyright implications of using third party resources (Hassall & Lewis, 2017). Not only can faculty experience confusion about the digital licensing potential, but they must also come to terms with a new way of thinking about sharing their work. Kursun, Cagiltay and Can's (2014) findings supported this view. In their 2014 study of Turkish faculty perceptions about OER, they found that faculty felt that the greatest barrier to contributing to open resources was "having or expecting problems protecting intellectual property rights of their own materials" (Kursun et al., p. 26) followed by the problems involved in clearing others' copyrighted work for use in course materials (Kursun et al., 2014). Legal issues also influenced faculty perceptions of incentives to share course materials in the hopes that their work could be shared in such a way as to protect them from plagiarism and provide intellectual property protection (Kursun et al., 2014). Veletsiano (2015) also examined the open and sharing practices by faculty at a North American university. This researcher addressed the issue that, as also found in the Kursun et al. (2014) study, there is a difference in practice between the sharing of faculty-generated work and actively assigning open licenses to such work. Others in the literature have reported on the concern of sharing their knowledge

and lack of awareness of open licenses (Gadd, Oppenheim, & Proberts, 2003b; Hodgkinson-Williams, 2010; Mtebe & Raisamo, 2014a & b). Hylen indicated that there is a growing interest in using open licenses and recommended that effort be put into this area (2007b). In fact, on the BCcampus, where OER has been a focus for almost a decade and a half, it was recently reported that 69% of respondents were familiar with open licensing (Jhangiani et al., 2016). Fifty-three percent of respondents reported that open licensing was ‘very important’ and 22% reported it being ‘important’ to use these licenses in their teaching (Jhangiani et al., 2016). Mishra (2016) advised that, as a community, we need to be “more inclusive and focused on developing appropriate policies that allow copyright holders to decide how they want to share” the resources that they create (p. 9). Porter (2013) pointed out the importance of training faculty and staff so they might understand the obligations and affordances of copyright and open licensing. Finally, Green (2017), in a recent chapter on open licensing, stated that for OER to go mainstream, one of the requirements is an overall adoption of open licensing policies.

**Quality Concerns.** Though numerous studies have indicated that faculty generally view the quality of OER as comparable to traditional materials, it should also be noted that the issue of quality has been one concern regarding OER adoption as reported in the literature. Wiley et al. (2014) discussed the quality problem in their chapter in the *Handbook of Research on Educational Communications and Technology* and brought up the aspect of OER proponents sometimes struggling to demonstrate that free materials can be of equal or greater instructional value when compared to for-cost alternatives. They pointed out that this aspect battles the common reference to anything that is free in that ‘you get what you pay for’ (Wiley et al., 2014). The 2016 *BCcampus Research Report* provided data indicating that one of the barriers to using OER was in locating high quality OER (Jhangiani et al., 2016), but it is unclear if the problem identified referred to the act of locating the resources or to the quality of the resources once located. In a cross-European study that looked at the barriers to adoption of social sciences OER, data indicated that the most critical challenges seemed to relate to judging the quality of the resources

without spending a lot of time evaluating them and then matching OER to their own curriculum (Pirkkalainen, Jokinen, Pawlowsski, & Richter, 2015). Finally, Hylén suggested several approaches to addressing the quality issue: presenting materials organized by an institution-based provider, where the prestige of the institution is at risk; organizing a peer-review system as exemplified by the OpenTextbook Network; and a low-level or bottom-up approach where users actually rate, comment, and post those comments on the resource website (Hylén, 2007b). Hodgkinson-Williams (2010) presented a range of quality-assurance strategies with varying loci of responsibility from individual contributor, various academic groups, institutional and cross-institutional, to national and international bodies.

**Time constraints.** A variety of factors that hinder the adoption of OER by faculty have been reported. One of the recurring factors that stands out in the literature is that of time constraints: the time it takes to find (Hatzipanagos & Gregson, 2015; Percy & Van Belle, 2012; Richter, Bruce, Hoel, Megalou, Kretschmer, Mazar, Sotiriou, & Stracke, 2013) or create the resources (Belikov & Bodily, 2016; Everard & St. Pierre, 2014). Faculty report that they do not often have the time it takes to investigate OER, the time to try OER, or the time required to create OER (Delimont et al., 2016). An example is illustrated in the 2016 *BCcampus Research Report* where this issue was listed as one of the top ten barriers to using OER (Jhangiani et al., 2016). Thirty-nine percent of faculty reported that lack of time to find OER was a significant barrier and 28% reported that the lack of time to determine the relevance and quality of the OER themselves hinder them in adopting OER (Jhangiani et al., 2016). Hatzipanagos and Gregson (2015) also reported on a case study conducted at the University of London International Programmes, noting that the development of materials and time to assess OER are time intensive, though they also noted that such development can result in cost and time savings overall in the long term. On the other hand, in the Mtebe and Raisamo (2014b) research of Tanzania faculty, it was reported that 55% of faculty felt that the lack of time required to find suitable materials was not a hindrance factor. But Hassall and Lewis

suggested that the lack of time to modify instruction in order to incorporate available OER was one of the three main problems preventing educators from adopting these resources (2016).

**Localization.** In one publication, Smith (2009) introduced OER and discussed how OER can help to level the access to information and therefore knowledge around the world and further explained that “the act of modifying an OER to meet language, cultural, or readiness requirements increases useful access” to the resources (p. 89). In fact, the 2012 Paris Declaration on OER requested that governments

Favour the production and use of OER in local languages and diverse cultural contexts to ensure their relevance and accessibility. Intergovernmental organisations should encourage the sharing of OER across languages and cultures, respecting indigenous knowledge and rights (UNESCO, 2012, p. 2).

Wiley et al. (2014) discussed this issue as well through the concept of “localization” and stated that this is one of the most important aspects of open educational resources, yet one of the least understood. Once a resource is found, it may need to be contextualized for a given set of needs or for a specific learning environment (Wiley et al., 2014). A simple translation of the resource does not provide the bridge to arrive at the cultural or contextual meaning. Ivins (2011) presented this concept in dissertation research that reviewed the adoption of OER in a Nepalese context. The author discussed not only the need for translating the learning materials into local languages but the more subtle need to create the translations recognizing the cultural context in applying the subject material (Ivins, 2011). In a 2016 study of faculty in public institutions in Croatia, Krelja Kurelovic found that respondents mostly agreed (60%) or strongly agreed (17%) that the OER they found needed customization and localization before they could be used in the classroom. Okada, Mikroyannidis, Meister, and Little (2012) discussed the importance of translating the language of the original resource and adding contextual information to create more usable OER. Richter and McPherson cautioned that even when a resource is translated into another language, it may not necessarily be appropriate for the targeted regional context (2012). Hatakka

(2009) explored the problem of language style in research focusing on educational content developers in Bangladesh and Sri Lanka. The author surmised that besides the consideration of diction and figures of speech, local cultural expressions may interfere with understanding. To further elucidate, the author gave an example of three types of English used in Bangladesh: U.K. English, U.S. English, and Indian English (Hatakka, 2009). The idea of localization not only focuses on adapting the content to fit the local cultural needs but includes “meeting local logistical constraints that impact access to information, such as limited technology and distribution channels” (Jimes, Weiss, & Keep, 2013, p. 81), a constraint that is addressed in the next section. In their case study conducted in KwaZulu-Natal, South Africa, the authors found that teachers who had access to computers could download materials that could then be cheaply printed by students, who only had spotty access to computers and the Internet (Jimes et al., 2013). Others have discussed the concept of localization as it applies to OER, not only in terms of language translation but also in regard to cultural, geographical, and socio-economic contexts (Amiel, 2013; Hatakka, 2009; Pirkkalainen et al., 2015; Richter & McPherson, 2012; Richter et al., 2013). Finally, one author recommended that when OER are being developed, the developer should keep in mind the potential “secondary” audience – the invisible group of users who will eventually be accessing and studying the materials in different modalities (DeVries, 2013). By more closely tuning in to the needs of potential users, the greater the subsequent ease will be in adapting the resource to future open audiences.

**Technology.** There are two main aspects of technology that can present challenges to the adoption and creation OER. The first aspect addresses the infrastructure needed to access and then share these resources. Especially in developing countries, access to computers, unreliable Internet services, and low bandwidth can hinder the use of OER (Mtebe & Raisamo, 2014a; Nyandara, 2012; Percy & Van Belle, 2012; Samzug & Mwinyimbegu, 2013). In today’s world, information is knowledge and knowledge is power. Besides a proficiency in technology, access to information is an economic imperative. Because not all people have the same access to technology and the infrastructure supporting global access, Block

(2010), in a paper focusing on the 'digital divide', emphasized that such people can be hindered in their ability to learn and explore solutions to communal problems. So, this divide really represents more than just a lack of technology, it represents a divide of those who have the capability to seek knowledge and to learn and those who do not.

Reusability is the second aspect of technology to be considered as applied to OER – a key aspect that can extend usefulness and expand impact of these resources (Okada et al., 2012). These authors discussed the various levels of reusability and ways of reusing OER through recreating content and contributing to new productions, by adapting part of the content, or by adapting aspects of the structure, format, or interface. These concepts are more thoroughly explored by Wiley (2014) as he reminded us of the “5Rs of Openness”: the ability to retain, reuse, revise, remix, and redistribute OER. However, as mentioned previously, it is important to note that in order to take advantage of the value that this framework can afford, technology and the skills to use the technology must first be in place. Hilton, Lutz, and Wiley (2012) noted in their research that OER are often adopted or reused in a wholesale manner, without revision or remixing. One problem discussed in the literature is that some learning resources are developed for specific learning management systems (LMS) and may not be easily digested into a variety of other LMSs (Texas Higher Education Coordinating Board [THECB], 2014). In a 2013 study where authors designed a booklet for educators using remix, Amiel found that the technical issues, especially those concerning design standards and availability of source files, were of concern. DeVries (2013) noted this as well and encouraged open resource developers to keep in mind the scalability of a learning resource that is more closely in tune with the needs of future open resource adapters. One example DeVries (2013) gave that exemplified this foresight was to provide the source files with the release of the open educational resources, files necessary for re-purposing or remixing the resource in a contextually appropriate manner. In addition, to the source files, developers of OER need to create resources using tools that have wide availability and that do not require a prohibitive level of expertise (Amiel, 2013).

Though Mishra (2017) warned that although OER should be created in open and accessible formats, it should not become a mandatory requirement. A closed quality might be introduced into the open production causing a conflict in philosophic approaches. For the various technological affordances to be harnessed, training becomes an essential piece of the “remix” equation, for these resources are developed and used by audiences with varying levels of technical expertise and resources (Thille, 2010). Mtebe and Raisamo (2014) noted, in their research on the use of OER in Tanzanian universities, that 63% of the survey respondents reported lacking the skills to create and/or use OER. Faculty members who are encouraged to develop high-quality OER must be given the training and support to understand digitally-accessible design and metadata tagging for resource findability (THECB, 2014) and technical and information technology assistance (de Hart, Chetty, & Archer, 2015; Everard & St. Pierre, 2014; Rolfe, 2012).

**Sustainability.** Some of the very first observations around the issue of sustainability of OER came from the writings of Stephen Downes a decade ago. This well-known educator pointed out in his early writings that “sustainable” does not mean “cost free” and that comprehensive development of OER may entail a large-scale investment (Downes, 2007). He also discussed that a comprehensive approach to understanding sustainability also encompasses the need for the technological infrastructure, organizational support, and guiding and sustaining policies. He also proposed funding, technical, content and staffing models to support sustainability (Downes, 2007).

Olcott (2012) declared that in order to strengthen and further build the OER movement, the focus must center on creating a ubiquitous global educational environment, though he speculated that this would entail a mix of both commercial and open content for the foreseeable future. The idea of an incremental approach was also echoed in research conducted from the Open, Transferable, Technology-enabled Education Resources (OTTER) project at the University of Leicester in the U.K. The authors of the project report found that, in interviews across the university departments, senior managers were more

supportive of incremental development of OER as opposed to a more immediate wholesale adoption (Nikoi & Armellini, 2012).

In the same study just mentioned, the topic of funding of OER was also explored by staff, faculty, and management at the University of Leicester (2012). Respondents proposed that funding sources could include the university general funds, which could be managed by the library, and from student tuition (Nikoi & Armellini, 2012). Stacey also reported on funding issues and concluded that as OER use becomes integrated into educational practices, the source and form of public support and funding will diversity to include government funding and individual investments, as well as support by foundations (Stacey, 2013). Hodgkinson-Williams summarized a wide array of funding models aimed at sustainability, which range from sponsorship, governmental, partnerships, foundation, and membership options to mention a few (2010). Others in the literature have reviewed funding for OER and have proposed a variety of approaches to funding sustainable efforts for OER development (Annand & Jensen, 2017; De Langen, 2013; Kortemeyer, 2013; Lashley, Cummings-Sauls, Bennett, & Lindsheild, 2017; Smith, 2009). Senack and Donoghue (2016) have even proposed an unlikely scenario where publishers could alter their business models with the aim of reducing student textbook costs!

The literature also indicates that policy development is important for sustainability. Nikoi and Armellini (2012) discussed how policies can facilitate and promote OER uptake at the institutional level. A survey of the students, staff, and managers at the University of Leicester in the U.K. indicated that these various populations want to see policy development in order to promote a culture of openness, to encourage OER adoption, to provide training and incentives, and to support the commitment to OER (Nikoi & Armellini, 2012). Stacey (2013) explored three government-funded OER initiatives across different countries – Canada, the U.K., and the U.S. – and in concluding statements remarked on how governments can generate substantial public benefits if they were to support OER development through policy, guidelines, and incentive funding. There exists a certain amount of large-scale effort in addressing

the need for sustaining policies. Both of the Commonwealth of Learning (COL) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO) are in the forefront in the advocacy for OER, working with the William and Flora Hewett Foundation to develop both national and institutional OER policies (Miao, Mishra, & McGreal, 2016). The Creative Commons organization has created an OER Policy Registry, which now holds 80 current policies and almost 40 proposed policies to address OER development (n.d.). Policy development is spreading throughout the developed world. The Organization for Economic Cooperation and Development (OECD) reported that as of 2014, 33 countries responded that they support and facilitate the development and use of OER (Orr, Rimini, & van Damme, 2015). With policies in place, governments can help ensure its citizens of having access to the very resources that can impact their learning.

The next section explores the factors that potentially motivate instructional faculty to embrace OER by asking, What motivates faculty to want to adopt, create, remix and reuse OER in their courses?

## Motivation to Adopt OER

McKerlich, Ives, and McGreal found that motivation in adopting OER was largely intrinsic (2013). These authors sought to determine how the faculty and staff at Athabasca University were adopting OER so that further insights might influence future adoption, policy development, and community commitment (McKerlich et al., 2013). They found that ‘recognition’ for both creation and use of OER was the lowest factor reported by the respondents and suggested that this might mean that it is intrinsic motivation that drives faculty in this situation (McKerlich et al., 2013). Pawlowski, in fact, suggested that “emotional ownership is the key to success and to overcome barriers” (2012, Abstract section, n.p.) of OER adoption. This author laid out a potential workflow in the development process for OER that would increase emotional ownership and then exemplified the process in a case study (Pawlowski, 2012). Ownership was also found to be an important element by researchers Algiers and Silva-Fletcher (2015). In a study collecting data from 52 institutions that had participated in a European Union educational project,

the researchers found that altruism is important in determining whether teachers share OER (2015, p. 35). They found that the most important incentive for the creation of OER was reflected in the statement that “I want to share this for the benefit of others” (Algers & Silva-Fletcher, 2015, p. 41). In another study published in 2013, which surveyed instructors from all levels of education on their sharing behavior with respect to OER, Van Acker et al. found that altruism was positively correlated with the intention to share OER. They also concluded that this finding implies that teachers enjoy the behavior of sharing OER, without the need for additional extrinsic incentives (Van Acker et al., 2013). Altruistic motivation for making learning materials accessible has also been noted in a variety of research studies (Hysten, 2007b; McGill, Falconer, Dempster, Littlejohn & Beetham, 2013; Pelger, 2012; Scheliga & Friesike, 2014).

In the study mentioned earlier by Belikov and Bodily, these researchers examined barriers and incentives for faculty to adopt OER and uncovered several motivating factors (2016). They found that some faculty (10.6%) were motivated to adopt OER in order to cut costs of materials for student convenience and for enhancing equity; a smaller percent of faculty (9%) indicated that pedagogical benefits would motivate them to invest the time into evaluating OER (Belikov & Bodily, 2016). Unfortunately, this study did not make the distinction if the respondents were faculty who were contemplating adopting OER or who had already done so, as this variable might influence response results. Other studies have shown that providing a cost savings to students is one of the highest motivating factors in the consideration to adopt OER by instructional faculty and staff (McKerlich et al., 2013; Tillinghast, 2015).

Scheliga and Friesike also found in their research on open science that faculty participants who were interviewed at the International Conference on Internet Science (Brussels, 2013) were willing to sacrifice rewards to be able to engage in experimenting with new forms of disseminating knowledge and from the sense of joy experienced from sharing knowledge (2014). Chae and Jenkins found somewhat similar results in their qualitative investigation of faculty using OER in the Washington Community and

Technical College System (2015). These researchers reported that two major motivating factors for faculty to use OER were the desire to provide access to academic materials at a low cost and their own pursuit of pedagogical freedom (Chae & Jenkins, 2015). Hassall and Lewis conducted a study at the University of Leeds examining both institutional and technological barriers to the use of OER (2016). What they found indicated that there is no innate motivational barrier to adoption but that rather the lack of motivation comes from a lack of opportunity (Hassall and Lewis, 2016). One external factor that can influence a faculty decision to adopt or create OER might be in the form of institutional support. In the discussion section of the Scheliga and Friesike study, the researchers recommended that constraints to open behavior can be diminished if this behavior is rewarded within the research culture and by the research institution (2014). On the other hand, in one study at a North American university, Veletsianos discussed how institutional policies might potentially affect adoption (2015). Veletsianos described the institution of focus as one lacking institutional support for openness. Though some open and sharing practices were evident, this author suggested that “individual (rather than systemic) motivators may be significant drivers of openness in the higher education context” (p. 205) and not those of institutional policies or initiatives. Finally, in a study that presented a different picture and that focused on three South African universities, Cox and Trotter conducted interviews with academic participants engaged in OER workshops (2016). The researchers wanted to learn what types of interventions might work best for motivating OER adoption and use in different academic institutional contexts. What they concluded was that institutional policy should not be regarded as a motivating factor for OER activity due to the individual institutional culture, which “mediates the role that policy plays in academics’ decision making” (Cox & Trotter, 2016, p. 9).

If faculty are motivated to explore, adopt, or create OER, other possibilities are then open to them. Faculty can explore the affordances of open resources and how they could potentially impact their teaching.

## OER-enabled Pedagogy

This section explores OER-enabled Pedagogy as one example of open educational practices. It examines how faculty can take advantage of open and sharing practices to enhance their instruction. It also addresses how open pedagogical approaches, using learner-generated resources, can potentially enhance student learning.

Open educational practices (OEP), including the use of open resources, have advanced globally across the higher education landscape (Armellini & Nie, 2013). Cronin defined OEP as not only the creation, use, and reuse of OER, but the use of open pedagogies and open practices of sharing as well (2017). Olcott described this potential as “immense” and advised that, though challenges remain in OER expansion, what is required now is a universal mobilization of OER practice (2012).

It has been argued that for the potential of OER to become fully realized, it needs to be accompanied by a radical change in educational practice (Masterman, 2016; Geser, 2012). In a qualitative study of academic staff in diverse disciplines at an Irish university, Cronin sought to understand how university educators perceive and make use of OEP in their teaching (2017). Data that were collected during semi-structured interviews indicated that there is a continuum of practices and values ranging from closed to open. Participants, practicing OEP, were characterized by the following: having a well-developed digital identity; using social media both personally and professionally; using open tools; using and reusing OER; valuing privacy as well as openness; and not having set boundaries between a professional and personal life nor between a staff-student relationship (Cronin, 2017). Open practices were also explored in a study published in 2014, where researchers focused, in part, on data collected from international OEP experts. The authors collected information on how repositories of OER help to promote open practices (Atenas, Havemann, & Priego, 2014). One take-away from the study was that pedagogical objectives should be documented and should accompany OER objects as they are archived in repositories in order to enhance reuse (Atenas et al., 2014). In a study at the University of Oxford,

qualitative research was conducted to explore the relationship between OER and the factors promoting an increase in the uptake of OER (Masterman, 2016). Masterman (2016) reported that one of the approaches necessary to increase uptake is through the encouragement in the use of OER as it aligns with the University's overall objective to develop students as "citizens of tomorrow" rather than dictating that OER are superior educational materials. The 2015 report from the Washington Community and Technical College System indicated that OER appeal to some faculty because they could take full control of course development by harnessing the fluid and flexible nature of open resources, using terms such as 'freedom' and 'liberation' in describing their experiences in using OER (Chae & Jenkins, 2015). However, a contrary opinion in regard to the discussion of open pedagogy is that what might look like a change in pedagogy is actually the result of subject specialists rediscovering the specificity of their disciplinary pedagogy through the lens of content sharing on the web "rather than discovering a new 'open' pedagogy" (Beetham, Falconer, McGill, & Littlejohn, 2012, p. 7). Panke and Seufert also suggested that teaching and learning with OER are applicable to longstanding theories such as Social Constructivism and cognitive learning and are not really a new phenomenon (2013).

Hegarty claimed that something "magical" happens when students become fully involved in the learning process (2015). In the author's article, a "learner-generated" approach to open educational practices is one of eight attributes of open pedagogy (Hegarty, 2015). In another approach, Hodgkinson-Williams and Paskevicius (2012) conducted a study that applied the conceptual framework of activity theory in examining the engagement of postgraduate students in a Cape Town university who worked with OER. The students assisted in reworking the academic teaching materials of some of their professors into open resources. The authors noted a number of benefits to the process of transformation: the materials may be re-conceptualized for a broader, public audience; materials can be uploaded, updated with current and open licenses, descriptive metadata and captivating images; and materials may be made generally more accessible to public audiences (Hodgkinson-Williams & Paskevicius, 2012). Wiley, Webb,

Weston and Tonks (2017) conducted research examining the success of students using OER created by other students regarding impact on student learning. They found that the overall trend of student grades increased in a statistically significant manner during the time frame when increasingly student created OER were added to the course (2017). They did note, however, that only from five to ten percent of the course content was comprised of the student created OER (Wiley et al., 2017). In a paper discussing a move from using open resources to the exploration of open pedagogy, DeRosa and Robinson have discussed how faculty who use openly licensed resources can explore the possibilities of creating new relationships between learners and the information they access within a course (2017). They stated that when students are exposed to the use and reuse of learning resources, they begin to develop a new relationship with resources, one which becomes even stronger if faculty involve their students in the critique and contribution to the body of knowledge with which they are engaged (DeRosa & Robinson, 2017). DeRosa and Robinson (2017) also stated that “open pedagogy uses OER as a jumping-off point for remaking our courses so that they become not just repositories for content, but platforms for learning, collaboration, and engagement with the world outside of the classroom” (2017, p. 117). Finally, in a recent study in post-secondary institutions in New Hampshire, researchers found that students do value open pedagogy and that they believe that it has a greater value than more traditional educational activities (Hilton III, Wiley, Chaffee, Darrow, Guilmett, Harper & Hilton, 2019)

Concluding this section, it is important to note that there is strong confirmation in the literature that a key factor in the expansion of OER and a comprehensive development of open pedagogical practices is the “Open Educator.” Nascimbeni and Burgos provided a definition of an Open Educator as follows:

An Open Educator chooses to use open approaches, when possible and appropriate, with the aim to remove all unnecessary barriers to learning. He/she works through an open online identity and

relies on online social networking to enrich and implement his/her work, understanding that collaboration bears a responsibility towards the work of others (2016, p. 4).

Some of the literature emphasizes the importance of the educator's role in open pedagogy. Nascimbeni and Burgos (2016) also stated that it is the educator that must embrace open approaches in his/her own teaching who will make the difference. In a report on using OER to open up curriculum, Allen and Seaman (2014) claimed that faculty are the key decision makers for OER adoption. Price stated that it is the educator – the person who must initiate and support change – who will perpetuate transformation in order for it to be sustainable (Price, 2015). The research and commentary on this aspect of OER and OEP point to a realization that it is the educator who will make the difference in the end.

## Theoretical and Conceptual Underpinnings

The previous sections of this literature review have focused on various aspects of OER. Included in the review has been a discussion of the many questions about the impact of OER adoption. These questions have been highlighted by the Open Education Group (Hilton III et al., 2016b) and have been used to create a framework specific to OER. Several frameworks have also been used to examine faculty adoption of various innovations and technologies; and the adoption of OER could be explored using one of these frameworks. In addition, various theories around engagement have been used to examine instructional practices using technology. These areas will be explored in this section by first examining the COUP Framework more closely and then moving on to explore a framework appropriate to addressing the adoption of OER as an educational technology.

**COUP Framework.** The COUP framework addresses the principal aspects of education that can be impacted using OER (Bliss et al., 2013b) and focuses on the issues of “cost,” “output,” “use,” and “perceptions’.”The literature provides a considerable amount of research and reporting on this topic, with authors applying the framework in its entirety or in various combinations of its constructs. Research focusing on the four constructs of the COUP framework was covered earlier in this literature review

under the sections entitled *OER Impact on Postsecondary Students: College Costs, Grades, Course Completion Enrollment Intensity* (pp. 4 -12); *Student Use of OER* (pp. 16 – 18); and *Perceptions: Ease of Use and Quality* (pp. 18-21).

Though this research has gone far to address questions about the impact of OER adoption, the literature might be enhanced by considering an additional factor: the concept of “engagement” could be addressed by extending the framework to create a richer picture, especially appropriate to the discussion of exploring open pedagogies using OER. Engagement refers to “the quality of effort students themselves devote to educationally purposeful activities that contribute directly to desired outcomes” (Hu & Kuh, 2002, p. 55). Though the overall concept of engagement encompasses several purposeful activities, the activity of focus that is appropriate for a discussion of OER is the use of institutional resources to impact student engagement in their learning (Hu & Kuh, 2002). Kahn looked at the contributions that students make towards their learning through their time, their commitment, and the resources they bring to their learning (2014). Khan continued his discussion of student engagement in higher education to discuss the realist social theory of Margaret Archer and how it should be considered when creating learning experiences (2014).

In a document reporting on a series of U.K. studies by The Higher Education Academy, a summary was given indicating a positive correlation between student academic engagement and individual student learning, with structure and process (for example involvement in student leadership), and with personal identity (Trowler & Trowler, 2010). As Gunuc (2014) found, there is a significant relationship between a student’s academic achievement and student engagement and that students with a high level of student engagement had higher levels of academic achievement. In fact, in a 2017 study at New York City College of Technology, Cooney relayed that students reported an increase in the satisfaction of their learning experience and in their engagement with course lessons when using an OER rather than a traditional textbook in their Health Psychology course. In addition, in a study focusing on student perceptions of

teaching and learning with OER, another researcher reported on increased student engagement when participating in classes using OER (Rowell, 2015). However, these studies limited the examination of engagement through the use only of OER in higher education courses. The research did not extend to recording data as a result of students actively participating in the creation of OER for their course.

I propose that richer data might be gathered using an extended framework, one which includes the construct of 'engagement' and in applying a treatment where students become active in course resource development. Therefore, in Chapter 4, I propose to extend the COUP framework to include the construct of 'engagement' and then to examine the data in three different treatment groups: the first using a traditional textbook for a course; the second using an OER textbook; and the third using an OER textbook with the addition of curricular activities that include student participation in OER development for the course.

The fifth chapter will be developed as a result of research examining variables that affect faculty decisions to adopt OER in their teaching practices. It can be extended to those faculty who have also taken different pedagogical approaches as a result of the affordances made available through OER. Therefore, a different design model will frame this research and will be discussed in the following section.

**Unified Theory of Acceptance and Use of Technology.** The research for Chapter 5 requires an additional framework to guide the exploration of factors motivating faculty to accept the use of OER by adopting it for instruction. A good number of design frameworks have been applied in technology-acceptance research over the last three decades in order to address the determinants of user acceptance and resistance to new technologies. This is true regarding faculty in higher education and their adoption of technologies applicable to instructional use. For example, Moser proposed a faculty educational technology adoption cycle and discussed the importance of technical support in that process (2017); Porter and Graham have proposed a framework to overcome barriers to faculty adoption of blended learning by applying Rogers' diffusion of innovation to their work (2016); and Cao, Ajjan, and Hong

created a model synthesizing the Technology Acceptance Model, the Social Cognitive Theory, and the Unified Theory of Planned Behavior to research social media applications for educational outcomes in college teaching (2013).

One of the well-known models that explores the acceptance and use of technology is the Technology Acceptance Model (TAM), which has been used extensively in research since 1986 (Ducey, 2013) when it was first proposed by Davis (Davis, 1986; Venkatesh, Morris, Davis, & Davis, 2003). TAM seeks to explain how individuals accept and use new technologies and provides the basis to trace how external variables can influence beliefs and attitudes leading to the intention to use information technology (Park, 2009). Though the TAM has been applied extensively to a vast array of contexts regarding technology acceptance and across numerous disciplines, only a small amount of research has been conducted applying the TAM to understand adoption of OER by instructors or students. Kelly conducted research surveying educational professionals from across the U.S. examining their perception of usability and usefulness of OER (2014). While the TAM provided the framework for analysis, a path analysis approach was used to test model fitness and examine the correlation between the variables (Kelly, 2014). Kim, Lee, Lee, and Shon also applied the TAM framework to examine the influencing factors in OER usage of university students at the Korea National Open University (2015). The authors sought to identify the related factors in adult learning regarding their intention for using OER, while at the same time addressing the relationship between those factors (Kim et al., 2015).

The original TAM configuration has been used extensively, though several extensions to the model have also been formulated and applied to research, commonly extending the scope by adding other variables (Buchanan, Sainter, & Saunders, 2013). In addition, several alternative models for explaining the acceptance of technology have been discussed in the literature (Gangwar, Ate, & Ramaswamy, 2015; Lee, 2013; Slade, Dwivedi, Piercy, & Williams, 2015; Tarhini, Arachchilage, Masa'deh, & Abbasi, 2015). The decomposed theory of planned behavior (Taylor & Todd, 1995) introduced

behavioral control as an influence and behavioral intention to use a technology, which then affects the actual behavior of use. Similar to this extension is the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh, 2003), which introduced ‘facilitating conditions’ that can have a direct influence on use behavior.

Buchanan et al. (2013) indicated that from their research they perceived the UTAUT as one model that incorporates characteristics important for faculty acceptance of technology and is preferable to the original TAM. In a literature review of studies conducted applying UTAUT, researchers found that of the 484 authors whose studies were reviewed, 98% had an academic background, with only a total of ten authors belonging to the public sector or industry (Williams, Rana, Dwivedi, 2015), indicating the appropriateness of the model for educational research.

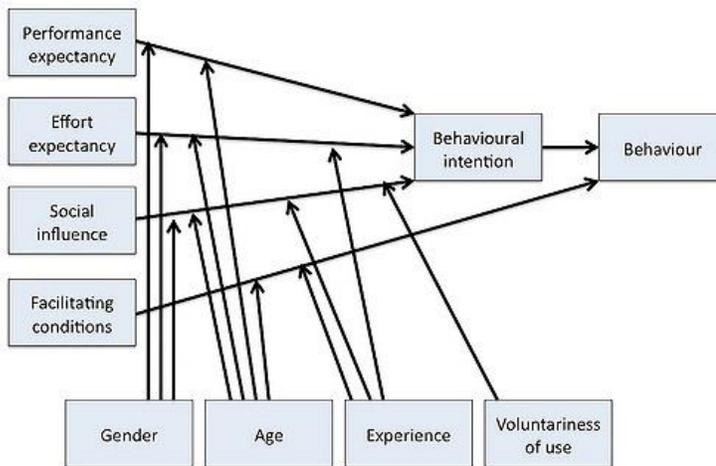


Figure 1. Original Unified Theory of Acceptance and Use of Technology Model

In fact, there are several studies whose OER impact research is built upon the UTAUT, which is a model that combines eight dominant theories or models of technology acceptance, including the Technology Acceptance Model. This model (as shown in *Figure 1.*) proposes that four core concepts – performance expectancy, effort expectancy, social influence, and facilitating conditions – are the

independent variables that influence the dependent variables of “behavioral intention” and then the actual “use behavior” (Venkatesh et al., 2003). The model also theorizes that gender, age, experience, and voluntariness of use all influence the dependent variables through the four main concepts (Venkatesh et al., 2003). One study explored users’ – both instructor and student - readiness to use and contribute to OER by several tertiary institutions in Hong Kong (Li, Yuen, & Wong, 2014) and examined the four core constructs to determine the intention and behavior of using or contributing to OER. Another study that employed the UTAUT model was conducted in East, West, and Southern Africa in order to identify the actual use level of OER by academics and to explain the factors that influence an individual’s actual use of the resources (Percy & Van Belle, 2012). This study used the four constructs mentioned in the previous study but with the addition of ‘attitude toward using technology’ and ‘information quality’ (Percy & Van Belle, 2012). A third study applied the UTAUT model to investigate instructors’ intention to adopt and use OER in higher learning institutes across Tanzania (Mtebe & Raisamo, 2014). These researchers modified the model by removing the influences of gender, age, experience and voluntariness of use (Mtebe & Raisamo, 2014) as did the Percy and Van Belle study (2012).

In reviewing the literature on the conceptual underpinnings for my area of research interest, I feel that the UTAUT is the most appropriate framework to support the design of research for Chapter 1. I will heed Buchanan et al. (2013) and their insight that the UTAUT incorporates characteristics that are important for faculty acceptance of technology.

## Summary

Open Educational Resources (OER) are increasingly playing an important role in opening education in terms of resource creation, distribution, and use as well as in terms of educational practices (Nascimbeni & Burgos, 2016). Their impact is becoming universal in such a way as to support the

expansion of quality education even at a global level (Mulder, 2013). Several researchers have noted the benefits of using OER (Choi & Carpenter, 2017; Wiley, Bliss, & McEwen, 2014) in particular how these resources might support student learning (Senack & Donoghue, 2016; Hilton III, 2016). It has been noted that challenges to adoption remain (Belikov & Bodily, 2016); however, an increasing number of faculty are exploring the use of OER (Chae & Jenkins, 2015) as well as experimenting with open pedagogy (Nascimbeni & Burgos, 2016). Few studies have investigated how student cost savings, learning outcomes, material usage, perceptions, and engagement with resources are impacted when utilizing OER and applying open pedagogy in higher education. So, too, is research scarce in presenting the various factors that have motivated the adoption of open resource practices by faculty who are actually using and creating OER. These research areas will be explored in separate studies through conducting a qualitative interpretive examination of the experiences of faculty and staff as they created an OER and applied it in instruction, through applying an extended COUPE framework to understand how OER can impact and engage students, and finally through applying the Unified Theory of Acceptance and Use of Technology framework to understand factors influencing faculty interaction with Open Educational Resources and OER-enabled Pedagogy. It is my hope that this research will provide a deeper investigation of the topics that could fill a gap in the literature and potentially impact further development of OER and the expansion of open educational practices.

## Chapter 3

### Abstract

This research uses a qualitative interpretive approach to explore the process of developing and implementing an Open Educational Resource within an undergraduate course and experimenting with OER-enabled pedagogy. It provides an accounting of this process, which might prove useful for other professionals contemplating the move toward developing OER. Through data gathered from face-to-face interviews, this research also explores faculty and staff perceptions of this process as guided by the Unified Theory of Acceptance and Use of Technology framework. Data are organized as per the UTAUT constructs pertaining to attitude, performance expectancy, effort expectancy, social influence, technology self-efficacy, and facilitating conditions. Therefore, this research reflects on the experiences and perceptions of faculty and staff throughout the development and implementation process. This research might potentially promote increased use of OER by providing insights into the actual process as well as useful recommendations along the way. Findings indicate that “attitude” and “performance expectancy” can strongly influence faculty to adopt OER and that “social influence” has no effect on adoption. Reflections on OER-enabled pedagogy indicate that it has the potential for increasing student engagement, though this potential has not yet been realized. Findings also provide an outline of recommendations that might guide others when considering developing OER.

Keywords: Open Educational Resources; OER-enabled pedagogy; UTAUT; OER use

### Introduction

Over the centuries, the concept of formal education has been intricately coupled with the idea that books are an indispensable component of that experience. Indeed, some of the first institutions of learning were formed around large collections of materials such as found at the Ashurbanipal Library at Nineveh and the Library of Alexandria (Cubberley, 1902). Modern education has continued to

demonstrate this reliance on books, with an ongoing dependence on commercial textbooks as an integral part of the curriculum (Weller, 2014). In a 2017 survey of faculty, Allen and Seaman found that 68% require a textbook and that 53% require articles or other material. Unfortunately, this practice has shown to have an impact on the student experience in the current higher education context. This is due to the high cost of textbooks, which can potentially prove to be an access barrier to essential educational resources (Brandle, Katz, Hays, Beth, Cooney, Miles, DiSanto, & Morrison, 2019; Ozdemir & Hendricks, 2017; Stein, Hart, Keaney, & White, 2017). In fact, one of the latest cost estimates of textbooks and course materials establishes the price tag at an annual average of \$1230 per student in the United States (College Board, 2017). As of 2017, the U.S. Bureau of Labor Statistics reported that the cost of textbooks rose by 142% over the last decade and a half, which represents a rate that is four times that of inflation. It would seem logical that one response to the untenable cost of textbooks would be that students would elect not to purchase them for their courses. In fact, a 2016 survey conducted by the Florida Virtual Campus found that 67% of students reported not having purchased a required course textbook. In a study published in 2018 by Wakefield Research, 42% of students surveyed said they had avoided purchasing course materials because of costs (Lederman, 2018). Alternatively, students might also explore non-traditional approaches to accessing learning resources. For example, a recent multi-country research project found that legal frameworks do not necessarily guide student practices when it comes to trying to secure learning resources (Czerniewicz, 2016).

Considering this backdrop, it is no wonder that there has been an uptake in interest in the adoption and development of Open Educational Resources (OER) in the last decade and a half. OER are learning resources that are made available at no cost in either digital format or for very low cost in print format. They either reside in the Public Domain or carry with them the necessary Creative Commons licenses to allow for flexible reuse, revision, remixing, retention, and redistribution (the 5 Rs) increasing their flexibility (Wiley, Bliss, & McEwen, 2014). It becomes apparent that OER, providing both free and

flexible access, would be a logical alternative to explore in addressing the textbook cost issue. In fact, much research has explored the adoption of OER in higher education by faculty.

## Literature Review

Several issues have come to light throughout the slow process of OER adoption. Perceptions around the quality and ease of OER use have a definite impact on the adoption of OER, especially as they apply to faculty. A 2013 study of math faculty at a community college found that faculty working with OER generally reported that they viewed the OER material positively (Hilton III, Gaudet, Clark, Robinson, & Wiley, 2013). This view has also been supported in additional research on the perception of quality regarding OER (Atenas, Havemann, & Priego, 2014; Delimont, Turtle, Bennett, Adhirari, & Lindsheild, 2016; Everard & St. Pierre, 2014). Ease of use has been shown to be a critical component in the adoption of OER. Kelly (2014) studied educators' perceptions of OER and willingness to adopt and found that OER must be considered easy to use; otherwise, there was a negative impact on adoption. An additional study conducted through the Community College Open Textbook Project found that ease of use emerged as one of the main factors influencing open textbook adoption (Petrides, Jimes, Middleton-Detzner, Wailing, & Weiss, 2011).

A large amount of research exists that explores both factors that might motivate faculty to adopt OER and factors that might present challenges (Algers & Silva-Fletcher, 2015; Anderson, Gaines, Leachman, & Williamson, 2017; Kursun, Cagiltay, & Can, 2014). Though faculty awareness of OER seems to be on the increase, this awareness does not always result in the adoption of OER (Seaman & Seaman, 2018). In addition to actual awareness of OER, some of the main challenges in the wide-spread adoption of OER include copyright and licensing confusion, limitations due to time constraints, the need to localize materials, technology issues, and the challenge of identifying and implementing sustainable models in support of OER (Mtebe & Raisamo, 2014; Murphy, 2013). Regarding rights, publishing in the digital age can require a shift in the understanding of copyright and the changing nature of publishing and

production tools afforded by the Internet. An example is when dealing with new licensing options, faculty might be unprepared to participate thus resulting in a cumbersome process (Hysten, 2007). Not only might faculty experience confusion about the digital licensing potential, but they must also come to terms with a different way of thinking regarding sharing their work in a global environment (Kursen et al., 2014). In addition, research has reported that faculty do not often have the time required to find OER (Hatzipanagos & Gegson, 2015) or to create the resources (Belikov & Bodily, 2016; Delimont et al., 2016). Localization of OER is a most important aspect of OER yet is often one of the least understood (Wiley et al., 2014). Materials shared globally may need to be translated, not only in terms of language, but also in terms of cultural context, in order for them to be appropriate for a new setting (Ivins, 2011; Krelja Kurelovic, 2016). Technology issues can also present barriers, both in terms of the infrastructure needed to access and share resources and in terms of creating resources using a format that allows for retention, reuse, revise, remixing, and redistribution (Okada, Mikroyannidis, Meister, & Little, 2012; Percy & Van Belle, 2012; Wiley, 2014). Mtebe and Raisamo (2014) have also noted that faculty reported lacking the skills to create and/or use OER and recommended providing training and support to understand digitally accessible design and formatting of materials. Finally, developing and maintaining a sustainable model for OER need to be addressed, one that encompasses technological infrastructure, organizational support, and guiding policies (de Langen, 2013; Downes, 2007; Ganapathi, 2019). Stacey (2013) concluded that as OER use becomes integrated into educational practices, the source and form of public support must diversify to include government funding, individual investments, as well as support by foundations.

The literature provides research examining faculty who speculate on OER adoption. Some researchers have found that motivation to adopt OER appears to be largely intrinsic and that faculty want to share their resources for the benefit of others (Algers & Silva-Fletcher, 2015; McKerlich, Ives, & McGreal, 2013; Pawlowski, 2012). Faculty are also motivated to adopt OER in order to cut costs for students and to enhance educational equity (Belikov & Bodily, 2016; Tillinghast, 2015). Other researchers

have found that faculty are motivated to adopt OER in order to pursue pedagogical freedom (Chae & Jenkins, 2015; Dermody, 2019).

A more recent movement in the consideration of OER adoption is how these resources play a role in the further development of open educational practices (OEP) and how these practices can potentially enhance student learning. Cronin (2017) defined OEP as the creation, use, and reuse of OER as well as the use of open pedagogies and open practices of sharing. One of the first discussions of OEP was put forth by Ehlers (2011), who described a second phase of OER development whereby there is a shift from a focus on OER as merely resources to a focus on how they can promote open educational practices. But Ehlers (2011) reminds us that the whole OER governance must include a community of policy makers, administrators of organizations, as well as both educational professionals and learners. In a paper discussing how open resources support the exploration of open pedagogy, DeRosa and Robinson (2017) reported that when students are exposed to and engaged in the use and reuse of learning resources, they can begin to develop new and deeper relationships with the resources, relationships that can impact their learning.

Since the term “open pedagogy” has become associated with OER in recent years, and in order to avoid confusion, this research used the term “OER-enabled pedagogy” as defined by Hilton III and Wiley (2018) as “the set of teaching and learning practices that are only possible or practical in the context of the 5R permissions that are characteristic of OER” (p. 133).

This study reported on faculty and staff as they shared perceptions of their experiences in creating OER, implementing it in their instruction, as well as experimenting with OP.

## Methodology

The literature does not provide in-depth research on faculty who have already adopted OER and who may be experimenting with open pedagogies. Nor does it provide research detailing the process of

OER creation and application within a course, though some research exists examining the remixing of resources (Mallinson & Krull, 2015). An accounting of this process might prove useful for other professionals contemplating the move toward OER creation by providing insights into the actual process as well as useful guideposts along the way. This knowledge could, in turn, be used to promote greater use and development of OER, which, in turn, could potentially support greater student access to learning materials and subsequent success in higher education. Therefore, the focus of this interpretive research was to explore the experiences and perceptions of faculty and various staff at the higher education level as they initiated and developed an OER for an undergraduate course and then applied the OER to instruction. The latter included the application of OER in one course that began to explore OER-enabled pedagogy with undergraduate students.

This study applied a qualitative interpretive approach to explore the perspectives of faculty and staff engaged with the development and application of an OER textbook and OER-enabled pedagogy at an institution of higher education. Qualitative data were collected through semi-structured interviews conducted with faculty, graduate assistants in the role of resource developers, an OER Technologist, and instructors to give light to the perspective of developing an OER and in moving from teaching a course using a traditional textbook to teaching a course using OER and then applying OP. Understanding gained from this study should fill a gap in the literature in regard to developing OER and applying OP and potentially provide data to support further expansion of OER and OP. A total of eight interviews were conducted with participants representing the various roles involved with the development and application of an OER for one specific undergraduate class at a research-intensive university.

## Participants

Two faculty members had been involved in securing a university OER Initiative Grant (<http://oer.hawaii.edu/projects/>) beginning in 2017 and organizing and guiding the overall development of a textbook for their academic area. GAs, acting as resource developers, worked on adapting or creating

detailed information within the text under the guidance of the faculty. An institutional OER Technologist provided expert instructional design and resource development support as well. Instructors implemented the OER textbook and provided feedback to enhance later modifications of the textbook. One out of the three instructors teaching the course experimented with implementing OP activities within one class. An exempt status IRB approval was secured for the study.

## The UTAUT Model

The research model was guided by constructs associated with the Unified Theory of Acceptance and Use of Technology (UTAUT) framework (Venkatesh, Morris, Davis, & Davis, 2003). The UTAUT framework is based on core constructs that determine the intention to adopt a specific technology - performance expectancy, effort expectancy, social influence, and facilitating conditions – and on moderators that might influence adoption. The UTAUT model was developed through the analysis of conceptual and empirical similarities of eight competing technology acceptance and usage models (Schaper & Pervan, 2007; Venkatesh et al., 2003). The original UTAUT framework also included the constructs of attitude and Internet self-efficacy and were incorporated into the framework (see Figure 1).

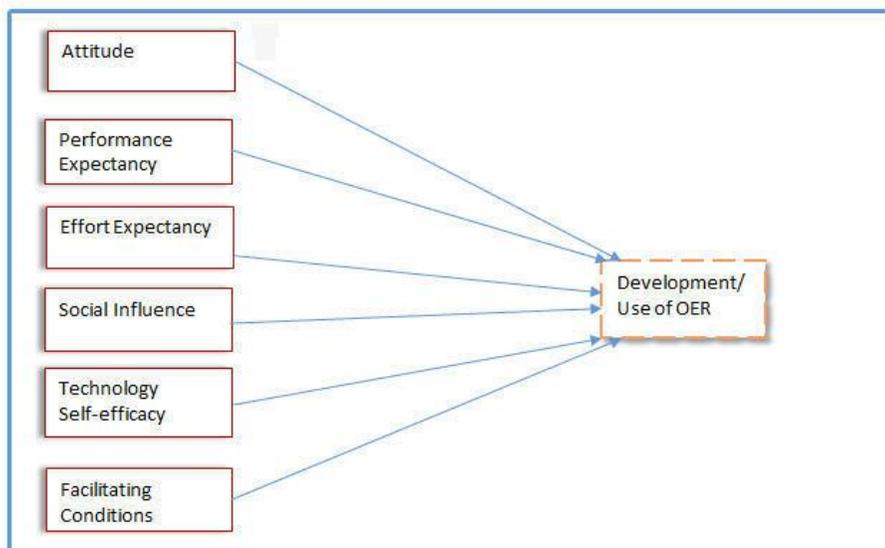


Figure 1. Modified Unified Theory of Acceptance and Use of Technology Model

This framework has helped to guide research exploring different aspects of technology acceptance in the context of open access adoption studies and open practices (Dulle & Minishi-Majanja, 2011; Kandiero, 2015; Li, Yuen, & Wong, 2014; Mtebe & Raisamo, 2014; Percy & Van Belle, 2012). Several of these authors have indicated that the UTAUT framework has proved consistent as a model, with high validity and reliability (Percy & Van Belle, 2012) and is robust in predicting the acceptance of a new technology as compared to other models (Li et al., 2014). Though this model has primarily been applied to research investigating potential acceptance and use of a technology, it is also appropriate to apply the framework as a guide in exploring the process of development and adoption of a technology because it examines influencing factors.

## Research Question

The research question explored in this study was as follows:

What are the perceptions and experiences of faculty and staff in the development of an OER, in instruction introducing the OER, and in the application of OER-enabled pedagogy in an undergraduate course?

## Instrumentation

One instrument was developed for this study, which encompassed four different groups of participants representing the roles of faculty, OER technologist, resource developer, and instructor. Questions varied as appropriate to the role. The instrument consisted of semi-structured interview questions with a guiding interview protocol.

The interview questions referenced those developed by Jung and Hong (2016), who examined instructional priorities for adopting OER, general OER questions developed by the OER Hub, a unit in the Institute of Educational Technology at The Open University, and (with permission) questions focusing on

the constructs of the UTAUT framework referenced from the work of Dulle and Minsihi-Majana (2011) and Venkatesh et al. (2003). The instrument was pre-tested with a subject matter expert.

## Data Collection and Analysis

Qualitative data were gathered through semi-structured interviews with the faculty, the technologist, the GAs as resource developers, and instructors who were involved throughout the project. Data were transcribed professionally and later approved by interviewees. Passages in the text were identified and coded. These codes were then categorized thematically, referring to but not restricted by the UTAUT framework. The narrative developed from the data was then sent to participants for final review and feedback.

## Findings

Findings for this study were organized in two ways. First, the experiences of the faculty and staff as they moved from the initial conception of the OER project through the development and application in instruction were recorded in a narrative format to more clearly explore and present those experiences. Secondly, findings and the emerging themes were then organized by and recorded through the lens of the UTAUT framework. Insights from the findings were translated into recommendations in order to provide a guide for subsequent OER development.

## Development and Application of the OER

**Inception.** This project was conceived through a visit to the campus bookstore. The lead faculty knew there had been an edition change in the main textbook used for the course. To prepare for the upcoming semester, the faculty visited the bookstore to pick up the new edition. She reported being “appalled. It was \$130 for a book that didn’t have any binding, no cover, and it had two sets of page numbers!” She didn’t think she could ask students to work with such an obviously “awful” textbook:

“Ultimately, I was embarrassed that I was requiring my students to pay \$130 for a book that had two sets of page numbers and didn’t even come in a binder.” The faculty immediately emailed the campus OER Technologist to find a solution.

The technologist suggested that the faculty apply for a campus OER grant offered through the Outreach College (<http://oer.hawaii.edu/projects/>). With the help of the technologist, the faculty applied for and was awarded the grant, at which point, the faculty identified a team that would become responsible for the development of the OER. The team would ultimately consist of the lead faculty, a support faculty, who had previously taught the course, the OER Technologist, and two graduate assistants, one who was partially funded by the OER grant award and the other who was completely funded by another source.

The goal of the project from the faculty members’ perspective was to develop a free resource that could be shared and that was as good as or better than the customary commercial textbook. Also, the faculty wanted a resource that was “placed-based and more appropriate for the Hawaii student population.” One of the GAs who assisted with the project understood that if the resource was free, “no student would be hindered from taking our course” and that the resource “could be used on our campus and on other campuses as well.” One faculty related that he was excited about “actually producing something where we had control over the content” and that could be updated with current nutritional information. In addition, the technologist was excited that this project would possibly be “the proof of concept for additional OER creations and adaptations – to show what was possible when the content is open.”

**Development.** The actual work began in January 2017 as the faculty “dove in.” After the first GA was hired, weekly meetings became the norm and then continued for the year during the development phase. As discussed later, these meetings became a critical component of the workflow and helped to

“ensure a successful product.” The GA reported that the first order of business was to “brainstorm everything. So brainstorming, figuring out ... what was the mission for this book, what were our goals ... then outlining the chapters ... before beginning to research.” The technologist relied on his background as an instructional designer to provide guidance in the overall design of the resource. “I followed a fairly typical instruction design approach ... that involved looking at the syllabus, the course outcomes ... the student learning outcomes – the end point – where the students would need to be at the end of the course.” They first looked at how the commercial textbook was organized in terms of structure and sequence of topics. Then the team “made a version that was based on how [the faculty] wished the course would be ... and how best the book would look like for [the topics].”

After the initial brainstorming meetings, the faculty members’ role became to first “organize the sequence of topic areas” and then “find OER resources that were already out there ... judging which ones best fit the level of science that we were teaching and were reliable and seemed to be sound, based on the knowledge base.” Along with the GA, they conducted preliminary searches of potential OER in the field of nutrition. The GA mentioned that this process was challenging because “there wasn’t a lot of current OER material to choose from.” However, the team was assisted in this phase by the OER technologist, who was able “put a lot of [material] in front of us.” They were directed to existing Flat World Knowledge (<https://catalog.flatworldknowledge.com/>) and OpenStax (<https://openstax.org/>) resources, which provided an initial base and a springboard for further exploration.

The supporting faculty acted in a “consultative” role by “trying to help keep things on track and giving perspective on things” as well as “reviewing some of the material and giving feedback on the content.” Throughout the process, it was necessary for someone to take a key role in leading the OER development. The lead faculty fulfilled this role by “ultimately being the one responsible to see [the project] from start to finish” and “then when the OER grant ended, I used our summer institute money to support our graduate student to finish [the OER].”

The GA reported helping with the “basic outline of the textbook, and then actually finding the content or writing the content if it wasn’t available.” At this point the GA would rely on other OER textbooks and would “go into copies of the books (selected by the faculty) and copy whole chapters at a time, or whole sections at a time” before editing for the team’s purposes. As the content started emerging, the GA was also aware of the need to provide a consistent tone and similar structure throughout the material. Throughout the process of developing the resource, the faculty members would rely on their expertise in the different fields in nutrition to provide feedback as the resource unfolded. The GA shared, “They were able to contribute to make sure that we had the key points correct ... as a lot of nutrition books seem to have wrong information.”

After the first semester, there was a change in graduate assistants. The newly hired GA brought fresh eyes to the project. Whereas it was thought that the new GA would “be able to skim through and quickly read the material and that we could just move on,” instead they found that “there were a lot of things missing that we really wanted to include” like making sure that “every chapter there has a connection to something ... that relates to Hawaii or Pacific Islanders and a quote in the beginning of every chapter.” This GA was also responsible for finding openly licensed photos and images, which became “a huge, time-consuming factor.” She ended up creating from 60 to 70 figures, which slowed the development phase down considerably. In addition to reviewing, reworking, and creating the material, the GA position was also responsible for creating the accompanying PowerPoint slide decks to be used during instruction.

As the resource more fully formed, chapters were assigned to various faculty members with different areas of expertise for a final review. At this point, the technologist organized an outside review by working with the Rebus Project (<https://projects.rebus.community/>), which provides a community of collaborators with publishing guidance for OER projects. Through this project, the resource was reviewed

by “subject matter experts from a couple of different institutions ... and [by] different copy editors ... to look for tone and consistency.”

Up to this point, the resource had been developed using Google Docs as a collaborative workspace for the team. “Chunking out the content, being able to comment and make suggestions was done more easily in Google Docs.” The team was then ready to migrate the draft of the OER to a platform that would provide the “technical openness” needed to allow the greatest access to and reuse of the resource. The university subscribed to PressbookEDU (<https://oer.hawaii.edu/tag/pressbooks/>). Pressbooks provided a do-it-yourself book design and production software, the platform that the university promoted for OER development. Most of the work had previously been completed in Google Docs, so only about 5% of the resource needed to be finished at this point. However, as the technologist shared, “Once you’re in Pressbooks, the process [of developing the OER], the workflow, is not as streamlined, not as smooth. ...The biggest surprise was working through the best way to bring the content in [to Pressbooks] ... and eliminate the extra formatting that was associated with ... the Google Doc.” Throughout the transition to Pressbooks, the OER technologist served as “the technical support person showing the faculty leads and the GA ... how to work with the software to make the content” in the new platform. Once the resource resided in Pressbooks, a reevaluation was made of the chapter information and length. The team also worked with the Pressbook templates “to try and figure out what’s the best style for reading the content.” It was in the Pressbook development phase where the team began “doing the real aesthetic things of making sure the references looked fine or fixing tables.” More work with the images occurred at this phase, especially working with the “resolution [in order to] to print well, and to display well.” The team also needed “to add in alternative text ... for accessibility.” The final stage also included sharing the resource beyond the boundaries of the university. The OER technologist “shared it over Twitter, over social media, and emailed it to a couple of different listservs, and sent it to a few folks ... who were waiting for the book.”

**Transition into instruction.** As the OER moved forward and was readied for instruction, the three instructors became more involved. They, too, agreed that one main goal in creating the OER was to save students money. One instructor shared that there was a feeling of being “alarmed and maybe somewhat disappointed with rising costs of higher education, and you know, just the feeling of inequity that that can cause and the barriers it causes for our students.” Another instructor added that a second goal was to localize the textbook information because “we have a ... really diverse student body, and I think it’s helpful for students to see familiar foods and things and people that they can identify with in the course materials.” In other words, it was important to offer a textbook with “localized foods and knowledge” of Hawaii and the Pacific. Finally, one instructor shared that she understood an additional goal was to create a textbook that could evolve over time and be regularly updated.

In the process of transitioning to a new instructional resource, the instructors reported that there “wasn’t much of an impact [on their workload] ... just updating links on ... a personal website.” For one instructor, it took a little more effort to begin working with a new set of PowerPoint slides that accompanied the lectures. These had been updated by the GAs in preparation for the roll-out of the OER. One instructor reported that the “impact was really positive. It feels so nice as an instructor to say, ‘We have this free resource for you.’ ...The textbook has such beautiful photos and even some of our faculty are in it. ... It feels so relatable. I feel more connected to it.” Another instructor reported, “a bigger impact [was] I felt good about the way the information was being shared to students and the fact that it was free, that they could have access to this textbook even after the course is over... So, I think part of my mission in the work I do is not just to educate students but to have a healthier kind of community ... and to share with others who might be interested in this material.”

When comparing the commercial textbook that the instructors had been using for this course to the new OER textbook, some comments reflected that the commercial textbook provided supplementary

materials that “were pretty convenient” and that “the book had really nice figures and graphs... [though] I didn’t like that [the book] was not as relatable to Hawaii.” This instructor shared that “I think it’s always beneficial to students to feel represented in the materials they’re learning from.” In considering the student use of the commercial textbook, one instructor commented that “I got the sense that most [students] weren’t purchasing or they were purchasing the older, used copy that may not have had the same tables [as the version used by the instructor].” Another instructor referred to the commercial textbook to say, “I didn’t follow the order of the textbook because it didn’t really make sense to me.” One instructor stated that “I wish the [OER] did have more tables and graphs and pictures ..., which I think is good for students.” Another instructor lamented that standard nutrition textbooks at this level don’t address an important current issue and wished that the OER incorporated a unit on “health at every size” but recognized that with the OER “it’s something that I think could be added.” But in general, the instructors “thought it was very well-written ... very well done ... and very interesting to read.” All instructors mentioned liking “the online format ... because no one had to carry around a book.” They could also easily “link the chapters in the syllabus” and quickly go right to a chapter in a lecture. Best of all, since it was online, one instructor indicated that “Really, it doesn’t give students any excuse for not doing their reading.”

**OER-enabled pedagogy.** One instructor was involved in creating a student assignment that represented the first step in the goal of developing a unit that she felt was missing from nutrition textbooks at this level. Her overall goal was to begin to develop a unit on the concept of “health at any size, body positivity, and size diversity.” Realizing that this goal would unfold over several semesters, she began by involving students in research in this field, research that would later appear in the textbook. “I was able to create an assignment for the students [on this topic], and on how to use the library database, and how to look up peer reviewed journals under [this] topic that were not in the book yet.” She continued by saying, “The whole premise of the class is that we’re teaching evidence-based

recommendations and information. To have them try to find research, read it, and connect to a topic we were developing. ... All of that was new for many of them.” The instructor continued by saying, “Many of the students are not science majors. So, this is their science exposure. To get them a little excited to know this is part of the research [process] and they’re contributing, and that it might make a difference. I felt that was very cool.”

In terms of the impact of this approach on instruction, the instructor shared that “students are taking part in deciding what is important, and making those decisions, and developing those critical thinking skills about maybe what ... their textbooks have, or don’t have, or that they wish it did have ... or make sense.” The instructor continued by saying, “they have ... that student eye, ... and we’re trying to develop them into these critical thinkers who can look at evidence and determine ‘Is this worth putting in a textbook, or no?’ ... It’s creative, and it makes a lot of sense.”

In discussing the place for OER-enabled pedagogy at the undergraduate level, the instructor felt that if the concept and activities were presented well, “the students could really get excited about it. They’d say, ‘We’re going to see what’s new in this area. In the field of nutrition science, things are changing over time.’ It’s something that we’re teaching, but [the students] can actually be a part of it, which is pretty exciting.”

## UTAUT Constructs with Emerging Themes

The following section reviews the data using the structure of the UTAUT framework in order to explore the perceptions of the OER team as they developed and applied the resource in instruction. It also provides data on the perception of OP as applied in the context of this study.

**Attitude.** This construct refers to an individual’s feelings – both positive and negative – towards the use of a technology (Fishbein & Ajzen, 1975) and includes domains such as altruism, intrinsic behavior, satisfaction, and enjoyment gained when using a technology (Vallerand, 1997). An assortment

of responses was reflected in the interviews: the feeling of pride at how beautiful the resource turned out; the hope that the resource would inspire people to love nutrition and become interested in the field; and the feeling of personal reward in creating such a useful product. However, three main themes emerged from the data: 1) pride in localizing the information; 2) the conviction that students were being served; and 3) sharing of the resource was part of the overall goal.

*Pride in localized information.* One of the faculty shared, "... the other thing that we prided ourselves on ... is keeping in mind [our university] is a land grant, state institution. Two thirds of our students come from here. So, we really try to be mindful of that and have the place – our community – reflected in the textbook... with Hawaiian values and examples... You wouldn't get that in a traditional publisher's textbook." One instructor also shared that "I think professionally it feels good to see a textbook, and say, 'I really think that my region, or my community, is represented in this textbook.'" A number of the interviewees remarked on their feeling of pride that the content "is current and culturally appropriate" and how it would "lend to the students' sense of pride" as well.

*Serving students through free access.* One instructor, who had recently been a student herself, relayed that "the personal satisfaction I get is just knowing that I have students who are probably helping their families to pay rent, or a mortgage, or bills... If I can help to offset that by having this resource available, then you know, they feel more supported in their education. I think it goes back to equity... and how we are not all privileged." Another instructor agreed, "... on a personal note, it just feels really good to know that I can support students in this way." This instructor continued, "I do know that the students feel supported so that's a piece [of this project] too. It's like an investment in the students – that they are the reason we have this job. ... The students view me as maybe a better teacher or a more caring teacher." One faculty relayed the feeling of altruism and "personal satisfaction ... in knowing that the resource is going to benefit students ..." unlike faculty outside of the project who advised him to just

“Do a textbook, and go to a publisher, and make money.” But this faculty stated, “That’s not the way I was viewing it.”

**Sharing part of the goal.** One faculty member reflected on the idea of sharing the OER they were developing, “... I would be honored to share the OER ... it’s part of the big objective that this be used elsewhere, too.” In fact, participants representing all roles of the team echoed the same thought. One GA spoke about her work as a resource developer, “I definitely have a sense of pride in what we created. It took a really long time to actually make, and so the fact that I think that we’re using it, not only in the state of Hawaii but all across the United States, I think it’s definitely a very rewarding experience, and I’m definitely proud of the work that we put in to create the book.” The technologist relayed that they “put the most liberal open license on it. Because we want this content, and this book, to travel as far as possible.” One instructor thought the idea of sharing was “brilliant and really speaks to a collaborative way of working instead of being competitive with each other. ... It feels like a win-win for everyone.” Another faculty discussed how “collaboration is becoming more and more accepted and working in ‘team science.’” As one instructor pointed out, “... someone else can benefit [from having the resource] and adapt it, and then we can see their adaptations, and incorporate them into our resource as well ... and maybe strengthen the work.”

**Performance expectancy.** This construct focuses on the degree to which an individual perceives that using a system or technology will help in attaining a gain in job performance and can include the concepts of perceived usefulness as well as extrinsic motivation and relative advantage (Venkatesh et al., 2003). Those interviewed perceived that the application of the OER afforded benefits for students, control over content, and professional recognition.

**Benefits for students.** Through the interviews, several benefits to students came to light. Data indicated that the OER benefited students in terms of equity and accessibility when an OER was employed

by both removing the cost barrier for the resource and by opening up forms of access. An additional benefit to students was perceived to be incorporating local culture and, therefore, offering information in a more relevant context for students.

Equity of access was important to the team. When discussing the commercial textbook that had been used in prior semesters, one instructor shared that “I don’t know that all of the students purchased the textbook when they had to buy it.” Another instructor commented that the number of students in prior semesters with an access code to the material was “probably unequally distributed.” One GA commented on the importance of making access to the resource less expensive and “it was really so that no student would be hindered from taking our course because there would be no cost to the textbook.” One instructor felt that the OER was “innovative and promoting ... student equity and diversity.” In addition, another team member spoke about how having the course textbook “can definitely affect [student] learning ... and students are going to be more engaged in the overall course because they can afford the book.”

Flexibility in access was also seen as a benefit to students. One faculty mentioned that, besides being free, one of the main benefits on an OER was “being able to view it on the web and then also download it in multiple formats.” Several other team members mentioned that some of the beneficial aspects of the online format were that students didn’t have to carry around heavy books and that offering an OER made a positive environmental impact. The OER Technologist also mentioned that “hundreds of students go through this course every semester. ... and they know that they will always have access to the book,” which is especially advantageous to those students majoring in the field of nutrition.

The team also felt that by offering a resource that was place-based – localized – student learning was enhanced. One faculty shared that, through experience, it had become evident that “the place-based aspects of [a resource] help someone relate to material and typically enhance learning.” Several of the

instructors felt very positive about offering the localized and culturally correct OER and noted that students provided positive feedback about the book. “Some students had told us that they loved how they could really relate to it.” One faculty member was excited about potentially “bringing in more local students [to the program], more Hawaiian students, who want to become dieticians, who want to enter the field of nutrition.”

***Control over content.*** The flexibility to revise and update the OER as allowed by the Creative Commons licenses was considered an important educational strength. One faculty felt that one of the motivating factors for creating the OER was “the concept of actually producing something that we had control over.” This faculty member later remarked, “I like the concept of having something that we can have in-house control over. It evolves as we use it, we should be able to improve it and change it and pass it on to the next generation coming along. It’ll just get better and better if we do it right as time goes on.” This same faculty also remarked that “teaching with [the OER]... will help to improve it and therefore enhance my instruction.” One GA was excited about being able to “get the correct information out there ... because nutrition is such an important thing in people’s life. ... It’s great that we’re able to edit it constantly, as material changes, because science is constantly changing.” The OER Technologist recognized the flexibility using an OER offers: “... it opens up the possibilities of what [faculty and instructors] can do with the book when they know they can change it, when they know they can edit it... It’s like being liberated ... and being given these freedoms to change the content and get hands on and actually publish something.” This aspect was also exciting for one instructor, who envisions plans to create a unit that is usually not addressed in most introductory nutrition books and who described the OER as “a living textbook.”

***Professional recognition.*** A range of professional gains were shared by the OER team. Though one faculty didn’t know if work on the project would be beneficial to promotion because no institutional

recognition is given to scholarship when developing OER, another faculty felt that the campus promotion and tenure committee “saw the value” in the work done on the OER because promotion had been awarded. Because the OER technologist was able to provide this faculty member with use statistics “on how it is being adopted ... and give me the numbers for how many hits and have that be a comparison to all the other OER books [in use on campus]. So, I think that was helpful [for promotion] to just have that data.” One GA felt that the experience was rewarding, as one of her goals was to gain more experience with online instruction and helping to develop an online resource helped. Another felt the team’s work on the OER was viewed as “positive ... and I feel like we are recognized [on campus].” This GA, who was later hired by a prestigious private school after her graduation, also shared that “in terms of my own job ... I think a big reason why I was a good candidate for the job I just got is because I actually was able to have this on my resume – that I had helped to create this free textbook that is now being used, not only at the UH Manoa, but also across the nation as well.” Finally, the OER Technologist shared that developing the OER was a positive “proof of concept to show that our workflow ... was going to guide us in producing a high-quality, well-fit book for the course.” The technologist continued that “we’ve been given kudos on mailing lists and ... personal emails. ... The lead on the project has gotten 17 or 18 different faculty [requests] from different institutions that have all reached out indicating that they were interested in adopting [the OER].” (One final note is that the OER Technologist was later awarded a 2019 Exemplary Employee Award in the Outreach College for work done regarding OER.)

**Effort expectancy.** This construct refers to the degree of ease associated with the use of the technology or system and refers to ease of use and complexity (Venkatesh et al., 2003). It is applied in this research as the ease of developing the OER and applying it to instruction. Themes that emerged related to 1) the challenges in developing the OER, and that there were 2) minimal challenges in instruction.

*Challenges in developing OER.* Numerous challenges came to light during the interviews: time needed for resource development; securing supporting funding; finding and adapting content; and creating graphics.

Surprise was echoed from all team members in regard to the amount of time it took to fully develop the OER, which was identified as a major challenge. As one GA mentioned, “The idea of an OER textbook, a free textbook, sounds great, but when you are actually doing a lot of the work, ... you realize how much work it really is!” One faculty mentioned that what they assumed might take two semesters actually took almost 1 ½ years. Another faculty shared that it was “personally a major challenge finding enough time to put into [the OER].” An instructor also mused about “the difficult balance of responsibilities ... to develop [the OER] ... to put the time into the book in terms of revising some things and tightening things up a bit.” The OER Technologist shared that the only negative aspect about developing the OER was the “uncertainty of how much work would have to go into the book, to meet the standards, to meet the expectations of the instructors. ... It wasn’t that we weren’t going to meet the goals. It was just the uncertainty of how long it would take.” The technologist continued that the time factor was influenced by typical academic cycles that would slow the work down. “So, maintaining consistent progress over the course of the academic year” presented challenges.

In addition to recognizing direct costs of developing the OER, other indirect costs were acknowledged. Though a grant had been awarded to initiate the development of the OER, the lead faculty shared, “When the OER grant ended, I used our summer institute money to support our graduate student to finish [the OER].” This faculty estimated the total cost for the GA support for the entire project as \$27,000 and further speculated, “Everything else came through our time – [the time of the faculty and the OER technologist] ... so maybe [costing] a total of at least \$60,000 to \$80,000.” The faculty also

pointed out that “this cost does [not consider] the technology” provided by the university: the Google Suite and the Pressbook platform.

Creating quality and engaging content posed its own challenge. One of the GAs mentioned that “the major challenge was that there wasn’t a lot of current OER material to choose from. So, we did have to write some of it [and then to] adapt some of it to our textbook, ... and writing content, of course, is just very time consuming.” When reviewing the first draft of the resource, one GA reported, “... as I went through [the OER] again, we realized that there were a lot of things missing that we really wanted to include. For example, we made sure that in every chapter, there was a connection to something in the introduction that relates to Hawaii or Pacific Islanders.”

In addition to creating content, designing appropriate figures became an additional challenge. Faculty, instructors, and GAs all related the importance of clearly designed graphics to support learning. One GA shared that “it is so important, in terms of a science course, for students to be able to really see a bigger picture ... and show the pathways [of concepts].” When it came to try to find these important graphics, the GAs faced new difficulties: “another really challenging part that we found, especially because it’s a science-related textbook, is the figures. They all had to be openly licensed, and we couldn’t find any figures that portrayed whatever we were trying to show in a particular way.” One GA shared, “I actually had to create everything on Google Draw ... and I think that was the biggest challenge that we faced.”

*Minimal challenges in instruction.* One instructor mentioned that the transition to using the OER “didn’t really have much of an impact on me ... other than we just had to change the syllabus for the reading. That was it.” Another instructor shared the same sentiment: “the very immediate impact was just updating things. Updating my course website, but that’s pretty small.” A third instructor shared that “I was more impacted when the PowerPoint slides changed” as she taught from the slides. All instructors

interviewed felt that rather than presenting a challenge, the resource provided a benefit as discussed through performance expectations.

**Social influence.** This construct represents the degree to which an individual perceives that important others believe he or she should use the system. It includes concepts of social factors, subjective norm, and image (Venkatesh et al., 2003).

There was no one outstanding positive social influence identified by the team members. In fact, the lack of social influence was noted more prominently, indicating a negative social influence. For example, one faculty mentioned, “I’m not necessarily sure, or I don’t really have a sense, that the department or the college really has a sense of pride over [the OER project]. ... I don’t necessarily feel as if the department or the college really values the benefit that we’re bringing.... I don’t necessarily think that the value system [of the college] is in line with the OER community value system.” One instructor observed, “I’ve come to understand that not all faculty ... have the same feeling because commercial textbooks can have other ... teaching materials that go along with textbooks.” No team member mentioned outside social influence that could be described as a positive influencing factor.

**Technology self-efficacy.** This refers to an individual’s personal belief that he or she possesses the aptitude and skills to succeed when engaging with a technology (Moghavvemi, 2014). For this research, this concept applies to the technical skills needed to create the resource using appropriate technology and also the technical understanding of open publishing such as to assign the open licenses needed for OER.

**Skills needed to create resource.** “You definitely have to have a pretty solid set of technology skills, I think, to able to create [a textbook].” This statement by a GA summed up the team perspective about necessary technology skills. One interviewee had not worked with Google Docs before the project and indicated, “It’s a little awkward at first ... with the commenting and editing process” but then shared

that “it wasn’t a big hurdle after some trial and error” and with support from the technologist. Participants who had prior experience working with the platforms found little technology challenge working on this project.

As mentioned, a major challenge evolved when trying to find copyright free images and realizing the need to create original images for the OER. The GA responsible for this task shared, “I had to end up creating all of the figures that were used throughout pretty much the entire textbook, which was very, very time consuming and difficult because I didn’t really have much experience with that. So, I actually had to create everything in Google Draw. And so, because I’m not a professional, I think that it was definitely the biggest challenge that we faced and what took the greatest amount of time.”

***Understand open source publishing.*** When asked how the skills brought to the project by the OER Technologist contributed to the overall development of the OER, the team, as a whole, felt those skills were critical. In fact, the technologist shared, “I don’t think that I would have been able to get this done in the same amount of time, if I wasn’t familiar with open source software and open content and copyright. My technical skills and my knowledge of copyright law have made this process so much more straightforward.” One GA shared how crucial it was to have “someone on the team who knows how to find the open content and work with the technology to put [the OER] together.” One faculty member summed up the importance of having someone involved with the project with the needed skills: “So, I think that maybe the other thing is not only having the confidence in yourself to know how to do it, but having confidence to know who to go to in order to find out how to do it. I think that, just as important as having the skills, is just knowing that you know who to turn to and that somebody is there.”

***Facilitating conditions.*** This is the degree to which an individual perceives that infrastructures are available for support. Factors discussed here include the financial, technical, and platform infrastructure to support OER development and use.

*Institutional support.* One important institutional step in supporting OER development is through a program such as an OER Grant Project (<https://oer.hawaii.edu/projects/>). When asked how important the grant program was to the success of this OER project, one faculty member replied, “100%” and the other commented, “I think it had a big impact on the decision ... I don’t think we could have done it without the grant.” As the technologist pointed out, “[The faculty] are pulled in so many directions that unless they’re compensated in some way that makes sense, many of them are literally unable to do this on their own.” Institutional support also came in the form of having the suite of tools available with which to create and then host the delivery of the OER. A final form of potential institutional support was mentioned by the technologist: “having policies in place for tenure and promotion, that value OER production as a scholarly output. That OER ... should be counted for what they are. And in most cases, it really is like serious scholarship. It is real work that gets done.”

*Team support.* The interviews brought to light how very important a team approach became as the OER evolved. The OER technologist shared, “if we had a small [consistent] team, a small crew of people that all know how to do [the publishing tasks] ... that would make it so much easier.” Many felt weekly meetings were of key importance. One GA shared, “I had very good support. Every week we met with the technologist and the faculty in the department as well. ... I got a lot of feedback from them, and I could also ask them questions to make sure that the book was up to their standard ... so it really was a team. We made decisions together as a group.” One faculty recognized the importance of “having the technologist and the graduate assistants because they were the work horses [of the project].” This faculty went on to say how important it was to have an OER technologist as part of the team: “I would say [the technologist] was probably one of the important [members]. [The OER] wouldn’t have been done without him.” One faculty, realizing the need for a team leader, took the role as lead on the project. This faculty “solicited support for the project” and “figured out ways to finish it up because I was committed to making it complete ... because I believed in it enough.”

**OER-enabled pedagogy.** Though only one team member, an instructor, had actually applied OP in instruction with the newly-developed OER, other team members reflected on the potential value of exploring OP. Two themes emerged from the interviews: OP has the potential to increase student involvement in their learning and the potential is not realized on campus at that time.

***Increases student involvement.*** In reflecting on exploring OP, one faculty shared, “I think that sounds great. I haven’t necessarily had the experience, but I think ... information really is about serving and getting people excited about learning the content. If [using OP] is another avenue to get [students] involved and be excited, then why not?” Another faculty member also shared that “undergraduates are pretty savvy. They amaze me. We just had two of our undergraduates lead a nutrition education session [at one of the community colleges]. I was so proud of them. They did so great!” One instructor who had experimented with OP shared, “... it makes sense to me ... that students are taking part in deciding what is important and making those decisions and developing those critical thinking skills about what their textbook should have or that they wish it did have. ... It’s creative and makes a lot of sense.” Another instructor speculated on how “it just gets them interested in what they’re learning. ... I think involving students [gives] them a little more of a buy in, and they feel like they’re a part of [instruction] not just being spoken to.”

***Potential not realized.*** In reflecting on OER-enabled pedagogy on campus, the OER technologist indicated, “I think OER-enabled pedagogy showcases what’s possible when the content is open. And I think there’s a lot of potential in that.” However, he cautioned that “I think it would take some time, and some effort, to design pedagogical tools that could be implemented within a course.” Both an instructor and a faculty member mentioned not being aware of much OP on campus. The technologist explained that “[pedagogical explorations] are not always prioritized when you look at cost savings being the

primary focus for administration. But when I work on OER, its' like there's cost savings, but really [we] should look at all of the freedoms you have, and beyond freedoms for the faculty and the students.”

## Discussion

This study provides an insight into the experiences and perceptions of university faculty and staff as they created an OER for an undergraduate course, adopted it in their instruction, and explored the use of OER-enabled pedagogy. It first provides a snapshot of the experiences of the professionals involved by organizing the data in a narrative format. It then organizes the thematic data through the lens of the UTAUT framework applied to this research to reflect on the perceptions of the faculty and staff throughout the OER development and subsequent instructional process. Findings from this research are important in that they provide an accounting of the process of OER development and application not seen in the literature. Knowledge taken from this study might be applied to promote greater use and development of OER and its potential application, which then might provide increased student access to learning resources and to unique educational experiences. Figure 2. summarizes how the themes found in this research are connected to the UTAUT framework. Themes relating to OP were pedagogical in nature and were, therefore, examined outside of the UTAUT constructs and not included within the framework.

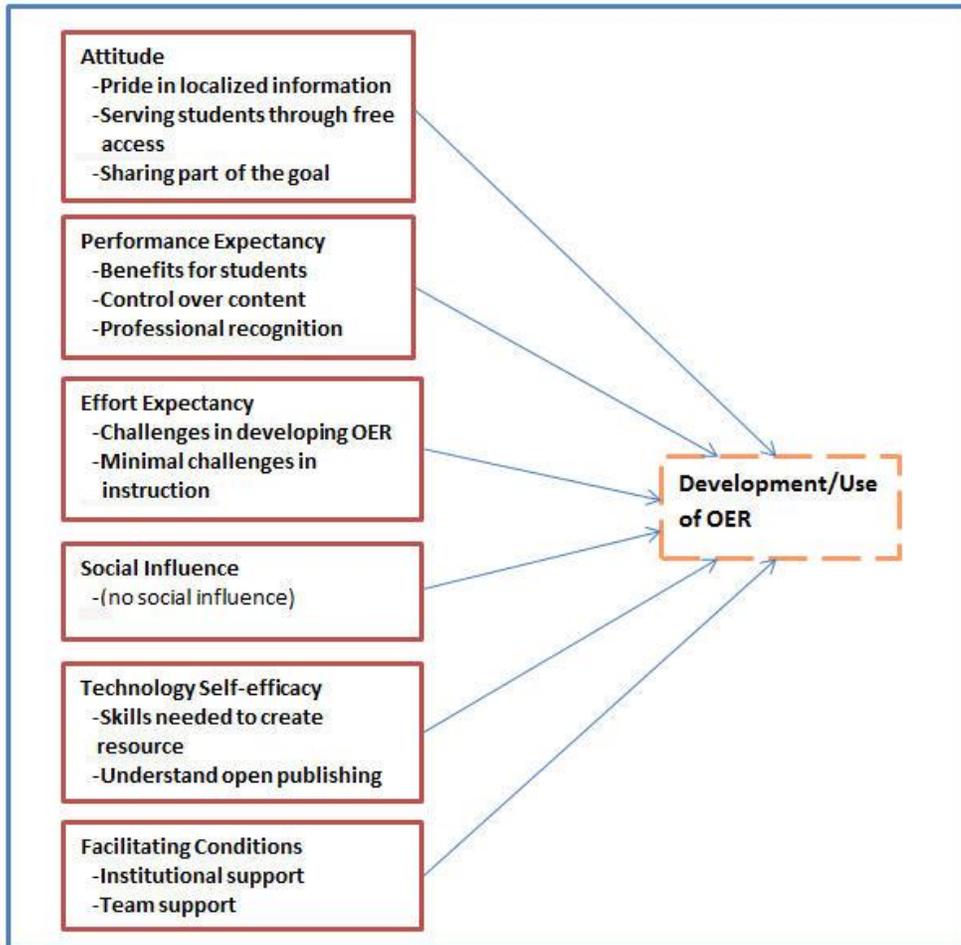


Figure 2. Modified UTAUT Framework with Construct Themes

All members of the OER development and implementation team felt positive about the experience of developing and implementing the OER. The overall goals were to provide a resource free to students and one that was place-based and appropriate for local students. Much research has explored the positive impact on student learning when OER are freely offered (Colvard, Watson, & Park, 2018; Hilton III, Robinson, Wiley, & Ackerman, 2014; Lieberman, 2018). Other research has indicated the importance of place in culturally relevant science education (Gruenewald, 2003; Sutherland & Swayze, 2012). Instructors in this research were particularly excited about the localization of the content and felt that it positively impacted their teaching experience with the students, which is consistent with other

research (Ivins, 2011). A final take-away as evident through the experiences of faculty and staff on this project is that the development of an excellent resource requires a great deal of time and various forms of support. This understanding should be the foundation of any project developing an OER textbook.

## Connections of Findings to UTAUT

Findings from this research, as organized through the lens of the UTAUT, are presented in this section as they correlate with other UTAUT research related to open practices in the literature. It should be noted that not all constructs used in the current research are found in the corresponding literature as constructs within the UTAUT framework can be expanded or deleted as per the context of the study.

Findings for several of the constructs in this research parallel those found in other UTAUT research on the topic of OER in higher education. “Attitude” was found to be an important factor in OER adoption. This is evidenced in this research through themes of pride in localized information, serving students through free access, and sharing as part of the goal of OER development. In their research, Huang and Wu (2013) found that “attitude” was the strongest predictor of behavioral intention to use OER. In addition, “effort expectancy” was found to positively impact the intention to use OER in several studies (Kaniero, 2015; Mtebe & Raisamo, 2014; Padhi, 2018; Percy & Van Belle, 2012). The current study helps to shed light on challenges experienced in the effort to create and apply OER. Finally, findings from this study are consistent with other OER-related UTAUT study findings in regard to the construct of “social influence” in that they show no effect on the intention to use or the use of OER (Mtebe & Raisamo, 2014; Padhi, 2018; Percy & Van Belle, 2012).

For several constructs, findings in this research indicate an inconsistency with research in the literature. “Performance expectancy” is important in this research, indicating there are benefits to students, flexibility in instruction through control over content, and providing opportunities for professional recognition. In support of this finding, research conducted by Padhi (2018) found that

performance expectancy had a positive impact on OER use. This finding was also supported by the research of Percy and Van Belle (2012), who found that faculty agreed that OER adds both value and quality to teaching and improving job performance. However, these findings were not consistent with those of Mtebe and Raisamo (2014), who found that Tanzanian faculty did not view the adoption of OER as positive for performance. No speculation was made by those researchers to explain this finding.

The most curious and inconsistent finding is regarding the construct of “facilitating conditions.” The current research revealed its critical importance through both institutional support and team support. Though the findings of Percy and Van Belle (2012) corroborate this finding in this research, those from Mtebe and Raisamo (2014) and Padhi (2018) do not. In addition to the quantitative data, the Padhi (2018) research also reported on major reasons for not using OER as opined by respondents through qualitative responses. These data indicated a need for various types of support, including institutional. In addition, the inconsistency might be explained by the different context of the studies: faculty and staff in the current research were creating OER, whereas faculty in the Mtebe and Raisamo (2014) and Padhi (2018) studies were adopting, but not creating, OER.

A final note should be mentioned regarding “technology self-efficacy.” Though the importance of technological infrastructure was addressed outside of the scope of the UTAUT framework in several studies (Mtebe & Raisamo, 2014; Padhi, 2018; Percy & Van Belle, 2012), technology self-efficacy was not included as a construct in the theoretical framework within the studies referenced here. The current research found that this construct was very important as revealed in themes regarding the skills needed to create a resource and in understanding open publishing. These findings are consistent with research conducted outside of the UTAUT framework (Alevizou, 2012; Butcher, 2015; Towey, Ng, & Wang, 2016).

## OER-enabled Pedagogy

The following two themes emerged through interviews with the team members: OP increases student involvement and the potential is not realized. The instructor, who had introduced OP through a research assignment, felt that the students were developing critical-thinking skills through their involvement and that applying this pedagogical approach was creative and would lead to students taking more responsibility for their learning. In some literature, assignments associated with OP are identified as non-disposable assignments (NDAs; Wiley, 2013); however, “little organized literature exists to effectively define, implement, and, accordingly, empirically evaluate the use of NDAs” (Seraphin, Grizzell, Kerr-German, Perkins, Grzanka, & Hardin., 2018, p. 1). Though there is not a plethora of research focusing on OP, the findings in this research align with the literature, which reveal an excitement and potential benefit to student learning when OP is applied (Dermody, 2019; Hegarty, 2015; Hodgkinson-Williams & Paskevicius, 2012; Wiley, Webb, Weston, & Tonks, 2017). Some of the team members agreed that the potential of OP is not realized on campus and the technologist pointed out that the development of OER is really the first step in exploring the freedoms that teaching with OER can afford. In fact, because there is little direction in the literature on best practices in implementing OP and because the OP assignment in this research represented an initial first exploration into applying OP, the full potential in this context has yet to be realized. This finding is supported by current research. There is literature that provides a focus on the potential of OP for student learning (DeRosa & Robinson, 2017; Dermody, R., 2019) but not a great deal of empirical research that has explored this potential (Seraphin et al, 2018).

## Implications

Future research might include more in-depth study into factors that promote or detract from OER and OP development and use. It would also be illuminating to compare OER and OP adoption rates between states that offer state-wide initiatives and those without a programmatic approach to OER

implementation. In addition, future research could encompass the assessment of student learning when involved with non-disposable assignments and when producing their own learning materials. Further exploration into the effect of localization might also prove of value. Some researchers have stressed the importance of localization (Ivins, 2011; Smith, 2009; Wiley et al., 2014), and the concept carries such importance that the recommendation to localize OER was included in the 2012 Paris Declaration on OER (UNESCO, 2012). However, there seems to be little research indicating that professionals who have developed OER have reported on this specific concept. It is also worth speculating that with increased development of OER, there might also be an increase in social influence, which is currently missing from those factors that motivate faculty to adopt OER.

The findings from this research have practical implications as well. They have helped to present a realistic, on-the-ground accounting of the process in developing an OER and implementing it in instruction. The latter includes one instructor's experience in the initial process of introducing OER-enabled pedagogy into instruction. By applying the UTAUT framework to data interpretation, recommendations emerged that should be taken into consideration when launching an OER development project: challenges, limitations, support issues, as well as potential benefits. These recommendations can help to provide a road map for institutions as they explore developing an OER program as well as for faculty as they consider developing or adopting an OER for their course. Recommendations that emerged from the data are summarized in the following list:

- Institutional Support
  - Funding through grants or programs
  - Programs promoting awareness and application of OER for instruction
  - Platforms for development and distribution
  - Policies in place for funding and tenure and promotion
  - Varied incentives
  
- Technical Support
  - Expertise in publishing platforms
  - Knowledge of copyright and open licenses
  - Instructional design expertise

- Knowledge of accessibility requirements
- Awareness of open resources
- Design skills for image development
- Publication expertise in design layout, review, and editing
- Team Support
  - Champion acting as the project lead
  - Subject matter experts to advise on content
  - Multiple members bringing diverse skills
  - Follow-up feedback as instructors use OER in instruction
- Time Management
  - Realistic and flexible outline of a development timeline
  - Weekly meetings to maintain standards and motivate progress

## Limitations

One limitation of this research is its generalizability to other contexts (Mack, 2010). It is recognized that there are differences in the academic culture between institutions and disciplines (Lee, 2004), which must be taken into consideration when applying this research to other institutional settings. In addition, the original team for this project was made up of nine individuals, eight of whom agreed to participate in interviews. The small number of participants may affect the generalizability of the findings (Leung, 2015); however, this research was well documented, which can boost reliability through replication (Zohrabi, 2013).

## Conclusion

This study explored the perspectives of faculty and staff engaged with the development and application of an OER textbook at an institution of higher education. It applied a basic qualitative interpretive approach through semi-structured interviews with those university professionals involved with the OER project development and subsequent application in instruction, including an instructor's experience in applying OER-enabled pedagogy in one class.

Findings have been organized first into a narrative overview outlining the actual process involved in the development and implementation of an OER, including experimenting with OER-enabled pedagogy. Following the narrative, findings were then presented through the lens of the UTAUT constructs.

These findings can help fill a gap in the literature and potentially provide an informed approach to the planning and development of OER. The data from this research helped to outline factors needed for the support and management of such a project and provided reflections on the challenges and benefits throughout the process. Armed with this knowledge, it is this author's hope that others seeking to develop OER will benefit from this research.

The participants in this research have already begun implementing a future edition of the OER. This will include edits from feedback originating from instructors, students, and other professionals outside of the campus who are using the resource. The upcoming version will also embed study activities and include a student activity pack and test bank. These features have shown to be very important for the instructors. The instructor, who had experimented with an OP activity, plans to take the next step in having students assist in developing a new unit for the OER. Finally, the lead faculty is preparing to develop a new OER for an upper division class for the department. In this research, the process of developing an OER has positively impacted the participants and has opened up potential projects and creative applications of OER.

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## Chapter 4

### Abstract

In the last decade, much research has taken place that examines various aspects of Open Educational Resources (OER). Some research has demonstrated that educational benefits are as evident when using OER as when using commercial textbooks, but with significant cost savings. This study uses an explanatory sequential mixed method approach and is unique in that it incorporates the variable of “engagement” with the “cost,” “outcomes,” “usage,” and “perception” (COUPE) constructs that are often measured in OER research. It is also unique in that it explores OER-enabled pedagogy through the lens of the COUPE framework. This research compares these constructs in undergraduate classes, where one class used an OER and the other used the same OER in addition to applying OP. The quantitative analysis suggests there is no significant difference in output, usage, perception, and engagement between groups; however, interview data indicate that students value the OP approach and appreciate being involved in contributing to and sharing their work in the course OER textbook.

Keywords: Open educational resources, OER-enabled pedagogy, engagement, open textbooks

### Introduction and Literature Review

Some time ago Open Educational Resources entered the educational scene, and for almost two decades they have been playing their part in promoting the expansion of quality education (Mulder, 2013). OER are learning materials, including textbooks, that are openly licensed and that permit no-cost access, use, adaptation, and redistribution with no or limited restrictions (Hewlet Foundation, 2019). Using OER can harness the 5Rs permissions to enable flexible and creative applications of these resources in instruction (Wiley, 2014). The 5R permissions are those activities that can be applied to an OER as allowed by specific copyright licenses. They include the right to retain, reuse, revise, remix, and redistribute the resources (Wiley & Hilton, 2018) and can support open pedagogical approaches to

instruction sometimes referred to as OER-enabled pedagogy. Wiley and Hilton III (2018) define OER-enabled pedagogy as “the set of teaching and learning practices that are only possible or practical in the context of the 5R permissions which are characteristic of OER” (p. 135).

The literature provides a great deal of research regarding factors affecting the student experience using OER materials and progress towards graduation (Hilton III, 2016; Hilton III et al., 2016a). Many questions about the impact of OER adoption have been highlighted by the Open Education Group (Hilton III, Wiley, Fischer, & Nyland, 2016b) and have been used to create a framework specific for OER investigation. This framework, identified as the COUP Framework, addresses principal aspects of education that can be impacted by the use of OER (Bliss, Robinson, Hilton III, & Wiley, 2013b; Hilton III et al., 2016a) and focuses on the issues of “cost,” “outcomes,” “use,” and “perceptions.”

A much-researched area of OER adoption is the cost of textbooks (Hilton III, Robinson, Wiley, & Ackerman, 2014; Lashley, Cummings-Sauls, Bennett, & Lindshield, 2017). In fact, one of the salient factors driving the OER movement is that textbook prices have soared over the years, a fact which was highlighted in a 2016 Student Public Interest Research Groups (PIRGs) report (Senack & Donoghue). The data from this report indicated that there had been an increase of 73% in textbook costs in the previous decade alone, which was about four times the rate of general inflation (Senack & Donoghue, 2016). The 2018 Student PIRGS report indicated that, after exploring numerous options for reducing textbook prices, the author recommended that OER present the best solution to reduce cost (Vitez, 2018). A study conducted by Czerniewicz (2016) examined student practices regarding copyright and how textbook costs impacted those practices in a multi-national research project. The author recommended that higher education authorities should closely look at changing publishing models so that learning resources are cheaper and easier for students to use.

Another factor of interest in OER research is that of student output, such as grades (Pawlyshyn, Braddlee, Casper, & Miller, 2013; Winitzky-Stephens & Pickavance, 2017). Research in this area has

examined how students, who are using traditional texts, have compared with students using open textbooks in terms of student performance measures such as overall course grades and final examination scores (Bowen, Chingos, Lack, & Nygren, 2012; Hilton III et al., 2016a). A number of studies have found that there was no significant difference in grades between students in classes that used a traditional textbook and those in classes using OER (Allen, Guzman-Alvarez, Molinaro, & Larsen, 2015; Choi & Carpenter, 2017; Croteau, 2017; Fialkowski, Calabrese, Tillinghast, Titchenal, Meinke, Banna, & Draper, in press; Hendricks et al., 2017).

The cost associated with textbooks may affect several aspects relating to student success in higher education. Many studies and reports have reported large cost savings to students when OER are adopted (Florida Virtual Campus, 2016; Hendricks, Reinsberg, & Rieger, 2017; Jhangiani, Pitt, Hendricks, Key, & Lalonde, 2016; Klein, 2016; Ruth & Boyd, 2016.) Research also shows that, when faced with the high cost of textbooks, a student may choose to avoid buying a book because of budgetary restrictions, even when knowing it might impact course grades (Prasad & Usagawa, 2014). Course completion rates may be affected by textbook costs (Hilton III, Fischer, Wiley, & Williams, 2016). Students sometimes drop or withdraw from courses after realizing the need to purchase textbooks (Gale, 2016). However, a study by Fischer, Hilton III, Robinson, & Wiley study (2015) found that when comparing completion rates between groups using a traditional textbook and OER treatment groups, there was no significant completion rate difference in most of the courses under review. It has also been hypothesized that the use of no-cost open textbooks might lighten a student's financial situation enough to allow them an increased credit load, which would in turn allow faster progress to graduation (Fischer et al., 2015).

Research has also examined student use of OER materials in terms of the time spent with the materials as well as the amount of the material that is actually used during a course (Hendricks et al., 2017; Lindsheild & Adhikari, 2013). Hendricks et al. (2017) found that the patterns of use of the textbook between a class using a traditional textbook and one using an OER were very similar. In a report by the

California Open Educational Resources Council (2016), similar results were found in a survey of 351 students in higher education. Students indicated that they used the OER textbooks they had been assigned at about the same rates as they used traditional textbooks in other classes. However, a recent study of an undergraduate nutrition class that compared a traditional textbook with an OER textbook indicated that students rated their use of the OER textbook significantly more (Fialkowski et al., in press).

Finally, much research has investigated student perceptions of the overall quality of OER when OER are utilized (Cooney, 2017; Everard & St. Pierre, 2014; Hilton III, Gaudet, Clark, Robinson, & Wiley, 2013). In a study published in 2017, Cooney examined the impact of an OER introduced in three sections of a New York City College of Technology Health Psychology course regarding student perceptions of the OER. Students reported that course readings were equal to or better than those found in the traditional textbooks (2017). Jhangiani and Jhangiani (2017) reported on a study of post-secondary students in British Columbia. This study found that 96% of students indicated that the open textbooks were at or above average in quality compared to traditional textbooks.

Though not included in the COUP framework, the construct of engagement within a course could also affect student success (Webber, Krylow, & Zhang, 2013). Student engagement has been defined as an investment, commitment, participation or an effortful involvement in learning (Henrie, Halverson, & Graham, 2015). The intent of engagement is to create an environment that enhances student learning and therefore performance (Trowler, & Trowler, 2010). Few OER studies have included the construct of engagement as part of the research focus. One exception is recent research conducted as a precursor to this study using this research instrument, which included “engagement” as part of the methodological framework (Fialkowaski et al., in press). In addition, the 2017 study at New York City College of Technology, Cooney (2017) relayed that students reported an increase in satisfaction with their learning experience and in their engagement with course lessons when using an OER rather than a traditional textbook in their Health Psychology course. Though “engagement” was not identified as a focus of study,

several researchers have mentioned that students reported an increase in satisfaction with learning and engagement in courses when using OER (Cooney, 2017; Rowell, 2015). Only one other study specifically focused on levels of engagement when students used OER, though the domains within the construct were not clearly defined, and there seemed to be overlap in definition with “perceptions” and “use” (Ikahihifo, Spring, Rosencrans, & Watson, 2017).

It is interesting to investigate potential links between the construct of engagement and OER-enabled pedagogy (OP). Jhangiani and Biswas-Diener (2017) indicated that open educational practices encompass a range of practices. These include the creation, adaptation, and adoption of OER, but also encompass OER-enabled pedagogy, open course development, open science, and open access as well. Some researchers are beginning to explore how shifts in pedagogy, including student involvement in resource development and contribution to OER, might impact student learning outcomes (DeRosa & Robinson, 2017). Numerous studies have addressed the benefits realized by students when OER are adopted in their courses (Bliss, Hilton III, Wiley, & Thanos, 2013a; Fischer et al., 2015; Hilton III et al., 2013; Hilton III et al, 2014); however, discussion has been limited around the impact of OER-enabled pedagogy on student learning outcomes when OER and OP, afforded by the 5Rs of OER, are harnessed (DeRosa & Robinson, 2017).

This current study has expanded the original COUP methodology developed by the Open Education Group (Hilton III, Wiley, Fischer, & Nyland, 2016b) to include the construct of “engagement.” Under this expanded umbrella, it examined more traditional aspects of OER (cost, output, use, and perception) and added the construct of “engagement” (COUPE) to this framework. In addition, it explored the impact that OP might provide on the COUPE constructs in an undergraduate class. It explored differences between undergraduate students using an OER textbook and students using an OER textbook as well as engaged in OER-enabled pedagogy within a university introductory nutrition course over two semesters.

## Context

As of 2018, almost 18,000 students were enrolled at the University of Hawai'i at Manoa (UHM), with just under 13,000 registered undergraduates. This study reports on differences found between two semesters of an introductory nutrition class offered at UHM. This course is a large, service course that meets general education requirements and is taken mostly by students who are undergraduates and not nutrition majors. The class is organized around lectures, aided by slide presentations. Due to the size of the class, discussion is often limited. Students are able to access the complete course materials through the online course management system and have the option of completing the course at their own pace as long as they meet deadlines. Approximately 800 students register for the course annually. It typically offers two fact-to-face sections as well as one online section each semester. The face-to-face sections for the Spring 2018 and the Fall 2018 semesters were selected for this study, one section of the course for the first semester and two sections for the second semester. The same instructor taught both semesters, which helped to control for the variable of instructor inconsistency.

The focus of the research was on the differences in terms of outcomes (student final grade), use (use of the OER text), and perception of the material, as well as engagement within the class. Because the construct of cost was not an issue in this context - with the textbook offered at no cost for both semesters - it was not a dependent variable. However, cost plays an important role in students' perceptions in OER research (Ikahihifo et al., 2017); therefore, data on cost was collected for discussion. The course was selected because the faculty responsible for the course had recently participated in a campus wide OER initiative grant, which awarded monetary support for the development of an OER. The OER textbook for this course was developed over several semesters and was then published using the Pressbooks platform, available online or in a downloadable format (Fialkowski, Titchenall, Calabrese, Gibby, & Meinke, 2018). One instructor agreed to participate in this study by applying an OER-enabled pedagogical approach to certain aspects of instruction. Prior to this study, in the Fall 2017 semester, a

commercial textbook was used in this course. The OER textbook for the course was introduced during the Spring 2018 semester (control group; identified as OER in this study) and then used in the subsequent Fall 2018 semester (treatment group; identified as OER+OP in this study) while adding an OER-enabled pedagogical approach through a major assignment.

The OER-enabled pedagogical approach took the form of an assignment. One of the instructors had, for some time, been interested in addressing a health issue not covered in traditional nutrition textbooks. This was a focus on the concept of “health at any size,” which focuses on understanding size diversity and that each person’s body weight is influenced by a genetic inheritance in bone structure, body size, shape, and weight difference and that health can be maintained regardless of differences in size (Bacon, Stern, Van Loan, & Keim, 2005). For the treatment sections of the course, the instructor incorporated a research unit as one quarter of the overall course assignments. The assignment focused on conducting research on some aspect of this topic so that scholarly articles would help to provide a foundation for the future development of this unit. Student findings would be incorporated into the OER textbook. Students were introduced to the concept of nutrition research by a librarian liaising with the instructor. After the introduction to nutrition research, students were then assigned to research a topic of their interest within the theme of “health at any size,” exploring at least five resources. They were to summarize one resource that would later be incorporated into the resource section of the OER textbook. This project represented one-quarter of assignment grades for the course.

## Research Questions & Method

A sequential explanatory mixed method design was used for this study. The initial quantitative phase used a quasi-experimental approach with data gathered from the institution and from an online student survey. Phase two used an interpretive approach collecting data via interviews to provide a more in-depth understanding of the research concepts. Two research questions guided this study:

RQ #1. What are the differences in outcomes, use, perception, and engagement between undergraduate students who use an OER textbook and students who use an OER textbook and engage in OER-enabled pedagogy?

RQ#2. What insights can be learned from students who use OER and OER-enabled pedagogy in an undergraduate course regarding cost, outcomes, use, perception, and engagement?

The first research question was addressed by the initial quantitative phase of the study, while the second research question was addressed through data collected in the qualitative phase of the study. Both research questions were also guided by the COUP framework (Bliss et al., 2013b; Hilton III et al., 2016a) with the addition of “engagement” as a construct.

## Data Collection

Following approval from the Institutional Review Board, data to address the questions were collected from three sources.

**Institutional data.** Institutional data were examined to determine total number of students enrolled in each of the course sections for both semesters (see Table 1). This source also provided data on drop and withdrawal rates as well as final grades for all sections.

**Survey.** Data from students were collected through an online survey administered anonymously during the last quarter of each semester. The survey invitation was sent through the course management system to all enrolled students who could then choose to click on the link to participate. The online survey explored student perceptions, use, and engagement with the OER textbook, containing 24 closed and open-ended questions that provided both quantitative and qualitative data. Instructions were provided at the end of the survey for students to receive bonus points for participation.

**Interview.** In this phase of the study, qualitative data were gathered from student interviews conducted at the end of each semester. The interview phase built directly upon the results from the initial, quantitative survey phase in order to explore the COUPE constructs more deeply. Students were

randomly selected from each section and sent an email invitation to be interviewed. The fact-to-face interview consisted of 20 open-ended questions, including questions about the assignments. Students were provided gift cards for their participation.

## Data Analysis

An analysis comparing student withdrawal and drop rates and the final grade (a grade of C or better) is referred to by OER researchers as the Course Throughput Rate (CTR) and has been applied to various OER research studies (Fischer et al., 2015; Hilton III et al., 2016a; Hilton III et al., 2016b). The CTR was analyzed using a two-sample z-test of differences in proportions.

Three questions on the online survey asked about the use of the OER: the frequency of use throughout the semester; the amount of material read over the length of the semester; and how the OER was actually used (such as a supplement to the course, etc.). In addition, the survey explored student perceptions about the OER textbook. Specifically, there were three questions that focused on this construct: one pertained to the match between the textbook content and the learning objectives for the course; a second asked about the overall quality of the textbook; and the final question asked for a rating of the perceived ease of textbook use. Within the construct of “engagement” for this research, four domains were investigated: interest (in the class); challenge (challenged thinking in a positive way); understanding (of the course concepts); and participation.

An independent samples *t*-test was used to analyze responses to individual questions in each construct and then to analyze responses for the composite constructs relating to “use,” “perception,” and “engagement.” Descriptive statistics were used in the analysis of some of the multiple-choice and Likert-style questions on the survey. Specific questions about course assignments, which included the OER-enabled assignment in the Fall semester, were included in the student interviews. Open-ended questions on the survey collected qualitative data on student perceptions of positive and negative features of the

OER. This data, as well as the responses from the interviews, were analyzed by this author through thematic coding. Passages in the text were identified and coded by idea, which was a way of categorizing or indexing the text thematically to establish a framework of concepts. Braun and Clarke (2006) relay that this type of thematic analysis is a very flexible and useful research tool that can be applied in order to provide rich, detailed, and complex data.

Qualitative data for the OER semester and the OER+OP semester were analyzed separately to compare themes and to ascertain if themes apart from the COUPE emerged. Data were organized initially by the five main constructs representing the COUPE framework. Themes and sub-themes emerged from this framework.

## Findings

Respondent demographics will first be presented. Findings from the quantitative and qualitative phases will then be presented followed by a discussion of overall patterns.

## Respondents

The OER semester included 127 students enrolled in one section of the course, of which 113 completed an online survey, and nine participated in interviews. There were 291 students initially enrolled in two sections for the OER+OP semester, which were taught by the same instructor. A total of 204 participants completed the survey for the OER+OP semester, with 11 students participating in follow-up interviews (see Table 1). Ninety-seven percent of the students completed the survey for the OER semester, while 82% completed it for the OER+OP semester.

Table 1

*Enrollment, Course Completion, Response Rate for the Survey and Number of Student Interview Participants for Each Semester*

2018 Term	Enrolled in Course	Completed Course	Completed Survey	Interviewed
Spring (OER)	127	116	113	9
Fall (OER+OP)	291	248	204	11

*Note.* OER = Open Educational Resource used in course. OER+OP = Open Educational Resource plus OER-enabled Pedagogy used in course.

Student demographic profiles for each semester were very similar (see Table 2). The Spring semester, using OER only with no OP activity, will be referred to as “OER,” and the Fall semester using OER and the OER-enabled pedagogy will be referred to as “OER+OP.” For each semester, certain sections of the course were identified for the study; therefore, data do not represent the complete population enrolled in all sections of the course.

Of the student survey respondents for both semesters, freshmen made up the majority (OER=44.2% and OER+OP=47.1%) with almost 70% of the students taking 13 or more credit hours (OER=69.9% and OER+OP=68.1%). Most of the students were female (OER=64.6% and OER+OP=71.6%), with approximately 96% ranging from ages 19 to 25 (see Table 2). Although the data are not presented in Table 2, survey respondents represented a wide array of ethnic backgrounds. UHM is one of the most ethnically diverse universities in the United States (Chronicle of Higher Education, 2018), and the students enrolled were reflective of that diversity.

Table 2

*Frequency and Percentage of Demographic Survey Data of Student Participants in an Introductory Nutrition Class Over Two Semesters*

		<b>OER (Spring Semester)</b>	<b>OER + OP (Fall Semester)</b>
<b>Characteristic</b>		<b>n (%)</b>	
<i>Year in School</i>	<i>Freshman</i>	50 (44.2)	96 (47.1)
	<i>Sophomore</i>	34 (30.1)	55 (27.0)
	<i>Junior</i>	16 (14.2)	36 (17.6)
	<i>Senior</i>	9 (8.0)	11 (5.4)
	<i>Graduate</i>	1 (.9)	4 (2.0)
	<i>Other</i>	3 (2.7)	2 (1.0)
<i>Gender</i>	<i>Male</i>	37 (32.7)	56 (27.5)
	<i>Female</i>	73 (64.6)	146 (71.6)
	<i>Prefer not to say</i>	3 (2.7)	2 (1.0)
<i>Semester Credit Load</i>	<i>1-3</i>	0 (0)	3 (1.5)
	<i>4-6</i>	4 (3.5)	8 (3.9)
	<i>7-9</i>	3 (2.7)	7 (3.4)
	<i>10-12</i>	27 (23.9)	47 (23.0)
	<i>13 or more</i>	79 (69.9)	139 (68.1)
<i>Age</i>	<i>18-25</i>	108 (95.6)	196 (96.1)
	<i>26-30</i>	2 (1.8)	4 (2.0)
	<i>31-35</i>	0 (0)	2 (1.0)
	<i>36-40</i>	2 (1.8)	1 (.5)
	<i>41-50</i>	0 (0)	1 (.5)
	<i>51 and older</i>	1 (.9)	0 (0)

Quantitative

## Findings

Quantitative data reported on the cost, outcomes, usage, perceptions, and engagement as outlined in the following sections.

**Cost.** Though cost was not a dependent variable in this research, as an OER was used for both semesters, it is worth noting that with the advent of the Spring 2018 semester, when the OER replaced a traditional textbook, there was a significant potential cost savings to students. The commercial textbook that had been traditionally used was sold at the campus bookstore for \$130 during the Fall 2017

semester. The availability of an OER for this course, therefore, represented a potential annual savings for students of approximately \$104,000.

**Outcomes.** Student outcome was measured using the Course Throughput Rate (CTR) comparing the semester using the OER and the semester when the OER was used with the addition of OP. This measure combines the effect of the drop rate, with the withdraw rate, and the final grade to indicate the percentage of students who were present on the first day of class with those who completed the course with a final grade of C or better (Hilton III et al., 2016b). Table 3 indicates the course throughput rates. The z-score was calculated using the proportions and the enrollment numbers from the first day of class. The value of z for this calculation is 1.3118. The value of  $p$  is 0.1902, with the results indicating no significant difference at  $p < .05$ .

Table 3

*Course Throughput Rate for OER and OER+OP Semesters with Sample Proportions*

Semester	Enrollment #s	% Drop	% Withdraw	Grade $\geq$ C	Sample Proportion
OER	127 (N <sub>1</sub> )	0.0709	0.0157	0.8583	0.785
OER+OP	291 (N <sub>2</sub> )	0.1168	0.0103	0.8282	0.724

**Use.** As can be seen in Table 4, responses on the survey indicated similar patterns between the two groups. One slight difference was while 3.4% of the OER+OP students reported daily use of the OER, none of the OER-only group did.

Table 4

Survey Results for Questions Measuring Use of OER for Both OER and OER+OP Semesters

Item	Scale					Mean	SD
<b>Frequency of Use</b>	<b>% Never</b>	<b>% 2-3 times for the semester</b>	<b>% 2-3 times a month</b>	<b>% 2-3 times a week</b>	<b>% Daily</b>		
OER Only (n=113)	10.6	25.7	40.7	22.1	0.9	2.77	0.945
OER+OP (n=204)	7.8	27.0	33.3	28.4	3.4	2.93	1.002
<b>Amount of Use</b>	<b>% None or almost none</b>	<b>% A small amount</b>	<b>% About half</b>	<b>% Much of the OER</b>	<b>% All or almost all</b>	<b>Mean</b>	<b>SD</b>
OER Only (n=113)	9.7	48.7	26.5	14.2	0.9	2.48	0.887
OER+OP (n=204)	10.8	48.0	24.0	14.2	2.9	2.50	0.965
<b>Actual Use</b>	<b>Other</b>	<b>Didn't use it much</b>	<b>For visuals</b>	<b>Supplement only</b>	<b>Referred to closely</b>	<b>Mean</b>	<b>SD</b>
OER Only (n=113)	0.9	18.6	16.8	55.8	8.0	3.51	0.917
OER+OP (n=204)	0.0	24.0	16.7	51.5	5.4	3.33	0.981

Patterns for the approximate amount of the textbook that was read were much more similar. Approximately 10% of students over both semesters responded that they read “none” or “almost none” of the textbook. Most students (OER=75.2% and OER+OP=72%) reported reading a little bit or about half of the textbook.

As seen in Table 5, a *t*-test of independent samples was run for each of the questions comprising the “use” construct. Results indicated no significant difference. (It should be noted that the third question in this construct – the actual use of the OER – does not represent a continuous dependent variable.) Data indicated that the majority of students in both classes used the OER as a supplemental resource. There also was no significant difference in the overall construct of “use” between the OER class (M=2.92, SD=0.80) and the OER+OP class (M=2.92, SD=0.81);  $t(315)=-0.1, p=0.82$ .

Table 5

*Independent Samples T-test Comparing Use of OER for OER and OER+OP Semesters*

	Class		t-value	df	Sig. (2-tailed)
	OER only Mean (SD)	OER+OP Mean (SD)			
Frequency of use	2.77 (0.95)	2.93 (1.00)	-1.36	315	0.18
Amount of use	2.48 (0.89)	2.50 (0.97)	-0.25	315	0.81
Actual use	3.51 (0.92)	3.33 (0.98)	1.60	315	0.11

Note. \*= $p \leq .05$ , \*\*= $p \leq .01$ .

When asked on the survey how the students actually used the textbook, over 90% of students (OER=91.2% and OER+OP=92.2%) responded that they mostly used the textbook to supplement course information or to reference visual materials but not as a main source of information. Included in this statistic was the number of students who reported not using the textbook much or at all (OER=18.6%, and OER+OP= 24%).

**Perceptions.** In regard to the question asking about the match between the content in the textbook and the learning objectives for the course, the OER data indicated “agreement” and “strong agreement” at 68.1%, while the OER+OP data indicated approximately the same at 66.2% (see Table 6).

Another question asked about the ease or difficulty in using the textbook. A majority of students in both semesters felt the OER textbook ranged from “Somewhat Easy” to “Easy” or “Very Easy” to use (85.9% and 83.9% respectively). Neither the OER nor the OER+OP class rated the overall quality of the

Table 6

Survey Results for Questions Measuring Student Perceptions of the OER for OER and OER+OP Semesters

Item	Scale							Mean	SD
<b>Match of textbook content and course learning objectives</b>	<b>% Strongly disagree</b>	<b>% Disagree</b>	<b>% Somewhat disagree</b>	<b>% Neither</b>	<b>% Somewhat agree</b>	<b>% Agree</b>	<b>% Strongly Agree</b>		
OER Only (n=113)	0.0	0.0	5.3	7.1	19.5	38.9	29.2	5.80	1.10
OER+OP (n=204)	1.0	1.4	2.0	11.8	17.6	44.1	22.1	5.64	1.19
<b>Use of textbook easy or difficult</b>	<b>% Very difficult</b>	<b>% Difficult</b>	<b>% Somewhat difficult</b>	<b>% Neither</b>	<b>% Somewhat easy</b>	<b>% Easy</b>	<b>% Very easy</b>	<b>Mean</b>	<b>SD</b>
OER Only (n=113)	0.0	0.9	2.7	10.6	19.5	35.4	31.0	5.79	1.13
OER+OP (n=204)	1.0	0.5	3.4	11.3	25.5	31.9	26.5	5.61	1.21
<b>Quality of textbook</b>	<b>Poor</b>	<b>Below average</b>	<b>Average</b>	<b>Above Average</b>	<b>Excellent</b>			<b>Mean</b>	<b>SD</b>
OER Only (n=113)	0.0	0.0	33.6	38.1	28.3			3.95	0.79
OER+OP (n=204)	0.0	2.9	27.9	39.2	29.9			3.96	0.84

OER textbook as “Poor.” There was a close distribution of responses between “Average,” “Above Average,” and “Excellent,” with a slight emphasis on “Above Average” by both classes (OER=38.1% and OER+OP=39.2%). As indicated in Table 7, no significant difference was found when running the independent samples *t*-test comparing perceptions between the classes for the individual questions. This was confirmed when running a *t*-test for independent samples on the combined questions for the perception construct between the OER class (M=5.18, SD=0.80) and the OER+OP class (M=5.07, SD=0.84);  $t(315)=-1.08, p=0.28$ .

Table 7

*Independent Samples T-test Comparing Perceptions of OER for OER and OER+OP Semesters*

	Class		t-value	Df	Sig. (2-tailed)
	OER Mean (SD)	OER+OP Mean (SD)			
Match of textbook content and course learning objectives	5.80 (1.10)	5.64 (1.19)	1.14	315	0.26
Use of textbook easy or difficult	5.79 (1.13)	5.61 (1.21)	1.26	315	0.21
Quality of textbook	3.95 (0.79)	3.96 (0.84)	-0.145	315	0.89

Note. \*= $p \leq .05$ , \*\*= $p \leq .01$ .

**Engagement.** A summary of integrated responses to the questions seeking information on “engagement” is shown in Table 8. In regard to maintaining interest in the course, more than half of the OER class indicated that they “Agreed” or “Strongly agreed” that the OER helped to maintain their interest (60.2%), though only half of the students in the OER+OP class indicated the same (50.5%). Almost 62% of the OER class “Agreed” or “Strongly agreed” that the OER helped to challenge their thinking in a positive way, whereas 54.5% indicated the same in the OER+OP class. Data indicated that students felt that the OER helped to support their understanding of concepts in the classes. For the OER class, 69.9% of students “Agreed” or “Strongly agreed” with this, while 63.2% of students in the OER+OP class did so.

Regarding encouraging participation, the survey data indicated that 57.5% of students in the OER class “Somewhat” to “Strongly agreed” that the OER encouraged class participation. Response in the OER+OP class, however, was lower as 52% of students indicated that the OER encouraged participation.

Table 8

Survey Results for Questions Measuring Student Engagement Using OER for OER and OER+OP Semesters

Item	Scale								Mean	SD
	% Strongly disagree	% Disagree	% Somewhat disagree	% Neither	% Somewhat agree	% Agree	% Strongly Agree			
<b>OER helped maintain interest</b>										
OER Only (n=113)	0.9	3.5	4.4	11.5	19.5	43.4	16.8	5.42	1.30	
OER+OP (n=204)	1.0	4.9	1.5	16.2	26.0	38.2	12.3	5.25	1.28	
<b>OER challenged me</b>										
OER Only (n=113)	0.9	0.9	1.8	14.2	20.4	44.2	17.7	5.56	1.13	
OER+OP (n=204)	0.0	1.5	2.5	18.6	23.0	44.1	10.3	5.37	1.07	
<b>OER helped to understand</b>										
OER Only (n=113)	0.9	0.0	2.7	7.1	19.5	38.9	31.0	5.85	1.11	
OER+OP (n=204)	0.5	2.5	2.9	11.3	19.6	42.6	20.6	5.57	1.21	
<b>OER encouraged participation</b>										
OER Only (n=113)	1.8	4.4	7.1	29.2	32.7	18.6	6.2	4.67	1.26	
OER+OP (n=204)	2.5	14.2	6.9	24.5	25.5	15.7	10.8	4.47	1.58	

The independent samples *t*-tests run on the individual questions for “engagement” revealed no significant difference except for “understanding” (see Table 9). Students in the OER-only class rated the ability of the textbook to help them understand concepts in the course statistically more positively than students in the OER+OP class. Once again, when a *t*-test for independent samples was run for the combined questions constituting the construct of “engagement” as shown in Table 9, there was no significant difference between the OER group (M=5.40, S.D.=1.01) and the OER+OP group (M=5.16, S.D.=1.06);  $t(315)=-1.73, p=.084$ , although the OER+OP mean was lower.

Table 9

*Independent Samples T-test Comparing Engagement with OER for OER and OER+OP Semesters*

	Class		t-value	Df	Sig. (2-tailed)
	OER Mean (SD)	OER+OP Mean (SD)			
Helped to maintain interest	5.42 (1.30)	5.25 (1.28)	1.158	315	0.25
Challenged me in a positive way	5.56 (1.13)	5.37 (1.07)	1.152	228	0.14
Helped to understand class concepts	5.85 (1.11)	5.57 (1.21)	2.01	315	0.05*
Encouraged participation	4.67 (1.26)	4.47 (1.58)	1.273	276	0.20

Note. \*= $p \leq .05$ , \*\*= $p \leq .01$ .

## Qualitative Findings

Themes that emerged from the qualitative data are reviewed in the following sections.

**Cost.** Through the analysis of the qualitative data for each semester, three main themes evolved related to cost: the use of the OER had a financial impact, an emotional impact, and an impact on the course.

**Financial impact.** Interview data revealed that a majority of students were very appreciative of the free textbook as it allowed them more flexibility with their limited budgets. One student in the OER+OP semester shared, "I would have had to borrow more money through loans and through my parents and stuff like that. Borrowing money is not good!" Most of the students interviewed needed to work during their schooling, and the no-cost textbook allowed them to use the savings in other areas such as food or transportation. One student relayed that she was able to take an extra class because of the savings. The qualitative data from the survey also revealed the appreciation for the free resource. For

both semesters, data indicated that “cost” was the second-most mentioned aspect of “liking the textbook,” second to having online access. In the open-ended survey responses and in the interviews, students often used the phrase “free, online access.” One student from the OER+OP interview shared that “having this [OER] available free and online for me is very helpful because I usually don’t plan on paying for any textbooks.”

*Emotional impact.* A number of students shared that by not having to try and purchase an expensive text, it relieved them of the extra stress in trying to stretch their budget. One student said, “Since I didn’t have to wait and see if I really needed to buy the textbook, I had it right away as soon as the class began. This took a lot of worry off of my shoulders.” Another student shared, “Not having to pay [for the textbook] made it not so stressful trying to figure out paying for lunch or extras... I could pay for those now because of the no textbook cost.”

*Impact on the course.* What emerged from the interview data was that cost can determine whether a student will purchase a textbook. When students were asked to speculate on whether they would have purchased the text for the class at the cost of \$130., almost half of the students interviewed in the OER semester said they would not have purchased the textbook, while over two-thirds in the OER+OP semester said they would not have purchased it. In contrast, both groups indicated that had they not had access to the textbook due to cost, it would have limited their information, thus potentially impacting course success. For example, one student from the OER semester explained how she used the textbook to coordinate her reading with lectures and shared that without the textbook, “my grades wouldn’t have been nearly as good.” A student from the OER+OP semester said, “I think that a lot of college students would [not purchase the book] and they would just try to focus on the lectures and the slide shows that the professor offers. But I think that just shows how money can really limit a person’s learning.” Students shared that they would have had to find other ways to supplement the lectures:

online resources (including possible illegal copies of the text), rental, library reserves if offered, sharing copies with friends, and relying more thoroughly on lecture notes. One student shared that having a free textbook hadn't affected his budget much because he usually didn't buy textbooks. However, he stated, "But because it was freely available, I actually used the textbook, and I think it helped me in the class."

**Outcomes.** The major theme that became evident from the student interview data for this construct was regarding performance. Performance related to both course grades and course assignments.

What emerged from the data indicated students from both groups used the OER textbook to support their learning. Some examples mentioned by students were as follows: by reinforcing concepts, providing more in-depth information, assisting in exam preparation and review, and aiding in homework, which would impact student grades and how well they completed the assignments.

Most students in the OER class responded that they felt using the textbook was beneficial to their grade, while fewer of the OER+OP students felt the same. One student in the OER group explained, "I think it really impacted my grade. I did end up using the textbook a lot, as compared to my other classes, just because there was so much more in-depth information that I needed to know for sure for exams or quizzes. It definitely helped, I think." Another student from the OER+OP group explained how the OER had helped support his learning: "I think it definitely impacts my grade because I've gone back to it with our exams when we review it, trying to figure out what questions I've done wrong and just reviewing, going through everything, making sure I know which ones I got right and studying that information. So, without it, I wouldn't have been able to do all that research and making sure I got the answers correct."

Both the OER and the OER+OP interview data indicated that the impact of assignments on student performance in class was not great. It became clear through the student interviews that many students in both groups thought the course exams generally impacted their overall performance more

than the course assignments. However, though one student admitted that the assignments may not have impacted class performance, he thought they were very worthwhile because they could “be applied to our daily lives” in terms of the nutritional information. This response supported a theme that will be discussed later.

**Use.** For this construct, the data revealed two major themes: features of the OER that promoted use; and actual use of the resource.

**Features.** Analysis of the qualitative data from the open-ended survey questions and the interviews revealed parallel features of the OER that encouraged use. Those features were broken down into three groupings of overall organization: the design of the textbook, the way the text was structured, and navigation (see Table 10). One open-ended comment shared by a student in the OER semester was that “I liked that the table of contents was very clear ... It was easy to navigate the book. I also liked how there were many pictures and graphs that helped to further expand on the written text.” Another student praised “the table of contents that makes it easy to just tap and click to where you want to go in the chapters.”

Students also reported in interviews over both semesters that the features of the textbook that encouraged use was that the textbook was online and portable and that it was well organized. Interview data collected from the OER+OP class were very similar in pattern to the OER class, with no specific features emerging as more prevalent for the OER+OP class. Students in both groups also reported that the linked information within the text made navigation easy.

Students were asked in the interview about the ease or difficulty in using the OER. One or two students in both groups reported that, initially, they were challenged by the format options for accessing the text and that it took some effort to learn to navigate it properly. A small percentage of students also reported preferring a hard copy of the resource.

A number of students in both the OER and OER+OP semesters conflated ease of use with online access. A student from the OER semester interview exclaimed that “unlike my other courses where if I forget my book, I have to go back for it or do without, this online OER is available all the time.”

Table 10

Features of the OER Textbook That Encouraged Use As Reported in OER and OER+OP Student Interviews

Grouping of Features	Feature	Details
DESIGN	Images	-provide helpful details
	Format	-online access -free -choice of digital or PDF -portable
TEXT	Structure	-chapter format -use of sub-topics -use of Table of Contents -linked references -Glossary
FUNCTION	Navigation	-linked chapters
	Search	-key word search helpful
	Tools	-highlight tool

*Actual use.* Most students in the interviews for both semesters reported using the OER mainly as a supplemental resource. It emerged from interview data that students relied on the presentation slides, lecture notes, and links to supplemental information as their main sources of information for the class. One student shared that he “didn’t rely on the text as much because our professor gave us links to other papers and other information that provided lots of details.” Only one student interviewee in the OER+OP semester stated that the textbook “really helped with my assignment grade.” Students in both semesters shared that it wasn’t necessary to use the OER extensively because the information provided

by the professor was very complete. One student in the OER semester did share that “the textbook did come in handy when I couldn’t attend class.”

During the interviews, students from both groups shared the almost unanimous response that the textbook wasn’t essential to complete the assignments. One student in the OER+OP semester stated that “I used the textbook as a springboard to get an idea for my research, but then I didn’t need it again for that assignment.” Another student in this group admitted that “I didn’t really read the entire [textbook]. I usually see a question, I look at what’s the main topic, and then I go to the textbook ... and just use ‘Control F’ to find what I need. That’s pretty much how I use the textbook.”

**Perceptions.** In addition to the interview data, two open-ended questions on the survey asked students to provide feedback on the OER textbook. Very similar themes emerged through analysis of the data from the open-ended questions as from the interviews. The two major themes that emerged revolved around the content of the OER material and the quality of the material. When comparing the OER and the OER+OP thematic data between the groups, there was a marked similarity in patterns of information.

**Content correlates to course objectives.** Interview data indicated that there existed a parallel between the content of the course and the course objectives. The data indicated that students from both semesters thought that there was a match between the content of the OER textbook and the course learning objectives. One student in the OER interview group indicated that he thought the curriculum had been “specifically tailored to match the open resource” because it paralleled the course syllabus so well. A number of students in both semesters shared that they appreciated how closely the OER paralleled the course because it took the guesswork out of finding information. Students in both groups also reported thinking that the text had “just the right amount of information.” One student explained, “I think [the textbook] was spot on to what we were learning in class. I remember reading along in the textbook and

having my PowerPoints open, and like, Oh, it's kind of the same format, ... which made it easy when studying for exams and tests and things.”

**Quality.** Regarding quality of the OER, two sub-themes emerged from the data: the OER was easy to comprehend and it added depth to the course. A student from the OER+OP semester shared this information on the survey: “I liked how straight forward the context was, it goes straight to the point. I never once was confused with what was being said. All the information given in the textbook was useful, not every textbook is like that.” Students for both semesters reported in the survey that they most appreciated that the OER was easy to understand. Students also commented in interviews and on the survey that the OER provided quality information. In an interview in the OER semester, one student sounded surprised when she spoke about the quality of information “... it was really amazing. You know, you can actually learn a lot – just from reading it!” One student in the OER+OP semester shared that “it wasn't too overwhelming and had just the right amount of information. It was aesthetically pleasing to look at.” A student interviewed in the OER semester shared her thoughts on the OER: “I think there definitely was some more interesting facts or more in-depth information that made the class more interesting overall.” There were, however, a few students in both semesters who responded on the open-ended survey question that there was almost too much information.

**Engagement.** Qualitative data on “engagement” were also collected through the interviews and focused on interest, challenge, understanding, and participation. Several themes were identified.

**Interesting topics.** A theme that emerged for both semesters was that interest was maintained because of the topics covered in the OER textbook and in the class assignments. One student in the OER semester relayed that “the text helped me to build a better foundation for [the class].” Several students shared in the interviews that the topics, rather than just the textbook, promoted interest. One student in

the OER+OP semester explained, “it was really more the topics that [the professor] brought up that were engaging for me ...and everything was just intellectually challenging because it is a different mindset.”

Positive data on how the class assignments affected interest were slightly stronger for the OER class. One specific mention of how the OP assignment helped to maintain interest in the OER+OP class was from one student’s interview feedback. This student shared that the assignment was of interest because “... skills learned from the assignment will help me with research in future classes, and I appreciate learning these skills.” However, another student mentioned that “I wouldn’t say [the OP assignment] did or didn’t maintain my interest as it was a pretty easy assignment.” One student in the OER+OP semester shared that “I thought the activity where we added to the textbook was pretty cool because I never really used the library system to do research.” Students in the interview sessions for both semesters indicated that the class assignments were not necessarily academically challenging, though they challenged their interest level. One student in the OP class shared that “researching different topics and opening up articles for a diverse group of topics ... wasn’t challenging. It was just more interesting.”

*Real-world application.* Some of the interview data indicated how the OER textbook impacted course understanding. Both classes reported that the OER textbook helped with understanding by providing definitions to class concepts and to materials from research articles and outside resources. This vocabulary could be applied, not only in their course, but to understand information they would refer to on the Internet. One student in the OER+OP interview session shared, “I used the textbook to really understand the words more... [It] was definitely comprehensive in terms of the vocabulary we needed for the course and helped with reading and understanding linked resources.” Another stated, “I’m going to keep [the OER textbook] downloaded on my laptop because I’m into the topic. I’m into nutrition, so I’m going to look back at it and be able to reference it.”

In focusing on how the class assignments helped with understanding the course concepts, both groups affirmed that the assignments pertained to their life. Data indicated that students felt the content was relevant to their life because of the topics. This was especially true in the OER group. In an interview, one student in the OER group relayed that “I was able to change my diet or suggest to friends what they could do to be healthier.” Another student in the OER semester shared, “It was a lot of self-assessments - what do you feel, what does this do for your life? You know what I mean? Make it applicable.” In addition, one student in the OER semester wrote that “the information that I read for this course helped me to apply [the ideas] in real life.” Finally, one interviewee in the OER class indicated that the assignments “helped a lot because we were taking the information that [the professor] was telling us, and then we actually had to apply it to something real.” A number of students in the OER+OP group also discussed the real-world application of the assignments. One student in this interview group shared that the OP assignment “will really keep students engaged as opposed to what you would normally think of as an assignment for a nutrition class.” Another student in the OER+OP group shared, “The assignments ... helped you understand the concepts, and they also made you go a little bit deeper and helped you to relate the materials from class to the real world and to situations.”

**Localization.** The authors of the OER had spent time contextualizing the material to include local and regional examples, which was appreciated by students. One student shared that the “information was culturally diverse by bringing in Hawaii, which I really admired.” Another shared this information in an interview: “Again, talking about Hawaii’s cultures and our food habits ... was a great thing to put into the textbook. It was definitely something that I looked forward to when studying that because that’s primarily why I think a lot of us are going into this field – nutrition – for our families, friends, and us.” One student from the OER+OP semester shared that the OER helped to maintain his interest because of the information about Hawaii and the Pacific and said, “I grew up in Hawaii, and I didn’t even know these things about Hawaii.” One student responded in the open-ended survey data that “the details ... made

learning more interesting and engaging. The incorporation of the Hawaiian culture is also unique to our university, and I appreciate it.”

*Sharing forward.* The interview data revealed that few students in the OER+OP semester completely understood that the OP assignment would impact the future textbook. However, one student in the OER+OP class was impressed that they were working on an assignment where the information would later appear as part of the textbook: “We’re helping other students in the future with their research.” Another student shared, “I thought it was interesting ... how you guys are going to use [the assignment] for the ... textbooks because it shows that what we find interesting, maybe other students will find that interesting too. And then it'll really keep the students engaged as opposed to what you would normally think a nutrition class is just saying, ‘This is healthy, this is bad, this is good.’” The OP assignment was viewed as a means to understand how research is conducted and then shared. “The research opened my eyes to how we’re getting the information that we are, and where it’s being sourced. That’s pretty cool.” Finally, one student thought “it was really cool that we got to contribute in some way, and it was interesting for us as students. Not just something that the teacher assigned. We sort of had some control over it.”

## Comparison of Quantitative and Qualitative Results

The quantitative data collected regarding “cost” indicated that students choosing to purchase a new textbook for the course would have spent up to \$130 at the campus bookstore. Themes that emerged from the qualitative data indicated that this cost would have had a financial and emotional impact on students as well as impacting how they did in the course. Qualitative data gathered from student interviews indicated that, for a number of students, the cost would have prohibited them from purchasing the text. Interview data also revealed that the cost would have had an impact on the success

of completing the course. A majority of students in both groups felt that there would have been some negative effect on their success in the course had they not had access to the textbook because of costs.

The qualitative data supported the quantitative data in terms of student outcomes. The course throughput rate comparing both classes revealed no significant difference. This was substantiated by the theme that emerged in analyzing data from the interviews. The data portrayed a mixed message when analyzing if the OER textbook impacted overall performance: students in the OER semester felt more strongly that it did so, while fewer students in the OER+OP semester felt the textbook was impactful. A majority in both classes in the survey reported that the assignments had little impact on their overall performance in the class, though later interview data indicated students were very positive about the assignment topics and application to their life.

Both quantitative and qualitative data indicated that the OER was not fully used. The interview data supported the finding that students mostly used lecture notes and slides as the main source of information. This was evidenced by data from the survey indicating that more than half of the students in the OER (58.4%) and OER+OP (58.8%) groups used the textbook little or not at all. Both the survey and interview data indicated that the assignments (even in the OER+OP group) did not necessarily encourage the use of the OER. Only a very small number of students in both interview groups relayed that they read the OER closely. In fact, the majority of students in both groups shared that the OER was used mostly as a supplemental text. This was an interesting contrast to interview data reported under the construct of “cost.” Students had reported that not having access to the textbook would have potentially affected their performance in the course (OER=78% and OER+OP=60%). Students in both groups indicated that there were certain features that did promote use of the OER: the online format, the well-organized structure, and certain functions like the navigation and search features.

Referring to the data for “perceptions” and analyzing patterns for the match between OER content to course objectives, student interview data suggested similar patterns found in the quantitative

survey data. Both indicated that the content found in the OER matched closely with the course objectives. It should be noted that participants in both interview groups indicated they felt strongly that there was a match, though this was not as evident in the survey responses. This was especially true in the OER+OP interview data, where OP was applied. It could be hypothesized that the stronger response in the OER+OP interview data supporting the match between the OER and the course content was due to the treatment, but this was not evidenced by the quantitative data. The same patterns were evident regarding the quality of information for both qualitative survey data and interview data. Once again, the interview data indicated a greater feeling that the OER contained quality information. The quantitative data revealed that students in both the OER and the OER+OP classes felt the quality of the OER textbook ranged from “Average” to “Excellent” with the mean indicating “Above average.”

Finally, this research explored student “engagement” as influenced by the OER text and by the OP assignment through examining levels of interest, challenge, understanding, and participation as evidenced by the quantitative data and through themes that emerged from the qualitative data. The quantitative data generally paralleled the qualitative data when examining interest level, where both classes felt the OER somewhat helped to maintain interest; however, the interview data indicated that students agreed more that the OER text promoted interest. Once again, thematic data suggested that interesting and relevant topics were important influencing factors. The latter was especially true for the OER semester. However, students in the OER+OP semester, who understood the goal of the OP assignment, reflected very positively on their role in contributing to the OER. Data were not consistent when comparing quantitative data with qualitative data in exploring how students were positively challenged by the OER textbook and by the assignments. While the quantitative data indicated a little over average agreement that the material in the textbook positively challenged them for both semesters, the data that emerged from the interviews indicated a much weaker support for this concept. This could possibly be due to the different contexts in which students answered the questions. There might have

been more clarification about the concept of “challenge” in the interview scenario, which lent a different meaning to the concept than was understood by students taking the survey. The quantitative data indicated that 89.4% of students in the OER class “Somewhat” to “Strongly agreed” that the OER supported understanding, while 82.8% in the OER+OP class indicated the same. Themes that emerged in the qualitative data substantiated this finding for the use of the OER textbook. On the other hand, though still positive, the interview data for the OER+OP class revealed that students didn’t really feel that the assignments promoted understanding. Finally, as the concept of “participation” was explored, the quantitative data and the qualitative data were very similar for both the OER and the OER+OP classes when exploring how the OER textbook encouraged class participation. For both data sources, approximately half of the students felt that the textbook encouraged participation. Data from the interviews on how the assignments affected participation indicated that generally the assignments weren’t impactful in either group.

## Discussion

This study explored various aspects of student experiences when utilizing Open Educational Resources and when applying OER-enabled pedagogy within an undergraduate course over two university semesters. It focused on the impact of cost, student outcomes, resource use, various perceptions, and engagement within this context. The conceptual framework utilized in this study extended the use of the original COUP framework (Hilton III, Wiley, Fischer, & Nyland, 2016b), which has focused on “cost,” “outcomes,” “use,” and “perceptions” that has been used as the basis of a great deal of research on OER to include the construct of student “engagement.”

## Discussion & Implications

**OER+OP.** This study was unique because most OER research compares similarities and differences between traditional textbooks and OER use. However, this study employed the use of an OER

for both semesters while seeking to determine if OER+OP significantly impacted students. Quantitative data comparing the OER group and the OER+OP group indicated that there was no significant difference regarding student outcomes, use, perceptions, and engagement. Since this finding was also supported by the qualitative data, this author believes that future research should be conducted exploring OER-enabled pedagogy in different contexts. For example, would OER+OP be more significant in smaller classes? In upper division classes? Is it as beneficial in online classes compared to those conducted face-to-face? A small number of educators are beginning to examine OER-enabled pedagogy in their courses (DeRosa & Robinson, 2017; Jhangiani & Biswas-Diener, 2017), but this author was not aware of empirical studies that have been conducted applying OP at the university level. Therefore, this study can be considered an attempt to begin exploring OP and factors promoting student learning in higher education.

**COUP.** That being said, there were still patterns on which one can reflect when comparing this research with former OER research. Findings in this research were similar to those in other OER research in terms of cost savings, course load, and impact on budget (Fischer et al., 2015; Hilton III, Robinson, Wiley, & Ackerman, 2014; Senack, 2014); however, this research differed in that qualitative data were gathered that indicated a degree of relief from the emotional impact when an OER was utilized. Considering that over both semesters in this study, almost one-third of the participants reported having a total household income of \$49,999 or less (OER =31% and OER+OP=32.4%) and that for both semesters 24% of students were utilizing economic grants, the cost savings could have quite an impact on students' budgets. Student outcomes found in this study were consistent with some OER research as well (Choi & Carpenter, 2017; Fialkowski et al., in press; Hilton III, Gaudet, Clark, Robinson, & Wiley, 2013) indicating no significant difference in outcomes when OER is utilized. However, other OER research does support a difference in outcomes (Feldstein, Martin, Hudson, Warren, Hilton III, & Wiley, 2012; Winitzky-Stephens & Pickavance, 2017). Just as in the Bliss et al. (2013b) study comparing traditional and OER textbooks, no significant difference was found in use patterns in this study between groups. Findings from the

qualitative data were important, however, because one theme that emerged discussed features of the OER that promoted use. The finding that “use” of the OER was primarily as a supplementary document was possibly influenced by complete and thorough lecture notes, slides, and linked information rather than by poor design or lack of information within the text. Understanding which features affect the design, text, and function of a resource have implications for future OER development. This is true also for themes revealed in the qualitative data regarding perceptions: quality and content are important to students as well. Much of the OER research focusing on perception has dealt primarily with quantitative data (Feldstein et al., 2012; Gil, Candelas, Jara, Garcia, & Torres, 2013); therefore, this research adds a deeper understanding to that aspect of OER research.

**Engagement.** This research is unique in a second way: it extended the original COUP framework to include the construct of “engagement,” work that began when utilizing this survey instrument in recent preliminary research (Fialkowski et al., in press). Though a great deal of educational research has focused on the concept of student engagement (Fallen, Walsh, & Prendergast, 2013; Fredericks, 2011; Fredericks & McColskey, 2018; Gunic, 2014), research on engagement when using OER and OER+OP has been limited. Unlike the Rowell (2015) study and the Ikaiahfo et al. (2017) research, the current research used a multidimensional view of engagement, which focused on the areas of behavioral, emotional, and cognitive engagement (Fredericks, 2011). Once again, themes were identified from the current study’s qualitative data, themes that could potentially be considered when further developing OER and OER-enabled instruction. For example, it became clear that if course topics were contextualized and made relevant to a student’s life, there was a higher degree of interest in the course. This has implications for instructional design. Another theme that carries implications for instructional design emerged from interviews with the OER+OP group. Those students who understood the nature of the OP assignment were excited about the prospect of sharing their work forward through the completed assignment. This

finding supports the exploratory work being done by researchers in terms of open practices and learning and should encourage further investigation (DeRosa & Robinson, 2017).

## Limitations

Several limitations of this study exist. Data were self-reported and therefore may not be standardized. Another limitation came to light during the interviews when it became evident that students reported that attendance was not required for the course. As a large, service class, attendance can be difficult to track. All assignments could have been completed through accessing the learning management system. This may have accounted for many of the students, when interviewed in the OER+OP semester, confessing to not understanding that the results from the research assignment would potentially be added to the OER textbook, thus including student-contributed work as part of the resource. This, therefore, gave rise to the speculation that a portion of the students (not attending the face-to-face class) may not have understood about their potential contribution to the OER. In addition, during the interviews, students also indicated that the classes were mostly lecture style, with limited discussion taking place, in part, due to the large class numbers. This has caused the researcher to wonder how engaged a student might be in this learning context, where discussion and participation were not an integral component of the class context. Finally, since this study took place within one course at one university, the findings cannot be extrapolated to wider populations.

## Conclusion and Future Research

Over the last decade, there has been a considerable amount of research conducted that has examined various aspects of OER adoption in terms of the cost, outcomes, use, and perception of OER on the COUP conceptual framework proposed by the Open Education Group (Hilton II et al., 2016b). However, scarce research has taken place that has focused on the aspect of student engagement in

courses using OER, in particular when OER-enabled pedagogy has been incorporated. This study was unique because it began to explore these concepts within an undergraduate class.

Though no significant quantitative difference was found between the OER and the OER+OP groups in this study, it should be acknowledged that there was no negative impact to student learning outcomes, and these students were able to save money through the use of the OER. With the adoption of the OER, annual cost savings for students were significant as compared to students who would have had to purchase the traditional, commercial text. Gratitude at the savings was acknowledged repeatedly by comments of appreciation through both the open-ended survey questions and through the interview data. The difference found in the qualitative data supported the idea that student engagement might be different in a course that offers an OER-enabled pedagogical approach by possibly empowering students to contribute to the field.

It should be noted that these findings are not isolated in their lack of statistical significance in terms of OER research (Grimaldi, Basu Mallick, & Waters, 2019). Instead of dismissing non-significant results, some researchers have indicated the importance of reporting on such results (Croteau, 2017; Polainin, Tanner-Smith, & Hennessy, 2016). These findings may be influenced by limitations acknowledged in the study.

As costs for higher education continue to rise (CollegeBoard, 2018), future research can continue to explore the role that OER and open educational practices might play in that context. In addition, it can explore how OER-enabled pedagogy might potentially impact student learning outcomes. Future research should also more fully explore how student engagement might be influenced using OER and OER-enabled pedagogy. These findings will hopefully prompt educators to explore other facets of learning and teaching with OER.

## Chapter 4 References

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## Chapter 5

### Abstract

This research reports on a mixed methods study querying faculty across the U.S. who have already adopted OER and who might have been exploring OER-enabled pedagogy in their instructional practices. This research approach was employed in order to gather general data from a larger population of faculty in higher education across the U.S. and then to focus more specifically on the perceptions of those factors influencing the adoption of OER and the possible application of OER-enabled pedagogy with a smaller sample of faculty through interviews. In 2018, over 250 faculty responded to an online survey that queried faculty on various motivating factors for both the adoption of OER and the use of OER-enabled pedagogy. Using the Unified Theory of Acceptance and Use of Technology as a design framework, this research expanded on the framework to examine motivating factors through the lens of six main constructs. This research explored 1) how individuals believed that OER have helped them perform in their job (performance expectancy), 2) the degree of ease or difficulty associated with using OER in their instruction (effort expectancy), 3) the degree to which faculty perceived if others thought it was important that they use OER (social influence), 4) the extent to which the faculty perceived that the technical and organizational infrastructure to adopt OER were available (facilitating conditions), 5) individual attitudes about the use of OER and OER-enabled pedagogy (attitudes), and 6) what individuals felt they could do with the technology skills they had acquired (technology self-efficacy). Findings indicate that supporting students is one of the main motivating factors spurring faculty to adopt OER and OP. In addition, both personal and professional growth as well as networking through engaging in open education is also important. Findings also indicate the need for careful planning before introducing OER-enabled pedagogical approaches. These findings have implications for future OER and OER-enabled pedagogical development.

Keywords: Open Educational Resources; OER-enabled Pedagogy; UTAUT; motivation; adoption; OER use

## Introduction and Literature Review

Traditionally, educational resources have been available through commercial publishers and for a variety of costs; however, more recently educators and administrators have been exploring the potential of low or no-cost Open Educational Resources (OER) to promote learning. These resources are defined as “material for teaching and learning that are either in the public domain or have been released under a license that allows them to be freely used, changed, or shared with others” (Sparks, 2017, n.p.). A great deal of research has focused on the use of OER, especially in terms of potential cost savings for students (Hilton III, Robinson, Wiley, & Ackerman, 2014; Lashley, Cummings-Sauls, Bennett, & Lindshield, 2017). A 2016 Student Public Interest Research Groups (PIRG) report indicated a 73% increase in textbook costs over the last decade alone (Senack & Donoghue, 2016). Senack (2015) also noted that, tuition aside, textbook costs represent the second-greatest expense for college students. Clearly, development and use of OER could go far to help relieve some of the economic stress experienced by our student population. Research has also shown that student recruitment can be positively impacted when OER are employed (McAndrew, dos Santos, Lane, Godwin, Okada, Wilson, & Webb, 2009; Nikoi & Armellini, 2012). Higher retention rates and lower withdrawal rates have been evidenced as well when utilizing OER (Hilton III, Fischer, Wiley, & Williams, 2016). In addition, pedagogic variety can be explored using OER, which might lead teachers to reflect on their use of content and approaches in their teaching (Kazakoff-Lane, 2014). In order to explore the benefits of and to promote the growth and potential application of these resources, research is needed to investigate the skills and context required to adopt, reuse, develop, and apply OER (Amiel, 2013; DeVries, 2013). As indicated in the literature, a significant number of students who are already struggling with tuition and housing costs will choose not to purchase textbooks, even knowing that this might affect success in a course (Prasad & Usagawa, 2014). Reduced student loan debt and

higher program completion rates for students have also been credited to the use of OER (Bowen, Chingos, Lack, & Nygrn, 2012; Hilton, 2016; Hilton, Gaudet, Clark, Robinson, & Wiley, 2013). In order to enhance student success in the pursuit of higher education, more research needs to be conducted into the factors that could potentially motivate faculty to adopt and develop OER and to explore teaching strategies leading to student success. Though there is a continued trend in faculty awareness of OER, their awareness and concerns about traditional publishers do not always result in adoption of OER (Seaman & Seaman, 2018). More research is needed regarding factors influencing faculty adoption of OER if the potential benefits and pedagogical impact are to be fully realized.

This research explored various factors that have played a role in influencing faculty adoption and application of OER and OER-enabled pedagogy (OP) in instruction. OER-enabled pedagogy has recently been defined by Wiley and Hilton (2018) as “the set of teaching and learning practices that are only possible or practical in the context of the 5R permissions which are characteristic of OER” (p. 135). The “5R” permissions refer to the right to retain, reuse, revise, remix, and redistribute resources as this material is released with copyright licenses that provide this freedom (Wiley & Hilton, 2018). Others, as well, have discussed an open pedagogical approach to learning by using OER and other open resources (Cronin, 2017; Weller, 2014).

In examining the literature on faculty adoption of OER, studies have addressed reasons for non-adoption of OER by faculty (Kursun, Cagiltay, & Can, 2014; Ngimwa & Wilson, 2012; Tovar & Piedra, 2014). Anderson, Gaines, Leachman, and Williamson (2017) found that there was no consistent understanding of OER among the faculty in their study. They also found that some faculty were unsure of where to locate quality OER and expressed a concern about overall quality (2017). Krelja -Kurelovic (2016) found that, though faculty at one Croatian university reported positive attitudes towards OER, there was very little actual sharing of teaching material. In contrast to studies where researchers have speculated on faculty adoption of OER, the current research focused on various influencing factors motivating adoption

by faculty *who have already adopted OER* in their teaching and who may be experimenting with applying OER-enabled pedagogy.

The literature includes a number of studies examining the potential of faculty to adopt OER. In a study designed to measure the readiness of faculty and staff to adopt OER, McKerlich, Ives, and McGreal (2013) found that motivation in adopting OER was largely intrinsic. They found that “recognition” for both creation and use of OER was the lowest factor reported by the respondents and suggested that this might mean that it is intrinsic motivation that drives faculty in this situation (McKerlich et al., 2013). In another study, Pawlowski (2012), in fact, suggested that emotional ownership is the key to overcoming barriers of OER adoption. This researcher laid out a potential workflow in the development process for OER that would increase emotional ownership and then exemplified the process in a case study (Pawlowski, 2012). Ownership was also found to be an important element by researchers Algers and Silva-Fletcher (2015). In a study collecting data from 52 institutions that had participated in a European Union educational project, the researchers found that altruism was important in determining whether teachers would potentially share OER (Algers & Silva-Fletcher, 2015). They found that the most important incentive for the creation of OER was reflected in the statement that “I want to share this for the benefit of others” (Algers & Silva-Fletcher, 2015, p. 41). In another study published in 2013, which surveyed instructors from all levels of education on their sharing behavior with respect to OER, Van Acker, van Buuren, Krijins, and Vermeulen (2013) found that altruism was positively correlated with the intention to share OER. They also concluded that this finding implied that teachers enjoy the behavior of sharing OER, without the need for additional extrinsic incentives (Van Acker et al., 2013). Altruistic motivation for making learning material accessible has also been noted in a variety of other research studies (Huyen, 2007; McGill, Falconer, Dempster, Littlejohn, & Beetham, 2013; Pelger, 2012; Scheliga & Friesike, 2014).

In a 2016 study on the general perceptions of OER, Belikov and Bodily examined barriers and incentives for faculty to adopt OER and uncovered several motivating factors. They found that some

faculty (10.6%) were motivated to adopt OER in order to cut costs of material for student convenience and for enhancing equity; a smaller percent of faculty (9%) indicated that pedagogical benefits would motivate them to invest the time into evaluating OER (Belikov & Bodily, 2016). Unfortunately, this study did not make the distinction if the respondents were faculty who were contemplating adopting OER or who had already done so, as this variable might have influenced response results. Other studies have shown that providing a cost savings to students is one of the highest motivating factors in the consideration to adopt OER by instructional faculty and staff (McKerlich et al., 2013; Tillinghast, 2015).

In their research on open science, Scheliga and Friesike (2014) found that faculty participants, who were interviewed at the International Conference on Internet Science in Brussels, were willing to sacrifice rewards to be able to engage in experimenting with new forms of disseminating knowledge and from the sense of joy experienced from sharing knowledge. Chae and Jenkins (2015) found somewhat similar results in their qualitative investigation of faculty using OER in the Washington Community and Technical College System. These researchers reported that two major motivating factors for faculty to use OER were the desire to provide access to academic material at a low cost and their own pursuit of pedagogical freedom (Chae & Jenkins, 2015). Hassall and Lewis (2017) conducted a study at the University of Leeds examining both institutional and technological barriers to the use of OER. What they found indicated that there was no innate motivational barrier to adoption but that rather the lack of motivation comes from a lack of opportunity (Hassall & Lewis, 2017). One external factor that could influence a faculty decision to adopt or create OER might be in the form of institutional support. In the discussion section of the Scheliga and Friesike study (2014), it was recommended that constraints to open behavior can be diminished if this behavior is rewarded within the research culture and by the research institution. On the other hand, in one study at a North American university, Veletsianos discussed how institutional policies might potentially affect adoption (2015). Veletsianos described the institution of focus as one lacking institutional support for openness. Though some open and sharing practices were

evident, this author suggested that “individual (rather than systemic) motivators may be significant drivers of openness in the higher education context” and not those of institutional policies or initiatives (Veletsianos, 2015, p. 205). Jhangiani, Pitt, Hendricks, Key, and Lalonde (2016) studied faculty at different types of institutions of higher learning in Canada – research-intensive, teaching-intensive, and colleges or institutes. They found that faculty at research-intensive universities were more likely to engage with OER than faculty at the other two types of institutions (Jhangiani et al., 2016). Finally, in a study that presented a different picture and that focused on three South African universities, Cox and Trotter (2016) conducted interviews with academic participants engaged in OER workshops designed to promote OER. The researchers wanted to learn what types of interventions might work best for motivating OER adoption and use in different academic institutional contexts. What they concluded was that institutional policy should not be regarded as a motivating factor for OER activity due to the individual institutional culture, which “mediates the role that policy plays in academics’ decision making” (Cox & Trotter, 2016, p. 9).

The concept of open educational practices (OEP), including the use of open resources, is beginning to be explored in higher education (Armellini & Nie, 2013). Cronin’s definition of OEP includes the use of OER but extends to the use of open pedagogies and open practices of sharing as well (2017). Some researchers have argued that, for the potential of OER to become fully realized, it needs to be accompanied by a radical change in educational practice (Geser, 2012; Masterman, 2016). In one study, Cronin sought to understand the perception and use of OEP in higher education (2017). Data from semi-structured interviews indicated a continuum of practices existed, with values ranging from closed to open (Cronin, 2017). In another study on open practices, authors collected information on how repositories of OER help to promote open practices (Atenas, Havemann, & Priego, 2014). One take-away from the study was that pedagogical objectives should be documented and should accompany the learning objects as part of the repository submission (Atenas et al., 2014). In a study at the University of Oxford, Masterman

(2016) reported that one approach to increase uptake in OEP is through the encouragement in the use of OER as it aligns with the concept that students are ‘citizens of tomorrow.’ Some researchers have voiced the opinion that teaching and learning with OER are not new phenomena but reflect longstanding theories such as Social Constructivism and cognitive learning practices (Beetham, Falconer, McGill, & Littlejohn, 2012; Panke & Seufert, 2013).

One author discussed a “learner-generated” approach to open educational practices and indicated it is one of eight attributes of open pedagogy (Hegarty, 2015). This author claimed that something “magical” happens when students become fully involved in the learning process (Hegarty, 2015). In addition, Hodgkinson-Williams and Paskevicius (2012) conducted a study involving student-assisted reworking of academic material into open resources, noting the many positive benefits to the process. In a recent study, Wiley, Webb, Weston and Tonks (2017) found that overall student grades increased in a statistically significant manner during the time frame when increasingly student created OER were added to a course. In a paper discussing a move from using open resources to the exploration of open pedagogy, DeRosa and Robinson (2017) discussed how faculty who use openly-licensed resources can explore the possibilities of creating new relationships between learners and the information they access within a course. They stated that when students are exposed to the use and reuse of learning resources, they begin to develop a new relationship with resources, one which becomes even stronger if faculty involve their students in the critique and contribution to the body of knowledge with which they are engaged (DeRosa & Robinson, 2017). These researchers also stated that “open pedagogy uses OER as a jumping-off point for remaking our courses so that they become not just repositories for content, but platforms for learning, collaboration, and engagement with the world outside of the classroom” (DeRosa & Robinson, 2017, p. 117).

If faculty are motivated to explore, adopt, or create OER, other possibilities could then be open to them. Faculty would be able to explore the affordances of open resources and how they might potentially

impact their teaching. It was this researcher's hope that the insights gained from this research would fill a gap in the literature and potentially provide a deeper understanding of the context for adopting OER, thus providing guidance and information for institutional policy and program development in support of OER implementation.

## Methodology

### Context

An explanatory sequential mixed method design was employed to address the research questions in this study. This particular research approach was employed in order to gather general data from a larger population of faculty in higher education across the U.S. and then to focus more specifically on the perceptions of those factors influencing the adoption of OER and the possible application of OER-enabled pedagogy with a smaller sample of faculty interviewees.

### Participants

Participants were identified by colleagues across the U.S. who were working in the area of Open Education. Faculty or instructors were identified by a colleague at their institution as being someone already using OER and who might be applying OER-enabled pedagogy in their instruction. Invitations to complete an online survey were sent to 1,100 faculty and instructors across the U.S., with a final rate of 234 complete responses used as the quantitative data source and open-ended qualitative source. Participants represented faculty and instructors of all ages and from community colleges to research institutions. In addition to the quantitative data collection, survey participants were invited to take part in a follow-up semi-structured interview. Fifteen face-to-face and phone interviews explored perceptions pertaining to OER and OER-enabled adoption more deeply than was possible on the quantitative survey.

## The Research Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) framework was used to guide the development of operationalized questions applicable to this research. Prior research applying the UTAUT framework to examine influencing factors pertaining to OER adoption helped to guide question formation for this research as well. For example, the work of Mtebe and Raisamo (2014a) applied the UTAUT to query faculty about their intentions to adopt OER, and Dulle and Minishi-Majanja (2011) conducted an Open Access adoption study applying UTAUT. This research was based on the work of Venkatesh, Morris, Davis, and Davis (2003), whose permission was given to adapt questions for this research. Questions for the interview were also based on operationalized questions from former UTAUT research, in which reliability analysis and construct validity tests were done (Dulle & Minishi-Majanja, 2011; Kandiero, 2015; Li, Yuen & Wong, 2014; Mtebe & Raisamo, 2014a; Percy & Van Belle, 2012). A seven-point Likert scale was used to record responses on the survey. In addition, several demographic questions were added to address information represented by the modifiers from the UTAUT model.

The UTAUT model for this research included six main constructs: performance expectancy, effort expectancy, social influence, facilitating conditions, attitude, and computer/technology self-efficacy. Venkatesh et al. (2003) defined “Performance Expectancy” as the degree to which an individual believes that using the system will help him or her to attain gains in job performance including domains such as perceived usefulness, extrinsic motivation, job-fit, relative advance, and outcome expectations. These authors indicated that “Performance Expectancy” is the strongest predictor of intention to use new technology. “Effort Expectancy” is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003). The domains captured within this construct are perceived ease of use, complexity, and ease of use. “Social Influence” is the degree to which an individual perceives that important others believe he or she should use the new system and is represented by subjective norm, social factors, and image in earlier technology models (Venkatesh et al., 2003). This construct

acknowledges that an individual's behavior is ultimately influenced by their perception of how others in their sphere of influence will view them as a result of their use of a particular technology (Venkatesh et al., 2003). These researchers tell us that this construct is not as significant in voluntary contexts but operates by influencing perceptions about the technology (2003). "Facilitating Conditions" are the degree to which an individual believes that the organizational infrastructure and the technical infrastructure both exist in order to support the use of the technology and includes perceived behavioral control and compatibility (Venkatesh et al, 2003). Finally, two constructs were added from the original UTAUT model, those of "Attitude" and "Computer Self-efficacy" (Dulle & Minishi-Majanja, 2011; Venkatesh et al., 2003). "Attitude" refers to an individual's positive or negative feelings related to the technology, and "Computer self-efficacy" is the confidence that is demonstrated in making decisions about use of computer and technology resources (Yussoff, 2009). These two constructs were dropped in later models of UTAUT because it was determined that they may not influence behavioral intention. Because this research was not concerned with intention but with actual use and because others researching the topic of the use of open resources and OER have included one or both of those constructs (Dulle & Minishi-Majanja, 2011; Percy & Van Belle, 2012), this research included questions in the instruments based on those constructs. The design framework used to support the research was modified and is depicted in Figure 1.

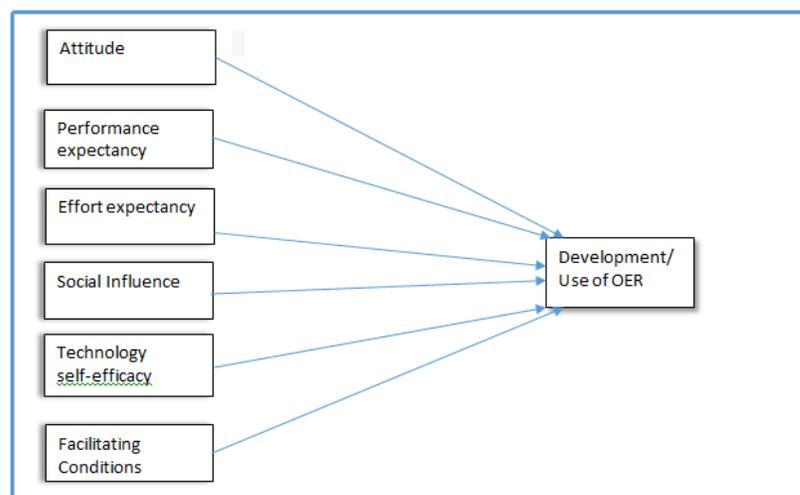


Figure 1. Modified Unified Theory of Acceptance and Use of Technology Design Framework

## The Research Questions

This study, based on the constructs from the UTAUT model, explored 1) how individuals believed that OER have helped them perform in their job (performance expectancy), 2) the degree of ease or difficulty associated with using OER in their instruction (effort expectancy), 3) the degree to which the faculty perceived that others think it was important that they use OER (social influence), 4) the extent to which the faculty perceived that the technical and organizational infrastructure to adopt OER were available (facilitating conditions), 5) individual attitudes about the use of OER and OP (attitudes), and 6) what individuals felt they could do with the technology skills they had acquired (technology self-efficacy).

The first research question was addressed by the quantitative phase of the study, while research question number two was addressed through the data collected in the qualitative phase of the study.

RQ#1. What are the factors that have informed the decision to adopt OER and possibly OER-enabled pedagogy by higher education faculty?

RQ#2. What are the perceptions pertaining to OER and OER-enabled pedagogy by higher education faculty who have already adopted OER?

## Data Collection and Analysis

Data were collected via an online questionnaire and via face-to-face and phone interviews. Questions for this study were operationalized and developed considering the UTAUT framework and helped to examine factors that had influenced faculty who had already adopted OER and who may have been applying OER-enabled pedagogy. As previously mentioned, participants were contacted via email for the quantitative and qualitative sections of the research. An online survey collected quantitative data and included several open-ended questions to collective qualitative data. Interviews were arranged either through face-to-face contact or through phone conversations for qualitative data collection and were

recorded with participant permission and later transcribed. Using a code recode approach (Saldana, 2009), data were thematically analyzed in alignment with the UTAUT model while allowing for other emerging themes.

Data from the quantitative survey were recorded using a 7-point Likert scale, and responses from the survey were aggregated using descriptive statistics. Central tendency was determined using median, and the frequency or percentages of the responses were used in order to build a picture and describe the reported variables that had influenced OER or OER-enabled pedagogical adoption by faculty. Qualitative data was imported into a computer assisted qualitative data analysis software program for coding, categorizing, and thematic analysis. In this way, the words of the faculty were used to deepen understanding and give voice to the participants (Corden & Sainsbury, 2006).

## Findings

This mixed method research explored perceptions of faculty who had adopted OER for instruction and may have used OP. Quantitative and qualitative findings will each be presented separately and then followed by a comparison of both quantitative and qualitative strands.

### Quantitative Data

**Participants.** Faculty participating in this study reported teaching at almost 100 institutions across the U. S. with over 65% teaching for ten or more years (see Table 1). Over half were in tenure track positions, and the majority were full-time faculty (84%). Age fell roughly into three main categories, ranging from 35 to 55 plus. Responses indicated that the majority had been teaching using OER less than six years at 91%. The majority taught at the undergraduate level (82.5%) with most of the remainder teaching both undergraduate and graduate levels (15.0%).

Table 1

*The Demographic Profile of Faculty Respondents to a Survey on OER (n=234)*

Classification	Percentage
Age	
Under 35	7.7
35-44	35.5
45-54	30.3
55+	26.5
Tenure Status	
Tenured	54.6
Tenure track, not tenured	10.0
Non-tenure track	35.4
Teaching Status	
Full-time faculty	83.8
Part-time faculty	4.7
Adjunct instructor	6.0
Other	5.6

Note. Other = Professionals such as teaching assistants or special lecturers.

**Performance expectancy.** This construct is the degree to which an individual believes using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003). The data from the survey indicated that faculty and instructors felt strongly (76% agreed or strongly agreed) that there was a benefit to using OER in their instruction (see Table 2).

More than half of the respondents (53%) agreed or strongly agreed that OER increased the learning outcomes of their students. Though 22% of respondents neither agreed nor disagreed that using OER had enhanced their reputation, over one-third (36%) agreed or strongly agreed it did with an

Table 2

*Survey Responses for Questions Pertaining to Performance Expectancy Related to OER (n=234)*

Item	Scale							M	SD
	% Strongly disagree	% Disagree	% Somewhat disagree	% Neither	% Somewhat agree	% Agree	% Strongly Agree	Mean	SD
Using OER has benefited me in my instruction	0.4	0.4	2.1	9.8	11.5	31.6	44.0	6.0	1.2
Using OER has increased the learning outcomes of my students	0.4	1.7	1.3	21.4	22.2	31.2	21.8	5.4	1.2
My academic reputation has been enhanced because I use OER	0.9	4.3	3.4	28.6	26.5	23.9	12.4	5.0	1.3
Using OER provides an advantage for promotion and tenure	3.8	6.4	5.1	55.6	12.4	10.7	6.0	4.2	1.3

additional 27% somewhat agreeing. A majority (56%) felt the use of OER neither helped nor hindered the promotion and tenure process, and less than a third (29%) felt that it would benefit promotion or tenure. The mean scores also reflect the relative importance of these factors in influencing faculty’s use of OER with the highest means for benefiting instruction (6.0) and increasing learning (5.4) and the lowest for enhancing academic reputation (5.0) and providing an advantage in tenure and promotion (4.2).

**Effort expectancy.** This construct is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003), and the domains within this construct are perceived ease of use, complexity, and ease of use. The continuum of introducing OER into courses often begins with finding suitable OER, adapting or creating an OER, and then integrating the OER into a specific course. Quantitative data explored the ease with which faculty and instructors were able to locate OER, and a majority (74%) somewhat to strongly agreed it was easy to find class material (see Table 3). A greater majority of respondents indicated they somewhat to strongly agreed that adapting and creating material was easy (78%). Finally, survey participants responded that they somewhat to strongly agreed (74%) that the integration of OER into their classes was a fairly easy process. Mean scores would seem to indicate

Table 3

*Survey Responses for Questions Pertaining to Effort Expectancy Related to OER (n=234)*

Item	Scale							M	SD
	% Strongly disagree	% Disagree	% Somewhat disagree	% Neither	% Somewhat agree	% Agree	% Strongly Agree	Mean	SD
It has been easy to find OER for my classes	1.7	5.6	13.2	6.0	34.2	26.5	12.8	5.0	1.5
It has been easy to adapt/create OER for my classes	1.3	3.0	9.4	8.1	23.1	38.0	17.1	5.3	1.4
It has been easy to integrate OER into my classes	0.9	7.3	3.8	14.1	40.6	32.9	0.4	5.9	1.2

That faculty found it easier to integrate OER into classes (5.9) than to adapt and create their own OER (5.3) or find appropriate OER to use in their classes (5.0).

**Social influence.** This construct represents the degree to which an individual perceives that others in the professional context believe he or she should use the new technology (Venkatesh et al., 2003). Quantitative data indicated that more respondents (59%) strongly to somewhat disagreed that they were influenced by others around them who were using OER, with just over one-fourth (27%) indicating that they were influenced by others (see Table 4). However, almost 38% somewhat to strongly

Table 4

*Survey Responses for Questions Pertaining to Social Influence Related to OER (n=234)*

Item	Scale							M	SD
	% Strongly disagree	% Disagree	% Somewhat disagree	% Neither	% Somewhat agree	% Agree	% Strongly Agree	Mean	SD
I began using OER because others were using OER	20.1	29.5	9.0	14.1	18.8	6.4	2.1	3.1	1.7
My department feels it's important to use OER	9.8	17.5	12.0	22.6	21.8	11.0	5.1	3.8	1.7
Students in my classes expect faculty to use OER	10.7	32.9	13.7	27.8	9.0	5.1	0.9	3.1	1.4
My institution looks favorably on OER adopters	4.3	3.4	3.4	28.2	23.5	28.2	9.0	4.8	1.4

agreed that their departments felt it was important to use OER, and a full 61% felt that their OER work

was favorably viewed by the institution. Only 15% of faculty and instructors indicated that they thought students expected OER to be offered in their courses. Means indicate institutional and departmental expectations (4.9 and 3.8, respectively) were more influential than student expectations or others using OER (both with a mean of 3.1).

**Facilitating conditions.** This construct refers to the amount of support an individual believes he or she will be given to use a new technology and the extent to which the new technology is compatible with one’s philosophy (Venkatesh et al., 2003). Though approximately one-third (34%) of respondents disagreed that campus guidance was provided when they began using OER, more than half of respondents (57%) felt that guidance was in place on their campus (see Table 5).

Table 5

*Survey Responses for Questions Pertaining to Facilitating Conditions Related to OER (n=234)*

Item	Scale							M	SD
	% Strongly disagree	% Disagree	% Somewhat disagree	% Neither	% Somewhat agree	% Agree	% Strongly Agree	Mean	SD
Campus guidance was available when I began using OER	10.7	12.4	10.7	9.0	19.2	19.2	18.8	4.5	2.0
Campus resources were available to explore and implement OER	5.1	8.5	9.8	11.5	19.7	30.8	14.5	4.8	1.7
Using OER parallels my instructional philosophy	0.0	0.4	1.7	5.6	11.5	32.1	48.7	6.2	1.0

A greater number of survey respondents (65%) felt that campus resources were made available when they were ready to explore and implement OER. In terms of the survey respondents' belief that OER helped facilitate their instruction and were compatible with their instructional philosophy, data indicated strong agreement (82%). Means also show the strength of this belief that OER parallels instructional philosophy (6.2 on the 7-point scale) with less agreement that campuses provided resources (4.8) and guidance (4.5) to implement OER.

**Attitude.** This refers to an individual's positive or negative feelings related to the technology (Yussoff, 2009). Respondents on the survey indicated that they somewhat to strongly agreed (92%) that sharing the OER they created was important (see Table 6). They also indicated that they expected other faculty to equally share the OER that they created (90%). Slightly more than half (51%) of respondents felt that working with OER enabled them to pursue their research interest. The means reflect the most and

Table 6

*Survey Responses for Questions Pertaining to Attitude Related to OER (n=234)*

Item	Scale							M	SD
	% Strongly disagree	% Disagree	% Somewhat disagree	% Neither	% Somewhat agree	% Agree	% Strongly Agree	Mean	SD
It is important that I share the OER that I create	0.0	0.4	0.0	8.1	10.3	34.2	47.0	6.2	1.0
I expect other faculty to share the OER they create	0.9	1.7	0.9	6.8	16.7	41.9	31.2	5.9	1.1
Developing OER allows me to pursue my research interest	4.7	11.1	6.8	26.1	16.2	19.2	15.8	4.6	1.7

least influencers in this area with feeling it is important to share (6.19) slightly higher than expecting others to share (5.87) and using OER to pursue research interests being the lowest (4.59).

**Computer/Technology self-efficacy.** This construct indicates the confidence that is demonstrated in making decisions about use of technology resources (Yussoff, 2009). For this study, self-efficacy applies to the skills needed to adopt OER, develop or modify OER, and apply the correct licenses to the resources. As shown in Table 7, quantitative data indicated a self-reported high level of skill for adoption at the time they began using OER (83%). Currently, most faculty (90%) felt they had the technical skills for developing and modifying OER. Data also indicated a high level of understanding (90%) in the selection and application of the appropriate copyright licensing to the resources for

Table 7

*Survey Responses for Questions Pertaining to Technology Self-efficacy Related to OER (n=234)*

Item	Scale							M	SD
	% Strongly disagree	% Disagree	% Somewhat disagree	% Neither	% Somewhat agree	% Agree	% Strongly Agree	Mean	SD
When I began using OER, I had the technical skills to adopt the resources	0.9	5.1	7.7	3.0	21.4	37.2	24.8	5.5	1.4
Currently, I feel I have the technical skills to develop or modify OER	0.9	1.7	3.4	3.8	16.7	40.2	32.9	5.9	1.2
I understand the public copyright licenses of OE to allow their reuse	0.0	1.7	3.8	3.8	20.1	41.9	28.6	5.8	1.1

distribution. Mean scores indicated faculty felt most comfortable with their current skills in developing and modifying OER (5.9) and in understanding public copyright licenses of OER (5.8) but were less confident in using OER when they first began (5.5).

**OER-enabled pedagogy.** One survey question inquired as to whether participants were now or had ever applied OER-enabled pedagogy in their courses. A brief explanation of OP was included on the questionnaire. Of the 234 respondents, 47% responded in the affirmative, with the remainder indicating they had not applied OP in their instruction (53%). Several open-ended survey questions followed, which are explored in the qualitative section.

## Qualitative Data

Qualitative data were collected from open-ended questions on the survey and from follow-up interviews. Approximately 90% of participants responded to open-ended questions on the survey adding to the qualitative data collected from 15 interviews. Of the interviewees, 60% taught at community colleges with the remaining 40% teaching at four-year colleges and universities.

**Performance expectancy.** During the interviews, and as indicated on the open-ended survey questions, faculty and instructors relayed that working with and using OER helped them in their job performance. A number of themes related to performance expectancy emerged from the data. These included (1) benefits to teaching and learning, (2) opportunities for personal and professional growth, (3) increased visibility and impact on reputations, and (4) encouraging institutional interplay.

**Benefits to teaching and learning.** Survey respondent open-ended data and interview data indicated three ways that participants believed OER benefited the teaching and learning process. These included providing better access to materials, reduced costs for students, and the ability of instructors to customize resources.

Most interview participants discussed the positive impact that their use of OER had on student learning. The fact that using an OER for a course provided instant resource access to students was very important for the interviewees. One participant mentioned that she covered a great deal of information in an undergraduate biology class and that having the OER textbook at the beginning of the course “is critical to [student] success because I don’t have enough time in class to go over every new term and every concept. So, I’m asking them to do the reading first before they come to class and then come to class prepared so we can go through things.” Another participant mentioned, “I was convinced that at least half of the class wasn’t buying the textbook before [introducing an OER]. So anecdotally, I think my students do better because they can access the text.” Discussions of access also included the important American Disabilities Act (ADA) access provided through ADA-compliant OER and having access to OER formatted for multiple devices. One issue pertaining to access was that of limited Internet coverage in some rural areas of the United States. One participant shared that students “all have access at least while they’re on campus, but then there are the limitations when you leave campus. That’s why accessibility on various devices is really important.” Students were encouraged to download the OER for offline use. In fact, some participants indicated that having the option to access OER in different formats really supported their teaching. “My students like that they can access [the OER] any number of ways. They can download it ... and print is available ... and they can access it from any number of portable devices.”

If the cost associated with textbooks is removed from the educational-cost equation for students, faculty and instructors viewed this as positive for the learning and teaching process and, in fact, some viewed it as a matter of social justice. When cost is removed, access is then immediate and provides support for student success. This concept was repeated numerous times in the open-ended data from the survey: “It allows students who are socially and economically disadvantaged to have the same chance as the rest of the students.” One participant commented, “It is important to me for the social equity component. I want to ensure all students can access their textbooks on Day 1 and not have to delay or

decline purchasing a textbook because of the expense.” Another participant indicated that because of the no-cost textbook he offers, “I keep more students in the class ... because the students at least have an opportunity to be successful ... just because the cost itself is less of a barrier.” Cost can be an extreme barrier in low-income areas. One interviewee shared, “We are low cost, open access, high, high, high poverty area here. It’s not everybody anymore, but I still think [our student body] is over 80% Pell Grant eligible.” One participant shared, “Students were so moved by the fact that they didn’t have to pay for a textbook that they are now looking for other ways that they could ... open the door or help other [students] ....”

Many participants felt that their teaching was enhanced because they could customize – even immediately - the resources in their courses by “building on the 5 R’s.” One participant spoke about “putting together lessons with just the right amount [of information] that added richness and quality material. This directly impacts the student experience because they can see, for example, a documentary that just came out yesterday in Spain.” Another shared that being able to customize the OER “... has given me more control on the content of the book by making it more relevant to the course, to my teaching, and the things I’m trying to emphasize in my teaching content-wise. So, hopefully that’s something that is benefiting my teaching.” One participant also shared, “Too often textbooks drive the curriculum. By creating my own OER, I’ve been able to modify it to meet the learning goals set by our state and by our local population of students. “ Many benefits were mentioned by participants in terms of the ability to customize an OER: an ease of editing as students gave feedback on the resource, which would promote ownership and empower the students to give informative feedback; the ability to add fresh, relevant information; putting the development of the content into the hands of experts – not publishers; the freedom to localize the content for relevance; a freedom from copyright restrictions; and the ability to add material in various formats to address different learning styles. The only negative comment about the ability to customize and contextualize resources was from an instructor who mentioned, “It’s unfortunate

that it can take so much time to pull together and edit the material when you're teaching so many classes."

*Provides personal/profession growth.* Several of the participants were excited about the skills they were developing by tackling an OER project. One shared, "For me the value of [developing OER] is that it pushes me to extend myself beyond my comfort zone, so I can bring more information to my students. So, it benefits my learning as well." Another participant, discussing developing OER for an institutional program, said, "It was really a growth experience, you know. Communicating with the university for permission to use certain aspects of the university's website, going to trainings for textbook creation. So that, I feel, was a great professional learning experience." One indicated, "I wanted to develop a new course in an emerging field, and the textbooks available were very limited, expensive, and, frankly, horrible and already out of date. OER enables me to access current, pertinent, and well-developed resources and produce a professional product." One participant commented about the experience of becoming a better teacher. "I think [developing OER] provides me the opportunity to be more engaged in the learning itself. I think it makes me, I hope, a much better instructor." Another discussed developing OER for his class and said, "I think it provides me the opportunity to be more engaged in the learning itself ... and reinforces what I'm doing in the classroom."

Data indicated that professional growth opportunities open when faculty and instructors tackle teaching and learning with OER. Various opportunities were mentioned: becoming involved in a new research study; attending different conferences and workshops; becoming a new co-curriculum developer; taking on the role of liaison with administration; and becoming a campus lead in OER development. A number of participants mentioned that part of the professional growth came as they were able to inspire others in their department and on their campus. One shared, "I know some of my

colleagues have been reluctant to try this on their own. But they see me working with OER and are inspired. Providing support for them has made me a better teacher, too.”

An overwhelming number of participants identified the importance of networking and collaboration as part of their personal and professional growth. One participant shared, “I think it’s nice to be in that OER community and talk to other people about what technology they’re using and how things are going and what topics they are covering... It’s been really positive for me professionally and really makes my job easier in the classroom.” Another participant was very excited about the “... amazing Twitter and social media network of folks that are working in OER, and there’s a constant river of information that I feel like I’m keyed into now that I wasn’t before I was using OER.” This participant went on to say, “I think one really important piece is that it allows you to be a contemporary part of the conversation. It’s a great way to stay current in the field. You’re part of those conversations!” This type of connection can also produce collaborative works. One participant mentioned jointly developing material that later was adopted nationally and internationally. “It was not just collaboration. It was a genuine intellectual fusion where the sum was way more than either of the parts could be. My colleagues are very collaborative. ... Personally, it was very satisfying to me.” This type of networking also allows faster access to resources. One participant mentioned the traditional process of publishing instructional material and comparing it to sharing in the OER community. This participant described waiting for the sample of publisher copies of resources and how that could be a ‘pain.” He went on to indicate that collaborative authors now “are more approachable or accessible with OERs because that’s their goal. Having immediate access to [the material] is great!”

*Increases visibility and impacts reputation.* Several participants felt that their professional reputation had been positively affected by their use of OER. However, one participant mentioned, “I don’t know if [my reputation] has been affected. We have a very strong, supportive OER community on

campus. ... I think there's so much support on campus for educators to be able to work in a way that gives students more opportunities, like low-cost classes, that I think we all know each other. There's nothing that I've done that would warrant a reputation of some kind. I just do what I do because I love what I do."

One participant did mention that some colleagues are "very concerned that there's going to be an expectation for them to switch to OER." This participant went on to share, "... and I think they should be concerned. I think that they should be really thinking about what they can be doing to move the needle on student success ..."

Another participant mentioned that some older colleagues seemed to respect commercial textbooks more than OER; however, also said, "But the students feel that they are part of something new, and they're part of something exciting." In fact, some participants mentioned how their involvement with OER was viewed very positively by students. One participant mentioned that the students had shared feedback about the OER they were using, "Thank you [for using OER]. Thank you for doing that. We really appreciate that you've done that for us." This participant also shared, "I think it's helped me because I think the students don't complain as much now about how tough my classes are, even though I'm a strict grader..."

Another participant mentioned that "my students have become involved and will go by [other faculty's] offices and say, 'Hey, I've taken your course before. This was how the cost of the textbook was a challenge for me.'" Several participants mentioned that their colleagues were impressed that they had applied for and received grants to develop OER. Several others also mentioned that their reputation was being enhanced because of their work with colleagues across their campuses. One participant shared, "I've actually had the opportunity to speak to people that I wouldn't have normally because I was advocating for OER. I'd go into some meetings, and in a way, was able to showcase the things that I was doing that otherwise people wouldn't have known about. ... People would say, 'Well, this contributes, really, to great curriculum design.' So that was a good connection." Several other participants mentioned that their work with OER had been recognized by the administration on their campus. One participant mentioned that "there are many deans and directors and provosts, and

now chancellors who know of me by name, even if I've never met them before because I'm now known as 'the OER Lady'." Another participant explained, "... when our small department completed the [OER] textbooks, I feel like that's brought some degree of visibility to the department for the wider university. And then also some recognition, potentially, at the state and national levels for using this kind of innovative curricular [resource]." One other participant mentioned that, after developing OER for their department, they were able to offer "zero-cost" courses, which resulted in a rise in their enrollment. She shared that "this is very beneficial to our department ... bringing in more funds for the college so we can expand our program. I mean it's just a domino effect." Another participant mentioned that by sharing a collaboratively-developed OER that the contributors were able to "get their name on [an OER publication] that is out there beyond our walls here, which is really great. ... Usefulness, visibility, prestige. I think it's contributed all those things to our department."

*Encourages institutional interplay.* The impact of offering OER can extend to a broader institutional level. One participant mentioned that their community college campus claimed to have saved students over \$200,000 dollars a term as a handful of instructors launched OER in their courses. This participant also shared that since launching OER, completion rates have risen. This can bring awareness and potential funding to support OER development. One participant indicated, 'Institutionally, I've definitely seen an interest from the administration. Even up as far as the president, who stated that OER were a good thing and wanted to promote their use on campus.'" Another mentioned that he has concentrated on sharing his teaching resources through the college's learning management system. "This has benefited my school's relationship with the company that made the system. I've spoken at conferences and have helped my school become more connected to an online learning network of sharing."

Participants also discussed institutional recognition of their efforts developing and implementing OER. Findings indicated that there is no direct positive influence on promotion and tenure through OER involvement, though indirect benefits were mentioned. Participants at four-year institutions indicated they were not recognized formally in the promotion and tenure process. However, one participant mentioned the advantage of “being able to speak about [creating and promoting OER] as part of my teaching philosophy when I go up next for promotion.” Another shared that “the OER movement has allowed me to become an OER Ambassador on campus and to participate in a state-wide program development project,” which would enhance a CV. One participant indicated that, though OER development “doesn’t help you get tenure, in the long term, it will help your career. This is because it makes you more visible in a way that you may not be with traditional publications.” Others discussed indirect ways that involvement with OER would be viewed positively by an institution: being able to speak about involvement during the hiring process; participating in OER-related committee work; completing certified workshop training; researching and publishing on topics related to OER; and creating and promoting newly-design curriculum using OER.

**Effort expectancy.** Participants also shared various aspects of finding, adapting, creating, and then integrating these resources in their practice. Themes that emerged from this data included that OER adoption and development are motivated by pragmatic factors, that the context strongly helps to determine the approach taken and the ease of adoption, and, finally, integration is not a difficult task.

**Pragmatic motivators for adoption.** It might be assumed that student savings is the sole reason that faculty and instructors would want to adopt OER, but the qualitative data revealed that other pertinent reasons exist: to reduce wastefulness; a dissatisfaction with department resource recommendations; a desire to create relevant material; and to share with a wider community. One participant mentioned a “growing dissatisfaction with rising textbook costs and the charges that go with

it.” This participant discussed a “textbook that was \$320 ... and the lab manual, that’s another \$150 or \$180. ... And with new editions coming out all the time, and there’s no change. That’s just stupid. ... When I realized how easy open textbooks could be, I was like, ‘Just do it!’” Another participant shared that “over the years, as the [textbook] companies consolidated, and I think the textbooks both climbed in price and became less useful to me at the same time.” A number of participants were very aware of the potential wastefulness when they required students to purchase a text and then required only a portion to be used. One discussed using a commercial textbook that was required by the department and “would tell my students, ‘This book is going to cost you \$200, and you’re only going to read ten or twenty percent of it. Sorry.’” Another participant mentioned the situation using the department-recommended textbook: “I only used maybe half [of the book] and the students were paying \$150 for the textbook. I mean, all of the information in it was valuable, but I just couldn’t legitimize or give myself good reason to have them keep buying this book when they were not using the entire book. And so, over two years, I developed my own material.” Another participant mentioned the process of initially trying to use, but hating, the department-recommended text. This participant had to implement an online text that required access codes. Students reported that the site continuously crashed. The same types of issues were experienced with a third online textbook. Finally, “our university invited Cable Green to speak about OER, and he described some of the studies on student performance using OER and that there were so many textbooks available. Though I didn’t believe him at first, I looked into it and realized he was right. I was so fed up with the other material I had been using that I just did it! I researched and found an OER.” One participant shared, “I had worked in business for years, and I had my own material that I had used as a consultant. My material was much more relevant to what students would need in the business world, so I just put together my own resource.” One participant shared that they became involved with OER when taking part in a project to develop an entirely new curriculum for the university. “These were new classes, and we decided to write the textbook specifically for the classes. We piloted the program and the

textbook together.” Another participant shared, “I transitioned to using OER when I began teaching online. It only made sense to me to offer my material online. I also wanted to share with everybody. Not just my students, but with a larger community. ... To me, that’s a big motivator.” However, one participant did mention a negative experience when making a resource they created available on the Internet: “Some people were writing me and criticizing the material,” with a result that he was “less excited about putting my name on something openly as a full-text OER.”

*Context determines approach and ease of adoption.* Insights from the interviews and open-ended survey data revealed that there were multiple approaches and varied phases as part of the adoption process. This was dependent on context and individual circumstances. Several participants shared that they enjoyed the process of finding OER that were available through repositories of open textbooks. “OpenStax is a pretty good resource, and they vet the material. ... It’s the same kind of content and quality that you get with your traditional textbook. So that’s relatively easy to adopt.” Knowing a resource has been vetted was important to one faculty who shared, “That’s one of the downsides of OER. Anybody can put anything they want on the Internet ... and you don’t know if it’s written by an expert or a so-called expert who may never actually have taught a class before. There are advantages and disadvantages.” Besides using a repository of vetted work, another faculty mentioned the importance of networking to find resources by “either going through the conferences [for resource recommendations] or talking to other people. Going to statewide meetings. Identifying experts and contacting them for ideas.” Because one participant was able to find an OER for a psychology class and not have to create it, they shared, “That in and of itself was a huge barrier lifted.” One participant, who had created their own OER in the past, shared that now, “I spend a lot more time searching than I do creating. It’s not less effort, but it’s different. It seems like a more reusable effort ... because I think we duplicate a lot.”

Regarding adapting and creating OER appropriate for a course, participants indicated that the effort varied with the circumstances. One shared, “With no textbook available for this lower division class, no open material in that field, ... it’s been a real challenge to bring that course up to a similar standard [as my other class] with OER.” One participant was an experienced teacher and shared that they had a lot of material that had been created over the years but experienced a different challenge when, along with a colleague, they tried consolidating their material into one text: “The content was not the issue, but learning how to put that all together and create the flow and consistent language ... I mean, just all of those editing issues were things that just weren’t even on our radar. ... You get so familiar with your own work that you gloss over those small errors or inconsistencies, and so we ended up having to bring in an editor to kind of look at the finished product and polish it for us.” Many participants shared that creating their own OER was time consuming, and at times, there was a steep learning curve. One participant reported working on a basic public speaking text and shared, “... the creation of a textbook like that - 15 chapters, over 400 pages, desk-top published, Creative Commons license - is EXTREMELY time consuming, and I don’t know if I’d recommend it.” She did continue to share that “... the book has been used in 12 other institutions that I know of and has been downloaded 14,000 times,” which was rewarding. One participant discussed the experience of creating a collaborative work and shared that “It took so long with [obtaining] permissions, so we had to throw out lots of stuff because we couldn’t get the permissions to use resources if not open source.” Another participant shared that most instructors “have the experience of creating ancillary material, so creating OER is just an extension [of this experience].”

*Integration not difficult.* One participant felt that introducing a new OER text into instruction was “similar to integrating other commercial material.” However, another felt that integrating OER was emotionally easier because it hadn’t involved a large financial investment, “I didn’t have to adopt it and get the students to buy it and then discover it wasn’t working well. ... and I could change it as we went along.” Another participant liked the ability to revise the OER was using in an audio production course

“... because things change in this environment, what I’ve written now will be obsolete in two years. But I can integrate new material, new technology any time.” One participant mentioned that, regarding maintaining one’s own online resources as opposed to trying to stay abreast of changing commercial textbook versions, “it has been more consistent for me than [using commercial] textbooks. It’s less work maintaining. More work setting up, but less work maintaining,” in the end saving time. Another participant commented, “Oh, it’s a lot of work, not difficult, but a lot of work ... but it should be a lot of work ... to find and to integrate anything new into your classes. That’s what we do.”

**Social influence.** Interview participants and survey respondents reflected on a variety of social influences that led them to adopt OER. This social influence could come from colleagues, the open source community, the culture of their institution, or empathy for students.

Some of the participants relayed that they had been influenced to adopt OER because of colleagues, especially in their departments, though not by the department administration. One participant acknowledged that there was an effort across some of the community college math instructors to coordinate curriculum using an OER. “Really the biggest influence was that the approach was about the concepts [in the math classes], and it was not about just the textbook.” Another participant shared that their English “staff was so enthusiastic about [using OER] and pitching it, we unified together and presented [the idea] to our department.” One participant mentioned being inspired by the open source community, while several others indicated that they were hired into new positions where there was already a culture of using OER and cited institutional support as the main influence in their use of OER. “I had already been dissatisfied with traditional textbooks, and then I shifted into this new job. And suddenly OERs were being talked about. I’d never had colleagues using OER. And then a state-wide OER grant was offered, so things just came together.” Some of the participants felt that they were influenced by their own frustration as students, who struggled with the cost of schooling. One

shared a story while being a student, "... no small part of [being influenced to use OER] was the fact that I was like some of these students. I'm a first-generation college student. I come from a single parent household, and a pretty troubled one at that, so when I went to college, it was kind of sink or swim. There was no support. There were a few semesters where I did better than others. There were some semesters where I was actually homeless, and it was a big challenge getting through college. ... So, I think we need to be doing better for our students."

**Facilitating conditions.** Data were collected regarding both the organizational infrastructure available to support adopting OER as well as the compatibility with instructional philosophy. Participants shared information that evidenced two main themes related to facilitating conditions: 1) providing support leads to results, and 2) the use of OER reflects teaching philosophy.

**Providing support leads to results.** Although two of the participants shared that they had begun work with OER very early on, when no formal support was provided, the overall data showed that currently support exists through various means at most institutions. At several universities, Cable Green, a leading expert in OER, was brought in to generate interest within the community. Inspiration was also generated because one participant worked at a university near Plymouth State University where Robin DeRosa teaches. Dr. DeRosa is a well-known and inspirational open pedagogy and OER advocate. At one campus, a special technology unit exists that began to encourage OER development. Having the support from this unit made the difference in one participant's experience with OER: "So I tried OER on my own like three years ago, and on my own I kind of failed. Then the next year, I applied for something called FITC, an institute of technology ... helping faculty stay current in technology. There's a big emphasis for OER, and I had the opportunity to then become an OER Ambassador." Some institutions offered special programs like the OER Ambassador program or a special Pathways Program that supported developing OER material. One participant spoke about being "part of a pilot project that was reasonably guided ... by

a librarian who assembled us all, gave us a background in what the [Creative Commons] licenses meant, gave us some ideas of places to look for content, and at that point would ... offer assistance.” In fact, several participants shared that their institutions had a dedicated librarian or some form of library support for OER. One participant shared, “The library really spearheaded this. My department would have never done this on its own. And some of our library staff is on the younger side. And I feel that they are taking some risks, and they don’t mind where [the OER push] goes. And I got on board with that.”

Another participant spoke about one of their librarians. “Besides the state-wide initiative, we’ve had one digital initiatives librarian with a huge interest in [OER]. She’s the liaison who manages [our efforts], who helps us through the process and kind of shepherds us, and then she also is the person who will help us with updates.” Data indicated that some form of grant program was offered at a number of institutions.

Grants took a variety of forms in the different institutions: stipends were made available for faculty interested in modifying courses to incorporate OER; specials grants for the creation of new OER; professional development grants for conference attendance; salary supplements for introducing OER; special grants for formal research on OER; small grants to review Open Textbook Network material; grants for upkeep and maintenance of previously-developed OER; and grants offered through student organizations providing iPads. One participant spoke about a grant offered from the president’s office: “The grant that was provided was not very much but was a little bit of an incentive. And so, I feel like had it not been for the university’s pursuit of this, it probably would not have occurred to me [to adopt OER].”

Other forms of support were revealed. One participant mentioned a new provost’s support who was trying “to get my department to give some time for a trade, so that instead of teaching one class, I can be the base person, just going out and really strongly advocating for OER. So far, for the past two and a half years, I’ve been doing this kind of completely pro bono. They’re making a little money available now.”

Other participants suggested that they felt they were indirectly supported at their institutions by not being deterred from experimenting with OER. One participant admitted, “Other than the grant, it was

mostly just not getting in my way, that they supported the idea that I was going to adopt a book that I was writing ... and were also very happy with the cost.” Finally, some participants indicated that they worked in institutions in a state that had organized state-wide OER initiatives, which in turn have promoted both grant programs and state-wide conferences supporting OER adoption and development.

*Use of OER reflects teaching philosophy.* Many participants shared that adopting and creating OER was a direct accompaniment to their instructional philosophy and helped to facilitate their instruction. One participant shared that “I teach my classes as storytelling classes, with the idea that the students tell their own versions of the stories that we’re reading in classes. So, it’s a remix ... as students are working with public domain material. It’s ready to be reused and remixed in whatever ways they want to do that.” Another shared that using online information “allows us to consider origin, to understand authorship, and to understand ownership ... and starts a whole new conversation.” Three different participants mentioned their collaborative approach to instruction. One specifically mentioned how the use of OER could model a constructivist philosophy to teaching: “So, I like to watch students building their own knowledge, and I think it can be helpful for them to see that I’m actually building the knowledge that we use in class as well.” Several participants felt that the flexibility of revising OER supported their approach to instruction as it helped them make the material relevant and localized and helped to promote engagement. Finally, a number of different participants mentioned that OER and open practices supported a larger philosophy about education. They spoke about the right that every person should have to an education. One shared, “... my teaching philosophy is based on the belief that students have the right to an education, and they have a right to be able to have an affordable education. ... we all have a right to learn and to grow, and we shouldn’t have to pay through the nose. I’m still paying, 15 years later and I’m still paying huge amount of debt. It’s crazy.”

**Attitude.** Data collected for this construct indicated two themes: satisfaction was derived from working with OER and there was an overwhelming sense that sharing of resources was positive.

***Derive personal and professional satisfaction.*** Many participants expressed some form of satisfaction in working with OER. Some mentioned that working with OER was fun and challenging in a positive way and that being an author was rewarding. One mentioned the pleasure in “taking satisfaction in the fact that money isn’t going to Pearson and McGraw.” Several participants felt they were a part of a larger, more important movement to support students. One stated, “I think it’s exciting to be a part of a team. Working with something that is free to the students. I think it’s exciting to be part of something new. I just feel like there is so much to tap into and there are a lot of possibilities with OER.” A good number of the participants felt that great satisfaction was gained because students were being served better as the result of the use of OER. One participant shared that “it makes me feel quite a lot better knowing that I can support students, and I have had just so many really kind and wonderful comments from students.” Another participant expressed a frustration that often undergraduate textbooks weren’t written for a student newly entering the community college environment. “The assumptions about 18-year olds in [commercial textbooks] is pretty different. So, finding a textbook that I could edit to make relevant to my students ... has been really satisfying – to find things that work for them.” Another agreed about the flexible nature of OER, “It’s really useful and therefore professionally satisfying just to have that flexibility ... to ditch certain concepts and emphasize others.” A number of participants mentioned that the ability to edit the textbook was very satisfying for them. One also mentioned that “If you’d told me 25 or 30 years ago that I would be able to spend my time reading 16<sup>th</sup> century books that I can get for free online, and then repurposing them and sharing them with new audiences, I wouldn’t have believed it. It’s incredible!” Several participants shared how working in OER supported their research efforts. Several were conducting OER-related research in their classes. One participant had already conducted research in one class and was participating with a colleague at another college in the state because “they have a

much larger student body. And so, we can increase our sample size and continue to explore the perceptions and usage by community college students because a lot of the OER literature is done at the four-year institution level.” Participants also mentioned the personal satisfaction that comes with the ability to share. One participant agreed that it was very satisfying to have your work “adopted by faculty across the nation and into Canada. So, I feel like maybe I’ve gained a little prestige, professionally, in the sense that I kind of feel like this important author. People are using my work across the country in their classrooms. And people email me, ‘This is great. Thanks for putting this together.’”

*Sharing supports global progress.* Much of the data indicated a very positive attitude toward sharing resources. Evidence of this came from one participant sharing how a colleague in another state requested instructional material. The participant shared, “... anything I have, I’ll share. So, I ended up sending her all of my exams, and quizzes, and all of my lab activities. So, it just seems like we faculty keep having to reinvent the wheel because we’re working in these little islands, or silos. I mean, the more we share, the more streamlined this process gets - and easier. It becomes more globally collaborative.” Another mentioned how sharing was a great thing because “I think that [a collection of OER] is really helpful. I think that the great thing is to have these collections available so people can go and look at them and decide what to choose from.” Another participant mentioned the transition to feeling comfortable in sharing. “I worried just a minute that [sharing work globally] would undercut my own research or might give away ideas ... but now that I’ve had some experience with it, I’ve only had positive experiences in sharing information. ... And then you get these amazing threads of amazing people link to all the work that’s available for free from researchers that they love.” Another participant shared a similar transition when they transitioned from using a more limited Creative Commons license to a less restrictive one as encouraged by a well-known OER advocate for language learning. “Carl Blyth said, ‘You know what? Put the most generous license on [the OER they had created]. Get your stuff out there. Let people do what they want. Some people will turn it into something awful. Some people will turn it into

amazing things.” Several participants discussed how working and sharing online promotes greater exposure of work, which can sometime be uncomfortable. One participant, while sharing work at a conference, was somewhat unnerved by what was perceived as harsh criticism of the OER being presented; however, most respondents felt similarly to one participant: “For me the sharing has been great. Once again, it’s a personal thing, but also a professional thing. I really believe in networked learning, networked knowledge, and so by sharing my stuff, I’ve been able to build a really important personal network of people that I collaborate with, that I can ask for help, that I feel connected to through the material that we work on.”

**Technology self-efficacy.** Data were collected regarding what extent faculty and instructors believed in their ability to be successful working with OER. Two themes emerged from the data. First, technology skills are important. Second, you need knowledge of the licenses for making resources open.

**Technology skills important.** Participants generally felt that they were technology savvy. However, one participant, who was adopting an OER, admitted, “I don’t consider myself tech savvy at all. ... having a supportive library staff helps [finding material]. But I don’t think I needed the skills that I thought I needed to be able to find these [resources].” On other participant mentioned that, “[Technology skills] are not an absolutely necessary component of OER if you use OpenStax because you can get a copy of a textbook and just use that ... but [skills] would probably be very, very useful in the creation of OER.” Another admitted that “I think I’m fairly tech savvy, and it was pretty easy for me to understand and to put a lot of this together, whereas my co-author was not as savvy. And I think she felt more challenged by it. But I don’t think that should be a reason not to do it because there are lots of resources to help people with the technical aspects.” This participant also admitted appreciating the “help of the digital initiatives librarian, who made the process easier.” Several other participants remarked on the aspect of technical support: “I’d say people who are interested in OER but don’t have

high technical competence can still do it, but they need technical support. You almost need an instructional designer or somebody working with you that has that level of skill.” Another participant admitted, “In terms of barriers to OER, [tech skills] can be a big one.” The aspect of technology also extends to students who will be using the OER. One participant advised that instructors need to consider how students will be using the OER: “... if I’m not explicit, I spend more time answering technical questions about how to access [the OER] than I do about the content of the text.”

***Need knowledge of licenses.*** Most participants were aware of Creative Commons licenses that are applied to OER. One participant admitted that “Until I started doing this, I didn’t really have a full comprehension of the differences in the licenses and how to give attribution. I do understand them now, but I don’t understand why ... some people don’t want their material changed. Do they really understand the license? You should be able to use the resource in the way that you need to for whatever you’re teaching.” A participant addressed learning about the licenses, “... we did kind of learn about [the licenses] at the beginning of the project, without necessarily understanding what they meant. Then we had to get our license... and the librarian offered a workshop for the grantees [to select the license]. And it was a super easy process to do.” Another spoke about how the concept of CC licenses was “really foreign” and “we’re going to have to do some work on [learning about CC] because we’ve been so scared of violating copyright throughout our careers.”

***OER-enabled pedagogy.*** Qualitative data for this topic were collected from open-ended survey questions and from interviews and helped to identify certain themes in this area. These themes indicated that OER-enabled pedagogy could be realized in many ways and there were benefits in teaching and learning; however, there also were obstacles in applying OP

***Realized in many forms.*** Data revealed many different types of activities that participants identified as OER-enabled pedagogy. Examples included student-created lessons, study guides, full

sections of the curriculum, glossaries, bibliographies, chapter introductions or whole chapters, and supplemental practice problems to support texts. The highest number of OP activities centered around student-generated content for wikis, blogs, and webpages, followed by student-selected articles and material to be incorporated into a course. Three participants shared that their students had created an entire OER. One participant indicated that “under my supervision, students in my classes created a history of psychology textbook.” Several others mentioned students developing banks of quizzes and study questions to incorporate into courses. One participant mentioned how frustrating it was not to find OER for a behavior analysis course that then prompted an OP approach to the problem. “So, I walked into my upper division behavior analysis course – with seniors and graduate students – and I bring in copies of different texts and say, ‘Let’s talk about OER, you guys. Let’s talk about this. I want you to read this and tell me what you think.’” Students ended up working on a Psychology 400 OER for future classes. Another participant mentioned having students “write additional sections [of the course textbook] that they felt would be targeted to community college students and creating local guides to go with [the textbook].”

*Benefits to teaching and learning.* Just as was realized in the findings regarding the benefits of OER, the application of OP benefits both teaching and learning as well. Many participants commented that they felt the OP approach increased student engagement and motivation. This realization provided the motivation for them to experiment with OP. Many other participants felt that students took more ownership of their learning and felt like they were building a learning community when involved with OP. One participant shared, “[Students] act like experts, responsible for their own education and learning.” Another participant shared an additional benefit: “[Creating OER] gives them a practical or tangible artifact that represents an outcome instead of saying, ‘We’re just going to learn about this.’ They have something they created that they can use again and that they have ownership of, basically.” Another participant shared, “It’s just been a wonderful experience all the way around, not only because [students] become authors and they get to demonstrate their competence in a particular topic, but because they

see that in actual practice [creating information] gets messy. It's a real-life experience." This same participant also shared how applying OP is basic to teaching philosophy. "For me it's a philosophical position I've always held ... that idea of student-centered learning. The students should ask the questions. The students should find the answers; we're just here to facilitate that process. So open pedagogy and the fact that we can have these information networks now allow me to implement the philosophy that I've had all along about teaching, that in a classroom is so hard." Finally, one participant shared, "The earlier that students understand that they are a part of the academic conversation, that their voices are of value and a worthy contribution, the better students they become and ideally better citizens."

*Obstacles in applying OP.* Data shed light on some of the frustrating aspects in actually implementing OP. One participant shared that "[Students] seem more engaged with [OP] but also sometimes more frustrated because it is not as cut and dried as a regular type of assignment." Another indicated, "At the undergraduate level, I find students very intimidated by open pedagogy. It has been a learning experience for me to adjust assignments that account for the intellectual confidence levels." Another participant also disclosed, "I think it has made them more interested, but also a little bit more frustrated because it does require them to work a little bit harder; however, once given guidance and allowance to make mistakes, each [student] found value in the process." One participant also discussed one aspect of the process: "... in part about me becoming comfortable with letting students try to be the authors, to try to be the creators." Other participants reflected on why they haven't become involved with OP: the logistics would be difficult; not wanting to single out particular student work to include in OER; the curriculum is too tight; the desire for a very concise textbook; and the fear that it would take a lot of extra preparation. Finally, one participant felt the pressure from administrative economic concerns: "Trying open pedagogy for the first time can lead to frustration ... and as long as we're in the era of declining enrollment and declining funding, there's a lot of pressure for certain metrics, like completion retention, and so experimentation in teaching can be hard to do in that climate."

## Comparison of Quantitative and Qualitative Data

Now that the quantitative and qualitative findings have been reviewed, we turn to examining both data strands together. Mixed methods research involves collecting, analyzing, and interpreting both quantitative and qualitative data in a single study, with a comparison of the data collected through each approach (Creswell & Plano Clark, 2011). This research utilizes an explanatory sequential approach in order for the initial quantitative data to be more fully explained by subsequent qualitative data (Leech & Onwegbuzie, 2009), providing a triangulation among different sources of data to enhance validity (Creswell, 2014). Each of the concepts discussed previously will be reviewed.

**Performance expectancy.** Qualitative findings indicated that participants felt very strong that OER supports several aspects of performance expectancy. The qualitative data indicated strong support in benefiting instructional practices, as well as increasing student learning outcomes, while quantitative data indicated just over 75% support for benefiting instructional practice and 53% in increasing learning outcomes. The semi-structured interviews allowed participants to expand on these concepts. They cited free, easily available, and early student access to resources, which, in turn, potentially supported greater student learning opportunities. The qualitative data also provided more in-depth information on the importance of being able to customize an open resource and on how this enhanced instructional practices.

Data also revealed that one's reputation could be enhanced through promoting OER use and development. Both data sources revealed similar findings. Approximately three-quarters (75%) of the survey participants felt this to be the case, which was substantiated by the qualitative data. Interview participants were able to discuss various aspects of this issue through the interviews. They were able to share the many ways that they grew both personally and professionally and were able to extend their

impact through the department, and across the campus, and even nationally and internationally because of their contribution to the development of OER.

Regarding how achievements through OER impact promotion and tenure, the quantitative data indicated that OER development and use somewhat impacted promotion and tenure (56%) but there was no confirmation of this in the qualitative data. Interview data revealed several ways that affiliation with and work in the OER area could potentially bear positive consequences with the promotion and tenure or hiring processes; however, no interviewee affirmed that there was a direct benefit in these processes.

**Effort expectancy.** Qualitative data added rich information as to the path that many instructors and faculty members took in the process of adopting OER. Quantitative data indicated that about three quarters of the respondents felt it was somewhat to very easy to find appropriate OER for their courses. This data mirrors that of the qualitative data. The educational context and academic area of instruction dictated the ease of finding material. Whereas almost 78% of survey respondents felt it was easy to adapt or create OER, more interview participants spoke about the effort required in the process. Quantitative data and qualitative data did not align regarding the adaption and creation of OER, with a higher sense of ease for the process by the survey respondents. Finally, almost three-quarters of survey participants responded that the integration of OER into their curriculum was not a difficult process. A higher percentage of interview participants agreed with this concept and cited examples of how OER made the integration process easy.

**Social influence.** The quantitative and qualitative data aligned regarding using OER because of the influence of others; however, they were not consistent regarding departmental influence. Almost 38% of survey respondents indicated departmental support, though none of the interviewees reported that their department administration directly influenced them to use OER. In fact, two participants indicated that they provided the impetus that influenced their departments to adopt OER. Data were

consistent regarding student influence. Quantitative data indicated that 15% of survey respondents felt that students expected OER and only a few interviewees indicating the same. However, in terms of professional reputation being enhanced, a full third of interview participants indicated that students looked at faculty work with OER as very positive. Interview data indicated an uncertainty in how participants' OER involvement was viewed by their institution, though there was a sense that it was positively viewed. In contrast, quantitative data indicated that OER work was viewed somewhat favorably by the institution.

**Facilitating conditions.** The quantitative and qualitative data were not entirely aligned regarding institutional support for the development of OER. The quantitative data suggested that in only about half of the situations some form of guidance was institutionally available (57%) and that some institutions provided resources in support of OER development (65%). However, almost all the interview participants indicated that they have some form of support. While survey respondents indicated that OER was compatible with their instructional philosophy (82%), data from the interviews were able to provide insight into this construct as participants discussed ways that OER facilitated their instructional philosophy.

**Attitude.** Data collected from the survey and the interviews regarding this construct were consistent. A little over 90% of survey respondents indicated that the act of sharing – both the work they created and the work of others – was important to them. Interview data indicated an overwhelming positive response to this concept and gave some insight into the process of moving towards viewing the importance of sharing openly. Once again, the interview data indicated a slightly stronger attitude that the process of developing and working with OER enabled instructors and faculty to pursue their research interests. Both quantitative and qualitative data indicated that slightly more than half of participants were able to pursue research interests through affiliated work with OER.

**Technology self-efficacy.** The quantitative data indicated that participants felt they had a fairly high level of skill for adopting OER, though the interview participants indicated they had an even higher rate of technology skills. This same pattern existed for self-efficacy regarding understanding and applying the Creative Commons licenses for work released as OER. Quantitative data reported a 90% efficacy while interview participants reported even more efficacy for the area of licensing.

**OER-enabled pedagogy.** Quantitative data indicated a higher participation rate (47%) in OP instructional practices than became apparent through the interviews. Possibilities for this discrepancy will be explored in the Discussion section. The qualitative data did, however, advance three themes shedding light on the many interpretations of OP, the benefits to both teaching and learning, and an exploration of barriers to applying OP.

## Discussion

This research explored various factors influencing faculty adoption and application of OER and OER-enabled pedagogy in instruction. It is organized through, but not limited to, the UTAUT framework in order to provide a structure for reflecting on the data by examining the expectations for performance and effort, social and institutional influences, as well as attitude and the types of technology skills supporting OER and OP application. These findings are important in that they illuminate various facets of an instructor's path through the process of selection, adoption, creation, and application of OER. A small number of studies have utilized a technology acceptance theoretical framework with which to study instructor perceptions and acceptance of OER (Kandiero, 2015; Kelly, 2014; Mtebe & Raisamo, 2014a) and even fewer have focused on factors motivating the adoption of OER from the perspective of faculty who have already adopted OER (Coleman-Prisco, 2016). This research is fairly unique in that it surveyed faculty and instructors who are already using OER, from the perspective of a technology acceptance theory. Data are also unique in that they give insight into the on-the-ground application of OER-enabled

pedagogy, prompting a deeper reflection on this process. As in the Coleman-Prisco (2016) study, data from this research indicate that supporting students is one of the main motivating factors spurring faculty to adopt OER and OP. Data reveal the importance of personal and professional growth and of networking for faculty and instructors through engaging in open education. Findings also indicate the need for careful thought and planning in terms of instructional context and student experience in higher education when applying OP.

## Performance Expectancy

This research indicates that performance is enhanced by using OER. Faculty and instructors feel that using OER benefits their instruction as well as the learning outcomes of their students, which is congruent with other research in this area (Coleman-Prisco, 2016). Qualitative data identified issues that enhance performance: immediate and multiple ways that students can access learning material; reduced textbook costs to provide equitable access; and the ability to customize material. These all enhance the teaching and learning experience. In regard to access, cost, and ability to customize OER, other research has indicated similar results (Chae & Jnkins, 2015; Hilton III, Robinson, Wiley, & Ackerman, 2014; Jhangiani & Jhangiani, 2017; Lashley, Cummings-Sauls, Bennett, & Lindshield, 2017; Seaman & Seaman, 2017).

Qualitative data further revealed that many participants, especially in the interview research, felt very positively that working with OER provided opportunities for personal and professional growth, including interfacing with new colleagues and administration. This finding does not easily connect with current research. Belikov and Bodily (2016) did, however, report that a small percent of faculty had indicated that various pedagogical benefits would motivate them to investigate OER. Though research has indicated that seeking prestige is not a motivator for adopting OER (Van Acker et al., 2013) this research finds that a large majority of faculty and instructors do feel that their work in open education has increased their reputation. However, previous research has indicated much lower agreement

(Hodgkinson-Williams, 2010; Sclater, 2010). Regarding benefits for promotion and tenure, these data do not indicate that there is a strong, direct benefit as a result of working with OER or OP. This is consistent with other research. There is little empirical work that explicitly addresses this issue (Thoms, Burns, & Thoms, 2018), though limited research has indicated a disconnect between the value assigned to open scholarship and institutional policies (Jhangiani et al., 2016; McKiernan, 2017). Data from this research provide a rich context for personal and professional growth and the interplay between the individual and the institution, which reflect on performance expectancy.

## Effort Expectancy

Findings in this construct indicate that there are multiple and pragmatic motivators for faculty and instructors to embrace OER adoption, with varying levels of effort. Data reveal that it is often the instructional context that determines the best approach to adoption and the ease of execution. This study's qualitative data provided a good sense of the actual effort and process of finding, adopting, creating, and integrating OER. Interview data revealed that finding appropriate material is fairly easy, while creating material much more challenging, though rewarding. The integration process mirrors the integration of any new material and is considered an integral part of instruction. These findings are consistent with findings from similar studies that have focused on the potential effort in adoption of OER (Anderson et al., 2017; Dulle & Minishi-Majanja, 2011; Mtebe & Raisamo, 2014b; Percy & Van Belle, 2012) but with the difference of providing more in-depth reporting of qualitative data.

## Social Influence

Findings indicate that various types of social factors influence the adoption process: via colleagues, departments, students, and the institution. Respondents in this research indicate collegial influence in approximately a quarter of the situations. Survey data also indicate the influence of departmental support (38%) in this study, with less support indicated through the interviews. Though

other research has indicated the hypothetical importance of collegial and departmental support (Coleman-Prisco, 2016; McKerlich et al., 2013) research indicating actual support is not evident. Both quantitative and qualitative data from this study indicate that the influence from student expectations is small, and little research has been conducted supporting this aspect of social influence. Two exceptions are related studies that indicated students viewed those faculty using OER much more favorably than those using a traditional textbook (Vojtech & Grissett, 2017) and a recent study that indicated students felt teachers should freely share their teaching resources (Pound & Bostock, 2019). However, the qualitative data indicated empathy for students was a motivator, which was based on participants' experience as a student. The assumption of a positive institutional perception of those using OER was reported by more than half of the survey respondents though this perception isn't as evident with interview participants. No outside research was found to substantiate these findings.

## Facilitating Conditions

Institutional support appears to be in place in over half of the institutions represented by survey respondents. This is not consistent with current research on the extent of actual institutional support, which indicated that funding still needs a wider support base (Cox & Trotter, 2016; Dutta, 2016; McGown, 2019). This finding is logical, however, because the current study examined the institutional influence on subjects who are actually using OER, while other research has focused on the projected needs at the institution to support OER development. Regarding the data relating to the compatibility of OER use with instructional philosophy, a large percent (82%) of survey participants reported this alignment while all the interview data supported this concept. It was difficult to relate these concrete findings to other research, which has dealt with more general philosophical exploration of "openness" (Dieman & Farrow, 2013; Jhangiani et al., 2016; Wiley, 2006), as the context of this research was on those who have already adopted OER.

## Attitude

This research data indicated a strong belief in sharing the work that is self-created as well as the work of others. These findings are consistent with some research on sharing (Schuwer & Janssen, 2018; Tseng & Kuo, 2013), though other research has indicated a lower rate of sharing (Banzato, 2012; Van Acker, Vermeulen, Kreijns, Lutgerink, & van Buuren, 2014). Data also indicated that working with OER fosters the opportunity to pursue research. In addition, the qualitative interview data revealed that faculty and instructors, who work with OER and OP, derive personal and professional satisfaction in doing so. This has been evidenced in prior research as well (Rolfe, 2012).

## Technology Self-efficacy

For this study, self-efficacy refers to the skills needed to adopt, develop, or modify OER and to apply the correct licenses to the resources to promote open use. The quantitative and qualitative data are in alignment for this construct: technology skills are needed, especially for developing and modifying OER. In lieu of individual skills, technology support needs to be available. Findings from this study are congruent with other research, which has found that individuals with a higher overall sense of computer efficacy are more likely to find OER easy to use (Kelly, 2014) and that adequate technology skills can be a barrier to OER development (Muganda, Samzugui, & Mallinson, 2016). However other recent research counters this assumption, indicating no significant difference between users and nonusers of OER in the degree of comfort with technology (Hassall & Lewis, 2017). An inadequate knowledge of copyright and licensing for open material can also be a barrier to adoption. This research indicates that respondents are fairly well-versed with licensing of OER. This is most likely due to the fact that all participants are involved in some aspect of OER and OP; however, current research has indicated a need for faculty and instructors to more fully understand copyright and CC licensing in order to promote OER development (Hassall & Lewis, 2017; Muganda et al., 2016; Seaman & Seaman, 2018) One finding that emerges from this

research is that faculty and instructors need to be aware of how their students will interface with the OER. Some students struggle with the technology needed to access and manipulate the resource, while other students may experience restrictions to accessing computers and the Internet. While the latter finding has been indicated in other research (Ally & Samaka, 2016; Liebenberg, Chetty, & Prinsloo, 2012), the former does not appear to have been addressed in the literature.

## OER-enabled Pedagogy

Quantitative and qualitative data were not parallel for this topic, as the quantitative data indicated a higher experimentation and use of OP than was evidenced through the qualitative data. It became clear when reviewing the open-ended data on the survey that a number of participants were conflating OP with the use of OER in their courses. This would account, in part, for the different proportion of individuals on the survey claiming to have used OP in their instruction. The concept of OER-enabled pedagogy is in alignment with ideas presented by some of the current scholarly discussion promoting the development of new pedagogical methods that enable transparency, communication, and engagement (Dalsgaard & Threstrup, 2015). However, this research does capture the excitement and positive outlook of others who are experimenting with OP and who believe that engaging in this approach to pedagogy and shifting to a student-centered approach can help to equip students with the necessary skills to live and work in an open world (DeRosa & Robinson, 2015; Masterman, 2016; Woodward & Kimmons, 2017).

## Implications

Findings from this research have helped to shed light on the actual use of OER and application of OER-enabled pedagogy in various institutions across the U. S. They have also exposed new limitations of practices as well as reemphasized limitations that have been brought to light in prior literature. These limitations have implications for future OER and OP experimentation and development. The

implementation of OER and OP can be realized either through a top-down institutional approach or through a grass-roots approach. In either case, having a champion is imperative – a committed faculty member or department, a librarian, an instructional designer, a committed administrator. This research indicates that personal and professional growth is an important motivating factor in adopting open practices. Workshops that emphasize professional development, student success, and research possibilities could assist in laying the groundwork for open practices. Networks, both on campus, within institutional systems, and beyond help to provide support for OER development and interested instructors, and faculty should be made aware of these. Network connections in terms of supporting organizations such as the OpenTextbook Network, the Rebus Community, and the Scholarly Publishing and Academic Resources Coalition (SPARC) organizations provide another source of support. Technology support is critical and could include support in locating resources, adoption, adaption, creation, and integration of OER, as well as untangling the nuances of copyright and licensing. Though not documented empirically in the literature, this research indicates that intuitional or state-wide support especially encourages the development of OER through grant programs and stipends. Institutions need to rethink promotion and tenure practices to be inclusive of work happening around open practices. Data drives many institutional initiatives, so institution-specific research needs to be conducted in order to frame development at a specific institution. This data could then be shared with the larger community to support more global efforts. Finally, further inquiry into open practices, which have implications for pedagogical exploration, need on-the-ground research if practical application is to be realized.

## Limitations

It is recognized that a small sample size will affect the generalizability of the findings (Leung, 2015). However, the methodology for this research was well documented in support of easy replication in order to boost reliability. Bias is always a possible factor when a single researcher is responsible for interpreting the data (Bryman, 2012). By requesting feedback from colleagues involved in OER research,

by striving for the highest ethical standards, and by employing member check of interview transcripts, bias has been kept at a minimum (Bryman, 2012). It is also recognized that data collected in this research was self-reported, which may not necessarily reflect reality (Roth, Ogrin, & Schmitz, 2016). In addition, the sample for this research was made up of faculty who had been identified by colleagues as individuals involved with OER or OP, faculty who could provide information-rich data. Therefore, this research used a purposive sampling approach, one without an underlying probability-based selection method, which, therefore, limited generalizability but that provided unique and rich information of value to the study (Etikan, Musa, & Alkassim, 2015). Finally, it must be acknowledged that volunteer bias may be evident in this research: those interviewed were volunteers who had indicated a willingness to be interviewed when responding to the survey. Full-time instructors or faculty were sought for this research. These individuals might be different in some systematic way from others who did not volunteer.

## Conclusion & Future Research

This study employed an explanatory sequential mixed methods approach, drawing upon survey and interview data from instructors and faculty across the U.S., who are using Open Educational Resources or OP, in order to fill a gap in the literature and potentially provide a deeper understanding of the context for adopting OER and implementing OER-enabled pedagogy. Findings have provided information for institutional policy and program development in support of OER and OP implementation.

One factor that motivates the use of OER stands out above all others in this research: faculty and instructors are motivated by the desire for their students to succeed. One faculty member shared, “If we’re serious about student success, and we’re very serious about increasing inclusivity and access for our students, we can’t be relying on things like financial aid, because that’s a terrible, terrible misnomer. We need to be very careful about how much we’re asking them to pay for things, and whether we can give them open resources.” Another factor sheds an interesting light on the impact of using OER. Many

interviewees, who started out exploring the use of OER to specifically help their students, now report wanting to share their OER beyond their students, by providing their material to a larger audience. What may start out as a small step can expand into a global leap.

Participants reported that their plans included creating more open material, both on their own and in collaboration, with a few expanding to experiment with OP. Many reported wanting to convert all of their courses to use OER. Some are inspired to conduct research around OER and OP, and numerous responses indicated a desire to reach out to colleagues to encourage these open practices.

Future research could include additional studies employing a technology acceptance model or perhaps other adoption models to frame the study of OER and OP application. It would also be informative to compare adoption rates and practices in areas with state-wide initiatives. An in-depth focus on very specific technology needs for adopting, creating, and implementing OER could also benefit institutions developing an institutional OER initiative. Finally, using an OER-enabled pedagogical approach to instruction is in a nascent state, and on-the-ground and in-depth research, from both faculty and student perspectives, is needed to more fully explore the potential of this pedagogical shift. As Wiley and Hilton (2018) have indicated, “As faculty come to understand that OER allows for the benefits of open pedagogy, the adoption of OER will significantly accelerate,” (p. 144) which, in turn, will impact education for learners everywhere.

## Chapter 5 References

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## Chapter 6 Discussion & Conclusion

### Introduction

As evidenced by the research presented through the articles in this dissertation, Open Educational Resources can be viewed as an important educational tool. These resources address issues of equity in higher education by providing affordable material to students; they allow faculty to work flexibly and creatively with their own materials customizing them for their classes; and they make available a wide selection of material to educators globally - material that is released with licenses allowing them to be freely retained, reused, revised, remixed, and redistributed (Wiley, 2015). In addition, these licenses afford the freedom to explore OER-enabled pedagogy thereby creating a more meaningful relationship between the learning tool and the learning process.

This final chapter will briefly review the methodologies used for the three studies that comprise this dissertation. It will give a brief overview of the research focus and findings for the individual chapters and then discuss the common findings that link the studies, while connecting them to current literature. The chapter will then discuss the contributions the findings make to theory and the implications for practice. The research limitations will be outlined as well as recommendations for future research. Finally, the dissertation will end with a general summary and concluding remarks.

### Methodologies

Though different conceptual frameworks were employed in the three studies, and though different methodologies and approaches were applied, the issues addressed in this dissertation revolved around the adoption, creation, and use of OER and OP in higher education in regard to both teaching and learning. Chapter 3 was organized through the UTAUT framework (Venkatesh, Morris, Davis, & Davis,

2003) and used an interpretive approach to explore the experiences and perceptions of professionals involved in the process of creating and instructing using OER and OP. Research in Chapter 4 applied the COUPE framework (Hilton III, Wiley, Fischer, & Nyland, 2016) and used a mixed methods explanatory sequential approach to address how OER and the application of OP might impact various aspects of student learning. Chapter 5 then examined factors that have motivated higher education professionals who have previously adopted OER and who may have experimented with OP. It used a mixed methods explanatory sequential approach and, once again, applied the UTAUT framework. Each of the articles was designed to shed light on the impact that OER might play in teaching and learning and in promoting student success.

## Major Findings

This section will first briefly review the research focus and findings for each of the articles for this dissertation. It will then discuss the linkages in the findings between the separate articles and connect these findings to current research literature.

### Article One, Chapter 3

The goal of this qualitative interpretive research was to present a realistic representation and to illuminate specific experiences by individuals involved with developing and applying an OER for instruction. The goal included outlining recommendations that support further OER development. Findings in this chapter were organized through two approaches. First, through a narrative accounting, the experiences and perceptions of faculty and staff were presented using the participants' voice. This accounting covered the inception of an undergraduate OER development project, the progression over the development phase, and the introduction into instruction. The latter included an accounting of one instructor's experience with introducing OP via an assignment through the OER. Secondly, these experiences were organized through the UTAUT framework, which resulted in identifying themes that

emerged from the experience. Themes were identified within most constructs of the framework: attitude, performance and effort expectancy, technology self-efficacy, and facilitating conditions. The one exception, where no theme was identified, was within the construct of social influence. These themes are summarized in Figure 2., which is taken from Chapter 3. Finally, by interpreting the data through the UTAUT framework, a series of recommendations emerged that outline issues of support. These included institutional, technical, and team support, as well as a recommendation for time management. It is hoped that these recommendations will help to provide guidance as others approach the development and adoption of OER and as they begin to explore the use of OP in their own instruction.

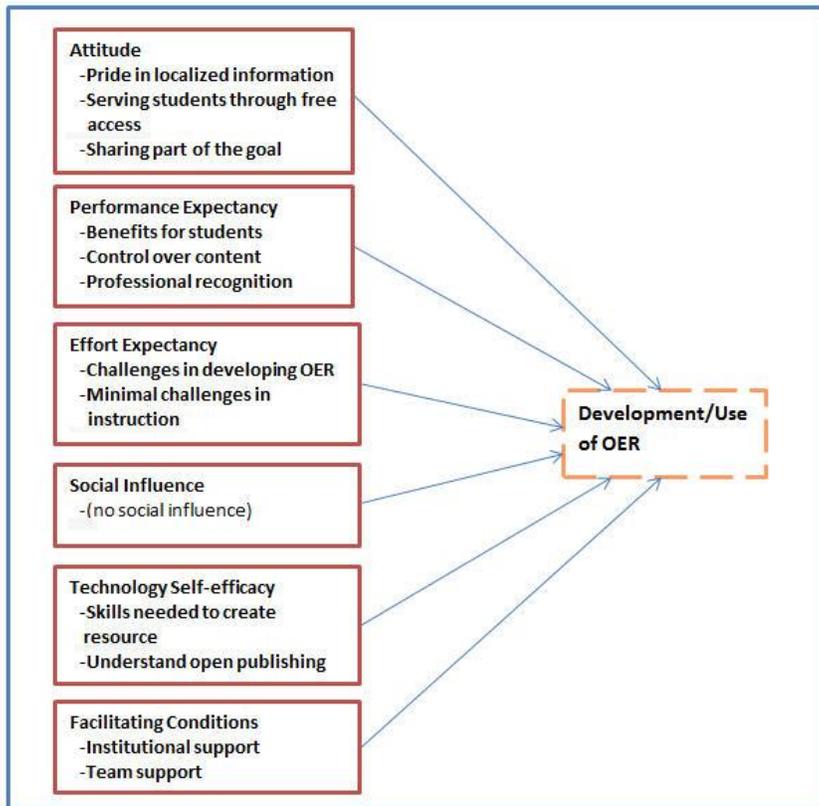


Figure 2. (Chapter 3) Modified UTAUT Framework with Construct Themes

## Article Two, Chapter 4

This research explored the use of an OER in one semester of an undergraduate nutrition class and compared this use with a second semester in which the OER was used in addition to the application of an OP assignment. It applied constructs from the COUPE framework (Hilton III et al., 2016) to focus on “cost,” “outcomes,” “usage,” “perceptions,” and “engagement” on the student experience. Research for this chapter coincided with research in Chapter 3. Findings for this research were gathered from quantitative survey data and qualitative interview data and then organized through the COUPE framework. In terms of “cost,” data indicated that because the textbook was free, this lightened a burden – both financial and emotional - on all students. “Outcomes,” in terms of the course throughput rate including grades, withdrawal and drop rates, revealed no significant difference between the two groups. “Usage” data indicated that students in both semesters heavily relied on the lecture information as their main resource and that more than half of all students relied very little on the textbook. In terms of “perceptions” of the OER, students in both semesters felt that the resource aligned with course objectives and that the quality of the OER ranked from “Average” to “Above average.” Finally, regarding the influence on “engagement” (as measured by interest, challenge, understanding, and participation) no significant differences were noted between groups. Generally, the quantitative data paralleled the qualitative data for both semesters. Ultimately, quantitative data comparing the OER group and the OER+OP group indicated that there was no significant difference in regard to student outcomes, use, perceptions, and engagement, which was paralleled by the qualitative data.

## Article Three, Chapter 5

The mixed method research for this article explored factors influencing faculty adoption and application of OER as well as perceptions of this experience. Participants targeted for this research were faculty who had already adopted OER and who may have already been using OP. This research was

conducted under the UTAUT framework (Venkatesh et al., 2003), once again focusing on the constructs of performance and effort expectancy, social influence, facilitating conditions, attitude, and technology self-efficacy. Both quantitative survey data and qualitative interview data were collected in order to present a more complete picture of OER adoption and the application of OP. The findings indicated that performance is enhanced by using OER, in terms of instruction and student learning as well as through professional development. Effort expectancy was influenced by the instructional context and determined both the best approach to adoption and ease of adoption. Social influence was evidenced, though not to a great extent. Facilitating conditions, as evident through some form of institutional support, was in place in over half of the institutions represented. Through the construct of attitude, findings indicated a strong belief in sharing the work and that those involved with OER and OP derived personal and professional satisfaction in doing so. Finally, this research found that technology skills were needed for developing and modifying OER and an understanding of the licenses that promote free and open access of the resources. Regarding OP, this research outlined certain barriers to experimenting with OP.

## Connecting the Findings

Though organized as separate research endeavors, these studies support the broader goal of understanding aspects of OER that might promote further development and pedagogical exploration. Each article reports on findings specific to that study; however, several prominent threads weave through the studies, which help bind together the findings.

**Sharing forward.** The concept of sharing the OER with a broader audience was a theme that emerged in all three research contexts. In Chapter 3, participants indicated that sharing the resource was “part of the big objective” and they envisioned the OER would “travel as far as possible.” In Chapter 4, students, who understood their contribution to the resource would become a part of the OER, were impressed that they would be helping future students. Through both the quantitative and qualitative data

in Chapter 5, participants revealed the importance of sharing. This finding is generally supported by the research as it applies to faculty as they share with other faculty (Atenas, Havemann, & Priego, 2014; OECD, 2007) though some research indicates that the open sharing and remixing of learning materials is a new concept and not so straightforward as it may seem (Atenas & Havemann, 2014; Kursan, Cagiltay, & Can, 2014).

**Working with localized resources.** Having the control to localize an OER and working with localized information represented another thread through this research. Participants in Chapter 3 expressed a great deal of pride in the fact that they had control over the content and that information could be localized so that their “community is reflected in the textbook,” which would “lend to the students’ sense of pride” as well. In Chapter 4, students reported that the relevant and localized topics and information helped to increase their engagement with the OER. Participants in Chapter 5 also felt their teaching was enhanced by the ability to customize their OER in order “to meet the learning goals set by our state and by our local population of students” and to have the “freedom to localize the content for relevance.” The research literature acknowledges challenges around localizing the material in OER (Ivins, 2011; Krelja Kurelovic, 2016; Okada, Mikroyannidis, Meister, and Little, 2012); however, it also acknowledges the importance of doing so (UNESCO, 2012; Wiley, Bliss, & McEwen, 2014).

**Impacting students.** A third thread uniting the findings pertained to the impact on students that was evidenced when OER were utilized. In Chapter 3, participants spoke about their efforts in creating and offering an OER as a way to support students through the lens of equity and accessibility. This finding is consistent with a great deal of literature (Bossu, Bull, & Brown, 2012; Gani, 2010; Hodgkinson-Williams & Trotter, 2018; Kalir, 2018; Willems & Bossu, 2012). Chapter 4 data revealed that students were very appreciative that the textbook was free. They indicated that the availability of a free textbook not only positively impacted their finances, which in turn helped to relieve the stress of figuring

out how to stretch their budgets, but it also relieved them of the decision as to whether to purchase the textbook or seek alternative means to access the information. In Chapter 5, quantitative data indicated that participants felt that OER had a positive effect on student learning outcomes. Qualitative data expanded on this concept as participants spoke about the free, easily available, and early access to the main resource, which potentially supported greater student learning outcomes. These findings were consistent with those in the literature pertaining to OER and student academic performance (Bliss, Hilton III, Wiley, & Thanos, 2013; Colvar, Watson, & Park, 2018; Fischer, Hilton III, Robinson, & Wiley, 2015; Hilton III, 2016; Pitt, 2015).

**Applying OP is beneficial but challenging.** As reported in Chapter 3, the one instructor involved in applying an OP assignment in conjunction with the OER felt that the approach made instructional sense because the students were thinking critically about the information that belonged in their instructional resource. Other instructional participants working with the OER felt that an OP approach could be productive but admitted that its potential had not been realized. Though findings in Chapter 4 revealed no significant differences in student outcomes, use, perceptions, and engagement when OP was used, some student interview data indicated that students viewed the OP approach as interesting and engaging. This is consistent with a recent study pertaining to student views of OP assignments (Hilton III, Wiley, Chaffee, Darrow, Guilmett, Harper, & Hilton, 2019). Finally, in Chapter 5, participants shared many varying examples of how they had applied OP. Those that had incorporated OP into their instruction felt that this approach increased student engagement and motivation while at the same time admitting there were numerous obstacles when exploring OP. Though there is little empirical research when applying OP in higher education, more researchers are beginning to explore educational possibilities through the lens of OER-enabled pedagogy, and the current research findings align with this literature (DeRosa & Robinson, 2017; Jhangiani & DeRosa, n.d.; Wiley & Hilton III, 2018).

**Differences.** One difference in findings between the two chapters using the UTAUT model was evident in the construct data for Social Influence. In Chapter 3, participants reported that there was not one outstanding positive influential factor present in the development of the OER. However, in Chapter 5, findings indicated that various types of social factors influenced the adoption and use of OER. This included various amounts of collegial, departmental, and institutional support. Consistent with the findings in Chapter 3, there was no outside research found that substantiated the findings for Social Influence in Chapter 5.

Another difference is that qualitative data in Chapters 3 and 5 indicated that participants – instructors, staff, and faculty - felt that by using OP, students would be more engaged in courses. Data indicated that this might be because students, when involved with resource development, might be more motivated to participate in the course. However, the quantitative data from Chapter 4 indicated that there was no significant difference in “engagement” between students using an OER and students using the same OER and involved with OP for an assignment. That being said, the qualitative data for Chapter 4 indicated that students, who understood the OP assignment, were excited about sharing their research with other students through the OER textbook.

## Implications for Theory

An important contribution to research around OER can be seen in the expansion of the COUP framework as outlined in Chapter 4. Developed by the Open Education Group, the COUP examines “cost,” “output,” “usage,” and “perceptions” of OER (Hilton III, Wiley, Fischer, & Nyland, 2016). The research reported on in Chapter 4 extends the framework by adding the construct of “engagement” to more deeply explore the potential of student success (Webber, Krylow, & Zhang, 2013). Henrie, Halverson, and Graham (2015) have defined student engagement as the investment, commitment, participation, or effortful involvement in one’s learning and Trowler and Trowler (2010) have explained that the intent of

engagement is to create a productive environment, one that enhances student learning and therefore performance. As explained in Chapter 4, only a few OER studies have included the concept of engagement within the research (Cooney, 2017; Fialkowaski, Calabrese, Tillinghast, Titchenal, Meinke, Banna, & Draper, in press).

In addition, this research includes quantitative and qualitative data collected to explore OP. Though there is current discussion around how the use of OER can potentially affect pedagogy (DeRosa & Robinson, 2017), little empirical research has been conducted with this focus (Hilton III et al., 2019). Therefore, the Chapter 4 study has contributed to this realm of OER research by extending the original COUP framework to incorporate the construct of engagement and by applying an in-depth mixed methods analysis of OP in higher education.

Chapters 3 and 5 address factors that have motivated the adoption and creation of OER in higher education. This research applied the UTAUT model with which to frame the findings by applying the four core constructs that are the basis for much UTAUT research: performance expectancy, effort expectancy, social influence, and facilitating conditions. However, the original UTAUT model was extended for this research by incorporating two additional constructs as recommended by other researchers (Kabra, Ramesh, Akhtar, & Dash, 2017; Khalilzadeh, Ozturk, & Bilgihan, 2017) and specifically for research reporting on open access in other studies (Dulle & Minishi-Majanja, 2011). Themes, important to understanding factors motivating faculty to adopt OER, emerged from the data in chapters 3 and 5. With the addition of the "technology self-efficacy" and "attitude" constructs, a more complete picture emerged, thus providing a deeper understanding of the factors that should be addressed when faculty consider the adoption of OER. It is, therefore, this author's recommendation that future research addressing the adoption and use of OER and OP include the six constructs when applying the UTAUT model to research in this area.

## Implications for Practice

The findings from the research covered in Chapter 3 and Chapter 5 have practical implications in support of OER development. They provide a realistic accounting of the process of developing OER and then implementing the resource in instruction. Emerging themes addressed issues to be taken into account when considering OER development: challenges, limitations, support issues, and potential benefits. If these themes are translated into practical and programmatic applications to OER development, the results might be productive and beneficial to student learning. Chapter 3 also provides a list of recommendations for OER creation that emerged from the data. These might provide a very realistic set of guidelines through which OER could be more easily developed.

Data from Chapter 4 have provided insights into aspects of an OER and OP that promote student engagement. In addition, themes were identified from the qualitative data that could potentially have instructional design implications when further developing OER. For example, understanding which features of an OER affect the visual design, text, and function of a resource carry significance for instructional design.

## Limitations

As noted in the Chapter 1 of this dissertation, an overall limitation of qualitative research is its generalizability to other contexts (Mack, 2010). This is especially true when participants volunteer for research, as volunteer bias could come into play. The data may not be representative of the broader population, therefore challenging external validity (Salkind, 2010). In addition, generalizability might also have been affected due to the small sample size of interview participants in all three articles (Leung, 2015). This might be especially true for Chapter 3 as the study is limited to a total of eight participants. Finally, much of the data throughout the three studies were self-reported, which can be subject to bias (Janssens & Kraft, 2012).

In Chapter 4, the study population was comprised of undergraduate students at one university, who may not represent the larger target population of undergraduate students across the U.S. Though some demographic questions were asked as control variables, control was not complete, thereby potentially limiting the generalizability of the findings. It is also possible that perceptions about both use and quality of the OER were influenced by more general perceptions about the use of this technology within the class (Bliss et al., 2013).

One limitation related to the fourth chapter can be described as the “Pygmalion effect” or sometimes referred to as the “Rosenthal effect.” This phenomenon is a type of self-fulfilling prophecy whereby the effects of interpersonal expectancies can influence behavior (Chang, 2011; Friedrich, Flunger, Nagengast, & Jonkmann, 2015). It could potentially be evidenced in this research through instructor expectations that students would use the OER textbook more, would receive better grades, would perceive the quality as higher, and would be more engaged with the textbook materials and class as a result of using the OER and through applying OP activities.

Data collected via survey instruments in Chapters 4 and 5 were self-reported, which may not reflect actual behavior or attitudes (Roth, Ogrin, & Schmitz, 2016). Also, those choosing to take the survey may in some way be systematically different from those who choose not to participate.

Finally, the sample for research for the Chapter 5 was made up of faculty who had been identified by my colleagues. Therefore, this research used a purposive sampling approach, one without an underlying probability-based selection method, which therefore limited generalizability but which provided unique and rich information of value to the study (Etikan, Musa, & Alkassim, 2015).

## Recommendations for Future Research

As demographic data emerged through Chapter 5 research, there was a concentration of responses in certain geographical areas. This could be explained, in part, by the location of colleagues

participating in professional OER listservs through which the list of subjects was generated. However, it would be interesting to analyze OER and OP adoption rates between states that offer state-wide initiatives and those without a programmatic approach to OER development. Data from this research might more fully flesh out factors that motivate and support faculty and instructors in adopting OER and in experimenting with instructional practices that OER afford.

Research focusing on OER-enabled pedagogical instruction is in a nascent state. Therefore, future research might explore the assessment of student learning when they are involved with non-disposable assignments and when producing their own learning materials.

Finally, research in this area might also reveal richer data with the expansion of the COUP framework to fully assess aspects of engagement when OER and OP are employed. This data might help to support higher student engagement thereby leading to increased learning outcomes.

## Conclusions and Summary

Research has shown that there are many benefits of OER, not only to faculty and to institutions (Choi & Carpenter, 2017; Wiley, Bliss, & McEwen, 2014), but particularly to students as the application of these resources can support student learning and progress through higher education (Senack & Donoghue, 2016; Hilton III, 2016). Though there remain many challenges in the adoption of OER (Belikov & Bodily, 2016), an increasing number of faculty are motivated to overcome challenges and adopt and create these resources (Chae & Jenkins, 2015) and then to utilize them in exploring new and open educational practices (Nascimbeni & Burgos, 2016).

The three studies that comprise this dissertation have provided an overview on various aspects of OER use and development as well as the impact they have on the student experience. The Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003) provided a framework in two of the studies: one that closely examined the experiences of faculty and staff as they created an OER

for an undergraduate nutrition course and then introduced it into instruction; and a second study that examined factors influencing faculty interaction with OER and OP. The third study was framed in the context of the COUP model (Hilton III, Gaudet, Clark, Robinson, & Wiley, 2013) extending the original model to include the construct of student engagement. This study investigated the “cost,” “outcomes,” “use,” “perceptions,” and “engagement” of undergraduate students when an OER was used and when an OP assignment was introduced into their course.

Findings from the studies were analyzed separately, and then themes running through the entirety of the results were identified. Prominent themes that emerged reflected on the importance of sharing resources with others and the power of having control over resource development and working to localize information. Another theme also touched on the support of student progress in educational endeavors through equity and accessibility. The final theme reflected on the application of OP practices that can evidence educational benefits, even though there are challenges in realizing the potential of OER-enabled pedagogy that might be slowing adoption.

It is my hope that this research will provide a deeper understanding of the topics that could fill a gap in the literature and potentially impact and inspire further development of OER including the expansion of OER-enabled pedagogical practices. The act of creating OER might lead teachers into closer proximity with the minds, lives, and issues of importance to their students, and the act of instruction through OER-enabled practices might empower students to create and control their own learning.

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## Appendices

### Appendix A – Chapter 3 – FSHN 185 Faculty/Developer/ Instructor Interview Consent

#### University of Hawaii Consent to Participate in a Research Project

*Project Title: Developing and Implementing an OER*  
Beth Tillinghast, Student Investigator

Aloha! I am Beth Tillinghast, and I am inviting you to take part in a research study for the Food Science and Human Nutrition Program here at UH Manoa. Besides being a librarian at UHM Library, I am also a graduate student at UH Manoa in the Learning Design and Technology Department. As part of my dissertation, I am conducting this research.

The overall purpose of this research is to evaluate the textbook for this introductory nutrition course, with the addition of exploring the transition from moving from the use of a traditional textbook to the use and application of an OER textbook in an undergraduate setting. I am asking you to participate because you have either acted as instructor, faculty, or OER developer of the textbook used in FSHN 185.

**Project Description – Activities and Time Commitment:** Over the past year, a small number of undergraduate and graduate instructors and faculty across UHM have been developing their own materials or modifying existing Open Educational Resource (OER) materials used for instructional support. You have been part of the team from the Food Science and Human Nutrition Program that has developed or applied an Open Educational Resource for the FSHN 185 course. Marie K. Revilla and I have been researching the perceptions and outcomes from the student perspective throughout the project.

This portion of the research seeks the instructor, faculty, or developer perspective as well. As an instructor or faculty associated with FSHN 185, you have been involved with some aspect of the development or transition from using a traditional textbook for the course, to using an OER textbook, and then to possibly applying open pedagogy within the course curriculum. Because of this experience, your opinion and perspective on this process represents valuable information that might potentially impact further OER or OER-enabled pedagogical development. Therefore, I would like to interview those instructors, faculty, and developers involved with this transition for this current research.

If you agree to participate, the interview will consist of approximately 10-15 open ended questions. It will take approximately 40 to 60 minutes. The interview will include questions like, “What was your role in the process of developing and implementing the OER for FSHN 185?” or “What did you understand as the main purpose for adopting the OER for FSHN 185?”

Only you and I will be present during the interview. With your permission, I will audio-record the interview for later transcription and analysis of the responses. I will ask you later to look at the transcription to make sure it is accurate. You will be one of about five faculty, instructors, or developers that I will interview for this study.

**Benefits and Risks:** There will be no direct benefit to you for participating in this interview. The results of this project might help improve the course material or curriculum for FSHN 185 and benefit future students. I believe there is little risk to you for participating in this research project.

**Compensation:** You will receive a gift of Hawaiian-made chocolate for your time and effort in participating in this research project.

**Confidentiality and Privacy:** I will keep all study data secure in a locked filing cabinet in a locked office or encrypted on a password-protected computer. Only I will have access to the information. Other agencies that have legal permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study.

After a transcription is made of the interviews, I will erase or destroy the audio-recordings. When I report the results of my research project, I will not use your name. I will not use any other personal identifying information that can identify you. I will use pseudonyms (fake names) and report my findings in a way that protects your privacy and confidentiality to the extent allowed by law.

**Voluntary Participation:** You can freely choose to take part or to not take part in this survey. Your participation in this project is completely voluntary. You may stop participating at any time. If you stop being in the study, there will be no penalty or loss to you.

**Future Studies:** Identifiers will be removed from any identifiable private information and after removal of identifiers, the data may be used for future research studies or distributed to another investigator for future research studies. I will not seek further approval from you for these future studies.

**Questions:** If you have questions about this study, please call or email me at 808-956-6130 or [bethht@hawaii.edu](mailto:bethht@hawaii.edu). You may also contact my faculty advisor, Dr. Christine Irvine at 808-956-3910 or [sorens@hawaii.edu](mailto:sorens@hawaii.edu). You may contact the UH Human Studies Program at (808) 956-5007 or [uhirb@hawaii.edu](mailto:uhirb@hawaii.edu) to discuss problems, concerns and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <https://www.hawaii.edu/researchcompliance/information-research-participants> for more information on your rights as a research participant.

If you agree to participate in this project, please sign and date this signature page.

Keep one copy of the informed consent for your records and reference.

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**Signature(s) for Consent:**

I give permission to join the research project entitled, *"A Textbook's Impact on Student Performance in an Introductory Nutrition Course."*

Please initial next to either "Yes" or "No" to the following:

\_\_\_\_\_ Yes      \_\_\_\_\_ No      I consent to be audio-recorded for the interview portion of this research.

My data may be stored and used to support any future research.

Initial one:  Yes  No

Name of Participant (Print): \_\_\_\_\_

Participant's Signature: \_\_\_\_\_

Signature of the Person Obtaining Consent: \_\_\_\_\_

Date: \_\_\_\_\_

*Mahalo!*

## Appendix B – Chapter 4 - FSHN 185 Survey Instrument with Consent



### ***Title: A Textbook's Impact on Student Performance in an Introductory Nutrition Course***

Aloha! We are Dr. Marie Revilla and Beth Tillinghast, and we are inviting you to take part in a research study for the Food Science and Human Nutrition Program here at UH Mānoa. The purpose of this research is to evaluate the textbook for this introductory nutrition course. We are asking you to participate because you are enrolled in FSHN 185, you have worked with the course textbook during the semester, you are at least 18 years old, and you are a student enrolled at UH Mānoa.

**Project Description – Activities and Time Commitment:** This past year, some instructional faculty and staff at UHM have been evaluating instructional resources - books, chapters, videos, etc. - used to support education. In collaboration with your instructor, a team from the Food Science and Human Nutrition Program wants to find out how you use your textbook and your perceptions of the quality of the material in your textbook for this class. Sharing your opinion is important as it may inform the types of textbooks used in the introductory nutrition course offered at UHM.

Therefore, your unique opinion is very important. The survey, which is offered online and is totally anonymous, consists of 25 questions, and should take less than 10 minutes to complete.

**Benefits and Risks:** There will be no direct benefit to you for participating in this interview. The results of this project may help improve the course material for FSHN 185 and benefit future students. We believe there is little risk to you for participating in this research project. If you do become stressed while answering the questions, you can stop taking the survey.

**Compensation:** Those who participate will be given extra points as compensation. There will be instructions on how to receive the points at the end of the survey.

**Confidentiality and Privacy:** You will not be asked for any personal identifying information, such as your name or address. Please do not include any personal information in your survey responses. Other agencies that have legal permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study.

**Voluntary Participation:** You can freely choose to take part or to not take part in this survey. There will be no penalty or loss of benefits for either decision and no negative affect on your grade. If you do agree to participate, you can stop at any time.

**Questions:** You may contact the UH Human Studies Program at (808) 956-5007 or [uhirb@hawaii.edu](mailto:uhirb@hawaii.edu) to discuss problems, concerns and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <https://www.hawaii.edu/researchcompliance/information-research-participants> for more information on your rights as a research participant.

If you have questions about this survey, you may contact Dr. Revilla at [mariekf@hawaii.edu](mailto:mariekf@hawaii.edu) or Beth Tillinghast at [beth@hawaii.edu](mailto:beth@hawaii.edu) .

Please note that at the end of the survey there will be instructions on how to receive bonus points for participating in the survey. Once you click **Submit**, this information will appear with the *Thank You* message.

Continuing with the survey will be considered as your consent to participate in this study. Please print or save a copy of this consent for your records.

Thank you very much for your support.

### **Mahalo!**

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**Please answer the following questions in this survey by clicking on the button that most closely matches your opinion or experience. There will be one question at the end of the survey asking for your overall thoughts and comments.**

Q1 Before you begin, please identify in which section of FSHN 185 you are enrolled.

- FSHN 185 with Draper
- FSHN 185 with LeMoon
- FSHN 185 with Banna

Q2 The information in the textbook has helped me to maintain my interest in the class.

Strongly agree

- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

Q3 I felt the information in the textbook challenged my thinking in a positive way.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

Q4 The textbook helped me to understand concepts in this course.

Strongly agree

- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

Q5 Using the textbook helped to increase my participation in the class.

Strongly agree

Agree

Somewhat agree

Neither agree nor disagree

Somewhat disagree

Disagree

Strongly disagree

Q6 I felt there was a match between the content in the textbook and the specific learning objectives for this course.

- Strongly agree
  - Agree
  - Somewhat agree
  - Neither agree nor disagree
  - Somewhat disagree
  - Disagree
  - Strongly disagree
- 

Q7 Overall, the quality of the textbook for this course was ...  
(Please feel free to add comments.)

- Excellent
- Above average
- Average
- Below average
- Poor
- Comments \_\_\_\_\_

Q8 How easy or difficult was it to use the textbook?

- Very easy
- Easy
- Somewhat easy
- Neither easy nor difficult
- Somewhat difficult
- Difficult
- Very difficult

Q9 What are the features, if any, that you **liked** about the textbook for this class?

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Q10 What are the features, if any, that you **disliked** about the textbook for this class?

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Q11 How often did you use the textbook for this course?

- Daily (1)
  - 2 - 3 Times a Week (2)
  - 2 - 3 Times a Month (3)
  - 2 - 3 Times for the Semester (4)
  - Never (5)
- 

Q12 Approximately how much of the textbook did you read over the length of the course?

- I read all or almost all of the textbook.
  - I read much of the textbook.
  - I read about half of the textbook.
  - I read a little bit of the textbook.
  - I read none or almost none of the textbook.
- 

Q13 How did you actually use the textbook during the course?

- I read the textbook fairly closely.
- I mostly used the textbook to supplement the course information but not as a main source of information.
- I mostly referred to the visual material like images, charts, graphs, and tables.
- I didn't use the textbook very much for the course.
- Other \_\_\_\_\_

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Please answer a few questions about yourself, such as your status in school, age, gender, general income and grant information, GPA, ethnic identification, and textbook buying behavior. The answers to these questions help to put the information from this survey into a broader context.

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Q14 What year are you in school?

- Freshman
  - Sophomore
  - Junior
  - Senior
  - Graduate
  - Other
-

Q15 How many credit hours are you taking **this** semester?

- 1-3
  - 4-6
  - 7-9
  - 10 -12
  - 13 or more
- 

Q16 On average, how many credit hours do you take **each** semester?

- 1-3
  - 4-6
  - 7-9
  - 10-12
  - 13 or more
- 

Q17 What is your age?

- 18 - 25
  - 26 - 30
  - 31 - 35
  - 36 - 40
  - 41 - 50
  - 51 and older
- 

Q18 Please indicate your gender.

- Male
- Female
- Prefer not to say

Q19 What was your total household income before taxes during the past 12 months?  
(If you are financially dependent, please give your family's income.)

- Less than \$24,999
- \$25,000 to \$34,999
- \$35,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 or more
- Prefer not to say

Q20 Are you currently a recipient of a Pell Grant, Federal Supplemental Educational Opportunity Grant (SEOG), State of Hawai'i B Plus Scholarship, or a Teacher Education Assistance for College and Higher Education (TEACH) Grant?

- Yes
- No
- Unsure

Q21 What is your GPA?

3.6 - 4.0

3.1 - 3.5

2.6 - 3.0

2.1 - 2.5

2.0 or below

Unsure

---

Q22 Select one of the following racial categories to describe yourself:

American Indian or Alaska Native

- Asian - Chinese
- Asian - Filipino
- Asian - Indian
- Asian - Japanese
- Asian - Korean
- Asian - Laotian
- Asian - Other
- Asian - Thai
- Asian - Vietnamese
- Black or African American
- Caucasian or White
- Hispanic or Latino
- Native Hawaiian or Pacific Islander - Guamanian or Chamorro
- Native Hawaiian or Pacific Islander - Native Hawaiian or part-Hawaiian
- Native Hawaiian or Pacific Islander - Micronesian
- Native Hawaiian or Pacific Islander - Other Pacific Islander
- Native Hawaiian or Pacific Islander -Samoaan

Native Hawaiian or Pacific Islander -Tongan (35)

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Q23 How much do you typically spend on textbooks each semester?

Less than \$100

\$101 - \$200

\$201 - \$300

\$301-\$400

\$401-\$500

More than \$500

---

Q24 In general, how often do you purchase the required textbooks for the courses you take?

Always

Often

About Half of the Time

Rarely

Never

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Q25 Please share any comments you may have about the textbook used for this class. We appreciate your insights. Thank you.

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## Appendix C – Chapter 4 – FSHN 185 Student Interview Consent

### *University of Hawaii Consent to Participate in a Research Project*

*Project Title: A Textbook's Impact on Student Performance in an Introductory Nutrition Course*  
Beth Tillinghast, Student Investigator

Aloha! I am Beth Tillinghast, and I am inviting you to take part in a research study for the Food Science and Human Nutrition Program here at UH Manoa. Besides being a librarian at UHM Library, I am also a graduate student at UH Manoa in the Learning Design and Technology Department. As part of my dissertation, I am conducting this research.

The purpose of this research is to evaluate the textbook for this introductory nutrition course. I am asking you to participate because you are enrolled in FSHN 185, you have worked with the course textbook during the semester, you are at least 18 years old, and you are a student enrolled at UHM.

**Project Description – Activities and Time Commitment:** This past year, some instructional faculty and staff at UHM have been evaluating instructional resources - books, chapters, videos, etc. - used to support education. In collaboration with your instructor, a team from the Food Science and Human Nutrition Program wants to find out how you use your textbook and your perceptions of the quality of the material in your textbook for this class. Sharing your opinion is important as it may inform the types of textbooks used in the introductory nutrition course offered at UHM. Therefore, your unique opinion is very important.

If you agree to participate, the interview will consist of approximately 20 open ended questions. It will take approximately 30 minutes. The interview will include questions like, "Tell me what you think about the quality of the textbook," "What makes it good or how could it be made better?" or "Please describe ways that the textbook helps or hinders your understanding of the course concepts?"

Only you and I will be present during the interview. With your permission, I will audio-record the interview for later transcription and analysis of the responses. I will ask you to later look at the transcription to make sure it is accurate. You will be one of about 15 students who I will interview for this study this semester.

**Benefits and Risks:** There will be no direct benefit to you for participating in this interview. The results of this project may help improve the course material for FSHN 185 and benefit future students. I believe there is little risk to you for participating in this research project.

**Compensation:** You will receive a \$15 gift certificate to either Starbucks or Jamba Juice for your time and effort in participating in this research project.

**Confidentiality and Privacy:** I will keep all study data secure in a locked filing cabinet in a locked office or encrypted on a password protected computer. Only I will have access to the information. Other agencies that have legal permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study.

After a transcription is made of the interviews, I will erase or destroy the audio-recordings. When I report the results of my research project, I will not use your name. I will not use any other personal identifying information that can identify you. I will use pseudonyms (fake names) and report my findings in a way that protects your privacy and confidentiality to the extent allowed by law.

**Voluntary Participation:** You can freely choose to take part or to not take part in this survey. Your participation in this project is completely voluntary. You may stop participating at any time. If you stop being in the study, there will be no penalty or loss to you.

**Future Studies:** Identifiers will be removed from any identifiable private information and after removal of identifiers, the data may be used for future research studies or distributed to another investigator for future research studies. I will not seek further approval from you for these future studies.

**Questions:** If you have questions about this study, please call or email me at 808-956-6130 or [betht@hawaii.edu](mailto:betht@hawaii.edu). You may also contact my faculty advisor, Dr. Christine Irvine at 808-956-3910 or [sorens@hawaii.edu](mailto:sorens@hawaii.edu). You may contact the UH Human Studies Program at (808) 956-5007 or [uhirb@hawaii.edu](mailto:uhirb@hawaii.edu) to discuss problems, concerns and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <https://www.hawaii.edu/researchcompliance/information-research-participants> for more information on your rights as a research participant.

If you agree to participate in this project, please sign and date this signature page.

Keep one copy of the informed consent for your records and reference.

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**Signature(s) for Consent:**

I give permission to join the research project entitled, *“A Textbook’s Impact on Student Performance in an Introductory Nutrition Course.”*

Please initial next to either “Yes” or “No” to the following:

\_\_\_\_\_ Yes      \_\_\_\_\_ No      I consent to be audio-recorded for the interview portion of this research.

My data may be stored and used to support any future research.

Initial one:    \_\_\_\_\_ Yes      \_\_\_\_\_ No

**Name of Participant (Print):** \_\_\_\_\_

**Participant’s Signature:** \_\_\_\_\_

**Signature of the Person Obtaining Consent:** \_\_\_\_\_

**Date:** \_\_\_\_\_

***Mahalo!***

Consent Form – version 1.19.2018

## Appendix D – Chapter 5 – Faculty Survey Instrument with Consent

Project Title: OER: From Adoption to Application  
Beth Tillinghast, Student Investigator

### Title: *Open Educational Resources: From Adoption to Application*

Aloha! My name is Beth Tillinghast, and I am inviting you to take part in a research study. I am a PhD student at the University of Hawai'i at Mānoa (UHM) in the Learning Design and Technology Department as well as a UHM Librarian working in the area of Scholarly Communication. As part of the requirements for earning my graduate degree, I am conducting research in the area of Open Educational Resources (OER).

**What am I being asked to do?** If you agree to participate in this project, you will be asked to fill out an online survey.

Taking part in this study is your choice. Your participation in this project is completely voluntary. You may stop participating at any time. If you stop being in the study, there will be no penalty or loss to you. Your choice to participate or not to participate will not affect you.

**Why is this study being done?** The purpose of this project is to understand the various factors that have motivated faculty to adopt OER and possibly to apply OER-Enabled Pedagogy in their instruction. A number of studies have been conducted of faculty who might be thinking about adopting OER, but very little research has been conducted in regard to faculty who have actually already adopted OER and who are using it in their instruction. I am asking you to participate because you have been identified by one of your colleagues at your institution as someone who has adopted and is using OER.

**What will happen if I decide to take part in this study?** The survey will consist of around 30 multiple choice and open-ended questions. It will take approximately 15 minutes to complete. The survey questions will include questions like, "What type of OER have you used in your classes?" or "Have you applied Open Pedagogy in your classes?" The survey is connected to this consent form. By reading this form and moving on to the survey portion, you are acknowledging consent to participate.

**What are the risks and benefits of taking part in this study?** I believe there is little risk to you for participating in this research project. You may become stressed or uncomfortable answering any of the survey questions. If you do become stressed or uncomfortable, you can skip the question or take a break. You can also stop taking the survey, or you can withdraw from the project altogether.

There will be no direct benefit to you for participating in this survey. The results of this project may help to inform and possibly promote further OER and OP development.

**Confidentiality and Privacy:** You will not have to provide any personal information, such as your name or email address. You will be invited, but not required, to contact me through my email address provided at the end of the survey if you would like to be contacted for a follow-up interview as part of the research project.

I will keep all study data secure in a locked filing cabinet in a locked office/encrypted on a password protected computer. Only my University of Hawai'i advisor and I will have access to the information.

Other agencies that have legal permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study.

**Compensation:** There will be no direct compensation for participation in this survey research.

**Future Research Studies:** Identifiers will be removed from your identifiable private information and after removal of identifiers, the data may be used for future research studies or distributed to another investigator for future research studies. We will not seek further approval from you for these future studies.

**Questions:** If you have any questions about this study, email me at [bethht@hawaii.edu]. You may also contact my faculty advisor, Dr. Christine Sorensen, at [sorens@hawaii.edu]. You may contact the UH Human Studies Program at 808.956.5007 or uhirb@hawaii.edu to discuss problems, concerns and questions, obtain information, or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <http://go.hawaii.edu/jRd> for more information on your rights as a research participant.

**To Access the Survey:** Please continue using the *Next* button below. By continuing, you are giving consent to participate in this study.

Please print or save a copy of this page for your reference.

Mahalo!

Please tell me a little about yourself by answering the following questions.

1) At what institution do you mainly work?

2) How many years have you been teaching?

- Less than 1 (1)
- 1 to 3 (2)
- 4 to 6 (3)
- 7 to 9 (4)
- 10 to 15 (5)
- 16 to 20 (6)
- More than 20 (7)

3. How many years have you been teaching using OER?

- Less than 1 (1)
- 1 to 3 (2)
- 4 to 6 (3)
- 7 to 9 (4)
- More than 9

4. How many years have you been teaching using OER-Enabled Pedagogy?

- Less than 1 (1)
- 1 to 3 (2)
- 4 to 6 (3)

7 to 9 (4)

More than 9

N/A

5. What is your tenure status?

Tenured (1)

Tenure track, not tenured (2)

Not tenure track (3)

6. What is your age?

Under 35 (1)

35 - 44 (2)

45 - 54 (3)

55 + (4)

7. What is your current status?

Full-time faculty (1)

Part-time faculty (2)

Adjunct instructor (3)

Other (4)

8. What level of courses do you teach?

Undergraduate (1)

Graduate (2)

- Both undergraduate and graduate (3)

Please select the most appropriate response to the following statements.

9. Using Open Educational Resources (OER) have benefited me in my instruction.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)
-

10. Using OER in my classes has increased the learning outcomes of my students.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
- 

11. I believe that my academic reputation has been enhanced because I am using OER.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
-

12. Using OER has been advantageous in the promotion and tenure process.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

13. Which approach, repository, or software have you used to provide OER for your students? (Please select all that apply.)

- Added OER materials to the Learning Management System (1)
- Pressbooks (2)
- OpenStax (3)
- Open Textbook Network (4)
- MERLOT (5)
- Created my own OER (6)
- Other (7) \_\_\_\_\_

---

14. What type of OER have you used in your classes? (Please select all that apply.)

- OER textbooks that I have downloaded from a site like OpenStax or Open Textbook Network (1)
- Scholarly articles that have been published in Open Access journals (2)
- Materials that I find freely on the Internet (3)
- YouTube Videos (4)
- Materials that I have created (5)
- Materials from open courseware sites (6)
- Other (7) \_\_\_\_\_

---

15. It has been easy for me to find appropriate OER material for my classes.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
-

16. It has been easy for me to adapt the OER material that I have used for my classes.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
- 

17. It has been easy for me to integrate OER into my classes.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

18. I began using OER in my classes because others around me were using OER.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
- 

19. My department considers it important that faculty use OER.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
-

20. Students taking classes in my department expect faculty to use OER in those classes.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
-

21. My institution has looked favorably on me because I adopted OER.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

22. When I began using OER in my teaching, guidance was available on my campus to provide assistance.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
-

23. The necessary resources were available to me to help me find, adapt, and integrate OER into my instruction.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
- 

24. Using OER is congruent with the way I like to conduct instruction.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

25. Sharing the OER that I might create or modify with others is important.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
- 

26. Researching and/or developing OER allows me to pursue my research interests or activities.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
-

27. I expect that other faculty who develop OER would share their work.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

28. When I first began using OER, I had the technical skills necessary to adopt the resources.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
-

29. I feel I have the technical skills needed to develop or modify OER resources.

- Strongly agree (1)
  - Agree (2)
  - Somewhat agree (3)
  - Neither agree nor disagree (4)
  - Somewhat disagree (5)
  - Disagree (6)
  - Strongly disagree (7)
- 

30. I understand the copyright licenses of OER that allow their reuse.

- Strongly agree (1)
- Agree (2)
- Somewhat agree (3)
- Neither agree nor disagree (4)
- Somewhat disagree (5)
- Disagree (6)
- Strongly disagree (7)

31. Are you now or have you applied OER-Enabled Pedagogy in your classes? (This approach might be exemplified by the involvement of the students in curriculum or resource development.)

Yes (1)

No (2)

*Skip To: Q33 In a few words, ... = No*

---

32. If you have applied OER-Enabled Pedagogy, would you please describe the activity in a few words.

---

33. What motivated you to try OER-Enabled Pedagogy in your classes?

---

34. How has the use of OER-Enabled Pedagogy affected student behavior or learning?

35. In a few words, please share what makes OER valuable to you in your teaching?

---

36. Finally, please sum up the reasons that you were motivated to adopt or develop OER.

---

End of Block: Default Question Block

---

Thank you very much for taking this survey. I would very much appreciate it if you would consider participating in an interview on this same topic. It would support my dissertation research and further

scholarly work in OER and OER-Enabled Pedagogy.

If you would like to participate in this continued research project, please contact me at [betht@hawaii.edu](mailto:betht@hawaii.edu).

Once again, thank you very much for your participation.

Mahalo!

## Appendix E – Chapter 5 – Faculty Interview Consent

*Project Title: OER: From Adoption to Application*

Beth Tillinghast, Student Investigator

Aloha! My name is Beth Tillinghast, and I am inviting you to take part in a research study. I am a PhD student at the University of Hawai'i at Mānoa (UHM) in the Learning Design and Technology Department as well as a UHM Librarian working in the area of Scholarly Communication. As part of the requirements for earning my graduate degree, I am conducting research in the area of Open Educational Resources (OER).

### **What am I being asked to do?**

If you agree to participate in this project, you will be asked to discuss your OER adoption experience in an interview.

### **Taking part in this study is your choice.**

Your participation in this project is completely voluntary. You may stop participating at any time. If you stop being in the study, there will be no penalty or loss to you. Your choice to participate or not to participate will not affect you.

### **Why is this study being done?**

The purpose of this project is to understand the various factors that have motivated faculty to adopt OER and possibly to apply open pedagogy (OP) in their instruction. A number of studies have been conducted of faculty who might be thinking about adopting OER, but very little research has been conducted in regard to faculty who have actually already adopted OER and who are using it in their instruction. I am asking you to participate because you have been identified by one of your colleagues at your institution as someone who has adopted and is using OER.

### **What will happen if I decide to take part in this study?**

The interview will consist of 15 questions. It will take us approximately 40 to 60 minutes to complete. The interview will include questions like, "What type of OER have you used in your classes?" or "Have you applied Open Pedagogy in your classes?" By reading this form and signing the document, you are acknowledging consent to participate.

### **What are the risks and benefits of taking part in this study?**

I believe there is little risk to you for participating in this research project. You may become stressed or uncomfortable answering any of the questions. If you do become stressed or uncomfortable, you can skip the question or take a break. You can also stop the interview and withdraw from the project altogether.

There will be no direct benefit to you for participating in this survey. The results of this project may help to inform and possibly promote further OER and OP development.

### **Confidentiality and Privacy:**

None of your personal information will be shared in connection to this interview. I will keep all study data secure in a locked filing cabinet in a locked office/encrypted on a password protected computer. Only my University of Hawai'i advisor and I will have access to the information. Other agencies that have legal

permission have the right to review research records. The University of Hawai'i Human Studies Program has the right to review research records for this study.

**Compensation:**

There will be no direct compensation for participation in this survey research.

**Future Research Studies:**

Identifiers will be removed from your identifiable private information and after removal of identifiers, the data may be used for future research studies or distributed to another investigator for future research studies. We will not seek further approval from you for these future studies.

**Questions:** If you have any questions about this study, email me at [betht@hawaii.edu]. You may also contact my faculty advisor, Dr. Christine Sorensen, at [sorens@hawaii.edu]. You may contact the UH Human Studies Program at 808.956.5007 or uhirb@hawaii.edu to discuss problems, concerns and questions, obtain information, or offer input with an informed individual who is unaffiliated with the specific research protocol. Please visit <http://go.hawaii.edu/jRd> for more information on your rights as a research participant.

Please print or save a copy of this page for your reference.

Mahalo!

---

**Signature(s) for Consent:**

I give permission to join the research project entitled, *"OER: From Adoption to Application."*

Please initial next to either "Yes" or "No" to the following:

\_\_\_\_\_ Yes      \_\_\_\_\_ No      I consent to be audio-recorded for the interview portion of this research.

My data may be stored and used to support any future research.

Initial one: \_\_\_\_\_ Yes      \_\_\_\_\_ No

**Name of Participant (Print):** \_\_\_\_\_

**Participant's Signature:** \_\_\_\_\_

**Signature of the Person Obtaining Consent:** \_\_\_\_\_

**Date:** \_\_\_\_\_

***Mahalo!***

Consent Form Version 01.19.2018

## Appendix F – Chapter 3 – Research Invitation to Faculty/Developer/Instructor

*Project Title: Developing and Implementing an OER*

Beth Tillinghast, Student Investigator

Aloha,

You are aware that over the last year, a small number of undergraduate and graduate instructors and faculty across UHM have been developing their own instructional materials or modifying existing Open Educational Resources (OER) in order to help reduce the cost of textbooks for students and to help create resources with local content. You have been part of the team from the Food Science and Human Nutrition Program that has developed or used an OER for the FSHN 185 course.

Marie K. Revilla and I have been researching the perceptions and outcomes from the student perspective throughout this project. But this portion of the research seeks the instructor, faculty, or developer perspective as well. As an instructor, faculty, or resource developer associated with FSHN 185, you have been involved with some aspect of the transition from developing or using a traditional textbook for the course, to using an OER textbook, and then to possibly applying open pedagogy within the course curriculum. Because of this experience, your opinion and perspective on this process represents valuable information that might potentially impact further OER or OER-enabled pedagogical development. Therefore, I would like to interview those instructors, faculty, and developers involved with this transition for this current research.

You are in no way obligated to participate in this interview, as it is completely voluntary, but I invite you to consider taking part in this research. At the time of the interview you will be asked to sign a consent form, but you can review this form by clicking on the following link

[https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV\\_9LkdSmb2hzvEKP3](https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV_9LkdSmb2hzvEKP3)

Please contact me via email within the next few days to set up a time convenient to you for us to meet should you agree to participate.

Mahalo in advance for your participation.

Beth Tillinghast  
Digital Repositories Librarian  
UH Manoa Library  
betht@hawaii.edu

## Appendix G – Chapter 3 – Interview Protocol for Faculty/ Developers/Instructors

*Title: Developing and Implementing an OER*  
Instructor/Faculty/Developer Interview Protocol  
Beth Tillinghast, Student Investigator

**Institution:** University of Hawai'i at Mānoa (UHM)

**Interviewee:** Instructors, faculty, and developers responsible for FSHN 185 at the University of Hawai'i at Mānoa (UHM) - identified as I#, F#, or D#. an abbreviation of Instructor or Faculty or Developer and the number for interviewee

**Interviewer:** LTEC Doctoral Student & UHM Librarian – Beth Tillinghast

**Purpose:** The purpose of the mixed methods explanatory sequential research will be to examine several aspects of the adoption of OER and the application of OP in higher education from an instructor, faculty or developer perspective.

**Research Questions: RQ#1.** What are the perceptions of the transition process, benefits, and drawbacks of faculty, resource developers, and instructors who have transitioned from using a traditional textbook, to an open educational resource, to the application of open pedagogy in an undergraduate course?

**Study Duration:** The interview was designed to last approximately forty-five to sixty minutes. Pre- and post-discussion sessions may last another fifteen minutes in total.

**Study Setting:** Though this study will span two semesters at UHM, Spring and Fall, 2018, the instructor and faculty interviews will take place during the final section of the Fall 2018 semester and later as necessary. This will be the appropriate time to explore this research question because instructors and

faculty will have completed the transition of moving from using a traditional textbook (Fall 2017), to using an OER textbook (Spring 2018), to applying OP in the FSHN 185 course (Fall 2018) over three semesters.

**Sample:** The sample are instructional faculty who teach the FSHN 185 course and the faculty or other developers who have created the OER.

**Sample Size:** The five to eight participants who have been involved with either instruction or OER development will be interviewed.

**Permission and Consent:** Written consent will be gained before the interview takes place (see Appendix M for Consent Form).

**Recording Interview:** An audio recording will be made of the body of the interview. This recording will be used to transcribe the interview into text for further analysis. The recording will then be deleted. No recording will be made of pre- and post-interview dialogue sessions.

**Post-transcription Verification:** In the pre-interview meetings, instructors, faculty, and developers will be asked if they would review the transcript of the interview. This post-interview transcript verification process will take place at a later date, and necessary modifications will be then made.

**Interview Sections:**

A: Introduction

B: Interviewee Background – Warmup Questions

C: Review of Study

D: Interview Questions for Instructors

E: Interview Questions for Faculty

F: Interview Questions for Developers

G: Concluding Questions

FSHN 185 OER/OP Interview

**Interviewer:**

**Interviewee:**

**Date of Interview:**

**Start Time of Interview:**

**End Time of Interview:**

**Location of Interview:**

#### **A. Introduction**

As an instructor, faculty, or developer associated with FSHN 185, you have been involved with some aspect of the creation of the OER, or transition from using a traditional textbook for the course, to using an OER textbook, and then to applying open practices within the course curriculum. Because of this experience, your opinion and perspective on this transition represent valuable information that might potentially impact further OER/OP development.

Thank you very much for agreeing to participate in this interview.

#### **B. Interviewee Background – Warmup Questions**

1. Before we begin talking about textbooks, please tell me a little about yourself. How long have you worked with FSHN 185?

#### **C. Review of Study**

So the purpose of this study is to gain an understanding of undergraduate students' experiences and perceptions in using Open Educational Resources or OER and to learn about the perspectives of faculty, instructors, and developers in the process. Others in higher education might benefit from hearing about the transition process, and therefore, your account will help add to that information.

As you know when you signed the consent form, I will be audio taping our conversations today.

Do you have questions before we begin?

→Start Recording

#### D. Interview Questions – Instructors

##### For Instructors Who Implement OER

1. What was your role in the process of developing and implementing the OER for FSHN 185?
2. When the idea of the OER textbook was first introduced, what do you remember thinking about that idea? For example, what did you think the negatives and positives might be in transitioning to the OER?
3. How familiar with OER were you at the time?
4. What did you understand as the main purpose for adopting the OER for FSHN 185?
5. Generally, what was your impression of what the students thought about the original, traditional textbook for the course?
6. Do you remember what you liked and disliked about the traditional textbook?
7. When you transitioned to the OER textbook this last spring, in what way did that transition impact you?
8. What were some of your experiences in using the new OER textbook?
9. What do you like or dislike about the current OER textbook?
10. Have you heard of open pedagogy (OP)?
11. If you heard about the section of FSHN 185 that has been implementing OP activities, would you please share your thoughts about this.

##### Additional Interview Questions - For Instructor Who Implemented OP

12. If you were involved with implementing some of the revised activities or assignments that involved students directly contributing to the OER, please tell me about that experience for you.
13. How do you think this experience has affected the students in your class in terms of their learning outcomes?
14. Would you recommend that these kinds of student activities and assignments be continued in FSHN 185? Why or why not?
15. What is your general impression of the impact on student learning in the course involving a shift using open pedagogy? Would you like to see open pedagogical practices continue?
16. Is there some other aspect of this experience that you would like to share?

→Start Recording

#### E. Interview Questions – For Faculty

##### OER-related Questions

→Start Recording

#### F. Interview Questions – For Resource Developers

##### OER-related Questions

1. Tell me about when you first learned about OER?
2. What inspired you to decide to be involved with this kind of project?
3. What did you understand as the main purpose for adopting the OER for FSHN 185?
4. What was your role in the process of developing the OER for FSHN 185?
5. What was your experience in either soliciting support for the project or being solicited to support it?
6. What did you see as the negatives and the positives in transitioning to OER for the course?

7. Would you please describe the process in creating an OER from your own experience.
8. What were the major challenges throughout this process?
9. In what ways do you think students have been impacted by the shift to an OER textbook?
10. What advice would you give to others who are contemplating developing an OER?
11. Please share anything else about your experiences with the textbook for the FSHN class.
12. Please share any final comments or ask any questions that you might have.

### **Follow-up Questions**

13. If applicable, describe the feeling of professional or personal satisfaction you gained because of your work on this project.
14. How might your reputation in the department or on campus have been affected because of your work with the OER?
15. In what way do you think your skills with technology assisted you in creating the OER?
16. What are your thoughts on sharing this resource with others?
17. What advice would you give to others who are contemplating developing an OER?

**→Stop Recording**

I think that is all then, and I want to thank you very much for taking time for this interview today.

You have been very helpful, and know that the information you provided has been important.

**Other Topics Discussed:**

**Post Interview Comments and/or Observations:**

- Make note of comments or observations here.

## Appendix H – Chapters 3 & 5 – Email Seeking Permission from Dulle

*Project Title: Developing and Implementing and OER and  
OER: From Adoption to Application*  
Beth Tillinghast, Student Investigator

Frankwell W. Dulle

Feb. 14, 2018

Dear Beth,

There is no harm just use those relevant to your research.

Best wishes,

Frankwell

On Wed, Feb 14, 2018 at 3:16 AM, Beth Tillinghast <[betht@hawaii.edu](mailto:betht@hawaii.edu)> wrote:

Aloha, Professor Dulle,

I am a librarian at the University of Hawai'i at Mānoa as well as a PhD student. Currently I am working on a proposal for dissertation research that involves examining factors that motivate faculty adoption of Open Educational Resources. I am using UTAUT as a design framework and have found that you have used the same framework in open access adoption studies.

I am writing to ask permission to use some of the questions in your survey instrument as a springboard to develop questions appropriate to my research.

Thank you for considering my request.

Beth

--

Beth Tillinghast

Digital Repositories Librarian

Head, Desktop Network Services

2017-2018 OER Research Fellow

University of Hawai'i at Mānoa

2550 McCarthy Mall

Honolulu, HI 96822

[\(808\) 956-6130](tel:(808)956-6130)

[betht@hawaii.edu](mailto:betht@hawaii.edu)

## Appendix I – Chapters 3 & 5 - Email Seeking Permission from Venkatesh

*Project Title: Developing and Implementing and OER and  
OER: From Adoption to Application*  
Beth Tillinghast, Student Investigator

Ankur Arora AArora@walton.uark.edu

Feb 14, 2018

Dear Beth,

My name is Ankur and I am contacting on behalf of Prof. Venkatesh regarding your request to use the UTAUT framework questions in your work.

Thank you for your interest. Your permission to use UTAUT framework questions from the paper is granted. Please cite the work appropriately. Note that this permission does not exempt you from seeking the necessary permission from the copyright owner (typically, the publisher of the journal) for any reproduction of any materials contained in the paper.

All permissions and access to papers are handled through my website: <http://vvenkatesh.com>

You may also find Prof. Venkatesh's book to be of use: <http://www.vvenkatesh.com/book/>

Have a blessed day :)

**Respectfully**

**Ankur Arora**

PhD Student of Information Systems

Sam M. Walton College of Business

Business Building, Office 211

University of Arkansas

Fayetteville, AR 72701

Email: [aarora@walton.uark.edu](mailto:aarora@walton.uark.edu)

## Appendix J – Chapters 3 & 4 – FSHN 185 – Client Non-disclosure Agreement

### CLIENT NON-DISCLOSURE AGREEMENT

This CLIENT NON-DISCLOSURE AGREEMENT, effective as of the date last set forth below (this "Agreement"), between the undersigned actual or potential client ("Client") and Rev.com, Inc. ("Rev.com") is made to confirm the understanding and agreement of the parties hereto with respect to certain proprietary information being provided to Rev.com for the purpose of performing translation, transcription and other document related services (the "Rev.com Services"). In consideration for the mutual agreements contained herein and the other provisions of this Agreement, the parties hereto agree as follows:

#### 1. Scope of Confidential Information

1.1. "Confidential Information" means, subject to the exceptions set forth in Section 1.2 hereof, any documents or other text supplied by Client to Rev.com for the purpose of performing the Rev.com Services.

1.2. Confidential Information does not include information that: (i) was available to Rev.com prior to disclosure of such information by Client and free of any confidentiality obligation in favor of Client known to Rev.com at the time of disclosure; (ii) is made available to Rev.com from a third party not known by Rev.com at the time of such availability to be subject to a confidentiality obligation in favor of Client; (iii) is made available to third parties by Client without restriction on the disclosure of such information; (iv) is or becomes available to the public other than as a result of disclosure by Rev.com prohibited by this Agreement; or (v) is developed independently by Rev.com or Rev.com's directors, officers, members, partners, employees, consultants, contractors, agents, representatives or affiliated entities (collectively, "Associated Persons").

#### 2. Use and Disclosure of Confidential Information

2.1. Rev.com will keep secret and will not disclose to anyone any of the Confidential Information, other than furnishing the Confidential Information to Associated Persons; provided that such Associated Persons are bound by agreements respecting confidential information. Rev.com will not use any of the Confidential Information for any purpose other than performing the Rev.com Services on Client's behalf. Rev.com will use reasonable care and adequate measures to protect the security of the Confidential Information and to attempt to prevent any Confidential Information from being disclosed or otherwise made available to unauthorized persons or used in violation of the foregoing.

2.2. Notwithstanding anything to the contrary herein, Rev.com is free to make, and this Agreement does not restrict, disclosure of any Confidential Information in a judicial, legislative or administrative investigation or proceeding or to a government or other regulatory agency; provided that, if permitted by law, Rev.com provides to Client prior notice of the intended disclosure and permits Client to intervene therein to

protect its interests in the Confidential Information, and cooperate and assist Client in seeking to obtain such protection.

#### 3. Certain Rights and Limitations

3.1. All Confidential Information will remain the property of Client.

3.2. This Agreement imposes no obligations on either party to purchase, sell, license, transfer or otherwise transact in any products, services or technology.

#### 4. Termination

4.1. Upon Client's written request, Rev.com agrees to use good faith efforts to return promptly to Client any Confidential Information that is in writing and in the possession of Rev.com and to certify the return or destruction of all Confidential Information; provided that Rev.com may retain a summary description of Confidential Information for archival purposes.

4.2. The rights and obligations of the parties hereto contained in Sections 2 (Use and Disclosure of Confidential Information) (subject to Section 2.1), 3 (Certain Rights and Limitations), 4 (Termination), and 5 (Miscellaneous) will survive the return of any tangible embodiments of Confidential Information and any termination of this Agreement.

#### 5. Miscellaneous

5.1. Client and Rev.com are independent contractors and will so represent themselves in all regards. Nothing in this Agreement will be construed to make either party the agent or legal representative of the other or to make the parties partners or joint venturers, and neither party may bind the other in any way. This Agreement will be governed by and construed in accordance with the laws of the State of California governing such agreements, without regard to conflicts-of-law principles. The sole and exclusive jurisdiction and venue for any litigation arising out of this Agreement shall be an appropriate federal or state court located in the State of California, and the parties agree not to raise, and waive, any objections or defenses based upon venue or forum non conveniens. This Agreement (together with any agreement for the Rev.com Services) contains the complete and

exclusive agreement of the parties with respect to the subject matter hereof and supersedes all prior agreements and understandings with respect thereto, whether written or oral, express or implied. If any provision of this Agreement is held invalid, illegal or unenforceable by a court of competent jurisdiction, such will not affect any other provision of this Agreement, which will remain in full force and effect. No amendment or alteration of the terms of this Agreement will be effective unless made in writing and

executed by both parties hereto. A failure or delay in exercising any right in respect to this Agreement will not be presumed to operate as a waiver, and a single or partial exercise of any right will not be presumed to preclude any subsequent or further exercise of that right or the exercise of any other right. Any modification or waiver of any provision of this Agreement will not be effective unless made in writing. Any such waiver will be effective only in the specific instance and for the purpose given.

**IN WITNESS WHEREOF**, the parties have caused this Agreement to be executed below by their duly authorized signatories.

**CLIENT**

**REV.COM, INC.**

Print Name: Beth Tillinghast

\_\_\_\_\_

By: \_\_\_\_\_

By:  \_\_\_\_\_

Name: Beth Tillinghast

Name: Abid Mohsin

Title: Librarian, PhD Student

Title: VP Sales and Marketing

Date:

Date:

Address for notices to Client:

Address for notices to Rev.com, Inc.:

2456 Lamaku Pl.

251 Kearny St. FL 8

Honolulu, HI 96816

San Francisco, CA 94108

\_\_\_\_\_

\_\_\_\_\_

## Appendix K – Chapters 3 & 4 – Email to Participants Requesting Review of Transcript

*Title: Developing and Implementing and OER and  
A Textbook's Impact on Student Performance in an Introductory Nutrition Course*  
Beth Tillinghast, Student Investigator

Aloha,

I am contacting you because the transcript of the FSHN 185-related interview in which you recently participated has been completed and is ready for review. I would very much appreciate it if you could review the document to make sure that the text represents your thoughts and opinions given during the interview.

After you have reviewed the document and have added any comments, please return it to me by attaching it to an email and sending it to [bethht@hawaii.edu](mailto:bethht@hawaii.edu).

I want to thank you once again and tell you how much I appreciate the time you took to participate in this research.

Mahalo,

Beth Tillinghast

## Appendix L – Chapter 4 - FSHN 185 General Survey and Interview Announcement in Laulima

*Title: A Textbook's Impact on Student Performance in an Introductory Nutrition Course*  
Beth Tillinghast, Student Investigator

Aloha mai kakou,

This past year, some instructional faculty and staff at the University of Hawai'i at Mānoa (UHM) have been evaluating instructional resources - books, chapters, videos, etc. - used to support education. In collaboration with your instructor, a team from the Food Science and Human Nutrition program wants to find out how you use your textbook and your perceptions on the quality of the material in your textbook. Sharing your opinion is important as it will inform the types of textbooks used in the introductory nutrition course offered at UH Manoa.

Therefore, all of you will be invited to complete a survey about the textbook later in the semester. In addition, some of you in this class will be chosen at random and invited through email to talk about your experiences with the textbook through a face-to-face interview. The interview is designed to last about 40 to 60 minutes and will be organized at your convenience. In appreciation for your time, you will be given a \$5.00 gift card to Starbucks or Jamba Juice. There will be almost no risk for you in participating in this project, and all of the information that you share will be kept confidential.

*Mahalo in advance for your participation.*

## Appendix M – Chapter 4 - FSHN 185 Student Interview Email Invitation to Participate

*Title: A Textbook's Impact on Student Performance in an Introductory Nutrition Course*

Beth Tillinghast, Student Investigator

Aloha mai kakou,

As you know, your instructor is part of a team from the Food Science and Human Nutrition program who wants to find out how you use your textbook and your perceptions on the quality of the material. As per an earlier announcement, you are aware that some of the students from your class were going to be randomly selected to be invited to participate in a face-to-face interview with one of the team members – a librarian from UHM Library. The interview should take about 30 minutes to complete, and the information you provide will remain completely confidential.

This email is to advise you that you are one of the selected students, and so I am extending an invitation to set up a time when you have about 30 minutes to talk with me about your experiences with the textbook for this class.

You are in no way obligated to participate in this interview, as it is completely voluntary. For your participation, however, you will be offered a \$15. gift certificate to either Starbucks or Jamba Juice. At the time of the interview, you will be asked to sign a consent form and will be given a copy.

The consent form can be reviewed prior to your decision to participate by clicking the following link

[https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV\\_cBKkws1f7x12ANn](https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV_cBKkws1f7x12ANn).

Please contact me via email within the next few days to set up a time convenient to you for us to meet if you choose to participate.

Mahalo in advance for your participation.

Beth Tillinghast  
Digital Repositories Librarian  
UH Manoa Library  
betht@hawaii.edu

## Appendix N – Chapter 4 – FSHN 185 Student Interview Protocol

Title: A Textbook's Impact on Student Performance in an Introductory Nutrition Course

Student Interview Protocol  
Beth Tillinghast, Student Investigator

**Institution:** University of Hawai'i at Mānoa (UHM)

**Interviewee:** Undergraduate Students in FSHN 185 at the University of Hawai'i at Mānoa (UHM) - identified as STU#, an abbreviation of Student and the number for interviewee

**Interviewer:** LTEC Doctoral Student & UHM Librarian – Beth Tillinghast

**Purpose:** The purpose of the mixed methods explanatory sequential research will be to examine a number of aspects of the adoption of OER and the application of OP in higher education from an undergraduate student perspective.

**Research Question:** RQ#2. What insights can be learned from students who experience OER and OP in an undergraduate course in regard to cost, output, use, perception, and engagement?

**Study Duration:** The interview is designed to last approximately thirty minutes. Pre- and post-discussion sessions may last another fifteen minutes in total.

**Study Setting:** The study will span two semesters at UHM, Spring and Fall, 2018.

**Sample:** The sample are undergraduate students who enroll in an introductory undergraduate course in Food Science and Human Nutrition 185 at UHM for Spring and Fall 2018 semesters.

**Sample Size:** Approximately 12 participants will be interviewed, but the final sample size will be determined when saturation has been reached.

**Permission and Consent:** Written consent will be gained before the interview takes place (see Appendix I for Student Consent Form).

**Recording Interview:** An audio recording will be made of the body of the interview. This recording will be used to transcribe the interview into text for further analysis. The recording will then be deleted.

No recording will be made of pre- and post-interview dialogue sessions.

**Post-transcription Verification:** In the pre-interview meetings, students will be asked if they would review the transcript of the interview. This post-interview transcript verification process will take place at a later date, and necessary modifications will be then made.

**Interview Sections:**

A: Introduction

B: Interviewee Background – Warmup Questions

C: Review of Study

D: Textbook Costs

E: Output

F: Usage

G: Perception

H. Engagement

I: Concluding Questions

**Interviewer:**

**Interviewee:**

**Date of Interview:**

**Start Time of Interview:**

**End Time of Interview:**

**Location of Interview:**

### **A. Introduction**

As you know, I have asked you to speak with me today because you are an undergraduate student at the University of Hawai'i at Mānoa taking FSHN 185. I am interested in further learning about your perceptions of using an Open Educational Resource textbook for that class. I appreciate you taking your time to assist in this project. The information you provide could also further guide studies about Open Educational Resources.

### **B. Interviewee Background – Warmup Questions**

1. Before we begin talking about textbooks, please tell me a little about yourself. About how long have you been studying at the University of Hawaii?
2. What experiences have you had at other institutions prior to coming the UHM?
3. What is your academic standing, a junior, or ...?
4. What is your major?
5. Tell me a little bit about your plans when you graduate?

### **C. Review of Study**

So the purpose of this study is to gain an understanding of undergraduate students' experiences and perceptions in using Open Educational Resources or OER. You might know that these are resources, often textbooks, which a professor has either selected or has created to use in their courses because doing so can have some advantages. These resources are offered at no cost to students, which can be a real cost benefit, but they also don't have copyright restrictions. That means that a prof can take the material in the textbook and revise it or delete it or add in any other material that they think works well for a course. (Third semester: You are also aware that

your instructor has given one main assignment where you conducted research and that this research will be incorporated into the text for future students to use. We call this OER-Enabled Pedagogy.)

As you know when you signed the consent form, I will be audio taping our conversations today.

Do you have questions about OER (and about OER-Enabled Pedagogy for the third semester) before we begin?

→Start Recording

#### D. Textbook Costs

1. How did the use of OER materials affect your costs for the course?

(1a. If response is reduced costs, follow up: What was the savings to you because an OER was used for this course?)

2. If you had to purchase the text, how might that have impacted your budget?

3. If you knew the cost of the textbook was usually \$165, would you have purchased it or would you have tried to complete the course without it?

4. Follow up: If you decided not to purchase the textbook, what other strategies might you have used to access the content?

5. If you had decided not to purchase the textbook, how might that have affected you in terms of the course?

#### E. Output

6. Would you describe how the OER textbook might impact the grade you'll earn in the course?

7. Please describe any of the course activities or assignments using the OER textbook that you feel have one way or another impacted your performance in the course?

## **F. Use**

8. Describe aspects about the OER textbook that have encouraged or discouraged you to use it.
9. In regard to the course activities or assignments, describe any of those that might impact how much time you spent reading the textbook or the amount of the textbook you actually used.
10. Please describe how you actually used the textbook as a resource. For example, was it your main resource or was it used as a supplemental document?

## **G. Perception**

11. Tell me what you think about how the content of the textbook matched the course objectives.
12. Tell me what you think about the quality of the OER textbook. What makes it good or how could it be made better?
13. Describe how easy or how difficult it is for you to use an OER textbook?

## **H. Engagement**

14. What about the textbook helped or not helped you to maintain your interest in the class?
15. In terms of the actual class activities, how might those help – or not help - to keep your interest in the class?
16. In what ways has the material in the course textbook challenged or not challenged you?
17. And what about the class activities or assignments? In what ways, if any, have they challenged or not challenged you?
18. Please describe any ways that the textbook helps or hinders your understanding of the course concepts?
19. Once again, in terms of the course activities or assignments, describe ways that they might play a role in your understanding of the course concepts.

20. Finally, would you describe any way that the course textbook has impacted your participation in class?

21. And in terms of the course assignments or activities, describe ways that those assignments might have impacted your class participation.

**I. Concluding Questions**

22. Is there anything else you would like to share about your experiences with the OER textbook for the Food Sciences Human Nutrition class?

23. Is there anything else about the activities or assignments in the class that you'd like to share?  
Any final questions or comments?

→**Stop Recording**

I think that is all then, and I want to thank you very much for taking time for this interview today.

You have been very helpful, and know that the information you have provided is important.

**Other Topics Discussed:**

**Post Interview Comments and/or Observations:**

- Make note of comments or observations here.

## Appendix O – Chapter 4 - FSHN 185 Student Survey Announcement in Laulima

*Title: A Textbook's Impact on Student Performance in an Introductory Nutrition Course*

Beth Tillinghast, Student Investigator

Aloha mai kakou,

As you know, this past year, your FSHN 185 instructor has introduced a textbook in your class that has been free for you to use. In collaboration with your instructor, a team from the Food Science and Human Nutrition program wants to find out how you use your textbook and your perceptions on the quality of the material in your textbook. Sharing your opinion is important as it will inform the types of textbooks used in the introductory nutrition course offered at UH Manoa.

The survey, which is offered online and is totally anonymous, consists of 25 questions, and should take less than 10 minutes to complete. There will be almost no risk for you in participating in this project. The only benefit to you will be the chance to earn bonus points for the course. At the end of the survey, there will be instructions on how to receive bonus points for completing the survey. Once you click *Submit*, this information will appear with the *Thank You* message.

To view the consent form and complete the survey please go to  
[https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV\\_2fcAMjZS7VB4ASx](https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV_2fcAMjZS7VB4ASx)

*Mahalo to you for your participation.*

## Appendix P – Chapter 5 – Email Research Request to Colleagues

*Project Title: OER: From Adoption to Application*

Beth Tillinghast, Student Investigator

Aloha, OER Colleagues,

I am contacting you with a research request. For part of my dissertation research, I am focusing on OER adoption. There is a good deal of research reporting on those factors that *might* motivate faculty to adopt OER, but I will be examining those factors from the perspective of faculty who have *already* adopted OER. I want to focus on factors that have motivated faculty in the adoption of OER for their teaching and on faculty who have possibly already begun exploring open pedagogy. I will be using a mixed methods approach, collecting data initially through an online survey and then later through face-to-face interviews.

I would very much appreciate it if you could assist me with this research by sending me a list of faculty (and possibly their email address) in your institution who would qualify. They will be higher education faculty teaching at the undergraduate or graduate level and will be someone who is already teaching using OER and possibly implementing OER-Enabled Pedagogy. I am differentiating between resources, focusing on OER rather than free online or library resources.

I want to thank you in advance for helping me. Please contact me if you should have questions.

Mahalo,

Beth

## Appendix Q – Chapter 5 – Email Invitation for Faculty Survey

*Project Title: OER: From Adoption to Application*

Beth Tillinghast, Student Investigator

Aloha,

I am contacting you with a request to participate in research on the topic of Open Educational Resources (OER). I am sure you are aware that numerous faculty across the U.S. and beyond have been adopting and developing their own instructional materials or modifying existing materials identified as OER. This activity has been taking place, in part, to help reduce the cost of textbooks for students, to make content available openly, and to help create resources with local content. Other faculty have actually been going a step further and have been exploring OER-enabled pedagogy or open pedagogy as well. These faculty have been involving their students in the creation or modification of instructional resources, in part, to engage students more in their own learning.

You have been identified by one of your colleagues at your institution as someone who has either adopted or created OER and who might be involved with exploring OER-Enabled Pedagogy. For this reason, I am contacting you with this research request.

Because of this experience, your opinion and perspective on OER adoption and application represents valuable information that might potentially impact further OER or OER-Enabled Pedagogical development. As part of a dissertation research project, I am seeking faculty who have been involved with using OER with a request to complete an online survey.

You are in no way obligated to participate in this research, as it is completely voluntary, but I invite you to consider taking part. It should take you no more than 10 minutes to complete. By following the link provided here, you will be directed to the online consent form and survey.

[https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV\\_6EzqS6nACZAp2u1](https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV_6EzqS6nACZAp2u1)

Mahalo for considering taking part in this research.

Beth

Beth Tillinghast  
Digital Repositories Librarian  
UH Manoa Library  
bethht@hawaii.edu

## Appendix R – Chapter 5 – Email Invitation for Faculty Interview

*Project Title: OER: From Adoption to Application*

Beth Tillinghast, Student Investigator

Aloha,

I am sure you are aware that numerous faculty across the U.S. and beyond have been adopting and developing their own instructional materials or modifying existing materials identified as Open Educational Resources (OER). This activity has been taking place, in part, to help reduce the cost of textbooks for students, to make content available openly, and to help create resources with local content. Other faculty have actually been going a step further and have been exploring OER-Enabled Pedagogy or open pedagogy as well. These faculty have been involving their students in the creation or modification of instructional resources, in part, to engage students more in their own learning.

You have been identified by one of your colleagues at your institution as someone who has either adopted or created OER and who might be involved with exploring OER-enabled pedagogy. For this reason, I am contacting you with a research request.

Because of this experience, your opinion and perspective on OER adoption and application represents valuable information that might potentially impact further OER or OER-Enabled Pedagogical development. As part of a dissertation research project, I would like to interview faculty who have been involved with using OER. You are in no way obligated to participate in this interview, as it is completely voluntary, but I invite you to consider taking part in this research.

Please contact me via email within the next few days in order to explore a time when we might set up a time for an interview. Because I will be traveling on the mainland in the next few months, there may be an opportunity to meet face-to-face, or we can arrange to conduct the interview via Skype.

To review the consent form before deciding on your participation, click the following link

[https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV\\_9moXzNM55SRMP09](https://manoahawaiiiss.az1.qualtrics.com/jfe/form/SV_9moXzNM55SRMP09)

Mahalo for considering taking part in this research.

Beth

Beth Tillinghast  
Digital Repositories Librarian  
UH Manoa Library  
[betht@hawaii.edu](mailto:betht@hawaii.edu)

## Appendix S – Chapter 5 – Faculty Interview Protocol

*Title: OER: From Adoption to Application*

Faculty Interview Protocol

Beth Tillinghast, Student Investigator

### Faculty Interview

**Interviewer:** BT

**Interviewee:** F#

**Date of Interview:**

**Start Time of Interview:**

**End Time of Interview:**

**Location of Interview:**

#### **A. Introduction**

As faculty identified for this research, you have been involved with some aspect of the adoption or creation of OER. Because of this experience, your opinion and perspective represents valuable information that might potentially impact further OER or OER-Enabled Pedagogical development.

Thank you very much for agreeing to participate in this interview.

#### **B. Interviewee Background – Warmup Questions**

1. Before we begin talking about textbooks, please tell me a little about yourself. How long have you worked at \_\_ (Name of Institution) \_\_\_\_?
2. What's your discipline?

#### **C. Review of Study**

The purpose of this study is to gain an understanding of the factors that have motivated faculty to adopt or create OER. If faculty are also experimenting with or implementing OER-Enabled Pedagogy, I would like to hear about the reasons for doing so.

As you know when you signed the consent form, I will be audio taping our conversations today.

Do you have questions before we begin?

→Record Time Start \_\_\_\_\_

→Start Recording

#### D. Interview Questions for Faculty

1. Please describe how you have used OER in your instruction.
2. Would you please describe the ways that using OER benefit or detract from your instruction.
3. What about for your students? Describe the ways that the use of OER in your instruction might either benefit or detract from your student's learning.
4. Would you please discuss ways that you may have personally or professionally gained by using OER?
5. What about gains for your department or institution? Would you describe those.
6. Please tell me about how you transitioned from using commercial materials to using OER in your classes.
7. Tell me about your experience in terms of the effort it has taken to find, and adapt, and then integrate OER into your classes.
8. What were the influences in your personal or professional life that caused you to adopt OER?

9. How have you felt your reputation on campus has been affected by your use of OER in your classes?
10. How did your institution support your initial use of OER?
11. How does the use of OER reflect your instructional philosophy?
12. If applicable, would you please describe the professional and personal satisfaction that you derive when adopting or creating OER.
13. Would you describe any advantages that using OER might have in the promotion and tenure process.
14. Would you please tell me your thoughts on the positive and/or negative aspects of sharing these resources.
15. In what way do you think your skills with technology have played part in adopting OER?
16. Would you describe your knowledge of the open licenses that support OER.
17. How have you experimented with OER-Enabled Pedagogy in your classes? (If No, ask “Why have you decided not to explore OER-Enabled Pedagogy? and conclude interview.)
18. Would you please tell me about your experiences applying OER-Enabled Pedagogy in your classes.
19. What motivated you to try this approach?
20. In what ways has the use of OER-Enabled Pedagogy impacted your instruction?
21. From your experience, please describe the benefits and drawbacks of OER-Enabled Pedagogy on students’ learning.  
  
Please describe the process and the effort in applying OER-Enabled Pedagogy in your teaching.
22. Would you please tell me about both the personal and professional reasons that influenced you to adopt OER-Enabled Pedagogy.

23. In what ways did your department or institution support your use of OER-Enabled Pedagogy?
24. Would you talk about possible personal and/or professional satisfaction in using OER-Enabled Pedagogy.
25. How might your technology skills have played a role in the application of OER-Enabled Pedagogy in your teaching?
26. Finally what makes OER valuable to you and to your students?
27. What are your future plans in terms of using OER or OER-Enabled Pedagogy?

#### E. Concluding Questions for Faculty

28. Is there anything else you would like to share about your experiences with adopting OER textbooks or materials or about using an OER-Enabled Pedagogy approach?

→Stop Recording

→Record Time End \_\_\_\_\_

I think that is all then, and I want to thank you very much for taking time for this interview today.

You have been very helpful, and know that the information you provided has been important.

**Other Topics Discussed:**

**Post Interview Comments and/or Observations:**

- Make note of comments or observations here.

## Appendix T – Email Request to Review Transcription of Interview

*Project Title: OER: From Adoption to Application*

Beth Tillinghast, Student Investigator

Aloha,

I am contacting you because the transcript of the OER-related interview in which you recently participated has been completed and is ready for review. Please find it attached. I would very much appreciate it if you could review the document to make sure that the text represents your thoughts and opinions given during the interview.

After you have reviewed the document please confirm by email. If you have any comments to add, please return the transcript with the comments to me by attaching it to an email and sending it to [betht@hawaii.edu](mailto:betht@hawaii.edu).

I want to thank you once again and tell you how much I appreciate the time you took to participate in this research.

Mahalo,

Beth Tillinghast