

## **Factors Influencing Faculty Innovation and Adoption of Open Educational Resources in United States Higher Education**

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### **Abstract**

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*This study examined the adoption and use of Open Educational Resources (OER) by faculty in higher education in the United States. The connection between the creation and continued adoption of OER, aspects such as the characteristics of OER, the innovation-decision process, and institutional supports have been investigated. The study used a mixed methods design. Five themes emerged from the three research questions that guide this study. First off, the attributes that faculty believe constitute a valuable and sustainable OER are cost effective and focus on improving student learning and success. Secondly, the ability to customize, remix, and share OER contributes to faculty adoption of OER. Finally, resources from home institutions, as well as projects and grants with funding are the supports that faculty identify as meaningful to the innovation and adoption of OER. These five themes explain and reinforce the process of innovation and adoption of OER by faculty.*

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**Keywords:** faculty, open educational resources, innovation, adoption, higher education.

### **Introduction**

The Open Educational Resources (OER) movement is an activist movement that works to achieve equality and access for underserved populations, specifically those populations who rely on federal student loans (United Nations Educational, Scientific and Cultural Organization, n.d.). In 2002, United Nations Educational, Scientific and Cultural Organization (UNESCO) defined OER as the “open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for noncommercial purposes” (2002, p. 24). OER are educational materials that exist in the public domain or license that allow them to be used at no cost and re-purposed by others (William and Flora Hewlett Foundation, n.d.).

Although educators regularly reuse content and materials as regular practice, participating in OER practices formally is a more complex matter (DeVries, 2013). One of the major ways higher education institutions have historically and currently achieved successful adaptive practices in OER is through the innovation, scholarship, creativity, and pedagogy of its faculty (Camblin & Steger, 2000). Faculty that use OER and have support from administration extend the institution’s outreach, augment collaborations among colleagues, and benefit the global community (Perkins, 2010). However, the extent of those benefits depends on the very donations of intellectual energy and time faculty and administration are willing to contribute (Perkins, 2010). These types of opportunities facilitate changes that occur in higher education institutions.

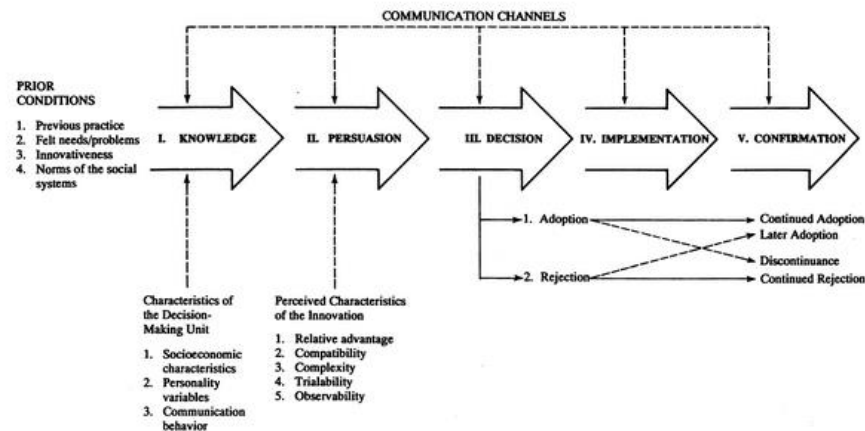
In relation to this study, the OER are educational activities that are used by higher education faculty and provided at no or low cost to students. According to the Diffusion of Innovations framework, individuals and social systems adopt innovations at different rates and play different roles in the adoption process. The instructional supports are framed as a solution to successful adoption rather than the overall goal of the innovation or adoption.

The following three research questions guide this small scale doctoral research study:

1. What attributes do faculty believe constitute a valuable and sustainable OER?
2. What contributes to faculty adoption or non-adoption of OER as reported by faculty?
3. What supports do faculty identify as meaningful to the innovation and adoption of OER?

## 1.2 Theoretical Framework

When considering the influence of faculty development, Rogers' (2003) model on the diffusion of innovations can be applied. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (2003). Success of an innovation depends on whether or not the participants partake in the innovation. Understanding that decisions are not collective or authoritative, each member of a social system, in this case the faculty in higher education, face innovation-decisions that follow a 5-step process: 1) knowledge, 2) persuasion, 3) decision, 4) implementation, and 5) confirmation (Rogers, 2003).



The *innovation-decision process* is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision.

Figure 1. Rogers' Innovation-decisions process (Hertz, 2013)

A great deal of attention has also been given to predicting rate of adoption based upon the perceived attributes of innovations: relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003). For innovators to infuse change and adoption, the actual innovation must have certain attributes. These attributes include their relative advantage; compatibility with existing values; complexity; trialability; observability (Rogers, 2003; Elliot, Foster & Stinson, 2003). Innovations are most expected to be adopted if they are compatible with existing values, not very complex, highly advantageous, and easy to experiment with (Rogers, 2003). These qualities align with the OER "remixability" attribute.

## 2. Literature

Before there were OER, there was still the concept of Openness. For example, D'Antoni and Savage (2009) share how "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" (p. 138). The educational value of an OER contributes to its sustainability. The value is influenced by its presentation and instructional design that are linked to learning theories (Koohang & Harman, 2007). Research has long documented that knowledge construction and design resulting from the constructivism theory is valuable to the creation and sustainability of OER (Bannan-Ritland, Dabbagh, & Murphy, 2000; Koohang & Harman, 2007).

### 2.1 Kaleidoscope Open Course Initiative

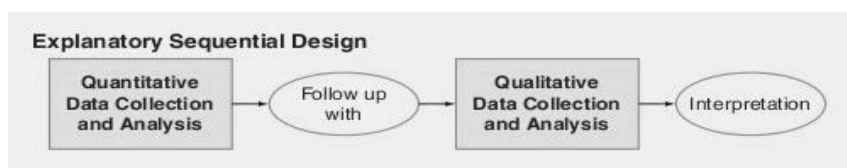
This study builds off the work of previous Kaleidoscope Open Course Initiative (KOCI) research. KOCI is a Next Generation Learning Challenges (NGLC) funded project with three goals. KOCI was intended to "(1) eliminate textbook costs as a barrier to student success, (2) improve the quality of course designs in order to increase student success, and (3) create a collaborative community to share learning and investment in the project" (Hilton, Robinson, Wiley, & Ackerman, 2014, p. 69). Faculty from eight selected colleges collaborated to identify, adapt, and when necessary create OER materials (new course designs and textbook replacements) for commonly taught courses (Hilton et al., 2014).

The project exceeded the original three goals by eliminating the cost of required textbooks in participating courses and replacing the costly textbooks with free OER, and by improving average student success rates by five to ten percent when compared to average student performance in the same courses offered by the same instructors in previous years (Lumen Learning, 2015).

One of the first KOCI research published articles focused on the perceived quality of the OER materials in comparison to the traditional materials. Students and instructors involved in KOCI reported on their perceptions of the cost, outcomes, uses, and quality of the new OER (Bliss, Robinson, Hilton, & Wiley, 2013). All respondents not only reported significant financial savings, but also positive learning and pedagogical impressions due to the adoption of the KOCI OER materials and even reported the KOCI OER to be equal in quality to traditional textbooks (Bliss et al., 2013). Pawlyshyn, Braddlee, Casper, and Miller (2013) found that when KOCI OER material was integrated into the math courses at Mercy College, the pass rates of the courses increased to 68.9% (Fall 2012) from 63.6 % (Fall 2011-when traditional learning materials were employed). Correspondingly, Freshmen students enrolled in KOCI OER versions of a reading course performed better than peers using traditional materials in other sections (Pawlyshyn et al., 2013). None of these studies focused on faculty perception or use of the OER over a period of time.

### 3. Methodology

This study used a mixed methods explanatory sequential descriptive design (*Figure 2*). A mixed methods design allowed the researcher to use the benefits of both quantitative and qualitative research and examine a research problem more completely than by using either method only (Creswell, 2012).



*Figure 2: Explanatory Sequential Design (Creswell, 2012, p. 541).*

This study used a cross-sectional survey tool that seeks to identify the variables that influence the adoption of OERs. In addition to the scaled closed-ended questioned sections of the survey tool, a section with open-ended questions was included. The second phase of qualitative data collection consisted of several semi-structured interviews with five participants who agree to be interviewed. Interviews were conducted using a web-based virtual conferencing program allowing for the participation of faculty independent of their location.

### 4. Data Analysis

The online survey instrument was sent to 96 faculty participants and available for data collection for 15 days. Of the 96 possible respondents, 16 completed the survey instrument resulting in a response rate of 16.7 percent. Of the 16 submissions, nine participants agreed to be interviewed and a random sample of six were contacted for interviews. Five interviews took place.

**4.1. Demographic Frequencies.** Summarized demographic frequencies for responses are listed in Table 1.

**4.2. Analysis of the Innovation-decision process indicator.** Lichy's (2000) Innovation-Decision Process Indicator (IDPI) places faculty in Rogers' (2003) five innovation-decision stages regarding the adoption of instructional technologies. The vocabulary of the instrument items was modified from computer-based instruction to OER usage in order to make them relevant to the study, yet the stages remain the same. The ranges for the stages are knowledge (items 0-3), persuasion (items 4-6), decision (items 7-9), implementation (items 10-12), and confirmation (items 13-15) (Lichy, 2000). The knowledge stage is when a person is exposed to the existence of an innovation and finds out its purpose. The persuasion stage is when a person forms an initial attitude toward the innovation. The decision stage is when a person chooses to adopt or reject the innovation. The implementation stage is when the person is creating new habits with the innovation and the confirmation stage is when the person either uses the innovation to its fullest potential or completely rejects it.

Composite variables were created for each of the stages. *Figure 4* expresses the composite variable percentages in a line chart. Each stage has an average score and percentage as well. The knowledge stage has 44.44 percent, persuasion has 55.56 percent, decision has 35.56 percent, implementation has 80 percent and confirmation has 57.78 percent. Based on the composite variables, the participants most frequently partake in activities found in the implementation and confirmation stages, but still cycle back to the previous three stages.

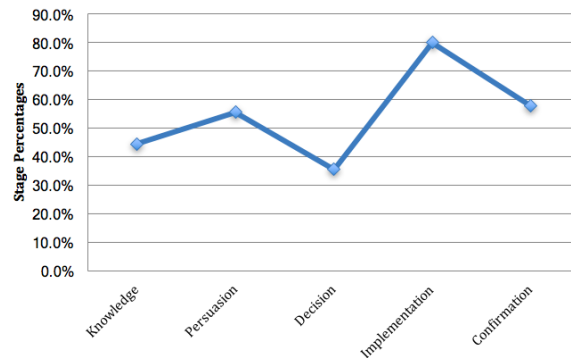


Figure 4: Percentages of scores of the innovation-decision process indicator.

**4.3. Analysis of OER attributes.** This section includes Likert-type statements that refer to innovation and adoption attitudes about using OER for instructional purposes. The five-point items ranging from strongly disagree to strongly agree correspond to the perceived characteristics of innovation which are relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003; Elliot, Foster & Stinson, 2003). Table 2 lists the items and percentages for the six items and *Figure 8* shows the items and percentages in chart form. Overall, 75 percent of respondents Agree or Strongly Agree with the items, while only one percent Strongly Disagree.

As seen in *Figure 5*, 93.75 percent (Agree and Strongly Agree) of participants believe that OER are compatible with their teaching and learning beliefs in item two, and no participants disagreed with the statement. Similarly, 87.5 percent (Agree and Strongly Agree) of participants believe that their students benefit from using OER for item three. No participants disagreed with that statement. For item five, 81.25 percent (Agree and Strongly Agree) of participants believe that OER are flexible and meet the needs of students, and no participants disagreed with the statement. Item one had the most spread out distribution and the only Strongly Disagree response in the entire survey. 37.5 percent of respondents were Neutral and 37.5 percent agreed that OER materials are better than traditional materials, which corresponds to the relative advantage of OER. Item four has to do with how complex or difficult the innovation is to understand and use and 68.75 percent (Agree and Strongly Agree) of participants believe that OER are easy to use and “remix” for future use. In item six, 75 percent (Agree and Strongly Agree) of participants believe that others can see the benefits of adopting and using OER. Overall, 75 percent of the total responses were either Agree or Strongly Agree. These results make it clear that the participants hold positive characteristics and beliefs towards OER. The participants believe that both they and their students benefit from using customizable OER that align to their teaching and learning values.

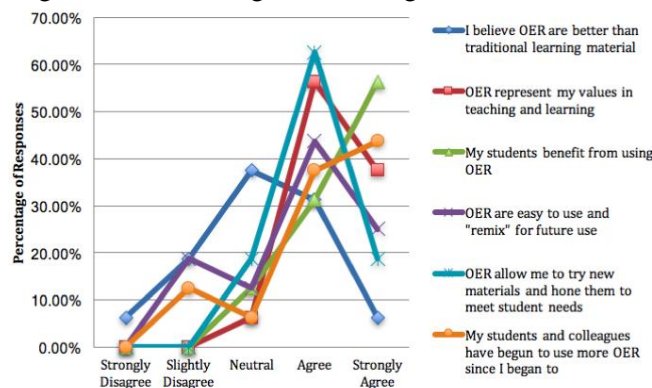


Figure 5: Percentages of scores of the OER attributes.

**4.4. Tests of Differences.** Statistical tests to determine differences in means were conducted for the demographics and survey items. A series of *t* tests and ANOVA were conducted on the survey items for bivariate demographic variables of gender and degree.

Overall, the *t*-tests conducted on demographic categories showed few significant differences between the subgroups in each category. The significant differences that occurred are related to differences in gender and observability, persuasion, and implementation, as well as years of teaching and observability.

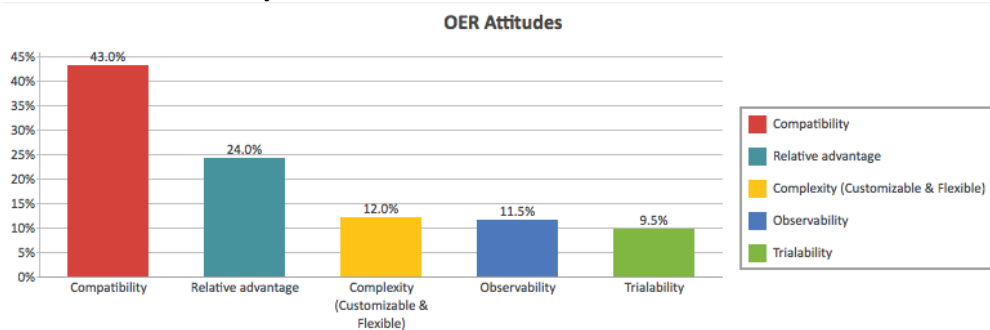
**4.4.1. T Tests.** Independent sample *t* tests were conducted in order to identify significant differences between the mean responses for gender (male and female), degree (masters and doctorate), age (30-49 and 50-69), and years teaching (3-15, 16+) against the survey items. As seen in Table 3, the *t* test for independent samples for the gender variable showed a significant difference in the response means between males ( $M = 3.71, SD = .1.380$ ) and females ( $M = 4.44, SD = .527$ ) was found in the OER Attitude item of observability where  $t = -1.467, df = 14, p < .001$ . A significant difference was found between mean responses for male ( $M = 1.8571, SD = .899$ ) and females ( $M = 1.33, SD = 1.41$ ) on the persuasion composite item ( $t = .852, df = 14, p < .036$ ). A significant difference was also found between mean responses for males ( $M = 2.71, SD = .488$ ) and females ( $M = 1.88, SD = .1.167$ ) on the implementation composite item ( $t = 1.746, df = 14, p < .006$ ). These significant differences between male and female responses indicate that males and females have diverse experiences in the innovation-decision process stages of persuasion and implementation, as well as experiences with how colleagues use OER.

**4.5. Qualitative Analysis.** The 16 participants completed all questions that align with the research questions, innovation-decision process, and perceived characteristics from the theoretical framework. Following the survey questions participants were given the opportunity to provide contact information in order to partake in the follow up interviews. 9 out of the 16 participants provided contact information. 5 participants were randomly chosen and via email were invited to participate in the follow up interview. All 5 participants scheduled interviews. The findings were imported into MaxQDA and coded.

**4.5.1. Emerging concepts and themes analysis.** Each code and sub code is summarized in the sections below. Upon completing the phases of the quantitative and qualitative data analysis themes emerged from each phase that gives insight into the themes across the interactive dynamic link between the innovation decision process, faculty attitudes towards OER, and future possibilities.

**4.5.1.1. Research question one.** The emerging codes were based on the five perceived characteristics from the diffusions of innovations theoretical framework. *Figure 6* exemplifies the percentages of responses for each of the five main codes. Compatibility had an overwhelming amount of responses with 43 percent, more than one third of all responses. Relative advantage has 24 percent of responses, while complexity and observability with closely group between 12 and 11.5 percent. Trialability had the least amount of responses with 9.5 percent. This may be due to the fact that participants are past the trial stage of adoption.

Most prevalently, faculty believe that OER are compatible with their values and needs of students. This corresponds to the highest rated OER attitude survey item which was the compatibility item where 93.75 percent Agreed and Strongly Agreed. The second highest responses were for relative advantage, which also corresponds to the second highest survey item where 87.5 percent (Agree and Strongly Agree) of participants believe that their students benefit from using OER. Overall the quantity of responses for the OER attitudes in the qualitative section mirror the responses in the OER attitudes survey section, which shows a soundness to the data collection and findings.



*Figure 6:* Perceived characteristics from the Diffusions of Innovations theoretical framework code percentages.

Relative advantage had two sub codes emerge: comparable/better material with 28 responses and access with 20 responses. Compatibility had two sub codes: cost with 29 responses and student learning and success with 57 responses. Complexity had 24 responses and trialability had 19 responses.

Finally, observability had two sub codes: sharing with 12 responses and support with 11 responses. *Figure 7* lists the counts for each code and sub code.

OER Attitudes Codes and Sub Codes	Count
<b>Relative advantage</b>	
Comparable/Better Material	28
Access	20
<b>Compatibility</b>	
Cost	29
Student Learning & Success	57
<b>Complexity (Remixable &amp; Flexible)</b>	24
<b>Trialability</b>	19
<b>Observability</b>	
Sharing	12
Support	11
<b>Total</b>	<b>200</b>

Figure 7: Counts of OER attitudes (Perceived characteristics from the Diffusions of Innovations).

4.5.1.2. *Research question two.* The coding of this section was done within the framework of the innovation-decision process stages. *Figure 8* exemplifies the percentages of responses for each of the five stages. The most frequently coded stage is implementation with 30.8 percent, followed closely by confirmation with 23.9 percent. decision with 18.8 percent, persuasion with 16.2 percent, and knowledge with 10.3 percent round out the totals. The rankings of the stages in order of highest to lowest percentage match the order of percentages of the IDPI section of the survey. Once again, respondents claim to most often participate in the implementation and confirmation stages of the innovation-decision process of adoption, yet they also continue to participate in the first three stages.

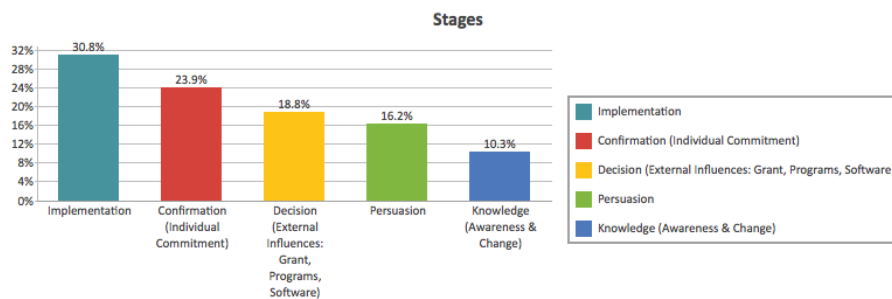


Figure 8: Innovation-decision process stages code percentages.

The knowledge stage had 13 responses. Persuasion had two sub codes, funding with 10 responses and institution support with 9 responses. Decision had 22 responses and implementation had two sub codes: internal and external instructional support with 25 responses and repository with 10 responses. The final stage of confirmation had 22 responses. *Figure 9* lists the stage codes, sub codes, and counts for each.

Innovation-decision Stages Codes and Sub Codes	Count
<b>Knowledge (Awareness &amp; Change)</b>	13
<b>Persuasion</b>	
Funding	10
Institution Support	9
<b>Decision (External Influences: Grants, Programs, Software)</b>	22
<b>Implementation</b>	
Internal & External Instructional Support	25
Repository	10
<b>Confirmation (Individual Commitment)</b>	22
<b>Total</b>	<b>111</b>

Figure 9: Innovation-decision process stage codes, sub codes, and counts.

4.5.1.3. *Research question three.* Within the survey and interview responses, four thematic areas emerged. They are institutional support, professional development, as well as projects, grants, and funding. These themes also present themselves in the previous two research questions, but are the main focus of the third question. The themes and counts can be found in Table 4.

## **5. Discussion of the Research Findings**

Five themes that emerged from the three research questions that guide this study. The first two include the attributes that faculty believe constitute a valuable and sustainable OER include OER which (1) focus on improving student learning and success, and (2) are cost effective. The third involves factors that considerably contributes to faculty adoption or non-adoption of OER as reported by faculty which are (3) the ability to customize, remix, and share OER. The last two include the supports that faculty identify as meaningful to the innovation and adoption of OER are the (4) value of resources from home institutions, including (5) projects and grants with funding for faculty time and effort.

In reviewing the findings across the data, the five themes were identified to explain and reinforce the process of innovation and adoption of OER by higher education faculty. The first theme is how OER focus on improving student learning and success. Participants stated how “in addition to quality/cost/convenience; retention, student success, and completions” are improved because of OER. OER allow faculty to use “material from other sources and get Creative Commons licenses” which allow them to incorporate OERs to improve courses, “adapt those materials to different situations”, and “go at it any order I want to”. In regards to OER being cost effective, the participants find it “difficult to justify the expense of buying a textbook”, “many of the OER books are just as good as the publisher books that cost well over \$120”, and “cost is the most important factor. I will admit there are times when the convenience of a textbook would be greatly appreciated. However, I have been creating OER source material for several years now, and I have quite a bit of material with a wide variety”. The third theme reflects the idea of variety of flexible materials. Faculty believe that the factors that contribute to OER adoption are focused on the ability to customize, remix, and share the OER. The customizable nature “of the materials and the ease of use make it desirable”. Faculty use OER in “order to provide current materials to my students and to target the information they need” and “I can mix, match and move around content at the chapter or module level. A print textbook won't do this well”. Most importantly, OER are not hoarded by faculty, and the faculty “can develop materials myself, share them with others, borrow and remix materials others have developed”.

The third research question which has the fourth and fifth themes are focused on the meaningful supports that faculty report on innovation and adoption of OER. One participant related how “from a collegiality standpoint, to get people together working together, learning together” is “a very important part”, but that it is very difficult to get faculty “all together so that we can train them and so that we can say, okay, this is the direction we're going” with OER. Other participants related how they have “dedicated OER person”, “administrative support”, “an instructional designer” for OER, and administration have “sent faculty to conferences and trainings and invited experts to campus to present and train. There is a campus-wide initiative for OER”. The campus supports come in various shapes and sizes, but are necessary nonetheless. The fifth theme has to do with external projects and grants that include funding. The majority of participants have attended external conferences, workshops, and trainings on OER. They have also seen “compensation for developing/adopting OER”. A handful of participants had support from state initiatives that provide funding and resources. A summary of the five themes from the three research questions are presented in Table 5 and discussed below.

These five themes are consistent with findings from the Babson Group’s (2016) survey of 3000 higher education faculty members and a previous survey of KOCI faculty. The Babson Group’s reports major findings relate that the most common factors reported by faculty regarding adoption of OER had to do with the cost of the materials to students, the comprehensiveness of the materials, and how easy the materials are to find (Allen & Seaman, 2016). The report also cites that faculty believe the materials are too difficult to find and a comprehensive catalog of resources does not exist, yet they are of high quality and have proved efficacy (Allen & Seaman, 2016; Bliss et al., 2013). These results also mirror findings from a KOCI faculty and student survey from 2012. The 2012 KOCI study mentions how faculty did relate negative comments about the online formatting of the materials, which is not mentioned by faculty in the current study (Bliss et al., 2013). One possible reason for this is due to the flexible and remixable nature of OER.

It is possible that between 2012 and 2016, the materials were remixed and revised to improve the formatting of the online OER materials or that the faculty sought out new OER materials to replace the initial ones. The findings of the current study reflect consistency with the adoption process by faculty in relation to existing studies.

## 5.1. Attributes findings

The first research question seeks to find out what attributes faculty believe constitute a valuable and sustainable OER. The two main themes that emerge from this question include OER that focus on improving student learning and success, and are cost effective.

**5.1.1. Student learning and success.** Student Learning and Success was the broadest and most common theme among survey and interview responses. Faculty believe that OER are material that focus on student learning and success that align to learning outcomes. OER give faculty the “ability to customize materials, reduced cost to students, [are] available to students from the first day of class, [and are] available online”. Noted differences in student “retention, student success and completions have improved considerably” since faculty began using OER. OER are notably different from traditional published materials because they are “very personal and humane” and meet “the needs and interests of the students”. These characteristics of OER closely align with the beliefs and values of the faculty.

**5.1.2. Cost effectiveness.** Freeing students the cost of textbooks and learning materials is a major argument in the OER movement. The respondents recounted how having no or low cost materials remove the “problem waiting for student aid funds to arrive. Everyone immediately has the textbook and my courses can get moving as soon as class meets”. OER removes the financial barriers that high cost traditional publisher materials have, and the faculty recognize this issue as important to their students’ success. This attribute may not directly affect the faculty member because they do not have a financial stake, but they recognize that it is vital to their students.

## 5.2. Innovation and adoption process findings

The second research question asks what contributes to faculty adoption or non-adoption of OER as reported by faculty. The central theme that emerged is the ability to customize, remix, and share OER considerably. This theme directly aligns with the 5Rs of OER: retain, reuse, revise, remix, redistribute (Fischer, Hilton, Robinson, & Wiley, 2015). Most commonly, respondents valued the “customization of the materials” and how “the ease of use make it desirable”. The remixing and reusing of “existing materials to meet the specific needs of the group you're working with is very important”. As far as sharing, creative commons licenses are used “to promote sharing within and outside of the college” to “get instructors to not hoard their materials, but to put a license on it and make it freely available”. Within and between institutions, repositories, clearing houses, and other ways of sharing are highly valued and desired by the faculty.

## 5.3. Meaningful supports findings

The third research question looks to identify what supports faculty believe are meaningful to the innovation and adoption of OER. The principal themes are resources from home institutions, as well as projects and grants with funding for faculty time and effort.

**5.3.1. Resources from home institutions.** Instructional and logistical support from administration and faculty at home institutions was main theme with the innovation and adoption of OER by faculty. Respondents related how funding, technology support from IT departments, assistance from instructional designers, and backing from administration were important in successfully adopting OER, even if other faculty members were resistant to change. OER innovation is successful at multiple levels, but support has “got to start with the top and it needs to be leadership-toned from the top”.

**5.3.2. Projects and grants with funding.** Since the participants of this study all partook in the grant funded KOCI OER project, it is not surprising that an emergent theme related to the importance of external projects and grants. The support of the KOCI grant, as well as the OER learning management systems such as Waymaker, were noted by several respondents. By having the financial and organizational support of external projects and grants, faculty found that the innovation and adoption of OER was more successful.



#### **5.4. Discussion of the Findings in Relation to the Theoretical Framework**

Rogers' (2003) Diffusions of Innovation theory was used as the theoretical framework used for this study. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (2003). Success of an innovation such as OER depends on whether or not members of a social system participate in the innovation. In this study, the members of the social system are the faculty in higher education. By recognizing that decisions are not collective or authoritative, each member of the social system face innovation-decisions that follows a 5-step process: 1) knowledge, 2) persuasion, 3) decision, 4) implementation, and 5) confirmation (Rogers, 2003).

Reinvention, or remixing in OER terms, usually happens at the implementation stage. Reinvention is "the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation" (Rogers, 2003, p. 180). The implementation stage had the highest recorded responses with 80% of participants selecting the items in it. Also, the three implementation items in the IDPI scored in the top five overall responses with between 87.5 percent and 68.75 percent response rates. 87.5 percent of the participants claim that they have integrated OER into their normal curriculum-planning activities and continue to evaluate their efforts to provide quality OER. An interviewee recounted how "as soon as I had the college's support, implementation was easy --although never glitch-free, that is the down side to all technology and not a negative reflection of OER or the K program". Implementation of a new innovation is not without growing pains and glitches, but the benefits of the innovation need to outweigh the disadvantages if the adopter is to move into the confirmation stage.

#### **5.5. Limitations**

Limitations exist with this study. First, sample size of 96 for this population was limiting because the participants participated in one specific grant project. Since all the participants partook in one specific grant, the population was more homogenous than if the sample was from a larger population. Although the participants came from various types of higher education institutions and diverse communities (locations, student populations, institutional goals), the small sample size made the quantitative findings not generalizable to other populations beyond the study participants. Having a larger number of participants would have potentially made the quantitative results more generalizable to larger faculty populations.

Another limitation had to do with the timing of the study. The initial email invitation to the survey was sent on July 18, 2016. Due to the academic calendars of many institutions, several faculty were away from their email for summer break. Multiple bounced back away messages were received by the researcher, indicating that potential participants were unavailable until the beginning of the Fall semester. Administering this study during the traditional academic semester may have yielded a larger response rate.

Within the quantitative phase, the instrument relied on participant self-reports of usage and attitudes towards OER, in contrast to direct measures of innovation adoption. This self-reporting creates an innate limitation in the study results. Although self-reporting is valuable, direct evidence and data collection is considered more rigorous.

#### **5.6. Implications**

The goal of this mixed-method research study was to examine the adoption process and use of OER in higher education. The significance of this research for scholar-practitioners was to investigate faculty adoption or non-adoption of OER in order to facilitate valuable and sustainable adoption of OER. In order to identify the connection between the creation and continued adoption of OER, certain factors such as the characteristics of OER, the innovation-decision process, and the kind of supports institutions should provide have been investigated. This study was successful at identifying five themes that distinguish specific supports, resources, and characteristics are needed for successful adoption of OER.

In relation to the needs of practitioners, through the five themes this study provides an outline specifying the key factors and practices that faculty believe make a successful adoption of OER. The study offers meaningful resources to improve the innovation-decision process for faculty, as well as what attributes and characteristics the OER should have for complete adoption. The themes and results of this study should be of interest to higher education administration, faculty, and external OER partners as a potential means of increasing the effectiveness and quality of OER material adoption.

## 5.7. Conclusion

This research study initially set out to examine the adoption process and use of faculty created OER in higher education. Five themes emerged from the mixed methods design. First off, the attributes that faculty believe constitute a valuable and sustainable OER include OER that focus on improving student learning and success, and are cost effective. Secondly, the ability to customize, remix, and share OER considerably contributes to faculty adoption or non-adoption of OER as reported by faculty. Finally, resources from home institutions, as well as projects and grants with funding for faculty time and effort are the supports that faculty identify as meaningful to the innovation and adoption of OER. These five themes explain and reinforce the process of innovation and adoption of OER by higher education faculty. These themes can be used to assist practitioners in preparing and performing new OER initiatives, as well as inform OER researchers and future research proposals.

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Table 1  
*Demographics*

Items		
Gender	Male=44%	Female=56%
Age	30-49= 44%	50-69= 56%
Highest Degree Held	Masters= 56%	Doctorate=44%
Professional Rank	Tenure Track=81%	Non-Tenure Track=19%
Years taught on the college level	0-15= 44%	16+ = 56%
Discipline do most often taught	Liberal Arts=44%	Sciences, Business, Etc:56%

Table 2  
*OER Attributes*

Items	Strongly Disagree	Slightly Disagree	Neutral	Agree	Strongly Agree
1. I believe OER are better than traditional learning material	6.25%	18.75%	37.50%	31.25%	6.25%
2. OER represent my values in teaching and learning	0.00%	0.00%	6.25%	56.25%	37.50%
3. My students benefit from using OER	0.00%	0.00%	12.50%	31.25%	56.25%
4. OER are easy to use and "remix" for future use	0.00%	18.75%	12.50%	43.75%	25.00%
5. OER allow me to try new materials and hone them to meet student needs	0.00%	0.00%	18.75%	62.50%	18.75%
6. My students and colleagues have begun to use more OER since I began to	0.00%	12.50%	6.25%	37.50%	43.75%
Averages	1.04%	8.33%	15.63%	43.75%	31.25%

Table 3  
*Summary of Results of T-tests for Gender Variable and Observability, Persuasion, and Implementation*

Item	Male (n=7)		Female (n=9)		p	t	df
	M	SD	M	SD			
6, Observability	3.71	1.38	4.44	0.527	0.001	-1.467	14
Persuasion	1.857	0.899	1.33	1.414	0.036	0.852	14
Implementation	2.714	0.488	1.89	1.167	0.006	1.746	14

Table 4

*Meaningful OER Supports for Faculty Adoption*

Meaningful Supports	Count
Institutional Support	14
Professional Development	13
Project, Grants, & Funding	12

Table 5

## Five Themes

Research Question 1: Attributes that faculty believe constitute a valuable and sustainable OER	
Theme 1	OER focus on improving student learning and success
Theme 2	OER are cost effective
Research Question 2: Factors that contribute to faculty adoption of OER	
Theme 3	OER offer the ability to customize, remix, and share materials
Research Question 3: Meaningful supports for the innovation and adoption of OER	
Theme 4	Resources from home institutions
Theme 5	Projects and grants with funding for faculty time and effort