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Advancing Faculty Adoption of Open Educational Resources in Higher Education: A Delphi Study

Stephanie Brasley
Brandman University, sbrasley@mail.brandman.edu

Advancing Faculty Adoption of Open Educational Resources in Higher Education: A Delphi Study

A Dissertation by

Stephanie Sterling Brasley

Brandman University

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Committee in charge:

Patricia Clark-White, Ed.D., Committee Chair

Douglas DeVore, Ed.D.

Gerard Hanley, Ph.D.

BRANDMAN UNIVERSITY

Chapman University System

Doctor of Education in Organizational Leadership

The dissertation of Stephanie Sterling Brasley is approved.

Patricia Clark-White, Dissertation Chair

Patricia Clark-White, Ed.D.

Douglas P. DeVore, Committee Member

Douglas DeVore, Ed.D.

Gerard Hanley, Committee Member

Gerard Hanley, Ph.D.

Patricia Clark-White, Associate Dean

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And we know that all things work together for good to those who love God, to those who are called according to His purpose. (Romans 8:28, NKJV)

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The world breaks everyone and afterward many are strong at the broken places.

—Ernest Hemingway, *A Farewell to Arms*

ABSTRACT

Advancing Faculty Adoption of Open Educational Resources in Higher Education: A Delphi Study

by Stephanie Sterling Brasley

Purpose: The purpose of this Delphi study was to identify and describe the perceptions of open educational resources (OER) higher education experts regarding the activities needed at colleges and universities in the United States in order to advance faculty adoption of OER over the next 10 years. Also, this study examined those activities that were most important and had the greatest likelihood of being implemented.

Methodology: The researcher utilized a mixed-methods Delphi study technique to identify and describe activities to advance faculty adoption of OER. The target population for the study consisted of a group of OER higher education faculty experts from postsecondary institutions within the United States. This study utilized a purposive criterion sampling method to identify 16 experts. The Delphi method employed questionnaires over 3 successive rounds to gather data from and build consensus among the expert panel. In Round 1, the researcher asked the expert panel for activities to support faculty adoption of OER. In Round 2, the expert panel rated the 35 activities for degree of importance and likelihood of implementation. In Round 3, the panel had an opportunity to revise their score, if desired, in order to move toward consensus.

Findings: Analysis of the quantitative data from the study revealed 17 OER activities that received consensus for importance and 11 OER activities that indicated consensus concerning likelihood for implementation. Finally, there were 6 OER research findings on which the expert panel came to consensus concerning equally importance and likelihood of implementation.

Conclusions: Based on the data and research findings, 6 conclusions were drawn related to faculty adoption of OER within colleges and universities over the next decade.

Recommendations: There were 8 recommendations for further research covering these topic areas: (a) replication of the study within different higher education arenas and across other stakeholder groups; and (b) examination of faculty receptivity and resistance to adopting OER, utilizing a change theoretical framework; (c) a model for open pedagogy; and (d) an examination of K-12 educators' OER adoption practices.

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CHAPTER I: INTRODUCTION

Education, particularly in the last 2 centuries, has risen in prominence and importance, becoming more vital as a measure of success over one's lifetime. To illustrate, on the international stage, access to education has been elevated to a human right (United Nations, 1948). Huijser, Bedford, and Bull (2008) underscored this fundamental human right, citing Article 26 of the United Nations' *Universal Declaration of Human Rights*, and expanded the idea by arguing that higher education should be accessible to every individual based on merit. They further contended that "showing 'merit' requires access to, and mastery of, the tools of education" (Huijser et al., 2008, p. 1). In the national arena, since the founding of the United States, the importance of education has been ingrained into the fabric of this nation and has been recognized as an equalizing force in its citizens' attainment of the unalienable rights proposed in the Declaration of Independence: life, liberty, and the pursuit of happiness. Proponents of this idea cite an array of economic, social, political, and health benefits that include increased economic prosperity with higher earnings over a lifetime (Berger & Fisher, 2013; Brown & Adler, 2008; N. H. Buchanan, 2012; Organisation for Economic Co-operation and Development [OECD], 2014), a more productive workforce, a better informed democratic citizenry (Berger & Fisher, 2013), enhanced quality of life (Brown & Adler, 2008), and greater employability (Mitra, 2011; OECD, 2014). Individuals' access to education worldwide helps to reduce the cycle of poverty, improves mortality rates, improves health, increases tax revenues, provides a better trained workforce, engenders higher participation in the political process, and facilitates higher life expectancy (Berger & Fisher, 2013; Mitra, 2011; OECD, 2013, 2014). Research

completed on the importance of education has clearly demonstrated its value to individuals, institutions, governments, and society as a whole.

Despite the well-documented value of education attainment, tangible gaps still remain in educational access and affordability that thwart people's ability to advance. Following the idea of a human being's right to education, Huijser et al. (2008) tied the notion of educational merit to this challenge of access, stating that "a basic question underlying the right to education then becomes one of how to create equal access to the tools of education, and thus the opportunity to show merit" (p. 2). On the issue of access, in the report *Education at a Glance 2014*, the Organisation for Economic Co-operation and Development (OECD, 2014) found that between 1995 and 2012, when reviewing access to education in OECD countries, the enrollment rate among 15- to 19-year-olds and 20- to 29-year-olds increased by 10%. While access to education across OECD countries has increased, the gap between the educational "haves" and "have-nots" is widening, due in large part to the increase in skills of those who have completed postsecondary education. In the United States, a 2012 National Center for Education Statistics study on higher education gaps in access and persistence reported "low expenses (36 percent), the availability of financial aid (57 percent), and an institution's academic reputation (58 percent)" (Ross et al., 2012, p. xi) among the chief postsecondary choice factors for potential students. These data underscore the notion that affordability is a key determinant of college attendance. Moreover, some describe a "crisis of affordability" for students attending U.S. colleges and universities, due to the massive amount of debt with which they are saddled upon graduating (Craig & Williams, 2015, p. 14).

With respect to affordability of education, statistics collected by the College Board (2014) showed a 42% rise in the cost of in-state tuition over the last decade within the 50 states. Specifically, California is among one of two states that have increased tuition costs by 70%, presenting an enormous barrier to access and equity for individuals in California desiring to further their education. In the United States, textbook costs have increased at twice the rate of inflation over the last 2 decades, according to a U.S. Government Accountability Office (GAO) report released in 2005. At the legislative level, in 2014, law and policy makers began the process to reauthorize the Higher Education Act, first signed into law by President Johnson in 1965, to improve efforts to increase access to education and to lower its costs (Burke, 2014; Rice, 2014). The recent statistics regarding access to and affordability of education demonstrate the challenges students face today. Online or distance education has been heralded as a solution to education's access and affordability issues. Christensen, Horn, Caldera, and Soares (2011) framed online learning as a disruptive innovation. Disruptive innovation is

> the process by which a sector that has previously served only a limited few because its products and services were complicated, expensive, and inaccessible, is transformed into one whose products and services are simple, affordable, and convenient and serves many no matter their wealth or expertise. (Christensen et al., 2011, p. 2)

The authors cited technology as an important enabler within this disruptive innovation framework (Christensen et al., 2011). Saveri and Chwierut (2011) identified open educational resources (OER), which they termed "open education" (p. 6), as one of seven disruptive innovations in education. Essentially, OER are digital learning resources that

are provided at no cost through an open copyright license (Wiley, n.d.). Although OER are available in print and digital forms, many of them, such as full courses, streaming videos, and e-textbooks, are online and facilitated by information and communication technologies (ICTs; UNESCO, 2002). Distance learning and OER, which reside within open learning or education, hold promise for delivering on the provision of accessible, affordable, and quality educational experiences for governments, institutions, and students (Johnstone, 2009).

Faculty members are at the crux of the educational enterprise; many of the teaching and learning activities in P-20 education depend on instructors facilitating knowledge acquisition. Despite the buzz about disruptive technological innovations, faculty remains central to the advancement of knowledge for learners. Although technology has great potential for learning, often the growth of technological innovations outpaces faculty adoption of them (T. Buchanan, Sainter, & Saunders, 2013; Kennedy, 2013; Sudhaus, 2013). Faculty adoption of OER is important to advancing access, affordability, and quality educational experiences. However, faculty awareness has been low (Allen & Seaman, 2014, 2016), and despite overwhelming evidence of the positive returns for access and affordability, acceptance has been quite inconsistent and underwhelming (Browne, Holding, Howell, & Rodway-Dyer, 2010; McKerlich, Ives, & McGreal, 2013; Mtebe & Raisamo, 2014a, 2014b). As such, an exploration of best practices for advancing faculty adoption of OER can provide valuable information to higher education stakeholders.

Background

A study of faculty adoption of OER necessitates an exploration into the precursors to and current aspects of OER and consideration of the change processes associated with an individual's decision to adopt a new idea.

Openness and the Open Education (OE) Movement

The broad concept of "openness" in education has greatly advanced the cause of proponents concerned with accessibility and affordability issues in education. Within the education arena, the term *openness* refers broadly to freely sharing information, knowledge, learning, and technology. There is an open ecosystem (e.g., open content, learning, research, textbooks, etc.), bolstered by the Internet and ICTs, that is driving "toward a knowledge ecology characterized by unfettered access to educational resources, choice, and change in the context and clientele of higher education" (Batson, Paharia, & Kumar, 2008, pp. 90-91). Zijdemans Boudreau (2014) extended the idea of unfettered access, confirming that openness in education "can be exemplified through expressions of iterative socio-technological innovations that erode barriers and create multiple opportunities for practice—learning, teaching, and the development of content and learning environments" (p. 106). Zero costs for using or consuming resources are at the heart of the concept of openness (Downes, 2006). Iiyoshi and Kumar (2008), in their progressive monograph entitled *Opening Up Education*, boldly suggested that the "history of education is a narrative on *opening up education*" (p. 1). They posited that the advances in ICTs and other technologies have paved the way for significant progress in education and made the case that education will advance through trifold emphases on open technology, content, and knowledge. Open education (OE) is an umbrella term that

signals educational reform through advances in technology that enable transformative changes in education. This transformation will occur by "making educational assets visible and accessible and by harnessing the collective wisdom of a community of practice and reflection" (Iiyoshi & Kumar, 2008, p. 2). The OE movement is a collective term that encompasses a variety of open content and technology options that include OER, open-source software (OSS), open courseware, massive open online courses, and textbooks among others.

Defining Open Educational Resources (OER)

OER, an overarching phrase to describe a group of educational and instructional resources, was first coined at the Forum on the Impact of Open Courseware for Higher Education in Developing Countries (D'Antoni, 2009a; Porter, 2013; UNESCO, 2002). The concept of OER is approximately 15 years old. However, rapid progress in some OER areas has resulted in its transformation from an "OER initiative" (Atkins, Brown, & Hammond, 2007, p. 3) to an "OER movement" (D'Antoni, 2009a, p. 17; see also D'Antoni, 2009b; Reedy, 2014).

Although multiple definitions exist, the two most often-cited definitions for OER come from The William and Flora Hewlett Foundation (2013), which defined OER as

> teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge. (p. 16)

UNESCO (2002) adopted this working definition of 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 non-commercial purposes" (p. 24). Recently, Olcott (2012), citing UNESCO and the Commonwealth of Learning (Butcher, 2011), proffered a revised definition of OER as "teaching, learning and research materials in any medium that reside in the public domain and have been released under an open license that permits access, use, repurposing, reuse and redistribution by others with no or limited restrictions" (p. 284). This more recent definition aligns more appropriately with the aspects of OER targeted in The William and Flora Hewlett Foundation's definition. David Wiley (n.d.), underscoring the reuse aspect, described open content/OER as "any copyrightable work . . . that is licensed in a manner that provides users with free and perpetual permission to engage in the 5R activities: 1. Retain . . . 2. Reuse . . . 3. Revise . . . 4. Remix . . . [and] 5. Redistribute" (para. 1). Tuomi (2013), viewing OER as a "public good," suggested a definition of OER from an economic perspective, stating that they are "accumulated assets that are available in a non-discriminatory way to educators, students and self-learners for learning and education" (p. 61). Smith and Casserly (2006) affirmed OER as a public good, stating, "At the heart of the open-educational resources movement is the simple and powerful idea that the world's knowledge is a public good" (p. 10). Reflected in these definitions are ideas surrounding openness of educational resources that may be used, reused, or distributed without limitations for the public good.

The Potential of OER

The promise and aim of OER is to broaden access to traditional modes of education and to open up alternative educational options for learners. In addition to expanding access, the OECD (2007) identified additional motivational factors for governmental, institutional, and educators' use of OER. Governments benefit by "widening participation in higher education, bridging the gap between formal, informal, and non-formal learning, and promoting lifelong learning" (OECD, 2007, p. 70); institutions can benefit from OER by attracting new students and enhancing their image by leveraging taxpayers' money via free sharing of resources; and educators may benefit by an enhanced reputation and an improved economic advantage.

Generally, there is agreement in the literature that more promotion of and education about OER is required for the movement to advance. Staff development to raise awareness and to provide skills for working with and contributing to OER has been suggested (Browne et al., 2010). However, more information is needed about activities that will support successful faculty implementation of OER in postsecondary institutions if this movement is to gain momentum.

Change Processes in Education

Although higher education institutions are marked by tradition, conservatism, faculty independence, and adherence to institutional norms, values, and behaviors, these organizations do experience catalytic circumstances that provide an impetus for change (Lane, 2007). From a systems standpoint, technological advances implemented over the course of the last 2 decades and OE, which promotes and enables openness, have catalyzed educational reform efforts globally, facilitating opportunities to transform

teaching and learning (Brown & Adler, 2008; Kumar, 2012; Watts & Economou, 2015). Alongside vigorous consideration of large-scale systems changes to the educational landscape, exacting attention to the change processes of individuals is equally important (Fullan, 2016; Hord, Rutherford, Huling-Austin, & Hall, 1987). A discussion of faculty adoption is deficient without an examination of the concomitant change processes in which faculty must engage in order to effectuate adoption of OER.

There are a number of elements to a successful change process. Attention to the individual in the innovation adoption process cannot be underestimated or undervalued. Transformational change requires consideration of "people's hearts and minds [which] need to change, and not just their preferences or routine behaviors" (Heifetz & Linsky, 2002, p. 60). One key element is motivation; people need to understand the return on investment for them (Fullan, 2016). Heifetz and Linsky (2002) added that when people are being asked to adopt a new idea, they must understand the risks and any potential sacrifices that will come into play with the change. Another crucial factor is time; people need to engage in reflective action or time to think about acting on a new idea before actually engaging in it. Understanding that changes in people's attitudes, behaviors, and emotions precede a change in beliefs is an important concept to grasp; people need to engage actively with a new idea before they can gain insight into it (Fullan, 2016). With respect to faculty adoption, OER researchers cite motivation as a pivotal aspect of faculty buy-in. Deutschman (2005) cited Kotter's insights on the importance of feelings to a change in behavior. Kotter stressed that "the central issue is never strategy, structure, culture, or systems. The core of the matter is always about changing the behavior of

people; Behavior change happens mostly by speaking to people's feelings . . . not just thought" (as cited in Deutschman, 2005, p. 54).

The concerns-based adoption model (CBAM), developed by Loucks and Hall (1979), is an additional change model that facilitates understanding of faculty change processes. The CBAM emphasizes the potential adopter of an innovation, stressing that change at the individual level is ongoing, is deeply personal, and involves incremental growth. Anderson and Anderson (2010) drew attention to the importance of culture, individual behaviors, and mindset as internal change drivers within a change process.

Statement of the Research Problem

The United Nations (1948), in its *Universal Declaration of Human Rights*, asserted the right of all individuals to an education, declaring that "higher education shall be equally accessible to all on the basis of merit" (p. 7). Despite this compelling argument for access to educational opportunities for all, the escalating costs of a college education have proven to deter access and affordability for many potential students (U.S. GAO, 2013). The lack of affordable educational options that range from lower tuition to instructional materials is creating a schism between those who can afford higher education and those who cannot. Citing data from the National Center for Education Statistics, Oliff, Palacios, Johnson, and Leachman (2013) pointed out that public universities educate in excess of 75% of graduates in the United States and that states are spending 28% less per student on education than they did in 2008 when the recession hit. Juxtapose this with the fact that the demand for high-quality education worldwide is steadily increasing, with more than 263 million people eligible to enter the higher education market by 2025 (The William and Flora Hewlett Foundation, 2013).

Despite well-documented cases regarding the need for a quality education, deep cuts have been made to education budgets over the last 5 years, resulting in formidable barriers to access and equity. A recent College Board (2014) report noted that "in 18 states, average in-state tuition and fees at public four-year institutions increased by 20% or more in inflation-adjusted dollars" (p. 19). Underscoring this barrier to access and equity is the prohibitive price for textbooks (Grasgreen, 2014; U.S. GAO, 2005). The fundamental belief of equal access to education espoused by the United Nations, which is critical to a competitive knowledge society, is the foundational premise of the OER movement (D'Antoni, 2009a). This movement, which gained momentum in the early part of the 21st century, seeks to increase access and equity to educational opportunity for all citizens around the globe (D'Antoni, 2009a, 2009b).

Teaching-faculty members are central to the acceptance and adoption of OER within postsecondary institutions, yet a lack of awareness and understanding persists (Allen & Seaman, 2012, 2014, 2016; D'Antoni, 2009a; Porter, 2013), and barriers abound (Allen & Seaman, 2012, 2014; Reedy, 2014). Allen and Seaman (2012, 2014, 2016) of the Babson Survey Research Group have conducted several studies of faculty awareness and use of OER. They found that chief academic officers and faculty members self-identify as the primary decision-making groups for the selection of teaching resources (Allen & Seaman, 2012). Of faculty members surveyed in 2014, 59.6% identified "proven efficacy" (Allen & Seaman, 2014, p. 8) as the primary criterion when selecting instructional materials; conversely, cost was cited as the least important criterion (2.9%). The results of Allen and Seaman's 2016 study demonstrated significantly improved consideration of student costs for materials, with 87% of faculty

members identifying students' cost for materials as either very important or important. Despite this heightened consciousness surrounding cost, the survey revealed an ongoing lack of awareness of OER (Allen & Seaman, 2016). In studies of faculty barriers sponsored by the Babson Survey Research Group, Allen and Seaman (2012, 2014, 2016) cited a lack of institutional support and time, difficulty in locating materials, and unclear outcomes as constraints to be addressed.

More information is needed to determine what has the greatest chance of facilitating faculty adoption of OER and how postsecondary institutions can overcome impediments to effecting this change. Research on the change process provides insights to effectuate change among faculty in the adoption of OER. There are a number of elements to a successful change process for individuals. One key factor is motivation; another is time; people need time to engage in reflective action or to think about acting on a new idea before actually engaging in it. Understanding that changes in people's attitudes, behaviors, and emotions precede a change in beliefs is an important concept to grasp; people need to engage actively with a new idea before they can gain insight into it (Fullan, 2016). Despite its relatively nascent stage as a movement, the literature around OER creation and production has been robust; however, empirical research concerning faculty adoption and use of OER needs further attention (Ehlers, 2011; McAndrew et al., 2009; Paradis, 2014; Porter, 2013).

Purpose Statement

The purpose of this Delphi study was to identify and describe the perceptions of open educational resources (OER) higher education experts regarding the activities needed at colleges and universities in the United States in order to advance faculty

adoption of OER over the next 10 years. Also, this study examined those activities that were most important and had the greatest likelihood of being implemented.

Research Questions

The following questions were investigated to address the purpose of the study:

1. What activities do OER higher education experts believe will advance faculty adoption of OER at colleges and universities in the United States over the next 10 years?
2. Which activities do OER higher education experts believe are most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?
3. What is the likelihood of implementation of the activities that OER higher education experts perceive as most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?

Significance of the Problem

In response to the burgeoning financial crisis surrounding higher education tuition costs and fees, federal and state plans and legislation have been enacted to lower the cost of a college education for students within the United States. Examples include President Obama's college affordability plan (Gary, 2013), proposed Senate Bills 1704 and 1864 for the Affordable College Textbook Act (2013, 2017), and California Senate Bills 1052 (2012) and 1053 (2012). The OER movement seeks to fulfill the United Nations' (1948) declaration that advocated for free education for all. OER options run the gamut from full courses and open textbooks to videos and tests. This array of open content offers

value to faculty members in their quest to provide a quality yet affordable educational experience for students (Conole, 2013; D'Antoni, 2009a, 2009b).

Faculty involvement and buy-in are key factors in the advancement of the OER movement. However, faculty awareness and participation have been sluggish, despite a number of governmental, statewide, and institutional initiatives to introduce OER use and creation (Allen & Seaman, 2014, 2016; Ehlers, 2011; Falconer, Littlejohn, McGill, & Beetham, 2016; Mtebe & Raisamo, 2014a, 2014b). In order for the benefits of OER to be realized, challenges to faculty adoption of OER, which include sustainability, faculty buy-in and resistance to change, and intellectual property issues, must be addressed and resolved (Fullan, 2016; McKerlich et al., 2013; Thoms & Thoms, 2014). Research studies on OER adoption to date have succeeded at describing motivations for and enablers and barriers to OER adoption. However, missing from the literature are concrete potential strategies, policies, or activities to support advancement of the OER movement. In particular, no study has gathered the voices of experts in the field of OER with the goal of bringing into focus effective practices, at the least, and a framework, ideally, for adoption of OER.

Definitions

Adoption. Adoption occurs when the potential adopter makes the decision to use an innovation. It also acts as a precursor to the implementation change process, which occurs in stages (Rogers, 2003; Wisdom, Chor, Hoagwood, & Horwitz, 2014).

Adoption theory. Adoption theory refers to a specific behavioral change process dealing with individual choices to either adopt or reject a new idea (Straub, 2009).

Advance faculty adoption of OER. Advance adoption of OER involves faculty members moving beyond basic awareness of OER to actionable, observable activities related to OER that include using, reusing, retaining, revising, redistributing, or remixing OER.

Diffusion. Diffusion is a communication process in which an innovation is communicated to potential adopters via a particular social system (Rogers, 2003).

Faculty. Faculty consists of tenured, tenure-track, or non-tenure-track, part-time or full-time members who hold the title designation *faculty* within institutions of higher education within the United States. Thus, faculty members could be classified as either instructional (i.e., teachers) or noninstructional (e.g., librarians, academic technologists, etc.).

Faculty adoption of OER. Faculty adoption of OER involves faculty members using or deciding to retain, reuse, revise, remix, or redistribute digital educational materials under an open license (Wiley, n.d.).

Implementation. Following the adoption-decision phase, implementation occurs when adopters actually use an innovation (Surry & Ely, 2002).

Innovation. An innovation is a tangible product, technology, or an idea that potential adopters perceive as being new (Rogers, 2003).

Innovation-decision process. The innovation-decision process is an ongoing time period in which a potential adopter of an innovation moves through a series of steps from initial awareness to a decision to either adopt or reject a new idea, technology, or product (Rogers, 2003).

Learning object. A learning object is an instructional resource, usually in digital format, that can be used or reused within a learning environment (Wiley, 2000).

Open education (OE). OE is a global educational movement that utilizes Web 2.0 technologies to expand access to free or open resources, knowledge, learning, and research. Its transformative power lies in the potential to allow collaboration among formal and informal learners to facilitate knowledge transfer (Blessinger & Bliss, 2016; Meiszner, 2011; Meiszner & Glott, 2011).

Open educational resources (OER). OER are digital resources that either reside in the public domain or are available under open licenses that can be accessed and used openly and freely (The William and Flora Hewlett Foundation, 2013).

OER higher education experts. For the purposes of this study, OER higher education experts are OER faculty practitioners who possess knowledge of or have extensive experience with faculty adoption of OER at universities and colleges within the United States. They are faculty members working in higher education environments who have been involved in OER adoption, implementation, or sustainability activities for at least 5 years.

Openness. Openness is characterized by freedom, justice, transparency, collaboration, and inclusiveness; it allows stakeholders to engage in transparent, open activities to improve access to and availability of open content, learning, knowledge, and research. Openness and its concomitant movements hold promise to transform higher education globally (Baker, 2014; Meiszner, 2011; Weller, 2013).

Open pedagogy. A model for open educational practices (OEP). The enabling attributes for open pedagogy include participatory technologies, trust, openness,

innovation and creativity, and peer-review (Hegarty, 2015). A central aspect of open pedagogy is its focus on the learner. It is rooted in the open education movement of the 1980s in which children were treated as co-designers of their learning and acted as participant-observers (Hanley, Houts, Ruzek, Krasner, & Krasner, 1981). The learner is proactive instead of passive in the learning environment (Hegarty, 2015). With respect to information, the learner is not only a consumer of information, but also a producer of it.

Open-source software (OSS). OSS is software for which the source code has been published and has a copyright allowing the public to use, copy, modify, and distribute it absent a fee or royalty structure (B. Fitzgerald, 2011; Tuomi, 2006).

Open textbooks. Open textbooks are free resources that can be used, modified, reused, and redistributed (Petrides, Jimes, Middleton-Detzner, Walling, & Weiss, 2011).

Referatory. A referatory is a term commonly used in education to describe an online database that provides basic descriptive information on resources that are held in a repository. Information may include a title, description, a review, and hyperlinks to the source material (metadata). An instructional referatory is "a gateway to locating and using repositories" (Hart & Albrecht, 2004, p. 2).

Repository. A repository is an online database that contains files of information along with descriptions and metadata. An instructional repository "is an organized collection of online teaching materials" (Hart & Albrecht, 2004, p. 2).

Delimitations

This study was delimited to an OER higher education expert practitioner panel of 16 faculty members meeting at least one of the following two criteria:

- faculty members working either in the California Community College (CCC) system or the California State University (CSU) system as campus coordinators for statewide textbook affordability programs supported by California Assembly Bill 798 grants, with a minimum of 5 years of experience with OER; or
- faculty members selected to serve as peer reviewers for the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) editorial boards, with a minimum of 5 years of experience with OER.

Organization of the Study

The study is organized into five chapters, references, and appendices. Chapter I introduced the topic, provided the context for the research problem, and described the purpose and significance of the study and the research questions. Chapter II provides an in-depth review of the literature about the OE movement and OER, discusses the relevant theoretical frameworks and models pertinent to this study, and explores the facets relating to faculty adoption of these resources. Chapter III describes the research design and methodology for the study, which include the population, sample, instrumentation, and data collection and analysis components. Chapter IV presents the results of the data collection process and explains the findings. Chapter V contains a discussion of the findings, conclusions, implications for action, and recommendations for further research.

CHAPTER II: REVIEW OF THE LITERATURE

This chapter presents a review of the literature concerning the ecosystem supporting faculty adoption of open educational resources (OER). This literature review examines the changing landscape of higher education, the contexts for OER that include a broad overview of openness and open education (OE), and selected literature on change that forms a foundation for discourse concerning faculty adoption. The chapter discusses the theoretical frameworks that underpin transformational change and diffusion of innovations such as OER, providing examples from extant literature on OER faculty adoption. Also, the review distills the literature relating to the history and types of OER and faculty awareness of, motivations for, facilitators of, and barriers to adoption of OER, with an emphasis on public higher education institutions within the United States.

Theoretical Frameworks for Adoption and Diffusion

Chief to a study of OER adoption is an examination of the relevant theoretical literature. This section discusses frameworks associated with adoption and diffusion. The following sections discuss these areas, accompanied by examples from the higher education and OER literature.

Generally, adoption and diffusion theories demonstrate the multifaceted, complex, dynamic, and social factors relating to either individuals' or organizations' decisions to adopt something new. These dynamic processes traverse social, economic, organizational, cultural, and sociopolitical arenas (Peres, Muller, & Mahajan, 2010; Straub, 2009; Wisdom et al., 2014). Research on adoption and diffusion has revealed that the success of an innovation-diffusion process requires diligent attention to the complex phases covering innovation, adoption, dissemination, diffusion, implementation, and

sustainability (Durlak & DuPre, 2008; Rogers, 2003; Wisdom et al., 2014). Adoption theory essentially deals with a specific behavioral change process; it explores the process associated with an individual's choice to either adopt or reject a new idea. Diffusion theory examines how an innovation spreads over time (Straub, 2009). Dissemination strategies pertain to approaches for "maximizing the reach and adoption of new programs" (Oldenburg & Glanz, 2008, p. 318) and are considered "planned, systematic efforts designed to make a program or innovation more widely available to a target audience or members of a social system" (p. 314). Consequently, diffusion can be viewed as a direct or an indirect outcome of dissemination activities (Oldenburg & Glanz, 2008; Owen, Glanz, Sallis, & Kelder, 2006).

Central to the concept of innovation diffusion is the idea of social change. The most prevalent frameworks utilized in the literature to discuss the change process surrounding the adoption and diffusion of an innovation or technology are Rogers's (2003) diffusion theory, the concerns-based adoption model (CBAM), the technology acceptance model (TAM), and the unified theory of acceptance and use of technology (UTAUT) model. All of these theories seek to answer questions relating to why individuals either embrace or reject an innovation and the social and communication environments that might influence this decision (Straub, 2009). In addition, Anderson and Anderson's (2010) conscious change leader accountability model is a vital framework for examining individual and organizational change. This study focused on Rogers's (2003) diffusion of innovations theory, CBAM, and the Anderson and Anderson (2010) model.

The fifth edition of Everett Rogers's (2003) seminal work, *Diffusion of Innovations*, provided the foundational theoretical model for adoption of an innovation at the individual and organizational levels, and it is arguably the most influential and most cited theory among researchers of innovation diffusion. It is regarded as the most applicable for adoption of innovations in postsecondary arenas (Medlin, 2001). Rogers's theory has been a phenomenal catalyst for development of other theories in this area of study (Boyne, Gould-Williams, Law, & Walker, 2005). Rogers (2003) defined diffusion as "the process by which an *innovation* is *communicated* through certain *channels* over time among members of *a social system*" (p. 11). At its core, diffusion seeks to decrease a potential adopter's uncertainty about an innovation. Uncertainty was explained as "the degree to which a number of alternatives are perceived with respect to the occurrence of an event and the relative probability of these alternatives" (Rogers, 2003, p. 6). The salient elements reflected in Rogers's definition are innovation, communication channels, time, and social system. They refer to the relevant aspects of adoption of innovations by individuals in an organization. These elements influence the dispersion of innovations or new ideas.

Although Rogers's decades-long research on adoption and diffusion pertains to many fields of study, others have contributed significantly as well to specific fields of interest. For example, from a business marketing perspective, generally diffusion is seen as the spreading of innovation in a market. However, Peres et al. (2010) offered an expanded definition of diffusion from a marketing perspective that emphasized the importance of considering communication channels beyond the mass media and one-on-one interpersonal communication modes identified by Rogers. Peres et al., building upon

foundational marketing diffusion research conducted by Frank Bass, explained the term *diffusion* thusly:

> Innovation diffusion is the process of the market penetration of new products and services, which is driven by social influences. Such influences include all of the interdependencies among consumers that affect various market players with or without their explicit knowledge. (p. 92)

Allen and Seaman's (2014, 2016) research on the lack of faculty awareness of OER is an example of a detrimental driver of the spread of OER in the higher education market.

Innovation

The term *innovation* is conceptualized differently based on the disciplinary perspective from which it is viewed. Rogers (2003) defined innovation from a rural sociological perspective as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 12). As noted in this definition, an innovation does not equate with newness but rather with a perception of newness by a potential adopter. In addition to Rogers's conceptualization of an innovation, Greenhalgh, Robert, MacFarlane, Bate, and Kyriakidou (2004) offered additional definitions for consideration based on their review of the innovation diffusion literature. These authors reported that from the field of communication studies, innovation was defined as "news" (Greenhalgh et al., 2004, p. 589) and as products or services from a marketing perspective. Greenhalgh et al. cited Bourdenave's 1976 foundational research in development studies that expanded the definition to include "political, technological, and ideological" (p. 590) aspects of innovations. Bourdenave refashioned the notion of the diffusion of innovations as "centrally pertaining to the appropriateness of particular technology and

ideas for particular situations at particular stages of development" (Greenhalgh et al., 2004, p. 590). The importance of that author's research highlighted the potential variance in the "meaning" (Greenhalgh et al., 2004, p. 590) ascribed to an innovation by organizations versus the meaning assigned to an innovation by potential individual adopters. Fonseca (2001) proposed a vastly revised definition of an innovation that questioned the idea that an innovation's adoption is controllable by human beings. He conceptualized innovation as "the emergent continuity and transformation of patterns of human interaction, understood as ongoing, ordinary complex responsive processes of humans relating in local situations in the living present. It is in such patterns of interaction that innovative meanings emerge" (Fonseca, 2001, p. 3). He added that "mainstream thinking about innovation tends to downplay the messy relational processes" (Fonseca, 2001, p. 3).

Diffusion of an innovation can be viewed along a continuum, from the least organized, informal, and decentralized to a well-planned and formal process. The former is called "pure diffusion" and the latter "active dissemination" (Greenhalgh et al., 2004, p. 601; Oldenburg & Glanz, 2008). The unplanned, informal process of pure diffusion is also referred to as "passive diffusion" (Oldenburg & Glanz, 2008, p. 318). Greenhalgh et al. (2004) organized this continuum into a chart with the following three labels: "Let it happen," "Help it happen," and "Make it happen" (p. 593). The first category is characterized by uncertainty, unpredictability, and unplanned behaviors; individuals adapt as the organic innovation environment emerges. The second category offers some structure, with opinion leaders who may influence change within a social or technical

environment. The third category applies a planned and orderly approach to diffusion of an innovation (Greenhalgh et al., 2004).

The literature pertaining to faculty adoption of OER reflects examples of diffusion that fall either into the "Let it happen" or "Help it happen" categories. A noteworthy departure from the aforementioned categories is the Z-degree, an example of a "Make it happen" project. The letter *Z* stands for zero and signifies a textbook-free degree, using OER. Tidewater Community College in Virginia coined the term *Z-degree* and was the first to offer it (Wiley, Williams, DeMarte, & Hilton, 2016). This initiative is an exemplar of a well-planned and managed OER initiative to promote student success with faculty adoption of no-cost instructional materials. Ormrod (as cited in Wejnert, 2002), who underscored and extended Rogers's thoughts concerning environmental and cultural factors, argued that adoptions reside within an environmental setting, and they evolve within ecological and cultural contexts; success of an adoption is dependent upon how suitable it is to the environment in which diffusion takes place. The environmental context may be categorized into four subgroups: (a) geographic settings, (b) societal culture, (c) political conditions, and (d) globalization and uniformity. All of these subcategories are relevant to OER adoption; however, the cultural (i.e., norms, values, traditions, belief system) and geographical (i.e., proximity of social units) contexts are particularly salient to OER adoption (Mtebe & Raisamo, 2014a).

Communication Channels

Communication channels are mechanisms that facilitate exchanges of information between two or more individuals. Communication channels are essentially the means by which innovations are diffused among members of a group. Information is

communicated either through large information media channels or through one-on-one channels; the former channel type helps with the widespread communication of the new idea while the latter channel type works well when convincing individuals to adopt an idea (Rogers, 2003). Communication channels are critical to diffusion of an innovation; the degree of communication, information, and knowledge that potential adopters have about an innovation is positively correlated to both adoption and successful diffusion (Fullan, 2016; Straub, 2009).

The concepts of homophily and heterophily are closely connected to the diffusion process. Homophily involves individuals who share similar socioeconomic and educational traits and beliefs. Heterophilous individuals are different with respect to their socioeconomic and educational traits and beliefs. Diffusion researchers have found that individuals' adoption-decision processes are subjective; people tend to rely more heavily on the opinions of homophilous individuals in their social groups rather than determining decisions from facts and verifiable evidence (Rogers, 2003). Thus, homophilous individuals promote adoption and diffusion of an innovation in most cases (L. Fitzgerald, Ferlie, Wood, & Hawkins, 2002; Rogers, 2003). However, within the innovation-decision process, during the knowledge phase, heterophily is actually more desirable as individuals with dissimilar ideas are needed to introduce new ideas. Consequently, homophily and heterophily are necessary components of diffusion (Rogers, 2003).

Time

Rogers (2003) contended that the concept of time is important across three dimensions: during the innovation-decision process, when considering when to adopt, and concerning the rate of adoption by members of a system. Understanding the

innovation-decision process is critical to the adoption of an innovation. When individuals decide to accept or reject an innovation, they typically experience these stages: knowledge, persuasion, decision, implementation, and confirmation. In earlier editions of Rogers's book, these stages were labeled awareness, interest, evaluation, trial, and adoption. The knowledge stage deals with individuals' first encounters with and understandings of an innovation's use. Knowledge awareness is one type within the knowledge stage and deals with being aware of the existence of an innovation. Awareness of an innovation may emanate with either passive or active associations with the innovation. For example, faculty members may become aware of OER in a passive form from a notice posted on an institution's website. Conversely, a faculty member attending a conference may intentionally seek out information on OER uses at the conference. Change agents serve key roles in the knowledge-awareness process with clients: They may initiate the need for a change by providing information on alternative methods to current practices; they act as motivators for the change; they work to establish strong, credible relationships with clients; they assist in identifying problems with adopting the new practice; and very importantly, they facilitate the client's transition from information gatherer to an active adopter of the innovation (Rogers, 2003). The California State University Affordable Learning Solutions (CSU AL$, n.d.) initiative is a good example of an initiative that works to provide faculty members with the knowledge awareness and information about OER, guided by campus change agents who emulate the roles described by Rogers (2003).

While the knowledge stage is concerned primarily with cognitive aspects, the persuasion stage focuses on the potential adopters' feelings about an innovation (Rogers,

2003). Potential adopters seek additional information in order to better evaluate and reduce uncertainty regarding the innovation and also look to their peers for validation of their attitude toward the innovation. Ultimately, the persuasion stage asks individuals to decide positively or negatively about the innovation (Rogers, 2003). Again, the attitude or feelings of individuals are of primary consideration at this step. Fullan (2016), like Rogers, understood the importance of feelings to enable change. Fullan argued that the key factors in a change process are motivation, attitudes, behaviors, feelings, and emotions; at a foundational level, people need to feel good about the change they are being asked to make. Oblinger and Lombardi (2008) asserted that resistance to adoption has "more to do with tradition and attitude than technology" (p. 389), signaling again the importance of people's attitudes and peer opinions to the adoption process.

During the decision stage, individuals decide to either adopt or reject an innovation (Rogers, 2003). The decision to adopt is followed by the implementation stage, which involves actually using the innovation. Once an innovation has been adopted for some time, it may shift from a new idea to an accepted practice becoming integrated and no longer viewed as novel. Reinvention, which deals with the user deciding to modify an innovation, is an important aspect of the implementation stage (Rogers, 2003). Reinvention is a core aspect of OER. David Wiley (2014) developed his "framework of permitted activities" (para. 1) that could be utilized with OER. Originally labeled the four *R*s (reuse, revise, remix, and redistribute), Wiley expanded his definition of appropriate activities to include *retain*. Revising and remixing of OER are similar to modifications that Rogers (2003) described. The final stage is confirmation, during which time an individual seeks to confirm a prior decision to adopt. A review of the

literature by Wisdom et al. (2014) reflected agreement with Rogers's five stages, citing that individuals typically recognize that a need for change exists, which is followed by a search for additional information to inform a decision and then a decision to proceed to implementation. Finally, after the decision to adopt, a later decision to continue with implementation or to de-adopt will be made (Wisdom et al., 2014).

Also tied to the dimension of time, Rogers (2003) developed adopter categories with corresponding characteristics for when individuals might adopt. He labeled the adopters as innovators, early adopters, early majority, late majority, and laggards. In The William and Flora Hewlett Foundation's (2015) recent report on advancing widespread adoption of OER, the authors utilized "the pencil metaphor" (p. 3) to characterize the range of technology adopters; these categories are similar in their characteristics to Rogers's adoption categories. Specifically, at the very tip of the pencil are "the leaders," those who are first to enthusiastically adopt and implement technologies (The William and Flora Hewlett Foundation, 2015, p. 3). Close behind them are "the sharp ones," who emulate and improve upon the early lessons learned by the leaders (The William and Flora Hewlett Foundation, 2015, p. 3). In the middle are "the wood," those who will adopt a technology if others set it up and carefully walk them through it (The William and Flora Hewlett Foundation, 2015, p. 3). At the other end of the pencil are those in "the erasers" category, who endeavor to undermine all that the leaders have accomplished; "the ferrules," who remain resistant to technology change of any sort; and finally, the "hangers-on," who simulate engagement in adoption activities with no intention to implement (The William and Flora Hewlett Foundation, 2015, p. 3).

The rate of adoption, also related to time, relates to the pace at which an organized group adopts an innovation. As such, the speed of adoption is measured as a number or percentage and can be visualized most often by an S-shaped curve, reflecting a slow rate of adoption at the onset, with a sharp and rapid rise in user adoption behavior at a later date and then a tapering off of adoption as a critical mass of users in the innovation category level off (Rogers, 2003; Surry & Ely, 2002). The S-shaped curve can be utilized to demonstrate individuals' and organizations' time sequences when adopting innovations. During the rapid rise in innovation adoption, attention to the technical and social aspects of an innovation is a predictor for success (Surry & Ely, 2002). The five major attributes of innovations used by individuals that impact the rate of adoption are "(1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability" (Rogers, 2003, p. 222).

Relative advantage. Relative advantage deals with the extent to which adopters think that the innovation is better than its predecessor and will surpass their current practices (Rogers, 2003). The degree to which an innovation is viewed and communicated positively coupled with its ability to reduce the uncertainty among potential adopters will potentially increase its rate of adoption. Social status, cost effectiveness, reduction of the time and effort with workloads, and return on investment are key elements of this attribute. Some potential adopters weigh whether the innovation will increase their social status while, for others, initial cost outlays may be perceived as barriers to adopting an innovation (Rogers, 2003). Yet cost savings may be a perceived advantage. In the case of OER adoption, it does not typically require faculty members to expend their own monetary resources. A primary benefit of OER resides with the end

users, who are the learners. Incentives encourage adoption. For example, faculty members willing to create or include OER may be awarded a grant or given course release time or a stipend to redesign a course (CSU AL$, n.d.). While relative advantage is an important factor for adoption, it cannot guarantee it. There still exists the negotiation that is carried out among opinion leaders and potential adopters that can positively or negatively impact an innovation adoption decision (Denis, Hebert, Langley, Lozeau, & Trottier, 2002; L. Fitzgerald et al., 2002).

Compatibility. Compatibility concerns the extent to which an individual perceives an innovation as being similar to prior experiences and congruent with his or her value system. When a new idea is compatible with existing values, past experiences, and needs, it reduces adopter uncertainty, which results in increased adopter confidence that the idea does not veer from what is familiar and comfortable (Aubert & Hamel, 2001; Denis et al., 2002; Rogers, 2003). The values and beliefs held by faculty members, their reactions to former innovations, and their perception of the necessity of a new idea are all salient elements of compatibility. A study of social science and humanities faculty at the University of California, Berkeley revealed the importance of compatibility to adoption of OER. An impediment to faculty use of OER was its incongruence with the faculty members' teaching methods (Harley, 2008).

With few exceptions, faculty members at colleges and universities within the United States select and utilize textbooks in their courses. Moreover, publisher-offered supplemental materials have been embraced for use by over 85% of faculty members (Farmer, 2006). Given the high percentage of faculty members who use publisher-provided content, it is reasonable to conclude that adopting publisher textbooks is an

existing value based on widespread past practice. With regard to the need for a new idea, Wiley and Gurrell (2009) identified quality of OER as a factor in faculty acceptance of their use, underscoring Rogers's (2003) notion that an innovation should align with the requirements of an adopter. There is a positive correlation between the rate of adoption and the perception of compatibility of an innovation. For example, 17% of the respondents to Allen and Seaman's 2016 survey acknowledged awareness of OER but lacked ideas on how to use them.

Complexity. Complexity pertains to ease of use and an adopter's ability to easily comprehend and apply a new idea. Essentially, when an innovation is viewed as overly difficult to either understand or use, it negatively impacts the rate of adoption (Denis et al., 2002; Rogers, 2003). Data collected by Kelly (2014) of faculty perceptions of OER found that "ease of use had a strong effect on perceived usefulness and was highly correlated" (p. 37). National surveys of faculty members by Allen and Seaman (2012, 2014, 2016) have also addressed this complexity component. Data they gathered on faculty opinions of OER did not overtly state a lack of understanding of OER. However, ease of use did surface as a concern. For example, of the faculty respondents in 2012, 86% cited "ease of use" as a major selection criterion for online materials (Allen & Seaman, 2012, p. 3). Their 2014 report revealed that 38% rated locating OER as either "very difficult" or "difficult" (Allen & Seaman, 2014, p. 2). This discoverability challenge builds in a level of complexity that retards adoption.

Trialability. Trialability involves potential adopters being able to experiment with the innovation. When a potential adopter is able to try out an innovation on an incremental basis, it positively impacts the rate of adoption (Rogers, 2003). Regarding

OER, trialability has been a staple of the movement to adopt it; indeed, the literature on use of OER is replete with examples of instructors who have used open textbooks or other open content or courseware on a trial basis. The California Open Online Library for Education (COOL4Ed, n.d.) open textbook initiative is an example of setting up an environment in which faculty members can adopt an open textbook on a trial basis.

Observability. Observability concerns the extent to which the innovation is visible and available to potential adopters. Simply stated, the extent to which a new idea can be seen and communicated easily by potential adopters is positively correlated with the rate of adoption (Rogers, 2003). There are many OER products, ranging from basic presentation slides to full courses. Many of these products are showcased in repositories, in referatories, or on websites, thus providing opportunities for faculty members to utilize and observe the results of their experiments with OER (Geser, 2007). Straub (2009) suggested that observability "leads to a social threshold—the point where an innovation becomes so pervasive in a culture that even those who would not normally adopt consider adoption of an innovation" (p. 631). Faculty awareness of OER remains very low (Allen & Seaman, 2012, 2014, 2016, Mtebe & Raisamo, 2014b), signifying that a social threshold in the OER faculty adoption realm may be a distant reality.

In their review of innovation adoption theories, Wisdom et al. (2014) found seven theoretical frameworks that aligned and agreed with Rogers's research concerning the key attributes for an effective adoption; relative advantage, complexity, and observability stood out in importance. They observed that innovations that were "clear in purpose, simple to use, unambiguously more advantageous than current or prior practice, minimal expertise needed to implement them, observable, and transferrable" (Wisdom et al., 2014,

p. 9) were more likely to be adopted successfully. In addition, the compatibility attribute was cited in three frameworks as critical to the preadoption, or knowledge and persuasion, stages (Wisdom et al., 2014).

Wejnert (2002) expanded Rogers's research on innovation characteristics with consideration of public versus private consequences and benefit versus cost. Public versus private consequences refer to "the impact of an innovation's adoption on entities other than the actor (public consequences) versus that on the actor itself (private consequences)" (Wejnert, 2002, p. 299). Large groups (e.g., states, social movements, or countries) are impacted by innovations resulting in public consequences, and individuals or small groups (e.g., communities or organizations) are impacted by innovations resulting in private consequences; both consequences affect "societal well-being" (Wejnert, 2002, p. 299) and may result in "societal change" (p. 300). There exist examples of both variables within the OER arena. Recently, Arizona, Georgia, Michigan, North Carolina, and Wisconsin were among 13 states to commit to OER initiatives in order to change from traditional methods of content delivery (Mulholland & Roscorla, 2016). Also, the private consequence results have been evidenced by the myriad pilots involving OER adoption showcased in the literature of the last decade.

Benefit versus cost pertains to the direct and indirect costs associated with adoption of innovations and the accompanying advantages or disadvantages (Wejnert, 2002). Direct costs are economic in nature and may cause financial uncertainty for the adopter. Indirect costs, whether monetary or nonmonetary, may bring a certain amount of risk to an adoption situation (Wejnert, 2002). Downes (2006) asserted that while OER might be free to end users, ancillary costs to create, provide access to, and ensure

maintenance of OER still exist and must be factored into adoption decisions and implementation plans.

Social System

A social system is composed of informal or formal groups of interconnected members who form to solve problems related to mutually agreed-upon goals. Within a social system, social and communication structures exist that can either advance or hinder the adoption of an innovation. Social structures are organized with ongoing relationships among group members that provide stability and reduce uncertainty (Rogers, 2003). For example, faculty members within a certain department, discipline, or rank constitute a social structure. Communication structures deal with informal, interpersonal networks of homophilous groups of people; this type of structure helps to track both the situations under which and with whom individuals communicate (Rogers, 2003). Faculty members working in a learning community, on a project, or on a committee engage in homophilous groups.

De Hart, Chetty, and Archer (2015) undertook a research study at the University of South Africa (Unisa) in which they utilized Rogers's five stages of the innovation adoption process to gauge the uptake of OER at that institution. During the knowledge and persuasion stages in which the institution undertook awareness-raising activities, they found at Unisa that information was best disseminated through internal communication channels and repositories. When instructors were in the decision phase, they placed emphasis on facilitating access to OER through portals. Interestingly, after initial implementation had taken place, the institution focused primarily on identifying and finding solutions to barriers to facilitate operationalization of OER at Unisa. The

confirmation stage, which involves a final decision to adopt, would require action at the institutional level. Thus, one purpose of the research study on OER uptake at Unisa was to determine the level of institutional maturity needed to successfully implement OER (de Hart et al., 2015).

The Innovation Process in Organizations

The innovation process in organizations is complex; in some cases, organizational adoption of an innovation is a prerequisite to adoption of an innovation by individuals. In addition, as organizations make the decision to adopt and then implement an innovation, a transformation occurs in both the organization and the innovation concomitantly (Rogers, 2003). As such, examination of the innovation process from an organizational perspective is germane to the study of OER adoption. An organization is "a stable system of individuals who work together to achieve common goals through a hierarchy of ranks and a division of labor . . . with predetermined goals, prescribed roles, an authority structure, rules and regulations, and informal patterns" (Rogers, 2003, p. 433). The innovation process in organizations can be divided into two major subcategories: initiation and implementation.

Initiation. During the initiation phase, organizations work through the planning stages that lead to a decision to adopt an innovation. The initiation phase comprises two components: agenda setting and matching (Rogers, 2003). It is during the agenda-setting stage that an organization identifies a problem that may engender a perceived need for a new idea, practice, or object. During the matching phase, a suitable innovation is identified, an adoption decision has been made, and an implementation plan is developed (Rogers, 2003). With respect to OER adoption, typically administrators in higher

education institutions initiate OER awareness, adoption, and implementation projects for faculty, thus driving the initiation stage of OER adoption. The work done at the University of South Africa (Unisa) is a good example of Rogers's initiation phase. Unisa is the largest open distance learning institution in South Africa. Following a government white paper on expanding online and blended learning, Unisa administration officials, engaging in the matching phase of adoption, decided to undertake an OER initiative, setting the agenda for it by developing an OER strategy and hiring an OER coordinator (de Hart et al., 2015).

Implementation. When the decision has been made to implement an innovation, the following three stages come into play: redefining/restructuring, clarifying, and routinization (Rogers, 2003). Within the redefining/restructuring stage, the innovation is reconfigured to make it suitable for the organization's needs; conversely, the organization revises its structure to accommodate the needs of the innovation. Therefore, during this stage, modifications are made both to the innovation and to the organization. As an innovation is implemented, over time, it undergoes a clarifying stage in which the purpose and uses of the innovation are elucidated. Finally, after the innovation has been integrated into the work activities and processes of an organization, it reaches the routinization stage. Closely tied to and equally important in this organizational change process is sustainability, which occurs when an innovation is used continually after initial adoption and implementation. Rogers (2003) made the notable observation that innovations that are sustained over time are those that experience widespread participation among adopters during the implementation process.

Constraints of Early Diffusion Research Theories

As stated earlier, the building blocks for innovation diffusion research resided in the work of Rogers and other researchers in the field of rural sociology. Beyond the theoretical contributions that included the identification of innovation attributes, adopter categories and behaviors, and the interpersonal and mass media communication channels' impact on the adoption process, Greenhalgh et al. (2004) observed these "erroneous assumptions" (p. 590) about the groundbreaking work of Rogers and others:

> (1) The only relevant unit of analysis is the individual innovation and/or the individual adopter; (2) an innovation is necessarily better than what has gone before and adoption is more worth of study than is nonadoption or rejection; (3) patterns of adoption reflect fixed personality traits; and (4) the findings of diffusion research are invariably transferable to new contexts and settings. (p. 590)

Other researchers have criticized how widely applicable Rogers's model is to all fields, noting that the field of study is a better determinant of the appropriate model to select (Kardasz, 2013). Two other constraints of diffusion research are the idea of proinnovation bias and the notion of individual-blame bias. The former assumes that all innovations are positive, that they should be diffused quickly, and that they should not be either reinvented or rejected. When proinnovation bias is at work, it stymies researchers from looking at potentially negative consequences of diffusion. Individual-blame bias casts blame on individuals for problems rather than the system in which the individuals work (Rogers, 2003).

Theoretical Frameworks for Individual and Organizational Change

At their essence, adoption and diffusion involve a change process. Thus, in addition to examining the literature related to diffusion and adoption, because faculty adoption of OER involves individuals and the institutions at which they work, it is important to explore models that address change processes with individuals and organizations. This section provides a discussion of the CBAM and the Anderson and Anderson (2010) model.

Faculty Adoption and Change Processes

Change processes revolve around the following tenets: Educational reform requires change (Fullan, 2016); change, particularly transformational change, is complex (Heifetz & Linsky, 2002); complex change inevitably triggers resistance (Lane, 2007); and successful change requires attention to individual and organizational factors and change drivers (Anderson & Anderson, 2010; Fullan, 2016).

Faculty members are at the center of the OER innovation adoption and diffusion process. Rogers (2003) and other researchers have accentuated this core point when discussing the innovation-decision phases and adopter characteristics. Those researching the diffusion of technology innovations in higher education point to their slow uptake and the continual de-adoption of seemingly beneficial new ideas or practices (Kardasz, 2013; Straub, 2009; Surry & Ely, 2002). These failings may be due, in part, to a lack of attention to the needs of individual adopters and a failure to address faculty resistance issues (McQuiggan, 2006). In order for OER to be adopted, diffused, implemented, and sustained within higher education institutions, administrators must concern themselves with how to actuate an effective change process with faculty members (Fullan, 2016;

Lucas, 2000). Building upon the research of Rogers (2003) concerning individual adopter needs, characteristics, and behaviors, Loucks and Hall's (1979) CBAM, Anderson and Anderson's (2010) conscious change leader accountability model, and the literature on change also contribute to the discourse concerning faculty resistance and receptivity to new ideas.

Research on the Change Process

The underlying themes that course throughout all of the aforementioned frameworks or models are the ideas that change is a process, that change drivers need to be factored into effective change efforts, and that motivation and feelings are essential factors in individuals' behavioral changes (Fullan, 2016; Loucks & Hall, 1979; Lucas, 2000). Organizations and individuals resist change proposals for a number of reasons; they include a fear of losing control or status, tension or uncertainty over the change, concern about the value and complexity of it, a lack of time to become familiar with it, and feeling that the change will endanger the status quo (Lane, 2007). Several of the factors identified in the change literature for individuals and organizations are analogous to those in Rogers's (2003) diffusion model, underscoring the fact that adoption and diffusion involve change processes at their essence.

A call to change may be initiated by a dynamically focused model such as Anderson and Anderson's (2010) drivers of change model, which contains the following external change drivers: "environment, marketplace requirements for success, business, organizational, and cultural imperatives; and internal change drivers: leader and employee behavior and mindset" (p. 33). These authors explained that an *environmental* shift may require new ideas and metrics for success; these new requirements then

stimulate a need for new *business imperatives* or strategies that necessitate a change in *organizational operations* that may pertain to technology, systems, or processes. If an organizational shift is significant, then it will likely require a change in the organization's *culture*. Tantamount to a shift in culture are requisite changes to individual workers' and leaders' *mindsets* and behaviors. Culture and mindset are internal change drivers (Anderson & Anderson, 2010). Mindset includes "values, beliefs, thoughts, emotions, ways of being, [and] levels of commitment . . . [while] culture includes norms, collective ways of being, working and relating, climate, and esprit de corps" (Anderson & Anderson, 2010, p. 6).

The Concerns-Based Adoption Model (CBAM)

In 1979, Susan Loucks and Gene Hall developed the CBAM as a conceptual change framework for educators in K-12 schools desiring to adopt innovations. The distinguishing characteristic of the CBAM is its emphasis on the potential adopter; change facilitators are trained to work closely with individuals on the operational, affective, and quality aspects of an innovation adoption process. The CBAM is based on six assumptions:

- "Change is a process, not an event" (Hord et al., 1987, p. 5). Change occurs over a long time period, often spanning years. Successful implementation requires acknowledgement of and commitment to this assumption.
- "Change is accomplished by individuals" (Hord et al., 1987, p. 6). The change process is a personal experience. The needs of all individuals involved in a change should be recognized.

- "Change is a highly personal experience" (Hord et al., 1987, p. 6). Individuals react and behave differently and at different paces during a change process. Attention to these individual differences will enhance the change implementation process.
- "Change involves developmental growth" (Hord et al., 1987, p. 6). Individuals perceive change based on their feelings and the skill set they bring to the change process. Their feelings will change over time as they interact in the implementation of the proposed change.
- "Change is best understood in operational terms" (Hord et al., 1987, p. 6). Individuals often view a proposed change in practical terms and desire to know how they will be impacted personally and what demands will be placed on them. If change facilitators address these issues, it can result in less resistance during the change process.
- "The focus of facilitation should be on individuals, innovations, and the context" (Hord et al., 1987, p. 6). The human element in a change process cannot be underestimated; when implementing an innovation, the realization that individuals need to change their behaviors in order for change to be successful is a critical aspect to understand and address.

The CBAM consists of three major components: the innovation configurations, levels of use, and stages of concern (Hord et al., 1987). Innovation configurations address the operational and practical aspects of a new program; essentially, this component addresses how a program will actually be used, providing a clear roadmap and exemplar of a high-quality implementation. Similar to the change concepts introduced in Rogers's (2003) innovation-decision process and the adopter characteristics, the levels of use for implementing a change involve eight levels that

educators might experience during the innovation adoption process. The levels are "non-use," "orientation," "preparation," "mechanical use," "routine," "refinement," "integration," and "renewal" (Hord et al., 1987, p. 55). The levels of use characterize adopters on a spectrum; at one end, people have no interest in engaging with the innovation, and at the opposite end, they seek new approaches or environments for using the innovation. The stages of concern also form a framework for understanding the personal dimension of the change process, with the individual at the center. These stages are concerned with the affective aspects—reactions, feelings, perceptions, and attitudes (Hall, Dirksen, & George, 2013). The stages of concern are statements that describe how adopters feel and the questions that arise for them during an innovation change process. Loucks and Hall (1979) labeled these stages nonuse, informational, personal, management, consequences, collaboration, and refocusing. Aligning with the levels of use, these statements run along a continuum from nonuse, when individuals are concerned that they lack knowledge of the innovation and are taking little action to learn, to refocusing, which occurs when individuals have used the innovation for some time and are comfortable enough with it that they have the confidence to explore approaches to improve its use. The stages of concern provide rich information to inform professional development for adopters to improve the change process (Hall et al., 2013; Hord et al., 1987; Wooley, 2013).

Any plans to adopt OER should give careful consideration to the models and strategies discussed in this review of the literature. It is worth noting, however, that the literature examined by the researcher on faculty adoption of innovation did not frame faculty adoption projects in terms of the individual change processes described in the

aforementioned models and frameworks; only examples of changes needed at the organizational/institutional levels were found in the literature.

The Changing Landscape of Higher Education

The success of higher education is critical to the social and economic future of the United States. Higher education institutions train the new workforce and knowledge workers. In turn, educational attainment provides economic opportunities for individuals and helps the nation maintain its competitiveness in a global economy (Iiyoshi & Kumar, 2008; Leef, 2016; OECD, 2007; Watts & Economou, 2015). Nevertheless, the issues of access, cost, and quality continue to plague higher education (Kumar, 2012; Leef, 2016; Marcy, 2014). The literature of the last decade has addressed the evolving nature of the higher education landscape; in recent years, there has been a proliferation of articles concerning marked and substantial changes within the higher education landscape. Batson et al. (2008) countered the notion of an incremental or evolutionary change in the nature of higher education, suggesting that it is moving to a "period of disrupted equilibrium" (p. 103). Several writers have extolled the transformative virtues of innovation in technology advances and openness to the teaching and learning ecosystem (Adams Becker et al., 2017; Johnson et al., 2016; Kumar, 2012; Watts & Economou, 2015) while also exhorting policy makers, administrators, faculty members, and higher education advocates to pay heed to these areas. Others talk more broadly of profound issues bringing pressure to bear upon education that must be addressed (Kumar, 2012; Lucas, 2000; Staley & Trinkle, 2011). Following is a brief examination of the major issues, changes, and foci occurring or on the horizon for higher education.

A key idea woven throughout the literature regarding change in higher education is the conviction that there are and will continue to be substantial transformations in the areas of teaching and learning (Kumar, 2012; Leef, 2016; Marcy, 2014; Staley & Trinkle, 2011; Watts & Economou, 2015). Anya Kamenetz (2010) dramatically depicted the coming sea change in higher education in this way:

> Change rumbles like a seismic wave from the basements of the ivory tower, and the schoolhouse down your block. The demand for access to both existing and new models of learning is rising as uncontrollably as the average temperature throughout the globe. The traditional educational ecosystem is edging toward collapse. Fifty million university students in 2000 will grow to 250 million by 2025. The graph of educational costs is a hockey stick—headed straight up. (para. 4)

Technological advancements such as the Internet, tools for engaged learning such as interactive media and computer-assisted learning, information and communication technologies (ICTs), mobile computing, learning analytics and data visualization, and new delivery platforms such as massive open online courses (MOOCs), hybrid courses, and fully online courses are transmuting teaching and learning approaches and expanding opportunities. Adding to these advancements are creative innovations to transform learning such as flipped classrooms, high-impact practices, game-based learning, and simple augmented reality that hold promise for significant metamorphoses within higher education (Kumar, 2012; Leef, 2016; Marcy, 2014; Staley & Trinkle, 2011). Batson et al. (2008) pinpointed forward-thinking shifts toward open learning in higher education that include social learning methods such as service, collaborative, and experiential

learning as well as changes in how educators view knowledge creation that encompass cocreation of knowledge among students and movement from "content as a thing" to "content as a process" (p. 91). However, they also posed this thought-provoking question: "Can higher education fully exploit the abundance of open education opportunities available?" (Batson et al., 2008, p. 91). A major consideration in this potential transformation is the readiness of both faculty members and students to embrace the innovations that emerge from this abundance of technological, network, and social learning advances.

Despite the potential positive impact of technological and pedagogical innovations, there remain compelling forces for change that should be factored into a plan for alignment and congruence with these innovations. Pundits cite an array of forces that include budgetary challenges, competition from alternative higher education models, the increased pace of information transfer and dissemination, changing expectations and demands of students and parents, increased demand for the added value of a college education (Leef, 2016; Lucas, 2000; Staley & Trinkle, 2011), just-in-time/anytime learning, movement from seat-time and situated learning environments to customized learning opportunities (Kumar, 2012; Leef, 2016), diversity of the types of educational institutions, the rise of specialized for-profit institutions, pressure to revise the general education curriculum to better align with employer expectations, the escalation of global faculty and adjunct faculty, education affordability, and changes to the current notions of "traditional" students (OECD, 2007; Staley & Trinkle, 2011) among others. The OE movement and OER have been referenced as powerful countervailing forces for some of the challenges to higher education (Adams Becker et al., 2017; Iiyoshi & Kumar, 2008;

Johnson et al., 2016; Kumar, 2012). However other researchers caution that while OER may have reached the reached the innovation adoption phase described by Rogers (2003), the preponderance of OER access and discovery projects obfuscate equally important areas that deal with faculty learning to apply Wiley's re-use, remix, and redistribute ideas for OER in new contexts; and much-needed innovations in teaching and learning (Ehlers, 2011; Harley, 2008).

An Illustrative Overview of Openness, OE, and OER

The idea of openness, enabled by Web 2.0 technologies, is potentially transformative and increasingly demands critical attention and action if higher education is to thrive and meet the needs of current informal and formal learners. Embracing openness within education will enable OE practices that allow for authentic, rich, and relevant formal and informal learning experiences. These OE practices will rely heavily on OER to fulfill their goals (Geser, 2007).

Openness Overview

Defining openness is a complex and multifaceted task. Over time, researchers have viewed it from historical, sociopolitical, philosophical, conceptual, or practical perspectives. From a historical perspective, Wiley and others involved in the OER movement view openness as emanating from the open-source software (OSS) movement and integrating into academia (Wiley & Gurrell, 2009). Those defining openness from a sociopolitical viewpoint discuss it as an approach to gaining freedom, transparency, and justice (Baker, 2014). Similar to the historical viewpoint, philosophical and conceptual perspectives involve looking at openness from a continuing cultural lens in which stakeholders engage in transparent, open activities to improve access and availability.

From a practical perspective, the OER movement derives from openness in action, namely the free access to resources through open licenses (Baker, 2014). Openness also encompasses instructor pedagogical approaches, the publishing industry, and learning. Technology, namely the Internet and digital resources, enables openness. Scholars of openness or the open movement agree that openness is characterized by sharing (Wiley 2010), enabling technologies, freedom, transparency, collaboration, and inclusiveness that possess transformative capacity for higher education (Baker, 2014; Meiszner, 2011; Tuomi, 2013; Weller, 2013). Weller (2013) summed up the value and promise of OE, explaining,

> In its most positive interpretation it is the means by which higher education becomes more relevant to society, by opening up its knowledge and access to its services. It provides the means by which higher education adapts to the changed context of the digital world. (p. 2)

OE Overview

In keeping with the concepts of openness and OER, there are multiple definitions of OE. Evident in the definitions are the foundational elements of expansion of access to learning resources and knowledge through the Internet, enhanced participatory collaboration among formal and informal learners, and its potential to transform and catapult higher education to much more effective, impactful arenas. Baraniuk (2008) summarized the views of faculty concerning OE thusly:

> The open education (OE) movement is based on a set of intuitions shared by a remarkably wide range of academics: that knowledge should be free and open to use and reuse; that collaboration should be easier, not harder; that people should

> receive credit and kudos for contributing to education and research; and that concepts and ideas are linked in unusual and surprising ways and not the simple linear forms that today's textbooks present. OE promises to fundamentally change the way authors, instructors, and students interact worldwide. (p. 229)

OE opens up many facets of traditional education that include open content, technology, degrees, assessment, communities, and learning among others. It also transcends formal modes of educational delivery to embrace informal communities of learners such as individuals, peers, collaborators, and practitioners (Meiszner & Glott, 2011).

Several writers view OER as a component of the larger OE movement. For example, Blessinger and Bliss (2016) described OE in three dimensions: "spatial, temporal, and process" (p. 12). The spatial dimension encompasses the OER traits of access to information via free materials and open courses, among others, unbounded by physical locations. The temporal dimension of OE frees individuals from time constraints associated with their educational pursuits. The process dimension contains three important groups—discipline experts, students, and organizations—for whom sound design of OE platforms is necessary in order to ensure access to resources and learning. Although some regard OER as a component and enabler of the OE movement, in actuality, much of the literature on the OE and OER movements supports the interconnectedness between them. Meiszner (2011) identified component layers of OE, several of which are intrinsically tied to OER; they are the content layer, which covers open instructional resources produced by faculty and those participating in course activities; the teaching layer, which includes other open lecture sources for formal and informal learners; and the technological layer, which addresses the course platforms used

in a learning environment. Ultimately, the OE movement, whose fundamental tenet is access, provides the foundation for a successful OER movement (Blessinger & Bliss, 2016; Kahle, 2008; Meiszner, 2011). Blessinger and Bliss (2016) spoke of the powerful, transformative nature of OE, asserting that it "has the potential to become a great global equalizer, providing opportunity for people throughout the world to exercise this basic human right" (p. 12).

OER Overview

Several open projects within the umbrella of the OE movement served as catalysts and inspirations to the OER movement. One project involves OSS. OSS is software for which the source code is published and made available to users, who are then able to use, modify, and redistribute it. The copyright enables this free use without attendant fees or royalties (Tuomi, 2006). In 1998, Wiley coined the term "open content" with the intention of applying the OSS principles to content (Wiley & Gurrell, 2009). During this same time period, the concept of learning objects, also referred to as reusable learning objects (Kernohan & Thomas, 2012) or digital learning objects, was being introduced. Generally, learning objects are small, discrete digital learning units whose purpose is to teach one learning objective and that can be reused in multiple learning situations. Wiley (2000) referenced Reigeluth and Nelson's 1997 ideas concerning the value of reusing discrete chunks of learning material, explaining,

> When teachers first gain access to instructional materials, they often break the materials down into their constituent parts. They then reassemble these parts in ways that support their individual instructional goals. This suggests one reason why reusable instructional components, or learning objects, may provide

> instructional benefits: if instructors received instructional resources as individual components, this initial step of decomposition could be bypassed, potentially increasing the speed and efficiency of instructional development. (p. 3)

The idea of reusing digital instructional materials aligns with Wiley's (n.d.) notion concerning open content or OER, namely to promote the use of a copyrighted work with open licenses that allow for the five *R*s: retain, reuse, revise, remix, and redistribute.

From 1997 to 2002, a number of influential and catalytic projects and initiatives were undertaken that provided a boost to the OER movement. For example, in 1997, the Multimedia Educational Resource for Learning and Online Teaching (MERLOT, n.d.-a), an online curated collection of free and open teaching and learning resources, was launched. In 1999, Richard Baraniuk, a professor of computer engineering at Rice University, realizing the barriers imposed by traditional textbooks, created the Connexions Project with the aim of providing open content and access to free software tools that provide for the development, use, and repurposing of educational content (OpenStax CNX, n.d.). Connexions, now called OpenStax, has been a vital resource for advancing OER in higher education (OpenStax CNX, n.d.). In 1999, the provost and faculty at Massachusetts Institute of Technology (MIT) desired to create and provide educational course materials to faculty and learners worldwide (MIT OpenCourseWare [OCW], n.d.). Following up on this commitment, with funding from The William and Flora Hewlett Foundation, in 2002, they launched the OpenCourseWare (OCW) project, in which an array of educational materials for online courses were made available through a Creative Commons license (MIT OCW, n.d.; Rhoads, Berdan, & Toven-Lindsey, 2013). Also in 2002, following the success of the MIT OCW, UNESCO (2002)

convened the Forum on the Impact of Open Courseware for Higher Education in Developing Countries. It was at that meeting that the term *OER* was created. Other open courseware initiatives, including Open University's Open Learn project and YouTubeEdu, along with projects at the Open University of Hong Kong, the National University of Columbia, the University of Western Cape, and Stanford University, have launched around the globe to provide general and discipline-specific open courses that are accessed freely by instructors and learners alike (Butcher, 2015; Cengage Learning, 2016; Kernohan & Thomas, 2012).

Seminal to the OER movement were the pioneering activities of The William and Flora Hewlett Foundation. After realizing in the early 1990s that despite the innovation of the Internet and the launch of the World Wide Web, the distribution of quality educational resources, enabled by technology, was sorely lacking, program officers in 2002 wrote the strategic plan *Using Information Technology to Increase Access to High Quality Educational Content* (as cited in Atkins et al., 2007). The William and Flora Hewlett Foundation created a logic model to cover the following areas: "remove barriers, equalize access, sponsor high-quality open content, and understand and stimulate use" (Atkins et al., 2007, p. 3). It expressed its purpose for supporting OER in this statement:

> A theme and implicit goal of this model is to build a community so that the emerging OER movement, stimulated by the Hewlett Foundation, will create incentives for a diverse set of institutional stakeholders to enlarge and sustain this new *culture of contribution*. (Atkins et al., 2007, p. 3)

From 2002 to 2006, The William and Flora Hewlett Foundation supported 134 grants at $68 million. By 2016, the foundation had funded 177 K-16 OER grant projects (Atkins et al., 2007; Cengage Learning, 2016).

The notion of quality as it relates to OER development is complex in that "there are a variety of quality approaches, tools and procedures which may be applied to OER" (Camilleri, Ehlers, & Pawlowski, 2014, p. 13) by a number of stakeholders, over the life-cycle of an OER. When grappling with the indeterminate concept of quality, these authors offered these concepts: efficacy, impact, availability, accuracy, and excellence (Camilleri et al., 2014, p. 13), which were utilized to develop a framework for OER and OEP quality.

Over the last 5 years, there have been significant efforts to increase access to open textbooks. The cost of textbooks has risen dramatically over the last 2 decades with little accountability being placed on the five publishers that dominate the textbook publishing market (Senack, 2014). According to the U.S. Government Accountability Office (GAO, 2013), textbook prices have risen over 82%, which accounts for triple the rate of inflation. Cost-saving measures such as e-textbooks and campus bookstore rentals were undermined by publishers' practice of releasing new editions every few years. Open textbook projects at colleges and universities in many states portend to vastly improve the situation for college students. Studies have demonstrated the value of open textbooks to facilitating access to a quality educational experience for students (Bliss, Hilton, Wiley, & Thanos, 2013; Petrides et al., 2011).

The Babson Survey Research Group survey of over 3,000 faculty members, conducted by Allen and Seaman (2016), focused on open textbooks and found that 87%

of the faculty members identified cost as either a *very important* or an *important* factor in selection decisions for material such as textbooks. Other factors included the ease of discoverability of resources and their comprehensiveness of content coverage. Although nearly 98% of courses taught by faculty members responding to the survey required textbooks, only 5.3% of them were using textbooks that had open licenses. In fact, faculty awareness of open textbooks as a type of OER was low, with only 34% of faculty members identifying any level of awareness (Allen & Seaman, 2016). However, on a positive note, OpenStax openly licensed textbooks had been selected for high-enrolling lower division undergraduate courses. Discoverability and evaluation of OER continued to be the most significant barriers to faculty adoption in Allen and Seaman's latest study, in alignment with previous study data and from other studies (Hylen, 2006). Several pivotal pieces of legislation that have been introduced federally and in California—the Affordable College Textbook Act (2017) and California Senate Bills 1052 (2012) and 1053 (2012)—promote open textbooks as a solution to this problem. In recent years, California, Colorado, Connecticut, Minnesota, North Dakota, Maryland, Oregon, Pennsylvania, Texas, Washington State, and Wisconsin have passed legislation promoting the adoption and use of OER (Mulholland & Roscorla, 2016; Steen, 2017).

Open Pedagogy/Open Educational Practices (OEP)

The term pedagogy deals with those methods and practices employed in teaching others a subject. Open pedagogy and open educational practices (OEP) are grounded within the concepts of openness, OE, and OER and warrant explication apart from these interrelated ideas. Also, open pedagogy has its roots in the open education movement of the 1980s in K-12 education in which there were concerted efforts to integrate children

into the design process of their learning as participant-observers (Hanley et al., 1981). The terms open pedagogy and OEP are often used interchangeably. However, Hegarty (2015) proposed that open pedagogy is a model for OEP. Some proponents of open pedagogy and OEP view them as extensions of OER discourse that move the conversation beyond a human right to education and content access viewpoints to encompass authentic integration of OER into informal and formal teaching and learning environments. Blog posts from OER experts at the #YearOfOpen website offering definitions of open pedagogy demonstrated the lack of consensus on its meaning; researchers conceded that it is without a clear definition (Bali, 2017; Wiley, 2017). Prevalent among the opinions on this topic was that open pedagogy is about "connecting the outside world to the educational process in institutions in an open way, using available open tools to realize that, creating and reusing OER by both teachers and students, realizing an active form of learning" (Schuwer, 2017, para. 1). Hegarty (2015) advanced an open pedagogy model containing eight attributes to promote OEPs:

1. Participatory technologies. This involves the use of social media, such as blogs, forums, chats, and other avenues for sharing content, ideas, to create a "participatory culture" (p. 5).
2. People, openness, trust. This attribute speaks to the importance of creating open networked environments that engender trust and a level of comfort among communities of learners in order to develop connected spaces "where people can access and interact with resources and each other (Kop et al., 2011, p. 88)" (p. 7).

3. Innovation and creativity. This attribute speaks to the benefits associated with embracing social media and other learning applications in order to increase creativity and innovation in teaching and learning.
4. Sharing ideas and resources. This involves the benefits gained by instructors who share their work among colleagues in a networked environment. This requires a minimum comfort level of participants.
5. Connected community. This deals with encouraging instructors and learners to use social media and other technologies to connect with others in a learning community. This requires a minimum comfort level of participants.
6. Learner-generated. This attribute advocates for creating open learning spaces (e.g., second life) that allow for students to actively participate as leaders in their knowledge acquisition instead of passive containers to be filled.
7. Reflective practice. In this attribute, instructors are encouraged to reflect on their teaching practice as they apply creative and innovative pedagogical strategies, such as inclusion of OER and collaborative curriculum revision, to their teaching.
8. Peer review. This attribute talks about open peer review which encourages instructors to provide input and feedback to colleagues concerning their OER creations or applications.

Following a firestorm of conversation about open pedagogy and OEP over social media platforms in the spring of 2017 in which consensus over a clear definition of open pedagogy was sorely lacking, David Wiley stepped into the fray with the term OER-enabled pedagogy, which situates open pedagogy within the context of OER. He defined this term thusly: “OER-enabled pedagogy is the set of teaching and learning practices

only possible or practical when you have permission to engage in the 5R activities" (Wiley, 2017, para. 7).

The researcher found a few useful definitions to explain the concept of OEP. OEP are "practices which support the (re)use and production of OER through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path" (Ehlers, 2011, p. 4). A more detailed definition of OEP includes

> teaching and learning practices where openness is enacted within all aspects of instructional practice; including the design of learning outcomes, the selection of teaching resources, and the planning of activities and assessment. OEP engage both faculty and students with the use and creation of OER, draw attention to the potential afforded by open licenses, facilitate open peer-review, and support participatory student-directed projects. (Paskevicius, 2017, p. 127)

As the uptake of OER over the last decade has lagged, despite an increase in repositories and referatories to enable discovery of OER, the literature reflects a more recent shift from accessibility and availability of resources to actual application to teaching and learning environments. The central question is "whether access alone will support educational practices and promote quality and innovation in teaching and learning" (Ehlers, 2011, p. 2). Attendance to effective learning designs and instructor expertise are crucial elements of OER uptake; utilizing repositories and referatories that build in the idea of "pedagogical content knowledge" (Carey & Hanley, 2008, p. 183), which is looking at how instructors teach in their disciplines, is equally as important to OER adoption as providing access to resources.

OEP is viewed as a potential solution for closing the gap between access to open resources and sustained usage of them. The desired shift is from access to OER to framing OER as a catalyst for improving the quality of learning (Ehlers, 2011). Conole's (2013) work on openness identified five principles that are necessary for OEP to thrive. These five principles foster:

> (1) collaboration and sharing of information; (2) connected communication about learning and teaching; (3) collectivity to grow knowledge and resources; (4) critique for the promotion of scholarship; and (5) serendipitous innovation. (Hegarty, 2015, p.3).

The Open Educational Quality (OPAL) Initiative has conducted research on moving beyond OER creation and publication activities to catalyzing innovations in teaching and learning. Members working on this initiative created the technological intervention framework that integrates OER and technology integration by addressing policy, teacher practice, the learner's experience, and research development (Conole, 2013). After a review of 65 case studies, an additional valuable OEP model was developed to assist organizations in transitioning to OEP (Ehlers, 2011).

Open Licenses

Wiley (n.d.), who coined the term "open content," viewed the nascent stages of the OER movement from a copyright and license perspective. OER, as defined by The William and Flora Hewlett Foundation (2013), are "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 and re-purposing by others" (p. 16). This definition and others surface the centrality of open intellectual property licenses to the

effective use of OER. Butcher (2015) pointed out that the feature distinguishing OER from general educational content is the license. Thus, a discussion of open licenses as it relates to OER use is particularly germane.

The movement toward alternative licenses began with the OSS movement. Richard Stallman, a programmer at MIT, desired that software be free for all to use. He was a tireless advocate for free software, founding the Free Software Foundation and the GNU project (Wiley & Gurrell, 2009). Stallman and other software producers adopted the GNU Public License (GPL). In 1998, Wiley created the OpenContent License, a license for open content that was based heavily on the GPL that software producers had developed. A year later, Wiley collaborated with publisher Tim O'Reilley, author Eric Raymond, and others to release the Open Publication License (OPL). This license allowed for users to copy, redistribute, and make revisions to content licensed under the OPL; however, it did not allow any use of content for commercial purposes, and "it required users to attribute the original author(s), and included additional clauses a licensor could opt to invoke" (Wiley & Gurrell, 2009, p. 13). The OPL was criticized due to its lack of clarity on how to clearly indicate the licenses it opted to invoke (Wiley & Gurrell, 2009). It is important to note that open licenses do not circumvent traditional copyright law and rights; rather, they allow creators to grant permissions for utilizing their work. Liang (2005) described the value of open licenses as a model that creatively accentuates the positive aspects of copyright laws with respect to content owner rights.

Larry Lessig, a professor at Harvard University, greatly improved open licenses with his and other collaborators' creation in 2001 of Creative Commons licenses that were released in 2002 (Wiley & Gurrell, 2009). The goal of Creative Commons is to

enable and simplify the sharing of content (Wiley & Gurrell, 2009). According to the Creative Commons (n.d.) website, the aim of Creative Commons is to "forge a balance inside the traditional 'all rights reserved' setting that copyright law creates . . . [and] give everyone from individual creators to large companies and institutions a simple, standardized way to grant copyright permissions to their creative work" (para. 1). While allowing creators to retain the copyright to their work, the licenses enable users to "remix, tweak, and build upon" (Creative Commons, n.d., para. 10) the original work and accommodate those desiring to use the original work commercially or noncommercially. The Creative Commons licenses provide three layers or versions: first, the legal layer that contains the official legal language of the license; second, the Commons Deed or human-readable version that contains language that is easily understood by a layman; and third, the Creative Commons Rights Expression Language, a machine-readable layer that facilitates recognition by the World Wide Web when a technology-enabled work contains Creative Commons permissions. There are six Creative Commons licensing types, with the designations of attribution (cc by), share-alike (cc by-sa), noncommercial (cc by-nc), noderivs (cc by-nd), noncommercial-share-alike (cc by-nc-sa), and noncommercial noderivs (cc by-nc-nd). These varied licenses allow creators to share and protect their work and facilitate users' use, remixing, tweaking, and redistributing of works (Creative Commons, n.d.).

Allen and Seaman (2016) found little revision to faculty awareness of copyright compared to previous studies. However, faculty members disproportionately possessed a greater understanding of the Creative Commons licenses associated with OER than they did of OER itself.

Faculty Adoption of OER

The variety of higher education environments and faculty contexts complicate a discussion of faculty adoption of OER. For example, faculty requirements, practices, and expectations vary among the over 7,000 associate, baccalaureate, master's, and doctorate-granting universities and colleges in the United States. Geser (2007) wrote a report on behalf of the Open e-Learning Content Observatory Services (OLCOS) project to roadmap the creation and use of OER in Europe. However, the literature reviewed by this current researcher did not contain a roadmap of best practices for OER adoption within higher education institutions within the United States. Examples from the literature highlight that higher education institutions have chosen various paths to OER adoption based on local needs. For example, the University of Exeter in the United Kingdom elected to build an institutional repository for OER. Thus, an examination of OER faculty adoption must consider multiple facets that include the type of OER being explored, the institutional context in which faculty members work, and activities utilizing OER that may include creation, modification, and reuse/redistribution and sharing.

Faculty Awareness

Faculty awareness of OER varied among the studies examined. Allen and Seaman (2012, 2014, 2016) and Spilovoy and Seaman (2015) of the Babson Survey Research Group produced four different reports relating to faculty use of digital materials and have contributed significantly to the body of literature in this area. With surveys distributed from 2009 through 2011 and again in 2014, 2015, and 2016, their reports have increased understanding of faculty perceptions, awareness, creation, and use of an array of digital resources, among them OER. The 2011 study compiled the results of four

national surveys. For the 2011 survey, faculty members were selected from a "multi-stage process" to create "a stratified sample of all teaching faculty" (Allen & Seaman, 2012, p. 33). The first survey included 3,875 faculty members, 4,564 faculty members responded to the second survey, 2,144 participated in the 2014 survey, and 3,000 participated in 2016 (Allen & Seaman, 2012, 2014, 2016). The Babson Survey Research Group researchers collected data on awareness, use, and perceived value of OER as well as barriers to its use. The information asked of faculty members from 2011 differed slightly from that asked in 2014. However, the findings did correlate to those of other studies (Allen & Seaman, 2012, 2014, 2016).

In their 2011 study, Allen and Seaman asked only about faculty use of digital resources. Eighty-three percent of survey respondents reported that they used a variety of digital materials such as videos or simulations. Although not necessarily related solely to open content, the researchers queried faculty members about their production of digital teaching materials and found that a majority of faculty members surveyed did create digital resources (Allen & Seaman, 2011). This was a positive signal that faculty members could be receptive to creating digital materials to be used as open content. In the 2014 study, the researchers were more deliberate in asking specifically about OER awareness and use. Between two thirds and three fourths of faculty members surveyed were not aware of OER (Allen & Seaman, 2014). This affirmed Thoms and Thoms's (2014) study of 155 foreign language directors in the United States, which found that 66% of their faculty members were unaware of OER. Other researchers reporting on barriers to traction of OER also cited a lack of awareness of the term among faculty

members (McKerlich et al., 2013; Rolfe, 2012). McKerlich et al.'s (2013) study contained 90 complete responses, and Rolfe's (2012) study contained 56 participants.

Allen and Seaman's 2016 study evidenced little movement in faculty awareness of OER from the 2011 study. In fact, the researchers noted that

> the number of faculty claiming that they would use OER in the future (6.9%) is of the same order of magnitude of those already using open resources (5.3%). A larger group (31.3%) reports that they will consider future OER use. (Allen & Seaman, 2016, p. 3)

In the 2014 and 2016 surveys, Allen and Seaman noted that OER had not yet entered the mainstream, nor had they been integrated by faculty into their educational materials selection process. Encouragingly, however, the 2014 survey report found that the lack of faculty awareness did not arrest faculty members' actual use of OER in teaching and learning activities (Allen & Seaman, 2014).

Facilitating Activities to Promote OER Adoption

Facilitators are people, things, factors, or actions that help to bring about an outcome. *Drivers*, *enablers*, and *benefits* were other terms communicated in the literature to identify those activities that promote OER adoption. A preponderance of the literature pointed to two main facilitators of OER use: cost savings to students (Allen & Seaman, 2016; Bliss et al., 2013; Burke, 2014; Christensen et al., 2011; Ikahihifo, Spring, Rosecrans, & Watson, 2017; Mtebe & Raisamo, 2014a; Overland, 2011; Thoms & Thoms, 2014) and increased access to an education, particularly in developing countries (D'Antoni, 2009a; Mtebe & Raisamo, 2014a, 2014b; Nie, 2012; OECD, 2007; Sclater, 2011). For much of the last decade, the popular press and scholars have written about the

negative impact of rising higher education costs on students in the United States, noting that "between 2004 and 2012 the total student debt in the United States nearly tripled from $364 billion in 2004 to $966 billion in 2012" (Martin, Belikov, Hilton, Wiley, & Fischer, 2017, p. 80), with textbook costs being a major contributor to this debt. The research of Martin et al. (2017) affirmed that OER in general and open textbooks, a type of OER, could result in substantial cost savings to students. A recent study of students' impressions of OER found that they rated the quality of OER to be on-par with traditional textbooks and that the use of OER resulted in valuable savings to students (Ikahihifo et al., 2017). Bliss et al. (2013) cited several sources that accentuated the increased educational access that OER affords to students worldwide and particularly in developing countries. Allen and Seaman (2014, 2016) found that the cost to students was the primary factor in the faculty textbook or materials selection process. Thus, faculty members were very aware and sensitive to the need to help students save money in this area.

Other major facilitators that have surfaced in the literature concerning the potential of OER include more flexibility with OER and improvement of pedagogical practices (Nie, 2012; Reedy, 2014; Thoms & Thoms, 2014), increased faculty and student roles as producers of OER rather than solely roles as consumers (Browne et al., 2010; Butcher, 2011; Mtebe & Raisamo, 2014a), and an increase in institutional reputation (Browne et al., 2010; Hodgkinson-Williams, 2010; Nie, 2012). Reedy (2014) conducted interviews with six early career faculty members in the United Kingdom concerning their use and reuse of OER. She found that academics held positive reactions to being able to use OER from trusted sources without having to be overly concerned about provenance

and open licenses. They also found in the search process for OER creative approaches to teaching their discipline, which impacted positively on their pedagogical practices (Reedy, 2004). Although not reported as widely in the literature, some faculty members involved with OER projects at colleges or universities have discovered that these projects encourage collaboration across disciplines, foster connections among colleagues, create new synergies and linkages among disparate groups that had little contact previously, enhance sharing of teaching innovations, and allow the preservation of their academic accomplishments (Hodgkinson-Williams, 2010; Reedy, 2014).

Hodgkinson-Williams (2010) summarized workshop discussions held in South Africa and Namibia about OER benefits with respect to governments, institutions, faculty members, and learners that focused on potential and actual impact. In keeping with the ideas of OER advocates and proponents in recent years, governments have begun to view OER as potentially "widening participation in higher education" (Hodgkinson-Williams, 2010, p. 9) by broadening access to many types of users, closing the gap between formal and informal learners, and saving taxpayer dollars by sharing and repurposing resources among institutions. Over the course of the last decade, countries such as the United States, South Africa, and the United Kingdom have begun to interweave OER into national policy. In particular, the 2008 Cape Town Open Education Declaration and the 2012 Paris OER Declaration promoted guidelines to governments for the use of OER, utilizing open licenses (UNESCO & Commonwealth of Learning, 2015). At the institutional level, improving recruitment of students, providing open resources that encourage collaboration and enhanced learning, and enhancing the image of an institution were identified as perceived benefits of OER adoption (Hodgkinson-Williams, 2010).

Barriers and Challenges to OER Adoption

Contrasting with drivers and facilitators of OER adoption, the literature contained discourse around barriers that hindered the creation, use, and reuse of OER. Overall, Ehlers (2011), summarizing the *Open Educational Quality Initiative* report, focused on five barriers to OER use: "lack of institutional support; lack of technological tools for sharing and adapting resources; lack of users' skills and time; lack of quality or fitness of the resources; and personal issues such as lack of trust and time" (p. 1). In addition, lack of quality and sustainability of OER were identified as common barriers to OER adoption (Allen & Seaman, 2012, 2014, 2016; Atkins et al., 2007; Browne et al., 2010; Downes, 2006; Mtebe & Raisamo, 2014a, 2014b; Nie, 2012; Pawlowski, 2012). Wiley and Gurrell (2009) spoke to two issues concerning the idea of quality. At one end of the spectrum, OER were considered by some to be of poor quality because they were free. At the other end of the spectrum was the faulty idea that educational resources were inherently of good quality (Wiley & Gurrell, 2009). The study conducted by Yuan and Recker (2015) sought to shed light on the evaluation of OER quality through the use of rubrics. Their study contributed to the literature by highlighting the existing rubrics available and, more importantly, by emphasizing the importance of "content quality" and "pedagogical values" (Yuan & Recker, 2015, p. 24), measures for assessing the educational usefulness of OER. Faculty members at the University of Exeter expanded the discussion around the idea of quality from an institutional perspective, opining that a protocol should be devised to ensure adequate quality of materials in order to preserve the high-quality brand of the institution (Browne et al., 2010). Downes (2006), citing the ideas of Walker (2005), argued that sustainability of OER did not mean that it was free of

cost but rather that to be sustainable, it means that it "'has long-term viability for all concerned'—meets provider objectives for scale, quality, production cost, margins and return on investment" (p. 5). Downes explained that while open content may be free to use, there are typically ancillary costs for infrastructure and technology involved in the creation, housing, and provision of access. Thus, sustainability does not necessarily signify more cost-effective materials but rather content that is "capable of promoting wider objectives" (Downes, 2006, p. 6). Sclater (2011) underscored Downes's arguments with respect to the significant costs incurred for housing OER in repositories. Cost and sustainability may also be viewed through a user demand lens; chief to the success of OER adoption is the extent to which faculty perceive the benefits of OER use to his or her current disciplinary practices, which drives demand for OER, which in turn, propels institutions to make the investments required to ensure their sustainability (Harley, 2008).

Prominent among challenges to OER adoption is the discovery process for OER; faculty members have reported difficulty in locating OER for their disciplines (Nie, 2012; Reedy, 2014), pointing to a need for improved search functionality in OER repositories and referatories. A lack of skill and insufficient knowledge of copyright licenses were also discussed as faculty barriers in the literature (de Hart et al., 2015; Geser, 2007; Hodgkinson-Williams, 2010). This aligns with faculty members' reporting not needing to know the provenance of material as an enabler to OER use in an earlier section. Allen and Seaman's (2014, 2016) recent reports underscored this major challenge with OER ease of discoverability, and faculty members expressed the desire to have one search engine for OER. In the 2016 report by these researchers, use issues continued to prevail, with inadequate and insufficient resources cited as common barriers (Allen & Seaman,

2016). In studies presenting OER efforts in Africa, technology issues that include Internet bandwidth, reliable connections, and access to computers were also identified as challenges to be addressed going forward (D'Antoni, 2009a; Mtebe & Raisamo, 2014a, 2014b; Ngimwa & Wilson, 2012).

While not highlighted prominently in the literature, reward and recognition incentives for participation in OER, which is perceived as a teaching-related activity, need to be addressed and resolved. Faculty members are primary owners of the curriculum. Consequently, they need to be convinced of the benefits of adopting OER. Furthermore, faculty members are inundated with research, teaching, and service obligations, with research being featured more prominently than teaching activities in many higher education institutions. Therefore, faculty members question the return on investment for them, beyond altruistic goals, and the tangible career rewards for their willingness to add OER to their workloads (Camilleri & Ehlers, 2011; Mtebe & Raisamo, 2014b). A faculty member remarked, "At this moment teaching is not rewarded by the system and therefore what incentive is there to develop materials?" (Browne et al., 2010, p. 6). Several researchers have emphasized a need for a sea change in the policies and practices around faculty tenure and promotion to acknowledge and reward OER-related efforts (Browne et al., 2010; Geser, 2007). As an example, at the University of Exeter, administrators devised probation, performance reviews, and retention and promotion activities that included recognition and rewards for effective teaching (Browne et al., 2010).

The results of a recent study of OER use by postsecondary institutions in British Columbia underlined an array of potential facilitators and barriers to OER adoption. Among their key finds, the researchers found,

- Faculty who score higher on the personality trait of openness (to experience) were more likely to both adapt and create OER.
- Regardless of institutional type, the top three reasons faculty reported for using OER were for ideas and inspiration, to supplement existing coursework, and to prepare for teaching.
- The most frequently used types of OER were videos, images, and open textbooks.
- A majority of faculty perceive OER to be comparable or superior in quality to traditional, proprietary materials; however, faculty who have adopted OER rate the quality of OER significantly higher than those who have not adopted OER.
- The barriers of locating high-quality, relevant and up-to-date OER were reported to be significantly lower by faculty at research-intensive universities than by faculty at both teaching-intensive universities and colleges/institutes.
- Quantitatively, lack of institutional support for use of OER was reported as a more significant barrier by faculty at colleges/institutes than faculty at either teaching-intensive universities or research-intensive universities. However, a qualitative analysis of open-ended responses shows that faculty at all types of institutions face institutional barriers such as lack of administrative, staff, or department support for their use of OER.

- The availability of up-to-date resources from a reputable producer was reported to be relatively more important by faculty at teaching-intensive universities and colleges/institutes than those at research-intensive universities.
- On average, respondents agreed that the use of OER in the classroom benefited their students and had a positive impact on their teaching practice.
- Whereas two-thirds of respondents believe that their students save money by using OER, only one third of respondents believed that their institution did.
- Two-thirds of respondents were unaware of any relevant institutional policy concerning OER. Faculty at teaching-intensive universities and colleges/institutes reported more encouragement to use OER than those at research-intensive universities. (Jhangiani, Pitt, Hendricks, Key, & Lalonde, 2016, p. 5)

The preceding sections have highlighted enablers and barriers to faculty adoption of OER. While incremental steps for guiding adoption of OER have been made that include the OLCOS roadmap (Geser, 2007) and the Community College Consortium for Open Educational Resources' (n.d.) professional development strategies few researchers have gone beyond an identification of the issues and hurdles to be addressed.

Motivation for OER Adoption and Use

Closely tied to facilitators and barriers to OER acceptance are the motivating factors or incentives for their adoption. Contribution to the public good has been a recurring theme in the research (Browne et al., 2010; Hylen, 2006; Sclater, 2011; Tuomi, 2013). Essentially, authors such as Browne et al. (2010), Hylen (2006), Sclater (2011), and Tuomi (2013) contended that unfettered access to quality educational materials

would result in substantial positive outcomes for people around the world. Sclater (2011) reaffirmed Smith and Casserly's (2006) idea that "the world's knowledge is a public good" (p. 180). Therefore, faculty members working to use or create OER are working toward this goal to help educate all. Beyond altruism, Hylen (2006) provided these additional motivations for educators to share their content digitally:

1. Altruistic reasons.
2. A desire to sponsor or stimulate innovation.
3. A wish to share with others for creative, educational, scientific or research purposes.
4. A strategy for enhancing the commercialized version of the content.
5. Publicity, "egoboo" or reputation within the open community.
6. The desire to gain access to the best possible resources. (p. 4)

The grounded theory research of Falconer et al. (2016) confirmed general motives for releasing OER: building institutional reputations; improving the quality, efficiency, and cost of OER production; providing institutional incentives and policies for instructors to buy into and participate in OER development; expanding access to knowledge resources; and improving open pedagogical practices through the use, reuse, and development of OER (Atkins et al., 2007; Downes, 2006; Geser, 2007; Hylen, 2006; OECD, 2007).

Summary

This review of the literature provided an overview of the core issues related to faculty adoption of OER that include faculty awareness, motivators, barriers, challenges, and facilitating activities for advancing adoption. Additionally, the review set OER within the larger historical openness framework and OE movement and set the stage for

OER's trajectory within the changing higher education landscape. A study of innovation adoption involves change and adoption-decision processes that, in turn, require a discussion of the theoretical frameworks supporting those processes. Accordingly, an in-depth examination of Rogers's diffusion of innovations framework, alongside other adoption and implementation methods, was undertaken, with relevant examples from the faculty adoption literature to provide evidence to support the innovation diffusion framework. Because adoption is a change process, the change process literature was selectively reviewed with emphasis placed on the CBAM and the conscious change leader accountability model, both of which highlight the process of individual change throughout adoption of an innovation.

Synthesis Matrix

Consistent with Roberts's (2010) advice concerning the use of a synthesis matrix to capture the themes, relationships, gaps, and inconsistencies in a review of the literature, the researcher developed a synthesis matrix (Appendix A) that highlighted the following themes related to faculty adoption of OER: the transformation of the higher education landscape; openness, OE, OER basics; and open pedagogy and open educational practices. Also, a synthesis was completed of the following enabling factors to faculty OER adoption: faculty awareness, OER adoption facilitators, barriers and challenges, and motivators. Additionally, the common themes and factors distilled from the theoretical frameworks and models and synthesized in this review were adoption, innovation, diffusion, and implementation attributes, and general and faculty change processes.

CHAPTER III: METHODOLOGY

Overview

This chapter outlines the research design and methodology utilized to conduct this Delphi study concerning faculty adoption of open educational resources (OER) in public colleges and universities in the United States. The 11 sections that constitute Chapter III include an introduction to the chapter, the purpose statement, research questions, the research design, a description of the population, a description of the sample, the instrumentation, validity and reliability, data collection procedures, data analysis procedures, and limitations of the study. The chapter concludes with a summary.

Purpose Statement

The purpose of this Delphi study was to identify and describe the perceptions of open educational resources (OER) higher education experts regarding the activities needed at colleges and universities in the United States in order to advance faculty adoption of OER over the next 10 years. Also, this study examined those activities that were most important and had the greatest likelihood of being implemented.

Research Questions

1. What activities do OER higher education experts believe will advance faculty adoption of OER at colleges and universities in the United States over the next 10 years?
2. Which activities do OER higher education experts believe are most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?

3. What is the likelihood of implementation of the activities that OER higher education experts perceive as most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?

Research Design

This Delphi study employed a mixed-methods research design. In mixed-methods research, the researcher is actively engaged in constructing knowledge (Creswell, 2014). Data collection begins with open-ended questions eliciting qualitative data. This descriptive research design endeavors to capture thoroughly what is known about existing occurrences and provides "valuable data, particularly when first investigating an area" (McMillan & Schumacher, 2010, p. 217). This qualitative step is followed by quantitative analyses that use numerical ratings to produce median and interquartile scores. A foundational strength of the Delphi method is its consensus-building focus (Nworie, 2011). The median, a measure of central tendency, provides the "midpoint of a distribution of scores" (McMillan & Schumacher, 2010, p. 158). However, it is also useful for capturing "extreme scores" (McMillan & Schumacher, 2010, p. 159) that might skew results. Hence, during the consensus-building rounds of the Delphi study, any outliers are captured as well. This research study also employed the interquartile range (IQR), a measure of variability, which enabled the researcher to discover additional information about the dispersion of the scores clustered around the middle 50%.

Referred to throughout the literature as a technique, a method, a process, an approach, or a survey (Falzarano & Pinto, 2013; Mullen, 2003), the Delphi method allows for consensus building and forecasting (Critcher & Gladstone, 1998; Mullen,

2003; Rowe & Wright, 1999). While many authors of works on the Delphi technique agree that its primary objective is to facilitate consensus among a panel of experts (Hsu & Sandford, 2007; Mullen, 2003; Valdes & Marin, 2013), other authors suggest that consensus methods may also be viewed in terms of degrees of either agreement or disagreement among a panel of experts (Hsu & Sandford, 2007; Jones & Hunter, 1995; von der Gracht, 2012). Nevertheless, the primary objective of a typical Delphi design is consensus. In a study of consensus measurement in Delphi studies, von der Gracht (2012) contended that researchers do not take care to define the term *consensus* and, when determining the number of successive rounds to conduct, fail to differentiate between consensus/agreement and stability. In their often-cited research on stability and agreement criteria for terminating Delphi rounds, Dajani, Sincoff, and Talley (1979) argued that stability, defined as "the consistency of responses between successive rounds of a study" (p. 84), is a more effective determinant for stopping rounds than reaching a predetermined level of consensus or agreement. The argument concerning stability notwithstanding, there remain appropriate justifications for predetermining a three-round study that include cost and time-length considerations (von der Gracht, 2012). Despite this debate among researchers in the literature, for the purposes of this study, three rounds were decided upon during the research design in alignment with typical Delphi practice (Hsu & Sandford, 2007; Mullen, 2003). The strength of consensus methods, such as the nominal group technique, the consensus development conference, and the Delphi technique, lies in their features that allow for anonymity, controlled feedback, iteration, and statistical group response (James & Warren-Forward, 2015; Jones & Hunter, 1995; Rowe & Wright, 1999).

The term *Delphi* was coined by Kaplan, a professor of philosophy at the University of California, Los Angeles (UCLA) working for RAND, and the technique was originally conceived by researchers Olaf Helmer and Norman Dalkey at the RAND Corporation in 1953 as part of a U.S.-sponsored military project (Lang, 1995; Linstone & Turoff, 2002; Rowe & Wright, 1999; Skulmoski, Hartman, & Krahn, 2007). The Delphi technique is a structured group communication method that enables a group to tackle problems of a complex nature. Its distinguishing characteristics, provided via "structured communication" (Linstone & Turoff, 2002, p. 3), include an opportunity for a group to individually express initial ideas about a problem, followed by individual assessment of the views of other group members and, finally, the chance to revise individual opinions, all with the assurance of anonymity (Linstone & Turoff, 2002). The Delphi technique is an iterative process that uses questionnaires as a means to elicit feedback. A major aspect of the Delphi technique is to seek the informed assessments or opinions of experts concerning a problem with the additive qualities of working to solve problems and of predicting future events (Nworie, 2011; Skulmoski et al., 2007; Valdes & Marin, 2013). Adler and Ziglio (1996) underscored that the Delphi is most appropriately used when the "primary source of information sought is informed judgment" (p. 21).

Since its first uses in the 1950s, the Delphi technique has evolved in terms of its application (Linstone & Turoff, 2002). The Delphi method has been used in a variety of fields and modified to suit multiple purposes. For example, the Delphi method may be used

1. To determine or develop a range of possible program alternatives.
2. To explore or expose underlying assumptions or information leading to different judgments.
3. To seek out information which may generate a consensus on the part of the respondent group.
4. To correlate informed judgments on a topic spanning a wide range of disciplines.
5. To educate the respondent group as to the diverse and interrelated aspects of the topic. (Delbecq, Van de Ven, & Gustafson, 1975, p. 11)

An extensive literature review conducted by Landeta (2006) on the increasing popularity of the Delphi method since its initial use in the 1950s confirmed that it is a valid, valuable, and widely embraced scientific research technique (von der Gracht, 2012).

Linstone and Turoff (2002), seminal experts on the Delphi technique, posited that researchers reviewing the Delphi technique as a potential research method "usually recognize a need to structure a group communication process in order to obtain a useful result for their objective" (p. 5). These authors maintained that the answer to the following thought-provoking question provides insight into the appropriateness of this technique to a study: "Is it possible, via structured communications, to create any sort of collective human intelligence capability?" (Linstone & Turoff, 2002, p. 5).

As a mixed-methods approach, the Delphi technique, which employs qualitative and quantitative methodologies, was an optimal research design for this study because, as Creswell (2014) asserted, integrating qualitative and quantitative approaches within a research design facilitates heightened comprehension of problems more so than each

approach in isolation. Research Question 1 was an open-ended qualitative question that asked OER higher education experts about activities related to advancing faculty adoption of OER. Research Questions 2 and 3 were closed-ended quantitative questions that used a Likert scale to ask OER higher education experts to rate the importance of and likelihood of implementation of the activities revealed in responses to the qualitative question. Consequently, the Delphi method enabled the researcher to explore a complex, multifaceted issue and allowed for responses to both open-ended and closed-ended questions. In addition, the technique provided an arena for the expert opinions from a heterogeneous group of individuals to identify potential strategies for a realistic and successful implementation of OER over the next 10 years (Okoli & Pawlowski, 2004).

The fundamental attributes of the Delphi technique are structured questioning, iteration, controlled feedback, and anonymity of responses (Hsu & Sandford, 2007; Jones & Hunter, 1995; Lang, 1995; Rowe & Wright, 1999). This iterative process uses questionnaires to collect controlled feedback from experts over the course of multiple rounds, typically two or three (Cuhls, 2004; Loo, 2002), with three rounds being sufficient in most cases (Hsu & Sandford, 2007). In constructing a successful Delphi approach, Linstone and Turoff (2002) cautioned against controlling the structure overly much so that it inhibits the free-flowing perspectives related to the problems that may result: not summarizing the feedback of experts appropriately; not adequately compensating the experts, whom they termed "consultants" (p. 6), for their time and expertise; and not handling dissenting opinions correctly.

Population

As defined by McMillan and Schumacher (2010),

> A population is a group of elements or cases, whether individuals, objects, or events, that conform to specific criteria and to which we intend to generalize the results of the research. This group is also referred to as the *target population* or *universe*. (p. 129)

The target population, from which the sample for this forecasting and consensus-building Delphi study was drawn, was a group of OER higher education faculty experts from higher education institutions in the United States. The sampling frame comprised a list of 51 faculty campus coordinators for textbook affordability programs supported by California Assembly Bill 798 grants either in the California Community College (CCC) system or the California State University (CSU) system and a list of 566 faculty peer reviewers, from across the nation, selected to serve on the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) editorial boards.

Sample

The foundation of the Delphi method is the identification and selection of a panel of experts on a topic under study (Hsu & Sandford, 2007; Okoli & Pawlowski, 2004; Skulmoski et al., 2007). The panel of OER higher education experts for this study was selected utilizing a purposive criterion sampling method (McMillan & Schumacher, 2010; Patten, 2012). According to Patten (2012), a purposive sampling method is chosen when a researcher seeks to obtain useful information from a particular broad group of people. Purposive criterion sampling is selected when the group is required to meet a certain set of criteria in order to be selected for a particular sample. A purposive criterion

sampling method was chosen because members of the expert panel were required to meet certain criteria.

Hsu and Sandford (2007) acknowledged that while researchers agree that a robust, criteria-based panel identification process is vital for a successful Delphi study, the literature is scarce on actual criteria for selection. That notwithstanding, Skulmoski et al. (2007), summoning the work of Adler and Ziglio (1996), specified four required conditions for expertise: (a) knowledge and experience with the issues under investigation, (b) capacity and willingness to participate, (c) sufficient time to participate in the Delphi rounds, and (d) effective communication skills. The seminal monograph on Delphi processes by Delbecq et al. (1975) underscored the importance of including decision makers among the panel, arguing that "Delphi will be an effective process only if those decision makers who will ultimately act upon the results of the Delphi are actively involved throughout the process" (p. 85). Jones and Hunter (1995) cautioned that Delphi panelists "should be selected as to ensure that no particular interest or preconceived opinion is likely to dominate" (p. 379). Consequently, for the purposes of this study, the researcher defined expertise through the multiple lenses of years of implementing OER activities and experience with one or more OER types.

Expert Panel Selection Criteria

Guided by arguments for a varied panel (Linstone & Turoff, 2002) and requirements of a purposive criterion sampling technique, the researcher sought OER higher education experts who were faculty practitioners nominated by a group of three experts in the field. Falzarano and Pinto (2013), underscoring the significance of acquiring a verifiable expert panel, stated, "Insuring that your experts can be identified by

external means, such as advanced degrees, specialty practice, or practice longevity, will aide in establishing the rigor of your consensus outcomes and support a strong practice-based evidenced approach to research" (p. 101). For this reason, OER higher education experts were required to meet one of the following two criteria:

- faculty members working either in the CCC system or the CSU system as campus coordinators for textbook affordability programs supported by California Assembly Bill 798 grants, with a minimum of 5 years of experience with OER; or
- faculty members selected to serve as peer reviewers for the MERLOT editorial boards, with a minimum of 5 years of experience with OER.

In addition, the OER higher education experts' names, institutional affiliations, and credentials were collected during the initial phase of the data collection process (see Appendix B).

> California Assembly Bill 798 established
>
> the College Textbook Affordability Act of 2015 to reduce costs for college students by encouraging faculty to accelerate the adoption of lower cost, high-quality open educational resources, as defined.
>
> The bill would create the Open Educational Resources Adoption Incentive Program to provide incentives and reward campus, staff, and faculty efforts to accelerate the adoption of open educational resources. (College Textbook Affordability Act, 2015, para. 2-3)

The textbook affordability programs supported by California Assembly Bill 798 grants include grant projects that utilize open textbooks, one example of OER. According to the request for proposals for the California Assembly Bill 798 grants (COOL4Ed, 2016), the

California Assembly Bill 798 textbook affordability program campus coordinators are required to support (a) professional development and training for program participants engaged in finding and adopting OER, (b) integration of OER into learning platforms, and (c) activities to assess the cost impact of the OER and affordable learning materials. Consequently, faculty campus coordinators have knowledge of and expertise with using OER for a number of years (COOL4Ed, 2016).

MERLOT (n.d.-a) "is a curated collection of free and open online teaching, learning, and faculty development services contributed and used by an international education community" (para. 1). MERLOT has in excess of 20 content-based editorial boards. Individuals selected as peer reviewers must work as instructional faculty members in colleges or universities and have "expertise in the scholarship of their field[, e]xcellence in teaching[, e]xperience in using technology in teaching and learning, and [c]onnections to professional organizations in their discipline" (MERLOT, n.d.-b, para. 9).

Following the advice of Ludwig (1994) that "solicitation of nominations of well-known and respected individuals from the members within the target groups of experts was recommended" (p. 52), the researcher solicited nominations from the following prominent individuals in the OER field: Gerard Hanley, PhD, assistant vice chancellor of Academic Technology Services for the CSU system and executive director of MERLOT; Jane Moore, EdD, director of MERLOT Editorial and Professional Development Services and editor of the MERLOT Teacher Education Editorial Board; and Leslie Kennedy, EdD, director of Affordable Learning Solutions for the CSU system.

Sample Size

Opinions vary widely among researchers concerning the optimal sample size for a Delphi expert panel, with some proposing smaller panels ranging from six or seven to 12 members (Cavalli-Sforza & Ortolano, 1984; Loo, 2002), other proponents suggesting ranges from 10 to 30 experts (Fink & Kosecoff, 1998; Martino, 1983), and still other researchers citing confidence with large sample sizes ranging from the hundreds to the thousands (Cantrill, Sibbald, & Buetow, 1996; Wild & Torgersen, 2000). Cantrill et al. (1996) offered that size "should be governed by the purpose of the investigation" (p. 69). Many agree that attrition is a factor in this multiround process, suggesting that panels containing 20 members are effective (Giannarou & Zervas, 2014; Mullen, 2003; Reid, 1988). Factoring in attrition, 25 potential experts were selected to be invited to participate in the study, with the goal of having 20 experts—an effective number according to Mullen (2003)—agree to complete the three rounds. Ultimately, 19 experts responded to the invitation, and 17 met eligibility requirements and agreed to participate.

Instrumentation

The Delphi technique consists of a mixed-methods approach that "uses quantitative and qualitative research methods, either concurrently (i.e., independent of each other) or sequentially (e.g., findings from one approach inform the other), to understand a phenomenon of interest" (Venkatesh, Brown, & Bala, 2013, p. 23). Creswell (2014) offered that mixed-methods procedures involve "the collection of both qualitative (open-ended) and quantitative (close-ended) data in response to research questions or hypotheses" and that a mixed-methods study "includes the analysis of both forms of data" (p. 217). The standard Delphi technique begins with a first round

comprised of open-ended questions that are qualitative in nature to elicit expert opinions on a problem. Subsequently, the second round employs a quantitative approach in the form of a survey to obtain additional input on information gained in Round 1. Commentators of the Delphi method generally agree that consensus is the overarching goal of the standard Delphi technique (Cuhls, 2004; Hsu & Sandford, 2007; Mullen, 2003). As such, the Delphi technique utilizes multiple iterations of a questionnaire format. A three-round iteration process is generally accepted as a viable means to attain consensus among participants (Hsu & Sandford, 2007; Mullen, 2003).

In alignment with the literature, this study comprised three rounds, and feedback was collected utilizing SurveyMonkey (https://www.surveymonkey.com/), a reputable online survey tool. The Round 2 questionnaire was constructed utilizing a 10-point Likert scale to rate the degree of importance of activities identified in Round 1 and a percentage scale to rate the likelihood of implementation of those activities from 0% to 100%. Christie and Barela (2005) contended that a 10-point Likert scale facilitates the primary purpose of the Delphi technique, which is to measure the extent to which agreement is reached among expert participants. Giannarou and Zervas (2014) confirmed that the 10-point Likert scale is very popular and the most appropriate for investigating the level of importance. Therefore, in this study, a rating of 1, the lowest end of the Likert scale, represented the lowest degree of importance, and a rating of 10, the highest end, represented the highest degree of importance. In Round 3, the consensus round, expert panelists reviewed and compared their ratings to those of the other panelists and modified them as they chose. Rounds 2 and 3 provided multiple opportunities to give feedback and to revise opinions based on the responses of the group, undergirding the

Delphi method's goal of consensus (Cuhls, 2004; Dalkey & Helmer, 1963; Mullen, 2003).

Round 1

Round 1 of the study consisted of the following open-ended question to elicit feedback on Research Question 1 concerning future best practices for implementing OER (Iqbal & Pipon-Young, 2009): "What are four to six activities you believe should be implemented in order to advance faculty adoption of OER over the next ten years in public colleges and universities in the United States?" (see Appendix C). For clarity, respondents were also provided with the research study definition for advancing faculty adoption of OER: For the purposes of this study, advance faculty adoption of OER was defined as faculty members' moving beyond basic awareness of OER to actionable, observable activities related to OER that include using, reusing, retaining, revising, redistributing, or remixing OER.

Round 2

The responses from the open-ended Round 1 question were aggregated into thematic strands, with duplicate and out-of-scope responses eliminated; they formed the basis of questions developed for Round 2 (Iqbal & Pipon-Young, 2009). OER higher education expert panel members were e-mailed a questionnaire that utilized a 10-point Likert scale to elicit the degree of importance and a percentage scale (0% to 100%) to elicit the likelihood of implementation of activities identified by the expert panel in Round 1. OER higher education expert panelists were requested to respond to the following statements (see Appendix D):

1. Please rate the importance of the activities identified in Round One to advance faculty adoption of OER over the next ten years, using a 10-point scale, One (1) [the lowest importance] to ten (10) [the highest importance].
2. Please rate the likelihood of implementation of the activities identified in Round One to advance faculty adoption of OER over the next ten years, using a zero-to-100 percentage scale, 100 [the greatest likelihood] to zero (0) [the least likelihood].

Round 3

The results of Round 2 were analyzed to determine the median rating and IQR for expert panel members' responses to each activity statement. The OER higher education expert panelists were sent a summary containing their individual scores that included the median rating, percentage score, and the IQR for each response as well as the ratings for the entire panel. Panel experts were instructed to review the median ratings, percentage scores, and the IQR for their individual ratings and those of the group. They were informed that they could change their responses; if no changes were desired, they were requested to acknowledge that as well (Appendix E). Also, expert panel members were provided with an open-ended optional comment box and instructed that they could comment on any of the activities that were of particular interest to them.

Validity and Reliability

Venkatesh et al. (2013) explained that validity "refers to the legitimacy of the findings (i.e., how accurately the findings represent the truth in the objective world)" (p. 32). More specifically, they discussed measurement validity, which "estimates how well an instrument measures what it purports to measure in terms of its match with the

entire definition of the construct" (Venkatesh et al., 2013, p. 32). In order to ensure the validity of the instruments and to provide feedback on the e-mail, the survey instrument forms, and instructions, two individuals participated in a field test of the Delphi study research design as well as a field test of the survey instrument prior to each iterative round. The first individual was a California Assembly Bill 798 textbook affordability program coordinator who worked at a CSU campus and met the criteria for an OER higher education expert. The second participant was a director of special education and mental health who had graduated from the Brandman University Organizational Leadership doctoral program and had also completed a Delphi study.

Concerning reliability, Loo (2002) emphasized the fact that several leading researchers question the reliability of the Delphi method owing to the variance in responses among different expert panels and challenges with the use of open-ended questions. However, he did concede that careful attention to criteria for panel selection can mitigate these concerns with measurement reliability. Adler and Ziglio (1996) noted that "clear instructions to experts involved in responding to a Delphi questionnaire can help increase the reliability of their responses" (p. 17). The selection of the expert panel for a Delphi study was found to be an important criterion for establishing both validity and reliability (Adler & Ziglio, 1996; Giannarou & Zervas, 2014; Rowe & Wright, 1999). Feedback from the field-test participants was utilized to make minor revisions to the instruments to ensure clarity in the directions, examples, and wording of the instruments' activity statements. The Round 1 questionnaire was uploaded to SurveyMonkey, an online survey administration website.

Intercoder reliability, also called interrater or interjudge reliability, concerns the degree of agreement between two coders coding the same data collected from open-ended questions. Young Ik Cho (2008) emphasized that "intercoder reliability is a critical component in the content analysis of open-ended survey responses, without which the interpretation of the content cannot be considered objective and valid" (p. 344). In order to ensure intercoder reliability, a colleague of the researcher who was a community college director of a dance program and a graduate of the Brandman University doctoral program participated in the coding of Round 1 open-ended responses. Percentage agreement, a widely popular measure that relies on the ratio of agreement in coding decisions among all the data coded, was the statistical index utilized to ensure agreement in the coding process (Cho, 2008).

Data Collection

Members for the OER higher education expert panel were identified using a purposive criterion sampling technique. Upon receipt of the Brandman University Institutional Review Board (BUIRB) approval (Appendix F), a three-round Delphi study was conducted. Initially, Dr. Hanley, Dr. Moore, and Dr. Kennedy, the three prominent OER experts mentioned earlier, sent an Invitation to Participate in an OER Delphi Study e-mail memo (Appendix G) to individuals who met the criteria for inclusion as OER higher education experts. The e-mail memo included the purpose of the study and criteria for participation. Prospective panelists were requested to contact the researcher if they were interested in participating in the study. Subsequently, the researcher sent a Participation in OER Delphi Study e-mail memo (Appendix G) to prospective panelists who had expressed interest and agreement; the e-mail included the purpose of the study, a

description of the multiple rounds, expectations for participation, a timeline, study requirements, the Informed Consent to Participate form (Appendix H), the Research Participants' Bill of Rights (Appendix I), and SurveyMonkey instructions and a test SurveyMonkey form (Appendix J) on which they completed demographic information.

Anonymity is a bedrock component of the Delphi method (Hsu & Sandford, 2007; Jones & Hunter, 1995; Lang, 1995; Rowe & Wright, 1999). Based on the recommendation of Falzarano and Pinto (2013) concerning anonymity and confidentiality of the data collection process, each OER higher education expert was assigned a numerical code that was known only to the researcher. The study occurred from March 26, 2018, to April 25, 2018. OER higher education expert panelists were asked to complete each round within 5 to 7 days. On the third day of each round, panelists were re-sent the original e-mail with a reminder of the deadline date on which the survey instrument would close in the subject line of the e-mail.

Round 1

To begin Round 1, on March 26, 2018, expert panelists were sent an e-mail with a web URL link to access the online, anonymous, open-ended questionnaire for Round 1, which included an introduction, instructions, terms and definitions, a deadline of March 30, 2018, and contact information for the researcher (Appendix K). The goal of the Round 1 question was to elicit feedback on activities needed to advance faculty adoption of OER over the next 10 years in public colleges and universities in the United States. Sixteen OER higher education expert panelists completed the Round 1 questionnaire, resulting in a 0% participation/mortality rate.

Round 2

In Round 2, on April 5, 2018, the OER higher education expert panel was sent another e-mail with the URL and instructions for completing the Round 2 questionnaire (Appendix L) to be completed by April 12, 2018. Panelists were provided 2 additional days in order to complete their ratings of the 70 activity statements for importance and likelihood. Using SurveyMonkey, the OER higher education expert panelists were provided with a 10-point Likert scale that asked them to rate the degree of importance of activities identified in Round 1, from 1 (the lowest) to 10 (the highest; Appendix D). Expert panelists were also asked to provide a measure of the likelihood of implementation of those identified activities on a 100-point percentage scale, using 100% (the greatest likelihood) to 0% (the least likelihood). Sixteen expert panelists completed the Round 2 questionnaire, resulting in a 0% participation/mortality rate.

Round 3

In Round 3, on April 18, 2018, members of the OER higher education expert panel were sent an e-mail with the URL and instructions for completing the Round 3 questionnaire (Appendix M) to be completed by April 25, 2018. Expert panelists were asked to review and compare the rating responses they provided in Round 2 with the panel median and IQR ratings and percentage scores. They were provided with an opportunity to change their ratings if they elected to do so. Also, panelists were provided with the opportunity to comment on any of the activities that were particularly interesting to them.

Experimental Attrition

Attrition, which deals with participants withdrawing during the course of a research study, is one of several threats to internal validity (McMillan & Schumacher, 2010). Experimental attrition or mortality places emphasis on a study's internal validity and on the ability to generalize results following the loss of subjects. Jurs and Glass (1971) suggested increasing the size of the study sample and offering a monetary incentive to minimize the risks of experimental attrition. The current researcher sought 25 experts to complete the study. Although the researcher only succeeded in recruiting 16 eligible experts after multiple calls for participation, all of them completed all three rounds, resulting in a 0% loss overall across the three rounds.

Data Analysis

Analysis of data in Delphi studies is typically performed using descriptive statistics (von der Gracht, 2012), which the researcher employed at the conclusion of Rounds 2 and 3. The most prevalent statistics used in Delphi studies are measures of central tendency (mean, median, mode) and measures of variability, namely the IQR and standard deviation (Giannarou & Zervas, 2014; Hasson, Keeney, & McKenna, 2000; Hsu & Sandford, 2007). The former measure is utilized to demonstrate group aggregate rankings and the latter to reflect the level of consensus (Giannarou & Zervas, 2014; Holey, Feeley, Dixon, & Whittaker, 2007; von der Gracht, 2012). For this study, the median, percentage scores, and the IQR were selected to compute the degree of importance and likelihood of implementation ratings of each of the expert panel opinions. The median is the "midpoint of a distribution of scores" (McMillan & Schumacher, 2010, p. 158), with 50% of the scores distributed below the median and 50% distributed above

it. The literature supports the suitability of the median for capturing the middle or typical response as well as extremely dispersed responses and convergence of opinions (Hsu & Sandford, 2007; McMillan & Schumacher, 2010). The IQR (the middle 50%) provides a measure of the spread of scores and demonstrates where the majority of values lie in a data set. It is supported in the literature as a rigorous and reputable approach for determining consensus (von der Gracht, 2012). When measuring consensus using the Delphi technique, von der Gracht (2012) recommended an IQR of 2 when using a 10-point Likert scale, with the research of Giannarou and Zervas (2014) suggesting an IQR of 2.5 or less. Consequently, the researcher utilized a maximum IQR of 2 as a measure of agreement among expert panel responses.

Harvey, Bearley, and Corkrum (1997) recommended the use of a priority matrix when preferences regarding priorities are in question and when "weighing the importance of alternatives is called for" (p. 62). A priority matrix, a "non-quantitative device that allows decision makers to prioritize their choices by comparing their relative importance and feasibility" (Harvey et al., 1997, p. 208), facilitated a visual examination of the degree of importance and likelihood of implementation of the expert recommendations collected in Round 2. It enabled a visual depiction of low, medium, and high priorities. The priority matrix, consisting of nine cells, contained the likelihood of implementation represented on the *x*-axis and the degree of importance represented on the *y*-axis. Figure 1 demonstrates the priority matrix template that was used to capture the consensus level related to each response.

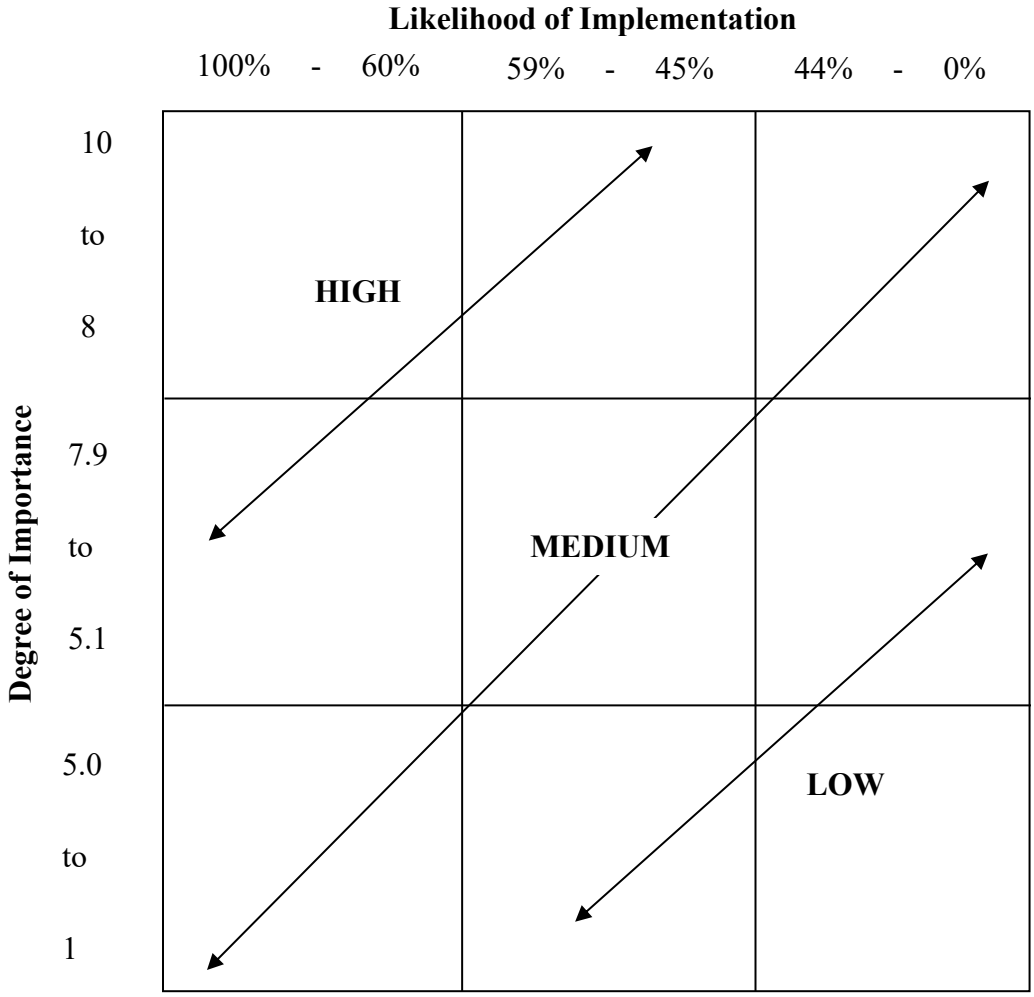

Figure 1. Priority matrix provides a high-to-low visual representation of ratings received from the OER higher education expert panelists.

Limitations

Linstone and Turoff (2002), seminal scholars of the Delphi technique, proffered five limitations that can cause it to fail:

1. Imposing monitor views and preconceptions of a problem upon the respondent group by overspecifying the structure of the Delphi and not allowing for the contribution of other perspectives related to the problem

2. Assuming that Delphi can be a surrogate for all other human communications in a given situation
3. Poor techniques of summarizing and presenting the group response and ensuring common interpretations of the evaluation scales utilized in the exercise
4. Ignoring and not exploring disagreements, so that discouraged dissenters drop out and an artificial consensus is generated
5. Underestimating the demanding nature of a Delphi and the fact that tire [*sic*] respondents should be recognized as consultants and properly compensated for their time if the Delphi is not an integral part of their job function. (p. 6)

In addition to the limitations of the Delphi technique set forth by Linstone and Turoff, these limitations also apply to the study:

1. A different expert panel composition may result in different outcomes. Although the discussion of OER has generated substantial interest around the globe, the researcher chose a heterogeneous faculty panel from within the United States. The absence of expert opinions from stakeholders outside of the United States may have resulted in a less comprehensive review and analysis of the solutions needed to address this problem.
2. The Delphi technique brings experts together to provide input on a problem until consensus is formed. Although the strategies identified may have great potential to solve the challenges related to advancing faculty adoption of OER, the data gleaned from experts are not automatically generalizable to the larger population because of the small sample.

The researcher, where possible, undertook the following actions to attenuate limitations of the research study design:

- The open-ended question designed for Round 1 was created so as not to be overly specific. For example, the use of the word *activities* enabled OER higher education expert panel members to interpret that as they saw fit with respect to OER faculty adoption.
- Data were coded and summarized using strategies such as analyzing word repetitions and large blocks of text (Ryan & Bernard, 2003).
- OER higher education panel experts were carefully chosen based on the outlined criteria to promote relevance of findings to higher education institutions in the United States.

Summary

The Delphi technique, first developed by Helmer and Dalkey at the RAND Corporation, was used in the study. The major components of the Delphi technique are (a) expert panels that provide (b) input on a problem through (c) successive iterations of questionnaires. Panel members have the opportunity to review their own responses and those of other panelists anonymously until a level of consensus has been reached. The mixed-methods approach utilizes open-ended questions for the first round and closed-ended questions and descriptive statistics to analyze Round 2 and 3 responses.

The data from the three rounds in this study were collected over the course of 5 weeks from March 26, 2018, to April 25, 2018. Sixteen individuals participated in the study. Round 1 asked participants to identify activities that need to be addressed in order to advance faculty adoption of OER in colleges and universities in the United States. In

Rounds 2 and 3, expert panelists were asked to rate Round 1 responses according to their importance and likelihood of implementation. Results of the iterative rounds are discussed in Chapter IV.

CHAPTER IV: RESEARCH, DATA COLLECTION, AND FINDINGS

Overview

This study was designed to convene a panel of experts and to bring them to consensus concerning the importance of specified activities to advance faculty adoption of open educational resources (OER) and the likelihood of implementation of these activities by higher education faculty and administrators. The Delphi technique, a forecasting and consensus building tool (Critcher & Gladstone, 1998; Mullen, 2003; Rowe & Wright, 1999), was employed in three successive rounds. The Delphi utilized a mixed-methods approach. Round 1 drew upon a qualitative method, asking higher education expert panelists to list activities they thought valuable and relevant to advancing faculty adoption of OER in higher education institutions over the next 10 years. Round 2 requested that panelists rate the degree of importance, using a 10-point Likert scale, from 1 (lowest) to 10 (highest) and the likelihood of implementation, with a 100-point percentage scale (0, least likelihood to 100, greatest likelihood) for the activities identified in Round 1.

In Round 2, the median, a measure of central tendency, and percentages were used to determine the degree of importance and likelihood of implementation for the OER activities, while the interquartile range, a measure of dispersion, was employed to provide information on the extent to which the values in the dataset were dispersed. After Round 3, analysis of the median, interquartile range, and frequencies data enabled the researcher to identify areas of consensus for the research findings. In particular, a median on the high end of the range determined a high degree of importance or likelihood of implementation and the interquartile range determined the level of

consensus. For the purposes of this study, an interquartile range (IQR) of 2.50 or less signaled consensus.

This chapter is comprised of eight sections: (a) purpose statement, (b) research questions, (c) research methods and data collection procedures, (d) population, (e) sample, (f) demographic data, (g) presentation and analysis of data, and (g) summary.

Purpose Statement

The purpose of this Delphi study was to identify and describe the perceptions of open educational resources (OER) higher education experts regarding the activities needed at colleges and universities in the United States in order to advance faculty adoption of OER over the next 10 years. Also, this study examined those activities that were most important and had the greatest likelihood of being implemented.

Research Questions

The following questions were investigated to address the purpose of the study:

1. What activities do OER higher education experts believe will advance faculty adoption of OER at colleges and universities in the United States over the next 10 years?
2. Which activities do OER higher education experts believe are most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?
3. What is the likelihood of implementation of the activities that OER higher education experts perceive as most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?

Research Methods and Data Collection Procedures

This study employed the Delphi technique, a mixed-methods research design in which the researcher is actively engaged in constructing knowledge. The Delphi method, whose goals are forecasting and consensus building, was utilized over three successive rounds during which a panel of experts' opinions were solicited regarding faculty OER adoption at higher education institutions in the United States. The hallmark features of a Delphi method are structured questioning, iteration, controlled feedback, and anonymity of responses. The initial 17 expert panelists were each assigned a three-digit identifying code that was used during each round. SurveyMonkey, a reputable online survey tool, was utilized to distribute each of the questionnaires.

Ludwig (1994) suggested that "solicitation of nominations of well-known and respected individuals from the members within the target group of experts was recommended" (p. 52). Therefore, the researcher solicited nominations from the following prominent individuals in the OER field: Gerard Hanley, PhD, assistant vice chancellor of Academic Technology Services for the CSU system and executive director of MERLOT; Jane Moore, EdD, director of MERLOT Editorial and Professional Development Services and editor of the MERLOT Teacher Education Editorial Board; and Leslie Kennedy, EdD, director of Affordable Learning Solutions for the CSU system. On March 11, 2018, Dr. Hanley sent an initial e-mail memo soliciting participation from experts in the OER field (Appendix G). Drs. Moore and Kennedy re-sent that initial e-mail memo in their follow-up correspondence to potential panelists up until March 25, 2018. Potential panelists who contacted the researcher expressing interest in the study were sent a Participation in OER Delphi Study e-mail (Appendix G). As each panelist

signaled his or her agreement to participate, he or she was sent two e-mails: The first e-mail contained the Consent to Participate in Delphi Study e-mail (Appendix H), which provided the three-digit participant code, a URL for the SurveyMonkey consent form, eligibility criteria for participation, and an attachment with the Research Participants' Bill of Rights (Appendix I). The second e-mail included information on and the URL for the SurveyMonkey Initial Test and Demographic Survey document (Appendix J). Upon completion of the panelists' adherence to the participation eligibility requirements, two people not meeting the eligibility requirement of a minimum of 5 years of involvement in OER adoption, implementation, or sustainability activities were removed, leaving 18 eligible expert panelists. One day prior to the beginning of Round 1, an expert panelist withdrew due to a family emergency, and one panelist, who had consented to participate, did not complete the Round 1 questionnaire. Consequently, of the initial 20 expert panelists, 16 completed the Round 1 questionnaire. On March 26, 2018, expert panelists received the Round 1 questionnaire e-mail containing their three-digit participant code, the SurveyMonkey URL and the deadline for Round 1 (Appendix K). Round 1 was held from March 26, 2018, to March 30, 2018.

Round 1 of the study consisted of the following open-ended question to elicit feedback on Research Question 1 concerning future best practices for implementing OER: What are four to six activities you believe should be implemented in order to advance faculty adoption of OER over the next 10 years in colleges and universities in the United States? Expert panelists submitted 76 activities (Appendix N). Following the approach suggested by Keeney, Hasson, and McKenna (2011) for analyzing data from a Delphi study, first, the researcher transferred the responses into one document and read

over each statement several times to identify similar and unique ideas. Afterwards, similar ideas were aggregated into a singular statement and the statements were aggregated into themes (Appendices O and P). Unique statements were transferred verbatim into the Round 2 questionnaire.

To ensure intercoder reliability, a colleague of the researcher who was a community college director of a dance program and a graduate of the Brandman University doctoral program participated in the coding of Round 1 open-ended responses. The raw data and statements, grouped by themes, were sent to the colleague who reviewed the groupings. The colleague reviewed the raw data and aggregated statements, making recommendations for additional or alternative groupings and themes to improve clarity. The original group of 76 activities was narrowed to 35 activity statements to advance faculty adoption of OER and grouped into the following nine themes:

1. Administrative and institutional activities
2. Professional development for 5Rs (retain, reuse, revise, remix, redistribute), searching and locating quality OER
3. Discovery, access, and quality of OER
4. Faculty incentives and awareness building of OER
5. Academic governance and reappointment, tenure, and promotion
6. Student involvement in OER
7. Department and discipline-based activities
8. Faculty OER development activities
9. Faculty partners

Although Keeney et al. (2011) suggested organizing the Round 2 questionnaire into themes, the researcher and her colleague determined it best to present the 35 individual activity statements to the OER higher education expert panelists without the themes in order to avoid bias (see Appendix O).

Round 2 of the Delphi study was conducted from April 5, 2018, to April 12, 2018. OER higher education expert panelists were sent an e-mail (Appendix L) with Round 2 instructions and the URL to the Round 2 SurveyMonkey questionnaire (Appendix D) that contained the 35 activity statements from Round 1. The e-mail was accompanied by an attached rating sheet with the 35 items to facilitate their review and scoring of each activity statement (Appendix P). Panelists were asked to rate each activity statement in terms of degree of importance, utilizing a 10-point Likert scale from 1 to 10, and likelihood of implementation, utilizing an 11-point scale from 0% to 100%. For each scale, the lower end represented the least importance and likelihood of implementation respectively. After the expert panel members completed their Round 2 ratings, the collective median response rates for the panel were computed for each activity statement with respect to importance and likelihood of implementation. This information formed the basis of the information provided to panelists in Round 3.

Round 3 of the Delphi study was conducted from April 18, 2018, through April 25, 2018. OER higher education expert panelists were sent an e-mail (Appendix M) explaining the consensus focus, information about submitting comments on each activity statement, and a URL to access their individual Round 3 survey via SurveyMonkey. In this third and final round, for each of the 35 activity statements, each OER high education panel expert was supplied with his/her individual rating for degree of importance and

likelihood of implementation, along with the collective expert panel median response rates. The median, a measure of central tendency that describes the midpoint or middle range of a list of values, was selected as the most appropriate means to describe the data because they are not skewed by extremely large or small values. During this round, expert panelists were asked to review their individual rating responses, compare them to the collective median responses, and make a decision to change their rating, if they elected to do so. Also, expert panelists had the opportunity to provide comments on their ratings for each activity statement, if they chose to.

Population

The target population for this Delphi study was a group of OER higher education faculty experts from postsecondary institutions in the United States. The sampling frame was comprised from a list of 51 faculty campus coordinators for California bill AB 798, legislation that supports textbook affordability programs and from a list of 566 faculty peer reviewers, from across the nation, selected to serve on the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) editorial boards.

Sample

The identification and selection of a panel of experts are fundamental elements of the Delphi method (Hsu & Sandford, 2007; Okoli & Pawlowski, 2004; Skulmoski et al., 2007). The group of experts represent a sample of the larger population for the study. This study utilized a purposive criterion sampling method (McMillan & Schumacher, 2010; Patten, 2012), which was selected because it required the panel to meet a particular set of criteria in order to be selected for the sample. The researcher's goal was to recruit 20 to 25 experts in order to account for attrition. However, ultimately, the sample for this

Delphi study consisted of 16 OER higher education faculty experts drawn from the list of California AB 798 campus coordinators or MERLOT faculty peer reviewers from across the nation.

Demographic Data

Figure 2 provides a graphical overview of the expert panel demographic characteristics. OER higher education faculty experts were asked to provide information on their institution type, discipline area, faculty designation, the number of years as a faculty member, and the number of years of experience working with OER. The majority (nearly 70%) of the expert panel worked at 4-year institutions: seven from master's/doctoral granting public colleges or universities that offered 20 or fewer doctoral degrees and three from master's/doctoral granting private colleges or universities.

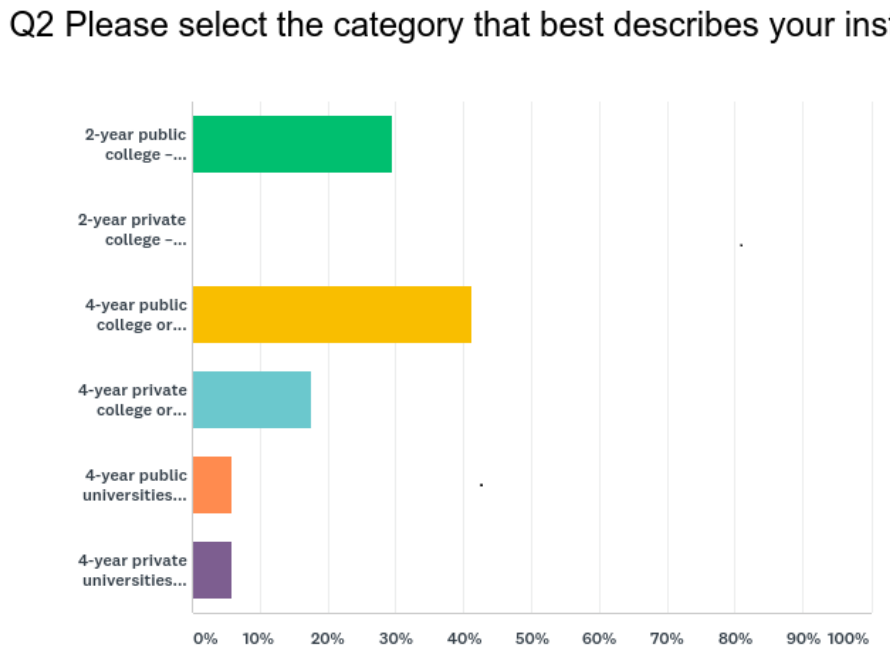

Figure 2. Institutional types for expert panel.

With the exception of the Arts, all major disciplinary categories were represented in the sample (see Figure 3). The behavioral and social sciences, health sciences/nursing, and library and information science each comprised approximately 18% of the discipline areas represented by the expert panel, followed by approximately 12% of faculty working either in the natural sciences, humanities, or mathematics. Education and business/management/public policy were each represented by approximately 6% of the expert panel. Similar to the disciplinary affiliations, all faculty designations were presented in the panel as follows: Two part-time faculty members, five full-time faculty lecturers, three tenure-track faculty members, and six tenured faculty members.

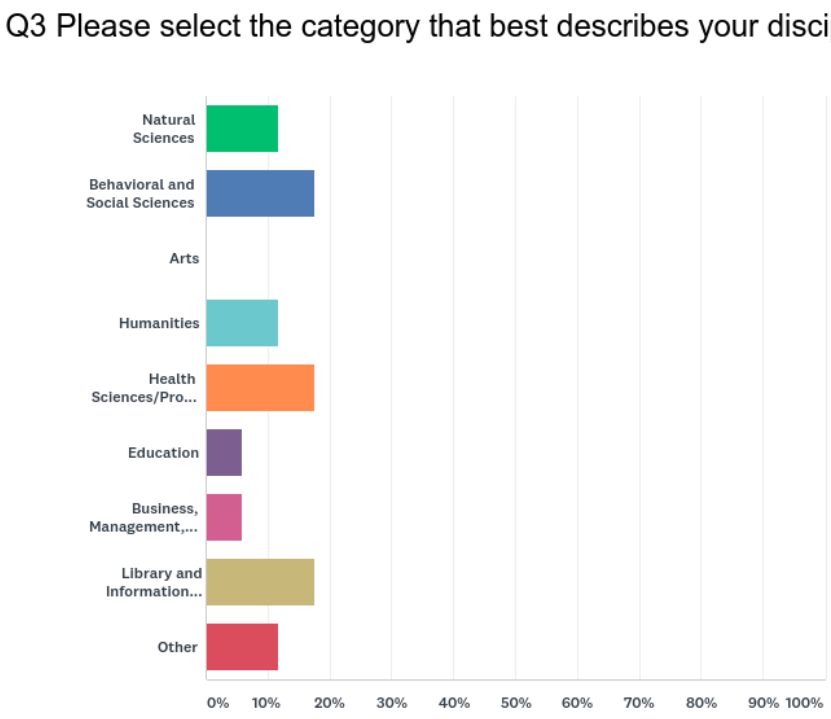

Figure 3. Discipline area for expert panel.

Figure 4 highlights the number of years the faculty expert panelists in the study had worked as faculty members. All of them had worked in higher education settings for at least 5 years.

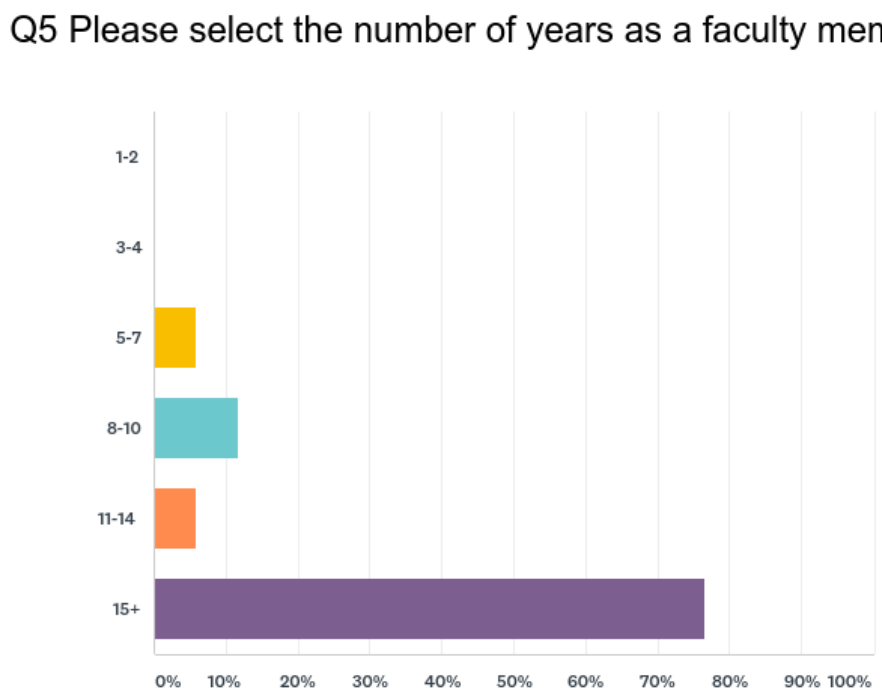

Figure 4. Number of years as a faculty member.

It is noteworthy that 13 of the 16 panelists had worked in higher education institutions for 15 or more years, portending a significant amount of experience with and knowledge of faculty, departmental, and institutional operations and norms, including those concerning the capacity for change and adoption of innovations. The criteria for the sample of experts included a minimum of 5 years of experience working with OER. As noted in Figure 4, most panelists had worked with facets of OER for 10 or more years and 14 of the 16 panelists spanned a minimum of 7 years to over a decade of experience with OER.

Presentation and Analysis of Data

In Round 1 of the Delphi study, the 16 OER higher education experts were asked to identify four to six activities to advance faculty adoption of OER. The panelists submitted 76 recommended activities. After grouping similar items, the researcher presented 35 recommended activities for the Round 2 questionnaire. In Round 2, the 16 OER higher education expert panelists were asked to rate the importance and likelihood of implementation on a Likert scale of 1 to 10 and 0% to 100% respectively. In Round 3, the 16 panelists were asked to compare their individual ratings from Round 2 with the collective median panelists' response ratings. They were provided the opportunity to revise their rating scores and to add comments, if they elected to do so.

Table 1 provides the frequency and sum of changes that were made by the expert panelists concerning the rating of 35 activities in terms of degree of importance and the

Table 1

Frequency and Sum of Changes for Importance and Likelihood of Implementation of OER Adoption Activities From Round 2 to Round 3

Importance			Likelihood of implementation		
Number of changes	Number of panelists	Sum of changes	Number of changes	Number of panelists	Sum of changes
0	5	0	0	5	0
1	3	3	1	4	4
2	3	6	2	2	4
3	2	6	3	2	6
4	0	0	4	0	0
5	2	10	5	0	0
6	0	0	6	1	6
7	0	0	7	0	0
8	0	0	8	1	8
9	0	0	9	0	0
10	0	0	10	0	0
20	1	20	25	1	25

rating of 35 activities in terms of likelihood of implementation of OER adoption activities from Round 2 to Round 3.

Overall, 45 (8%) changes were made to the ratings for degree of importance and 53 (9.4%) changes for likelihood of implementation resulting in a total of 98 (17.4%) changes within the two rated categories. Equally, five expert panelists chose not to make any changes to either the degree of importance or the likelihood of implementation for the 70 activities from Round 2 to Round 3. Of the group of 16 OER higher education expert panelists, there was one outlier who entered 20 revisions (57%) to his/her degree of importance scores and 25 (71%) rating changes for likelihood of implementation. In order to ensure that the outlier scores did not negatively skew the data, the researcher analyzed the data with and without the outlier. Removal of the outlier data resulted in 25 (4.7%) and 28 (5.3%) revisions to degree of importance and likelihood of implementation, respectively, for the group of 15 expert panelists.

Table 2 presents data on the rating change values and sum of changes for degree of importance and likelihood of implementation ratings for OER adoption activities from Round 2 to Round 3.

Overall, the OER higher education expert panelists elected to change the value of an activity rating upward or downward 46 times for degree of importance and 53 times for likelihood of implementation, for a total of 99 revisions in Round 3 from Round 2. More specifically, increases of 37 to the degree of importance and 42 to the likelihood of implementation ratings were made, for a total of 79 rating value revisions upward.

Table 2

Rating Change Values and Sum of Changes for Importance and Likelihood of Implementation Ratings of OER Adoption Activities

Importance				Likelihood of implementation			
Rating change value	Increase	Decrease	Sum of changes	Rating change value	Increase	Decrease	Sum of changes
1	17	3	20	10%	14	5	19
2	12	2	14	20%	8	4	12
3	0	2	2	30%	8	2	10
4	3	2	5	40%	6	0	6
5	1	0	1	50%	2	0	2
6	4	0	4	60%	2	0	2
				70%	1	0	1
				80%	1	0	1
Total	37	9	46	Total	42	11	53

Similarly, decreases of nine to the degree of importance and 11 to the likelihood of implementation ratings were made, for a total of 20 rating value revisions downward. The expert panel increased its ratings 24% more frequently for degree of importance and 26% more frequently for likelihood of implementation, enabling the researcher to make the point that panelists increased their ratings a great deal more than they decreased ratings between Round 2 and Round 3. The greatest changes in value were made by only an increase of one or two value points. Particularly, 34 changes were made by a one- or two-point increase or decrease to degree of importance, and similarly, 31 changes were made to likelihood of implementation by either one or two value points.

Tables 3 and 4 provide information concerning OER adoption activities whose ratings were changed most frequently between Rounds 2 and 3 for degree of importance and likelihood of implementation.

Table 3

OER Adoption Activities With Most Frequently Changed Ratings Between Rounds 2 and 3 for Importance

Research finding number	Frequency of change	Round 2		Round 3		Difference	
		Median	IQR	Median	IQR	Median	IQR
35	4	8.5	3.50	9.0	3.00	-0.5	+0.50
5	3	9.0	3.00	9.0	1.25	0.0	+1.75
16	3	9.5	2.50	10.0	2.00	-0.5	+0.25

Table 4

OER Adoption Activities With Most Frequently Changed Ratings Between Rounds 2 and 3 for Likelihood of Implementation

Research finding number	Frequency of change	Round 2		Round 3		Difference	
		Median	IQR	Median	IQR	Median	IQR
35	4	70%	3.50	65%	3.00	-5	-0.50
4	3	70%	3.75	70%	2.25	0	-1.50
5	3	70%	4.25	75%	3.25	+5	-1.00
16	3	50%	4.00	50%	3.50	0	-0.50
29	3	60%	4.75	65%	3.50	+5	-1.25

With regard to degree of importance, only three of the 35 OER research findings had three or more changes occur; two of them contained a median score decrease of .05, and the third research finding experienced no change to the median score. The changes revealed in Table 3 concerning OER Research Findings 5 and 16 resulted in movement toward consensus. OER Activity 5, which states, "Develop multi-institutional strategies for OER adoption (e.g., Open SUNY Textbook, CSU Affordable Learning Solutions," received an IQR of 3.00 in Round 2 and a positive increase of 1.75 in Round 3 to an ending IQR of 1.25. This transition in IQR resulted in expert panel consensus as it met the study's minimum threshold of 2.50 or less to indicate consensus. Similarly, OER research Finding 16, which states, "Provide faculty funding and/or release time to write

texts, develop ancillary materials (e.g., test banks, problem sets), participate in OER peer review activities, and in course redesign projects," began with an IQR of 2.50 in Round 2 and experienced a positive increase to an IQR of 2.00, also confirming expert panel consensus.

As it relates to the Table 4 data on likelihood of implementation, five OER research findings contained three or more changes. With respect to the median score, OER Research Findings 5 and 29 demonstrated increases of 5%, with OER Research Finding 35 presenting a 5% decrease in the median score. The remaining two OER research findings revealed no changes to the median scores between Rounds 2 and 3. Although the IQR data presented positive revisions in all five OER research findings, only one resulted in expert panel consensus. OER research Finding 4, which states, "Form partnerships with OER providers (e.g., Lumen Learning, OpenStax, MERLOT, etc.) that develop, maintain, and host OER for most commonly taught courses," demonstrated movement to expert panel consensus for likelihood of implementation with the transition of the IQR from 3.75 in Round 2 to 2.25 in Round 3, which satisfied the minimum qualifying IQR rating of 2.50 or less to signal consensus.

Research Question 1

The first research question in this study on faculty adoption of OER was the following: "What activities do OER higher education experts believe will advance faculty adoption of OER at colleges and universities in the United States over the next 10 years?" In order to address Research Question 1, during Round 1, OER higher education experts were asked to identify four to six activities that might advance faculty adoption of OER over the next 10 years. The expert panelists submitted 76 OER activities that they

thought would advance faculty adoption of OER. After removing duplicated ideas, the researcher summarized and aggregated the remaining activities into 35 statements. Table 5 displays the 35 aggregated OER activities identified in Round 1 in the order in which they appeared on the SurveyMonkey questionnaires, along with the median ratings from Round 2 and Round 3 pertaining to degree of importance and likelihood of implementation. A list of the 76 originally submitted OER activities is found in Appendix N.

An examination of the 35 OER activities revealed several overarching themes: seven concerned activities to be acted upon by the institution, three dealt with professional development, three concerned providing access to quality OER, three related to building faculty awareness and incentives for OER, two involved utilizing academic governance bodies to promote OER adoption, four called out student involvement activities, four pointed to department and discipline-based activities, six considered faculty peer OER activities, and three revolved around engagement with faculty partners.

The median scores for degree of importance remained consistently unchanged from Round 2 to Round 3, with the exception of four scores that changed by .5 and two scores that changed by one full point, signaling that the OER expert panel members' opinions of the importance of these activities only minimally changed over the course of the two rounds. Similarly, with the likelihood of implementation median ratings, only seven scores were either increased or decreased, with six of the seven scores moving upward or downward by only .5% and one score increasing by 1%, again signaling minimal change in opinions among the OER expert panel members over the course of the two rounds.

Table 5

Aggregated Version of the OER Activities With Rounds 2 and 3 Panel Median Ratings

OER activity	Median scores: Importance R-2	Importance R-3	Likelihood R-2	Likelihood R-3
1. Provide administrative support to collect data and publicize the value of OER to promote student success, retention, & graduation.	9.0	9.0	50%	60%
2. Advocate that administration mandate faculty involvement in OER activities.	3.0	2.5	25%	30%
3. Showcase faculty exemplars and highlight best practices on incorporating OER into courses.	9.0	9.0	80%	80%
4. Form partnerships with OER providers (e.g., Lumen Learning, OpenStax, MERLOT, etc.) that develop, maintain, and host OER for most commonly taught courses.	7.5	7.5	70%	70%
5. Develop multiinstitutional strategies OER adoption (e.g., Open SUNY Textbook, CSU Affordable Learning Solutions).	9.0	9.0	70%	75%
6. Develop file format best practices for creating and adapting OERs to reduce faculty obstacles when they try to adapt and use OER materials created by others.	9.0	9.0	45%	45%
7. Continue to develop consortial or campus publishing programs to support the creation of specialized OER (i.e., beyond textbooks), such as customized digital learning objects, that meet the needs of upper division curricula.	8.5	8.5	60%	60%
8. Provide training/workshops in multiple delivery formats on creating, revising, remixing, redistributing, OER.	9.0	9.0	80%	80%
9. Provide training on searching, locating, and evaluating OER.	9.0	9.0	80%	80%
10. Provide institutional support for OER learning communities for professional development.	8.5	8.5	70%	70%
11. Provide access to OER collections that contain high-quality, peer-reviewed OER materials (e.g., MERLOT).	9.5	9.5	95%	95%

Table 5 (*continued*)

OER activity	Median scores: Importance R-2	Importance R-3	Likelihood R-2	Likelihood R-3
12. Increase the quality of OERs that are created and currently are made available.	9.5	9.5	65%	65%
13. Provide criteria to faculty for evaluating OER.	8.0	8.0	70%	70%
14. Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation.	9.5	9.5	70%	70%
15. Provide faculty with research and research-based factors on OER that underscore benefits of OER use in order to optimize their incorporation.	8.0	8.0	75%	75%
16. Provide faculty funding and/or release time to write texts, develop ancillary materials (e.g., test banks, problem sets, participate in OER peer review activities, and in-course redesign projects.	9.5	10.0	50%	50%
17. Engage academic governance (e.g., Academic Senate) in OER process by forming OER governance committees.	5.5	6.5	60%	60%
18. Utilize academic governance structure to advocate for changes to the retention, tenure, and promotion processes that recognize faculty contributions to OER creation, adaptation, and use.	8.5	8.5	50%	50%
19. Engage students in the OER Adoption process (e.g., representation on academic governance committees).	6.5	6.0	60%	60%
20. Enable student feedback on OER course evaluation forms so that faculty can include the information in retention, tenure, and promotion files.	7.0	6.0	55%	55%
21. Students should increase their demands for free and/or low-cost affordable learning materials.	7.5	7.5	55%	50%
22. Provide opportunities for students to generate quality OER during their classes.	7.5	7.5	50%	50%

Table 5 (*continued*)

OER activity	Median scores: Importance R-2	Importance R-3	Likelihood R-2	Likelihood R-3
23. Set aside a meaningful portion of department faculty meeting time to discuss ways to use and scale OER within courses.	8.0	8.0	50%	50%
24. Create discipline-specific workgroups that create and curate OER to be shared at the institutional, statewide, and national levels/conferences.	8.5	8.5	60%	60%
25. Share OER content with instructors teaching the same courses.	9.5	9.5	75%	75%
26. Create more OER for other disciplines and within majors.	9.5	9.5	50%	50%
27. Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions.	8.0	8.0	75%	70%
28. Exert peer pressure with colleagues to engage in OER activities.	5.0	5.0	40%	40%
29. Review and revise OER content to align with course activities and instructor's teaching style.	8.0	8.0	60%	65%
30. Adopt open pedagogy practices.	9.0	9.0	60%	60%
31. Engage in research that highlights the impact of OER on students and faculty.	8.0	8.0	50%	50%
32. Create zero textbook cost pathways within majors.	8.0	8.0	65%	65%
33. Engage librarians as selectors and advocates for OER adoption.	8.0	8.0	65%	65%
34. Create OER professional development opportunities for instructional designers to facilitate their understanding of its value.	8.5	8.5	65%	65%
35. Encourage partnerships with Academic Technology, Disability Resources, and faculty mentors to increase OER adoption.	8.5	9.0	70%	65%

Note. R-2 = Round 2; R-3 = Round 3.

Research Question 2

The second research question dealing with faculty adoption of OER was, "Which activities do OER higher education experts believe are most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?" In Round 2, the 16-member OER higher education expert panel was asked to rate the 35 activities for degree of importance, utilizing a 10-point Likert scale and an 11-point Likert scale for likelihood of implementation. The lower numbers for each scale reflected lesser importance and likelihood and the higher numbers indicated greater importance and likelihood.

The median rank order for importance of OER adoption activity findings determined from Round 3 data is presented in Table 6. The median expert panel scores

Table 6

Round 3 Median Rank Order for Importance of OER Adoption Activity Findings

Rank	Item	Median	IQR	Rank	Item	Median	IQR
1	16	10.0	2.00	19	7	8.5	3.00
2	26	9.5	2.50	20	33	8.0	3.50
3	25	9.5	1.25	21	32	8.0	2.25
4	14	9.5	2.00	22	31	8.0	1.25
5	12	9.5	1.25	23	29	8.0	2.25
6	11	9.5	1.00	24	27	8.0	1.25
7	35	9.0	3.00	25	23	8.0	1.50
8	30	9.0	2.00	26	15	8.0	3.00
9	9	9.0	2.00	27	13	8.0	3.00
10	8	9.0	3.00	28	22	7.5	3.25
11	6	9.0	3.50	29	21	7.5	3.75
12	5	9.0	1.25	30	4	7.5	2.50
13	3	9.0	3.00	31	17	6.5	5.00
14	1	9.0	2.75	32	20	6.0	5.25
15	34	8.5	3.00	33	19	6.0	3.25
16	24	8.5	1.25	34	28	5.0	4.00
17	18	8.5	2.25	35	2	2.5	6.00
18	10	8.5	1.25				

for degree of importance in Round 3 ranged from 2.5 to 10.0. For the purposes of this study, OER activities with median scores of 8.0 or above and with an IQR of 2.50 or lower were deemed to be of high importance. Despite the wide dispersion of median scores, fully 77% of them were dispersed between 8.0 and 10.0. Specifically, the range of median expert panel scores from 8.0 to 9.5 accounted for 74% of the activities.

Item 16, "Provide faculty funding and/or release time to write texts, develop ancillary materials (e.g., test banks, problem sets), participate in OER peer review activities, and in course redesign projects," was the sole activity that received a median score of 10.0. Eighteen of the activities received an IQR of 2.50 or lower, reflecting simply 51% consensus on degree of importance among the expert panel.

Table 7 lists the 17 OER activities from Round 3 whose median and IQR scores produced findings of high importance and consensus. The 17 activities comprised 49% of the 35 activities identified. These were activities with a median score of 8.0 or higher and an IQR of 2.50 or lower. Seventeen percent of the findings had a median score ranging from 9.5 to 10.0 and IQR of 1.00 to 2.25. Only OER activity 16 received the highest median rating of 10.0 for degree of importance and an IQR of 2.00. Of the 16 remaining activities, five received a median score of 9.5, three a median score of 9.0, and eight a median range between 8.0 and 8.5. The group of 17 activities received an IQR within a range between 1.00 and 2.25.

Seven of the nine themes from the 35 activities were represented among the findings of high importance and consensus. Department and disciplined-based activities—Findings 23, 24, 25, 26—and faculty OER development activities—Findings

Table 7

Round 3 OER Activity Findings of High Importance and Consensus

Rank	Activity number	Abbreviated OER activity statement	Median	IQR
1	16	Provide faculty funding and/or release time to write texts, develop ancillary materials (e.g., test banks, problem sets, participate in OER peer review activities, and in course redesign projects.	10.0	2.00
2	11	Provide access to OER collections that contain high-quality, peer-reviewed OER materials (e.g., MERLOT).	9.5	1.00
3	12	Increase the quality of OERs that are created and currently are made available.	9.5	1.25
4	14	Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation.	9.5	2.00
5	25	Share OER content with instructors teaching the same courses.	9.5	1.25
6	26	Create more OER for other disciplines and within majors.	9.5	2.25
7	5	Develop multiinstitutional strategies OER adoption (e.g., Open SUNY Textbook, CSU Affordable Learning Solutions).	9.0	1.25
8	9	Provide training on searching, locating, and evaluating OER.	9.0	2.00
9	30	Adopt open pedagogy practices.	9.0	2.00
10	10	Provide institutional support for OER learning communities for professional development.	8.5	1.25
11	18	Utilize academic governance structure to advocate for changes to the retention, tenure, and promotion processes that recognize faculty contributions to OER creation, adaptation, and use.	8.5	2.25
12	24	Create discipline-specific workgroups that create and curate OER to be shared at the institutional, statewide, and national levels/conferences.	8.5	1.25
13	23	Set aside a meaningful portion of department faculty meeting time to discuss ways to use and scale OER within courses.	8.0	1.50
14	27	Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions.	8.0	1.25
15	29	Review and revise OER content to align with course activities and instructor's teaching style	8.0	2.25
16	31	Engage in research that highlights the impact of OER on students and faculty.	8.0	1.25
17	32	Create zero textbook cost pathways within majors.	8.0	2.25

27, 29, 30, 31, 32—were the two dominant themes from which the expert panel identified activities of high importance and consensus.

Round 3 activities found to be of high importance yet lacking consensus are contained in Table 8. Ten activities received a median score of 8.0 or above. However, nine of the OER activities received an IQR of 3.00 or above, revealing a lack of

Table 8

Round 3 OER Activity Findings of High Importance and Lack of Consensus

Rank	Activity number	Abbreviated OER activity statement	Median	IQR
1	35	Encourage partnerships with Academic Technology, Disability Resources, and faculty mentors to increase OER adoption.	9.0	3.00
2	8	Provide training/workshops in multiple delivery formats on creating, revising, remixing, redistributing, OER.	9.0	3.00
3	6	Develop file format best practices for creating and adapting OERs to reduce faculty obstacles when they try to adapt and use OER materials created by others.	9.0	3.50
4	3	Showcase faculty exemplars and highlight best practices on incorporating OER into courses.	9.0	3.00
5	1	Provide administrative support to collect data and publicize the value of OER to promote student success, retention, & graduation.	9.0	2.75
6	34	Create OER professional development opportunities for instructional designers to facilitate their understanding of its value.	8.5	3.00
7	7	Continue to develop consortial or campus publishing programs to support the creation of specialized OER (i.e., beyond textbooks), such as customized digital learning objects, that meet the needs of upper division curricula.	8.5	3.00
8	33	Engage librarians as selectors and advocates for OER adoption.	8.0	3.50
9	15	Provide faculty with research and research-based factors on OER that underscore benefits of OER use in order to optimize their incorporation.	8.0	3.00
10	13	Provide criteria to faculty for evaluating OER.	8.0	3.00

consensus with respect to degree of importance. Although OER Activities 1, 3, 6, 8, and 35 maintained a Round 3 median score of 9.0, the expert panel was not able to come to consensus over their degree of importance.

Research Question 3

The third research question in this study asked, "What is the likelihood of implementation of the activities that OER higher education experts perceive as most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?" Following the identification of OER activities, in Rounds 2 and 3, the OER higher education expert panel was asked to rate their likelihood of implementation, utilizing a Likert scale that ranged from 0% to 100%. Zero percent signified the lowest likelihood of implementation and 100% reflected the highest likelihood of implementation.

Table 9 displays the median rank order for likelihood of OER activity findings. An activity with a median rating of 60% or higher, combined with an IQR of 2.25 or less indicated a level of consensus among the expert panel. OER Activity 11, which states, "Provide access to OER collections that contain high-quality, peer-reviewed OER materials (e.g., MERLOT) with a median of 95% was the sole activity above 90%, with a corresponding consensus IQR rating of 1. Equally, 34% of the median ratings for likelihood of implementation fell within the high range of 70% to 100% and 60% to 65%. Twenty-eight percent of the median ratings occurred within the 40% to 50% range, and 2.8% or one median score was located at 30%.

Table 9

Round 3 Median Rank Order for Likelihood of Implementation of OER Adoption Activity Findings

Rank	Item	Median	IQR	Rank	Item	Median	IQR
1	11	95%	1.00	19	1	60%	3.50
2	3	80%	2.25	20	7	60%	3.25
3	8	80%	2.25	21	17	60%	3.50
4	9	80%	3.00	22	19	60%	1.25
5	5	75%	3.25	23	24	60%	3.25
6	15	75%	2.25	24	30	60%	2.25
7	25	75%	3.50	25	20	55%	4.25
8	4	70%	2.25	26	16	50%	3.50
9	10	70%	2.00	27	18	50%	3.25
10	13	70%	3.75	28	21	50%	4.25
11	14	70%	2.25	29	22	50%	3.25
12	27	70%	2.00	30	23	50%	3.25
13	12	65%	2.25	31	26	50%	3.50
14	29	65%	3.50	32	31	50%	3.50
15	32	65%	5.25	33	6	45%	4.25
16	33	65%	4.00	34	28	40%	3.00
17	34	65%	4.25	35	2	30%	4.00
18	35	65%	3.00				

The OER activities in Round 3 that received a median score of 60% or higher for this study were determined to have a high likelihood of implementation; 24 of the 35 OER activities met that criteria. However, only those activities that received a median of 60% and an IQR of 2.50 or less were findings that met the criteria for likelihood of implementation and consensus. The 11 research findings that met those two parameters are listed in Table 10.

The four activities centering around OER professional development and the discovery of high-quality OER dominated with respect to likelihood and consensus, with OER activity 19 as the solo activity related to student involvement in OER. Proportionately, institutional, faculty incentives and OER awareness building, and faculty OER development activities comprised the remaining findings for high likelihood of

implementation and consensus. With regard to the themes in which the Table 10 activities are addressed, there was no apparent dominant theme; Themes 1 through 4, which dealt with institutional, professional development, discovery, and awareness-building of OER strategies each contained two activities and Theme 6, which focused on student involvement, was represented by one activity.

Table 10

Round 3 OER Adoption Activity Findings for High Likelihood of Implementation and Consensus

Rank	Activity number	Abbreviated OER activity statement	Median	IQR
1	11	Provide access to OER collections that contain high-quality, peer-reviewed OER materials (e.g., MERLOT).	95%	1.00
2	3	Showcase faculty exemplars and highlight best practices on incorporating OER into courses.	80%	2.25
3	8	Provide training/workshops in multiple delivery formats on creating, revising, remixing, redistributing OER	80%	2.25
4	15	Provide faculty with research and research-based factors on OER that underscore benefits of OER use in order to optimize their incorporation.	75%	2.25
5	4	Form partnerships with OER providers (e.g., Lumen Learning, OpenStax, MERLOT, etc.) that develop, maintain, and host OER for most commonly taught courses.	70%	2.25
6	10	Provide institutional support for OER learning communities for professional development.	70%	2.00
7	14	Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation.	70%	2.25
8	27	Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions.	70%	2.00
9	12	Increase the quality of OERs that are created and currently made available.	65%	2.25
10	19	Engage students in the OER Adoption process (e.g., representation on academic governance committees).	60%	1.25
11	30	Adopt open pedagogy practices.	60%	2.25

For the purposes of this study, activities in Round 3 receiving a median score of 50% or lower had a low probability for implementation. Ten OER activities contained a median score ranging from 40% to 55%, all of which received an IQR of 3.00 or higher, signaling a very low degree of consensus. Item 2, which states, "Advocate that administration mandate faculty involvement in OER activities," received the lowest calculated median of 30% and the second lowest IQR rating of 4.00, signifying a significantly low likelihood of implementation and lack of consensus among the panel of experts. Although Activity 16, "Provide faculty funding and/or release time to write texts, develop ancillary materials (e.g., test banks, problem sets), participate in OER peer review activities, and in course redesign projects," received the highest median rating of 10.0 and an IQR of 2.00, indicating consensus for degree of importance, it was rated quite low, with a median score of 50% and an IQR of 3.50 in terms of likelihood of implementation, indicating a lack of consensus. Therefore, although the OER higher education expert panel arrived at consensus around this activity's importance, the group was quite skeptical about the likelihood of it being implemented.

Table 11 presents the 13 OER activity findings of high likelihood of implementation and yet that lacked consensus. The OER activity findings that lacked consensus had a median score ranging from 60% to 80%; none of the Table 11 activities were rated in the 80-to-100% range for likelihood of implementation. Although, the expert panel asserted above average probability of them being implemented, the lack of consensus was clear among these activities. Interestingly, OER activity Findings 33, 34, and 35 all center on the faculty partners theme. While ranked relatively high with respect

to the median rating, that grouping of activities was not viewed by the OER expert panel as being likely to be implemented within the next 10 years.

Table 11

Round 3 OER Adoption Activity Findings for High Likelihood of Implementation and Lack Consensus

Rank	Activity number	Abbreviated OER activity statement	Median	IQR
1	9	Provide training on searching, locating, and evaluating OER.	80%	3.00
2	5	Develop multiinstitutional strategies for OER adoption (e.g., Open SUNY Textbook, CSU Affordable Learning Solutions).	75%	3.25
3	25	Share OER content with instructors teaching the same courses.	75%	3.50
4	13	Provide criteria to faculty for evaluating OER.	70%	3.75
5	29	Review and revise OER content to align with course activities and instructor's teaching style.	65%	3.50
6	32	Create zero textbook cost pathways within majors.	65%	5.25
7	33	Engage librarians as selectors and advocates for OER adoption.	65%	4.00
8	34	Create OER professional development opportunities for instructional designers to facilitate their understanding of its value.	65%	4.25
9	35	Encourage partnerships with Academic Technology, Disability Resources, and faculty mentors to increase OER adoption.	65%	3.00
10	1	Provide administrative support to collect data and publicize the value of OER to promote student success, retention, and graduation.	60%	3.50
11	7	Continue to develop consortial or campus publishing programs to support the creation of specialized OER (i.e. beyond textbooks), such as customized digital learning objects, that meet the needs of upper division curricula.	60%	3.25
12	17	Engage academic governance (e.g., Academic Senate) in OER process by forming OER governance committees.	60%	3.50
13	24	Create discipline-specific workgroups that create and curate OER to be shared at the institutional, statewide, and national levels/conferences.	60%	3.25

High Priority of Importance and Likelihood of Implementation of OER Adoption Activities

This study sought to identify those OER activities in support of faculty adoption that are of high importance and that could be implemented over the next 10 years. To achieve this goal, OER higher education experts identified a set of potential OER activities in Round 1 and then, over the course of two remaining rounds, rated them according to their degree of importance and their likelihood of implementation.

The priority matrix in Figure 5 contains a depiction of the interplay between the degree of importance and the likelihood of implementation as represented in the median ratings from Round 3. The priority matrix device (Harvey et al., 1997) consists of nine cells, with the vertical axis displaying the degree of importance on a 10-point scale from 1 to 10, while the horizontal axis displays the likelihood of implementation on an 11-point scale from 100% to 0%. The intersection of the ratings for degree of importance and likelihood of implementation are represented by the cells grouped into high, medium, and low ratings; the arrows running through the cells also reflect the high, medium, and low ratings. Each cell in the nine-cell matrix is numbered from 1 to 9, starting in the upper left-hand corner and ending in the lower right-hand corner. The first row's cells are labeled 1, 2, and 4. The second row's cells are labeled 3, 5, and 7, and the third row is labeled 6, 8, and 9. Cells one, two, and three reflect items of high priority; cells four, five, and six represent medium priority; and seven, eight, and nine are considered low priority (Harvey et al., 1997). One represents the highest intersection between the degree of importance and likelihood of implementation while 9 reflects the lowest.

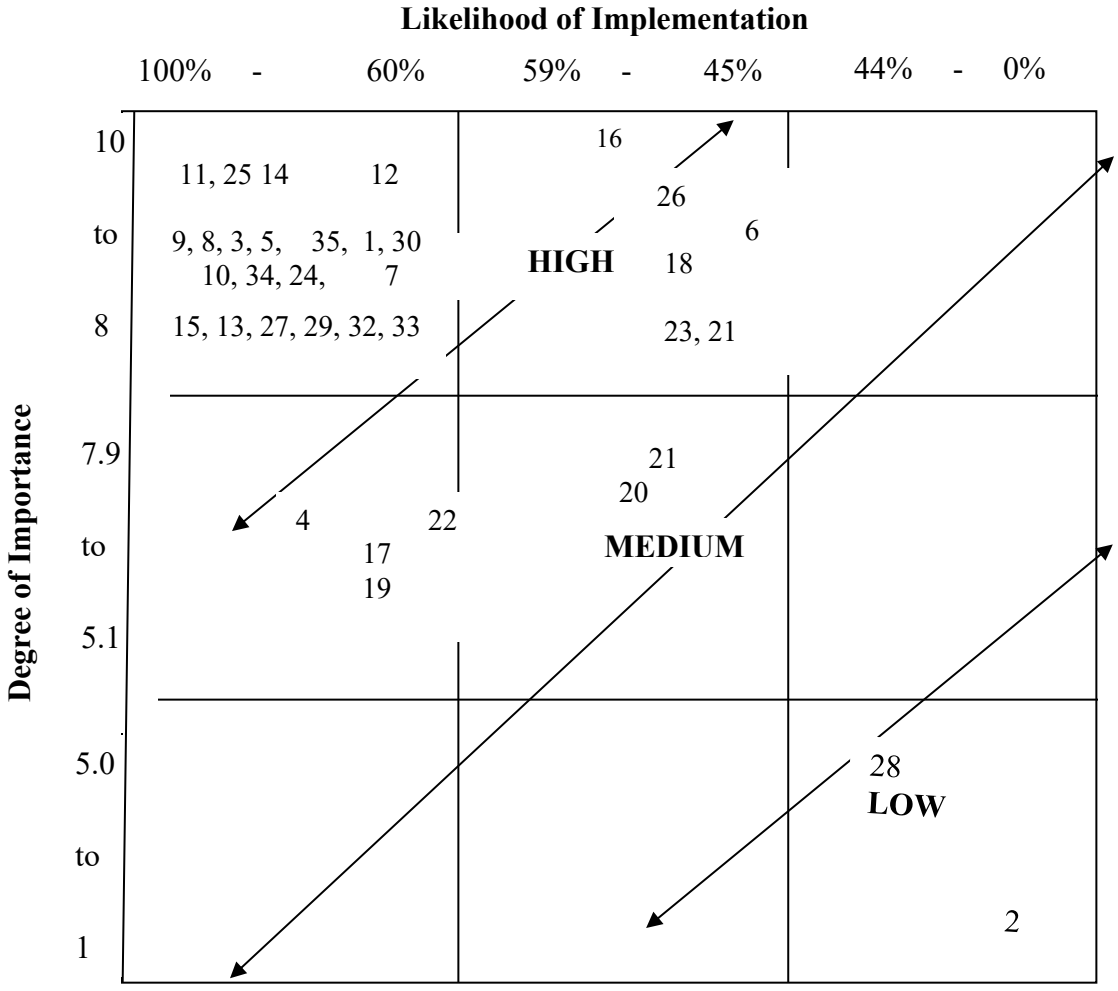

Figure 5. Priority matrix provides a high-to-low visual representation of ratings received from the expert panel.

For the purposes of this study, OER adoption activities with a median value of 8.0 or higher for degree of importance were considered high, 7.9 to 5.1 as medium, and 5.0 to 1.0 as low on the vertical axis of the priority matrix. Median ratings between 8.0 and 10.0 were selected as high importance because those equate to the upper quartile data for degree of importance, with 7.9 to 5.1 representing the middle quartiles, and 5.0 to 1.0 representing the lower quartiles. With respect to likelihood of implementation, a median rating of 60% or higher was considered high, with 59% to 45% as medium, and 44% to

0% as low on the horizontal axis. The median scores that met the aforementioned criteria for high, medium, and low concerning importance and likelihood of implementation are in alignment with the upper, middle, and lower respective expert panel members' ratings.

Twenty-one of the 35 original activities were determined to be of high priority in this study. Research Findings 1, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 24, 25, 27, 29, 30, 32, 33, 34, and 35 were located in cell 1 of the priority matrix and reflected activities identified as a high priority in terms of importance and likelihood of implementation. Research Findings 1, 3, 5, and 7 dealt with administrative and institutional activities; 8, 9, and 10 involved professional development activities for OER; 11, 12, and 13 represented the discovery of and access to quality OER; 14 and 15 reflected faculty incentives and awareness building of OER; 24 and 25 dealt with department and discipline-based activities; 27, 29, 39, and 32 concerned faculty OER development activities; and Research Findings 33, 34, and 35 spoke to activities involving faculty partners.

Activities outlined in cell 2 represented research findings of high degree of importance and medium likelihood of implementation. Research Findings 6, 16, 18, 21, 23, and 26 were located in cell 2. Cell 3 contained the following research findings that represent medium importance and high likelihood of implementation: 4, 17, 19, and 22. Research Findings 2 and 28 were located in cell 9, which contains research findings of both low importance and likelihood of implementation. OER Activity 2 states, "Advocate that administration mandate faculty involvement in OER activities," and OER Activity 28 states, "Exert peer pressure with colleagues to engage in OER activities."

Combined Importance and Likelihood of Implementation of OER Adoption Activities

The Venn diagram in Figure 6 presents a graphical representation of the combined consensus with respect to the highest degree of importance and likelihood of implementation of OER activities that were listed in Table 5. A Venn diagram is a diagram containing two circles that displays the entire set of possible relationships between information or items. The overlapping area between the two circles represents the information common to both sets. In Figure 6, the left circle displays the OER activities that represent a high degree of importance, and the right circle illustrates OER activities with a high likelihood of implementation. In this study, the intersection of information from the two circles represents the consensus of OER research findings in terms of degree of importance and likelihood of implementation.

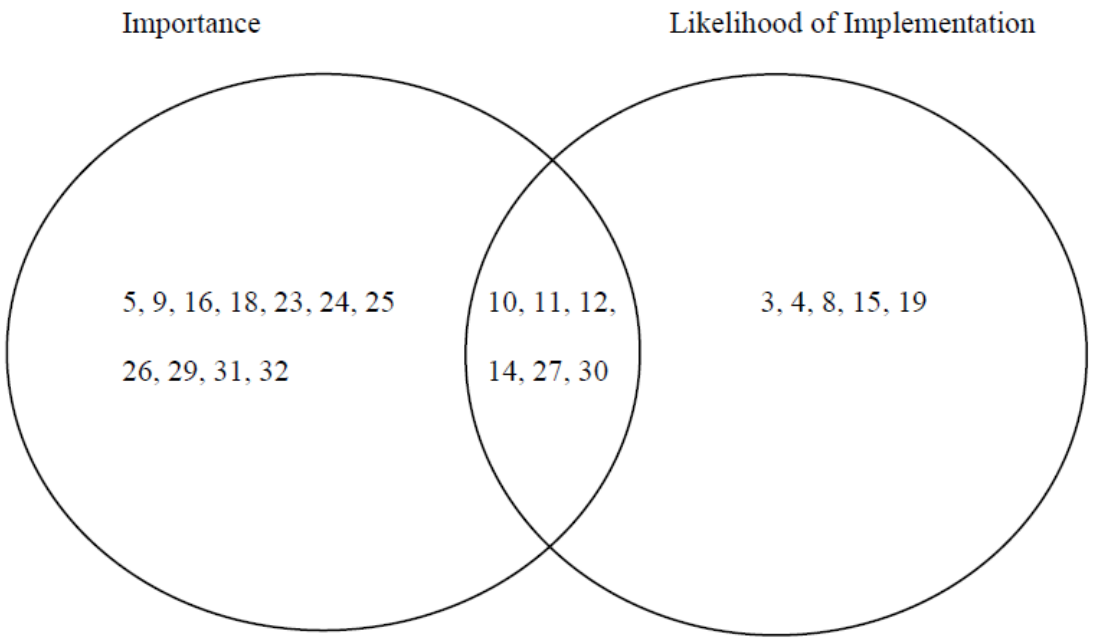

Figure 6. Venn diagram.

Seventeen OER activities, Research Findings 5, 9, 10, 11, 12, 14, 16, 18, 23, 24, 25, 26, 27, 29, 30, 31, and 32, obtained consensus for a high degree of importance from

the OER expert panel. Eleven OER activities, Research Findings 3, 4, 8, 10, 11, 12, 14, 15, 19, 27, and 30 received consensus for high likelihood of implementation. Items 10, 11, 12, 14, 27, and 30, the six OER adoption activities that intersect both circles, represent the research findings for which the OER higher education expert panelists came to consensus concerning the highest degree of importance and the highest likelihood of implementation,

Table 12 highlights the text of the six research findings depicted in the Venn diagram that received consensus because of their high median and IQR rankings for importance and likelihood of implementation.

Table 12

Highest Rank Order of Panel Median Ratings for Combined Degree of Importance and Likelihood of Implementation

Rank	Activity number	Abbreviated OER activity statement	Median		IQR	
			DI	LI	DI	LI
1	11	Provide access to OER collections that contain high-quality, peer-reviewed OER materials (e.g., MERLOT).	9.5	95%	1.00	1.00
2	14	Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation.	9.5	70%	2.00	2.25
3	12	Increase the quality of OERs that are created and currently are made available.	9.5	65%	1.25	2.25
4	30	Adopt open pedagogy practices.	9.0	60%	2.00	2.25
5	10	Provide institutional support for OER learning communities for professional development.	8.5	70%	1.25	2.00
6	27	Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions.	8.0	70%	1.25	2.00

Note. DI = degree of importance; LI = likelihood of implementation

Research Finding 11, "Provide access to OER collections that contain high-quality, peer-reviewed OER materials (e.g., MERLOT)" received the highest median ratings for importance at 9.5 and likelihood of implementation at 95% and an IQR of 1.00 in both categories. Research Finding 14, which reads, "Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation," and 12, which states, "Increase the quality of OERs that are created and currently made available," had the next highest set of ratings for consensus. Both had median ratings of 9.5 for importance but differed slightly for likelihood of implementation, with 70% and 65% respectively. The IQR for those two activities was 2.25 for likelihood, but differed greatly for importance, at 2.00 and 1.25 respectively. The three remaining research findings had a median ranging from 8.0 to 9.0 for importance and 60% to 70% for likelihood of implementation; their IQR ratings ranged from 1.25 to 2.00 for importance and 2.00 to 2.25 for likelihood of implementation. Regarding the themes represented by the six research findings in Table 12, Item 10 dealt with professional development, Items 11 and 12 concerned discovery and access to quality OER, Item 14 related to faculty incentives for building OER, and Items 27 and 30 pertained to faculty OER development activities.

Summary

The intent of this Delphi study was to have a panel of OER higher education experts identify and come to consensus regarding activities central to faculty adoption of OER within the United States over the next 10 years. The OER expert panel was comprised of 16 faculty participants working in higher education institutions in the United States with knowledge of OER. The consensus-building focus of the Delphi

method enabled the researcher to utilize it to bring about consensus from the panel of OER activities over the course of three rounds.

The researcher employed a three-round Delphi process. During the first round, the OER higher education expert panelists were asked this open-ended question: What are four to six activities you believe should be implemented in order to advance faculty adoption of OER over the next 10 years in colleges and universities in the United States? Sixteen expert panelists completed the Round 1 questionnaire, identifying 76 activities that were summarized and aggregated into 35 activity statements. In Round 2, panelists were asked to rate the 35 activity statements in terms of degree of importance and likelihood of implementation. They rated degree of importance on a 1 to 10 scale, with 1 being the least important and 10 signifying the greatest importance; likelihood of implementation was rated on a percentage scale from 0% to 100%, with 0% representing the least likelihood and 100% demonstrating a high likelihood. The data collected from Round 2 were compiled and analyzed in order to determine the median rating and IQR for each of the OER activity research findings. In Round 3, each panelist was provided the opportunity to review the group panel responses and to change his or her ratings for importance and likelihood of implementation, if he or she elected to do so.

Overall, there were 99 revisions made to 35 research findings from Round 2 to Round 3. The value of an activity rating was changed, either upward or downward, 46 times for degree of importance and 53 times for likelihood of implementation. In particular, there were 37 increases to activities rated on the importance scale and 42 increases to activities rated for likelihood of implementation, for a total of 79 rating value increases in Round 3. Concerning decreases in rating values in Round 3 from Round 2,

nine occurred for degree of importance and 11 for likelihood of implementation, for a total of 20 rating value reductions. With respect to the frequency of rating value revisions in Round 3 from Round 2, three of the 35 OER research findings experienced three or more revisions for degree of importance. As it relates to likelihood of implementation, five OER research findings contained three or more changes.

In this study, 28 OER research findings were found to be of high priority. The following 17 items received consensus regarding degree of importance: 5, 9, 10, 11, 12, 14, 16, 18, 23, 24, 25, 26, 27, 29, 30, 31, and 32. Full consensus was reached for likelihood of implementation related to the following 11 items: 3, 4, 8, 10, 11, 12, 14, 15, 19, 27, and 30. Of the 35 total OER activity statements, Activities 10, 11, 12, 14, 27, and 30 received a combined full consensus concerning degree of importance and likelihood of implementation and were illustrated in a Venn diagram (Figure 6). These 28 OER research findings form the basis for OER activities the expert panelists opined may advance faculty adoption of OER over the next 10 years. In Chapter V, the researcher presents the findings, conclusions, and recommendations based on the collection and analysis of data presented in Chapter IV.

CHAPTER V: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter provides a synopsis of the purpose of this study and research questions, and the research study design, which includes the research methods, the population, and the sample. It outlines the major and unexpected findings and conclusions of the study. Also, this chapter discusses implications for action and recommendations for further research. It concludes with the researcher's remarks and reflections.

The purpose of this Delphi study was to identify and describe the perceptions of open educational resources (OER) higher education experts regarding the activities needed at colleges and universities in the United States in order to advance faculty adoption of OER over the next 10 years. Also, this study examined those activities that were most important and had the greatest likelihood of being implemented.

The following questions were investigated to address the purpose of the study:

1. What activities do OER higher education experts believe will advance faculty adoption of OER at colleges and universities in the United States over the next 10 years?
2. Which activities do OER higher education experts believe are most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?
3. What is the likelihood of implementation of the activities that OER higher education experts perceive as most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?

This study utilized a Delphi technique, which is a descriptive research methodology. The Delphi technique consists of a mixed-methods approach that "uses quantitative and qualitative research methods, either concurrently (i.e., independent of each other) or sequentially (e.g., findings from one approach inform the other), to understand a phenomenon of interest" (Venkatesh et al., 2013, p. 23). The Delphi method employs a multiround process to build consensus among a group of expert panelists on a topic of concern. Typically, it employs questionnaires or surveys over the course of three successive rounds.

This Delphi study convened a panel of 16 experts in order to bring them to consensus concerning the importance of specified activities to advance faculty adoption of OER over the next 10 years in higher education institutions. In Round 1, expert panel members were asked to identify activities that would advance faculty adoption of OER. The panelists identified 76 activities that, after a review for duplication and similarity of ideas, were aggregated into 35 activity statements. The researcher grouped the 35 activity statements into topical themes. In Round 2, experts were sent a questionnaire that asked them to rate the importance and likelihood of implementation of the 35 aggregated activities identified in Round 1. For degree of importance, a 10-point Likert scale was utilized, with 1 representing the lowest, to 10 representing the highest. An 11-point Likert scale, ranging from 0% to 100%, was employed for likelihood of implementation. In Round 3, OER higher education expert panelists were sent their individual ratings for each of the 35 aggregated activities, accompanied by the group median score for each activity as well. In this consensus round, the expert panelists reviewed and compared their ratings to those of their fellow panelists and modified them

if they desired. Following Round 3, analysis of the median, interquartile range, and frequencies data enabled the researcher to identify areas of consensus for the research findings. A median rating of 8 or higher for degree of importance represented a high degree of importance. A median rating of 60% or higher for likelihood of implementation represented a high likelihood of implementation. An interquartile range (IQR) of 2.50 or less for an OER activity signaled consensus with respect to both importance and likelihood of implementation. Two graphical representations—a priority matrix and a Venn diagram—were included to depict interactions between degree of importance and likelihood of implementation.

The target population for this Delphi study consisted of a group of OER higher education faculty experts from postsecondary institutions within the United States. The sampling frame was identified from a list of 51 faculty campus coordinators for California Assembly Bill 798, legislation that supports textbook affordability programs and from a list of 566 faculty peer reviewers from across the nation selected to serve on the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) editorial boards.

Major Findings

Key Finding: Identification of OER Activities

Research Question 1 asked. "What activities do OER higher education experts believe will advance faculty adoption of OER at colleges and universities in the United States over the next 10 years?" In order to address the first research question in this study, the expert panel was asked to describe four to six activities that might advance faculty adoption of OER over the next 10 years. The OER higher education experts

highlighted 76 activities during Round 1. A review of the 76 activities for duplication and similarity of ideas, resulted in 35 aggregated activity statements. These 35 activity statements were categorized into the nine following themes by the researcher:

Theme 1: Administrative and institutional activities—7 activities

Theme 2: Professional development for the 5Rs (retain, reuse, revise, remix, redistribute), searching and locating quality OER—3 activities

Theme 3: Discovery, access, and quality of OER—3 activities

Theme 4: Faculty incentives and awareness—building of OER—3 activities

Theme 5: Academic governance and reappointment, tenure, and promotion—2 activities

Theme 6: Student involvement in OER—4 activities

Theme 7: Department and discipline-based activities—4 activities

Theme 8: Faculty OER development activities—6 activities

Theme 9: Faculty partners—3 activities

The themes with the predominate activities dealt first with administrative or institutional activities and secondly with OER development activities that could be undertaken by faculty. This phenomenon is discussed later in this study in the unexpected findings and recommendations for further research sections.

Key Findings: Most Important Activities

Research Question 2 asked, "Which activities do OER higher education experts believe are most important for advancing faculty adoption of OER at colleges and universities in the United States over the next 10 years?" To address this second research question, expert panelists were asked to rate each activity statement for degree of

importance on a 10-point Likert scale, from 0 to 10. Upon completion of Round 2, the entire panel's median response scores regarding degree of importance were computed for the 35 activities. Activities receiving a median score of 8 or higher were deemed to have a high degree of importance.

The 17 activities that produced findings of high importance and consensus are listed below in order by the highest to lowest median score:

1. Activity 16: Provide faculty funding and/or release time to write texts, develop ancillary materials (e.g., test banks, problem sets), participate in OER peer review activities, and in course redesign projects. Median score = 10.00
2. Activity 11: Provide access to OER collections that contain high-quality, peer reviewed OER materials (e.g., MERLOT). Median score = 9.50
3. Activity 12: Increase the quality of OERs that are created and currently are made available. Median score = 9.50
4. Activity 14: Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation. Median score = 9.50
5. Activity 25: Share OER content with instructors teaching the same courses. Median score = 9.50
6. Activity 26: Create more OER for other disciplines and within majors. Median score = 9.50
7. Activity 5: Develop multi-institutional strategies OER adoption (e.g., Open SUNY Textbook, CSU Affordable Learning Solutions). Median score = 9.00

8. Activity 9: Provide training on searching, locating, and evaluating OER. Median score = 9.00
9. Activity 30: Adopt open pedagogy practices. Median score = 9.00
10. Activity 10: Provide institutional support for OER learning communities for professional development. Median score = 8.50
11. Activity 18: Utilize academic governance structure to advocate for changes to the retention, tenure, and promotion processes that recognize faculty contributions to OER creation, adaptation, and use. Median score = 8.50
12. Activity 24: Create discipline-specific workgroups that create and curate OER to be shared at the institutional, statewide, and national levels/conferences. Median score = 8.50
13. Activity 23: Set aside a meaningful portion of department faculty meeting time to discuss ways to use and scale OER within courses. Median score = 8.00
14. Activity 27: Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions. Median score = 8.00
15. Activity 29: Review and revise OER content to align with course activities and instructor's teaching style. Median score = 8.00
16. Activity 31: Engage in research that highlights the impact of OER on students and faculty. Median score = 8.00
17. Activity: 32: Create zero textbook cost pathways within majors. Median score = 8.00

Key Finding: Activities Most Likely to Be Implemented

Research Question 3 asked, "What is the likelihood of implementation of the activities that OER higher education experts perceive as most important for advancing

faculty adoption of OER at colleges and universities in the United States over the next 10 years?" To address this third research question, the OER higher education expert panel was asked to rate the likelihood of implementation on an 11-point Likert scale from 0% to 100% in Round 2. The median scores for each activity were computed and presented to the expert panel in Round 3, with the accompanying information concerning their individual ratings for each of the 35 activities. Activities receiving a minimum median score of 60% or higher signaled a high likelihood of implementation. The 11 activities that produced findings of high likelihood of implementation and consensus are listed below in order by the highest to lowest median score:

1. Activity 11: Provide access to OER collections that contain high-quality, peer reviewed OER materials (e.g. MERLOT). Median score = 95%
2. Activity 3: Showcase faculty exemplars and highlight best practices on incorporating OER into courses. Median score = 80%
3. Activity 8: Provide training/workshops in multiple delivery formats on creating, revising, remixing, redistributing OER. Median score = 80%
4. Activity 15: Provide faculty with research and research-based factors on OER that underscore benefits of OER use in order to optimize their incorporation. Median score = 75%
5. Activity 4: Form partnerships with OER providers (e.g., Lumen Learning, OpenStax, MERLOT, etc.) that develop, maintain, and host OER for most commonly taught courses. Median score = 70%
6. Activity 10: Provide institutional support for OER learning communities for professional development. Median score = 70%

7. Activity 14: Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation. Median score = 70%
8. Activity 27: Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions. Median score = 70%
9. Activity 12: Increase the quality of OERs that are created and currently made available. Median score = 65%
10. Activity 19: Engage students in the OER Adoption process (e.g., representation on academic governance committees). Median score = 60%
11. Activity 30: Adopt open pedagogy practices. Median score = 60%

It is noteworthy that Activity 11, dealing with developing high-quality OER, was ranked highest of the OER adoption activities of high likelihood of implementation and consensus, and had the highest median score, at 95%, and the lowest IQR, at 1.00, of this group.

Key Finding: Research Findings of High Priority for Importance and Likelihood of Implementation

A priority matrix (see Figure 5 in Chapter IV) was used to depict the interaction between the degree of importance and the likelihood of implementation as represented in the median ratings from Round 3. Twenty-one of the 35 originally identified activities were determined to be of high priority in terms of importance and likelihood of implementation as referenced by their median scores: Research Findings 1, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 24, 25, 27, 29, 30, 32, 33, 34, and 35. Concerning the categories of themes, Research Findings 1, 3, 5, and 7 dealt with administrative and institutional

activities; 8, 9, and 10 involved professional development activities for OER; 11, 12, and 13 represented the discovery of and access to quality OER; 14 and 15 reflected faculty incentives and awareness building of OER; 24 and 25 dealt with department and discipline-based activities; 27, 29, 39, and 32 concerned faculty OER development activities; and Research Findings 33, 34, and 35 spoke to activities involving faculty partners.

Key Finding: OER Research Findings With Consensus for Importance and Likelihood of Implementation

A Venn diagram (see Figure 6 and Table 12 in Chapter IV) was used to graphically demonstrate the combined consensus regarding the highest degree of importance and likelihood of implementation of the 35 OER activity statements as represented in the median ratings and IQR from Round 3. In the priority matrix, 21 activities were identified as having a high degree of importance and likelihood of implementation as based on the median scores. The IQR is the measure that determines the level of consensus. Therefore, six OER activity research findings met the criteria for consensus based on high median and IQR rankings for degree of importance and likelihood of implementation. They are listed below in order of high median ranking:

1. Activity 11: Provide access to OER collections that contain high-quality, peer reviewed OER materials (e.g., MERLOT).
2. Activity 14: Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation.
3. Activity 12: Increase the quality of OERs that are created and currently are made available.

4. Activity 30: Adopt open pedagogy practices.
5. Activity 10: Provide institutional support for OER learning communities for professional development.
6. Activity 27: Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions.

The six research findings possessing consensus on importance and likelihood listed above covered four of the nine themes presented by the original 35 activities identified by the OER higher education expert panel. The themes represented dealt with professional development (Activity 10), discovery and access to quality OER (Activities 11 and 12), faculty incentives for building OER (Activity 14), and faculty OER development (Activities 27 and 30).

Unexpected Findings

The researcher found several unexpected findings during the course of the data collection and analysis process. Some findings dealt with the frequency ratings changes for the activities and the rating change values for importance and likelihood of implementation between Rounds 2 and 3. Overall, of the 35 OER adoption activities identified in Round 1, five expert panelists chose not to make revisions either to degree of importance or likelihood of implementation ratings from Round 2 to Round 3. Also, there was an outlier expert panelist who accounted for 57% of the importance rating changes and for 71% of the ratings changes for likelihood of implementation. In addition to the low number of ratings changes, the changes made to rating values were minimal; the greatest changes in value were made by only an increase of one or two value points. Perhaps, this reflects the steadfast conviction that OER higher education experts had in

their original Round 2 ratings; the opinions of their fellow faculty expert panelists held little sway over these original opinions.

Another unexpected finding for the study was that Activity 30, adopt open pedagogy practices, was included as a final research finding. There was very little research in the literature that dealt with open pedagogy at the time of the literature review. In 2017, conversations concerning definitions of open pedagogy surfaced in the literature and made some linkages to OER or open content. Since there has been little research on open pedagogy in the literature coupled with the fact that doctoral programs do not focus on teaching or pedagogical methods, it surprised the researcher that adoption of open pedagogical practices was found to be a research finding that was not only of great importance, but one that the expert panel found to have a high likelihood of implementation.

There was one unexpected research finding related to institutions supporting faculty for development of OER. The OER higher education expert panel recommended Activity 16, which states, "Provide faculty funding and/or release time to write texts, develop ancillary materials (e.g., test banks, problem sets), participate in OER peer review activities, and in course redesign projects." Although this activity received the highest median rating of 10 and an IQR of 2.00, indicating consensus for degree of importance, it was rated quite low in terms of likelihood of implementation, with a median score of 50% and an IQR of 3.50, indicating a lack of consensus. Therefore, although the OER higher education expert panel arrived at consensus around this activity's importance, the group was quite skeptical about the likelihood of it being implemented. It is noteworthy that faculty found this critically important, but did not

have confidence that the institutional structure, culture, or decision-making bodies would support this critical component to successful adoption and sustainability of OER. The OER higher education expert panel recommended three research findings that supported this aforementioned activity: access to and quality of OER, professional development for OER faculty learning communities, and support of early adopters to advance and promote OER. Providing faculty release time or funding so that faculty could learn how and then create quality OER would seem very logical. Yet, faculty did not think that it was a possibility for consideration.

The researcher grouped the 35 activities into nine themes. The theme that contained the highest number of activities was *administrative and institutional activities,* with seven. Activity 5, "Develop multi-institutional strategies for OER adoption (e.g., Open SUNY Textbook, CSU Affordable Learning Solutions)," received a median rating of 9.00, and Activity 3, "Showcase faculty exemplars and highlight best practices on incorporating OER into courses," received a median score of 80%; neither of these was among the final set of research findings. It was unexpected that none of the seven administrative/institutional-focused activities were among the final six research findings that were found to have consensus for degree of importance and likelihood of implementation despite being the theme with the most activities associated with it.

Activity 2, which states, "Advocate that administration mandate faculty involvement in OER activities," received the lowest calculated median of 30% and the second lowest IQR rating of 4.00, signifying a significantly low likelihood of implementation and lack of consensus among the panel of experts. Given state regulations concerning faculty members' roles with curriculum development, and

academic freedom concerning their rights to determine the content they teach and the approaches and resources they use to teach that content, it was not particularly surprising that this received the lowest calculated median score. However, what was unexpected was that a small number of expert panelists did rank this activity slightly higher. In the comments section for Round 3, some mused that unfortunately this strong-arm tactic by administration might be the only approach that would work for some segments of the faculty.

Conclusions

The intent and focus of this research study on faculty adoption of OER was to identify activities, through the lens of faculty experts that have the potential to advance faculty adoption of OER in higher education institutions in the United States over the course of the next decade. The conclusions that follow are based on the research findings and insights extracted from the review of the literature.

Conclusion 1

Institutions of higher education and OER developers, whether faculty or commercial entities, need to prioritize training and discovery activities that will increase faculty members' access to high-quality OER so that they may integrate OER into the curriculum of their courses. Institutions should utilize effective communications channels to increase information about where quality OER may be located.

The OER higher education expert panel produced a research finding concerning the need to provide access to OER collections that contain high-quality, peer-reviewed materials such as the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) referatory, a gateway to locating materials. One challenge to

accessing quality OER is the discovery dimension. Faculty need training on how to locate and use the discovery tools that will help them gain access to quality OER. This, in turn, will advance faculty members' ability to embrace and incorporate OER into their instructional and curricular practices. Also, institutions should provide information on commercial options for OER, particularly for upper-division courses in disciplines where OER is less available.

Communication channels are an additional challenge for notifying faculty of the discovery tools needed to access repositories, referatories, or commercial publisher sites that contain quality OER. Institutions should address these challenges with disseminating information effectively so that faculty can successfully access quality OER.

In alignment with the literature on access, the Hewlett Foundation, a strategic architect in the OER movement, highlighted this need to "equalize access" (Atkins et al., 2007, p. 3) as one of several core outcomes for OER development. Moreover, Blessinger and Bliss (2016) posited that providing access to OER is a core dimension of open education.

Conclusion 2

Proactive measures should be taken to increase faculty awareness of OER as a concept, its value to faculty, and its benefits to students. These measures should include attention to the knowledge stage in an adoption decision process and the communication channels needed to communicate and diffuse OER as an educational innovation. Faculty awareness activities should focus on approaches that facilitate faculty adoption of OER.

The OER higher education experts agree that faculty should be made aware of the value and benefits of OER for students, student success, and retention. Also, the expert

panel desired that faculty perceive OER as an educational innovation that encourages them to adopt these open materials. Institutional stakeholders that include senior administrators, deans, librarians, instructional designers, educational technologists, accessibility experts, and bookstore staff should be involved in proactive awareness-building events that segue into adoption activities. These events and activities should include attention to Rogers's (2003) knowledge stage in an adoption decision process and the communication channels needed to communicate and diffuse OER as an educational innovation. For example, senior administrators and decision makers should commit to developing and implementing OER and other affordable learning solutions at their institutions. Also, decision makers should identify appropriate partnerships that can assist in making faculty aware of what OER is, how it can be used, and its value. Regarding benefits to students, faculty at higher education institutions should be provided information about how much students are paying for their textbooks generally as well as for their courses specifically. If there are OER projects at their institutions, the cost savings for students should be made explicit to faculty.

The message regarding the value of OER needs specific attention. Faculty members, especially those who are not yet tenured, must deal with competing priorities for their time. Therefore, messages relating the value of OER should reflect the consideration of time constraints for faculty members and provide suggestions for incremental approaches to incorporating OER into the curriculum of their courses. Change agents may also play important roles as motivators for the change, among others. In short, when looking to adopt a new idea or innovation, in order to bolster knowledge awareness, the communication channels need attention and the knowledge stage of the

adoption decision process is key (Rogers, 2003) to a potential adopter's decision to adopt a new idea.

In concert with the expert panel's research finding, a lack of faculty awareness of OER and its benefits have surfaced in the discourse concerning OER for nearly a decade, with several authors citing a lack of awareness of the term and its meaning (Allen & Seaman, 2014; McKerlich et al., 2013; Rolfe, 2012; Thoms & Thoms, 2014). As recently as 2 years ago, Allen and Seaman (2016) found little evidence of forward momentum dealing with faculty awareness of OER from their 2011 study.

The literature also supports the ideas concerning effective communication dissemination and knowledge awareness in an adoption process. Communication channels are critical to the adoption and diffusion of an innovation. Communication channels, which are the means by which an innovation is diffused to group members, provide the avenue for information and knowledge of an innovation to spread to potential adopters (Rogers, 2003). Knowledge awareness is one type of knowledge outlined in Rogers's (2003) innovation-decision process stages. Awareness of an innovation may derive from either active or passive measures taken by the potential adopter. For example, a faculty member may intentionally seek out information at a conference or from an article about OER or, by happenstance, find a website devoted to OER on his or her institution's website.

Conclusion 3

Individuals or groups, whether in nonprofit or commercial sectors, should increase efforts to create and maintain quality OER. Evaluation measures should be

built into the OER development and maintenance processes to ensure a quality open content product that produces confidence in faculty seeking to utilize it.

The expert panel's research finding recommended that OER developers increase the quality of OER created and made available. Typically, when selecting commercial instructional materials, such as textbooks, faculty are comfortable making those selections because the publishing industry, over time, has built in a trusted peer-review process for developing these materials. Consequently, there needs to be a rigorous evaluation process for OER to ensure quality and a process that bolsters faculty confidence in OER products. Often, there is a question of whose job it is to evaluate OER. Does the responsibility fall to faculty primarily or to publishers, or both? Mechanisms need to be put into place to allow for both groups to evaluate and provide quality OER. With respect to faculty, they need time to do the evaluation and they need to be trained on the evaluation process that will include the use of rubrics and peer-to-peer evaluation techniques, among others.

This recommendation aligns with the literature. The William and Flora Hewlett Foundation program officers created a strategic plan *Using Information Technology to Increase Access to High Quality Educational Content* (as cited in Atkins et al., 2007) that highlighted the need to "sponsor high-quality open content" (Atkins et al., 2007, p. 3). The lack of quality of OER content was featured prominently in the literature as a barrier to OER adoption (Allen & Seaman, 2012, 2014, 2016; Atkins et al., 2007; Browne et al., 2010; Mtebe & Raisamo, 2014a; Nie, 2012; Pawlowski, 2012). Compatibility, which addresses an individual's perception of an innovation being similar to prior experiences and congruent with his or her value system (Rogers, 2003) is also relevant to the notion

of OER quality. When a new idea is compatible with existing values, past experiences, and needs, it reduces adopter uncertainty, which results in increased adopter confidence (Rogers, 2003). When faculty perceive the quality of OER to be in line with prior expectations and experiences, it reduces their suspicion of OER and increases their likelihood to utilize it (Mtebe & Raisamo, 2014a, 2014b).

Conclusion 4

There should be strategic activities undertaken at postsecondary institutions in the United States to promote the ideas behind open pedagogy, OER-enabled pedagogy, and Open Educational Practices (OEP).

The OER higher education expert panel identified the adoption of open pedagogy as important to advancing faculty OER adoption. The expert panel might have come to consensus on this research finding because they recognized the value of having a more socially and dynamically constructed and delivered pedagogy where students, faculty, and staff contribute to the learning-teaching process. As such, there should be awareness-building activities to educate faculty on this concept and its application to OER and OEP. Also, there should be professional development opportunities for faculty to gain concrete experience redesigning assignments and/or full courses to include open pedagogical practices and OER. It is these efforts that will facilitate the uptake of OER by faculty.

Open pedagogy is a model that lacks a clear definition at the writing of this study (Bali, 2017). It is closely connected to the concepts of openness, open education, and OER. It is interwoven into OEP, which are the actions that derive from an open pedagogy framework. Open pedagogy encompasses methods and practices for teaching

and learning that provide access to open content, that embrace open sharing of resources and collaboration among colleagues, that utilize participatory-enabling technologies (e.g., social media), and that involve students as producers of knowledge, both individually, and within networked learning environments (Bali, 2017; Hegarty, 2015). OER as a stand-alone, is a powerful enabler for broadening educational access and affordability globally. Open pedagogy or OER-enabled pedagogy, along with OEP, have the potential to create an enormously transformative environment for formal and informal teaching and learning processes because these frameworks transcend discussions about content and focus attention more broadly on innovative and creative ways to teach and learn. Naturally, faculty members are at the center of this transformative process. As such, they need awareness and knowledge of this teaching and learning framework. One definition of open pedagogy frames it in terms of learner-generated or learner-driven activities; essentially students are producers of information rather than just consumers (Hegarty, 2015). Learners' production of information and knowledge artifacts can become OER, which bodes powerfully for advancing OER adoption. Faculty have opportunities to empower students to construct their own knowledge through open pedagogical experiences and to help students to create OER through this process.

Conclusion 5

Institutions should provide professional development for adopting OER, with an emphasis on OER learning communities.

The OER higher education experts felt it important that institutions provide support for faculty professional development, with an emphasis on OER learning communities. Consequently, institutions need to provide mechanisms for faculty to

gather and build their knowledge base about OER, share ideas, and collaborate on OER projects in order to advance OER adoption and to also sustain it.

When faculty are able to engage in group projects around OER, it can foster connections among colleagues, create new synergies and linkages among disparate groups that had little contact previously, enhance sharing of teaching innovations, and allow the preservation of their academic accomplishments (Hodgkinson-Williams, 2010; Reedy, 2014).

Conclusion 6

Institutional resources should be allocated to faculty OER early adopters so that they can engage in activities that will facilitate OER adoption at their institutions.

The expert panel recommended that faculty OER early adopters engage in activities to facilitate OER adoption at institutions. Early adopters should be provided with the resources to promote OER awareness and to provide, in collaboration with other stakeholders, professional development activities for faculty to utilize, adopt, and adapt OER. Also, these early adopters should be able to avail themselves of additional training opportunities to help them gain additional knowledge and expertise with OER adoption in order to communicate up-to-date strategies for OER integration. Moreover, early adopters should be given time and resources such as release time, stipends, and summer assignments, in order to develop additional curriculum using OER and to assist other faculty to develop OER-focused curriculum.

Early adopters play a pivotal role in the diffusion of an innovation (Rogers, 2003). Faculty who have embraced OER early on, by engaging in the creation or incorporation of OER into their courses should receive support to help heighten awareness of OER

among their colleagues and to coordinate activities that would assist other faculty in adopting OER as well. They should have distinct and identifiable roles in their institutions so that faculty know who they can go to for OER help.

Implications for Action

Based on the research findings from this study and the conclusions drawn by the researcher, this study recommends the following actionable items to advance faculty adoption of OER at colleges and universities in the United States over the next decade:

1. Because access to OER is facilitated by discovery tools, faculty center directors and librarians, with support from administrators, should host OER access discovery events to help faculty, department chairs, and support staff in departments' search for quality OER that are located in repositories, referatories, or on commercial publishing websites. These events should account for multiple delivery formats, such as online webinars, 24/7 online tutorials, face-to-face workshops, and hybrid options. In addition to training options, librarians and educational technologists should create online information and help guides that could be referenced 24/7. Lists containing the URLs of major repositories and referatories such as MERLOT, the Open Textbook Library, OpenStax CNX/College, BCcampus, Skills Commons, the Digital Public Library of America, COOL4Ed Course Showcase, the Open Course Library, and the Open Learning Initiative, commercial publisher sites such as Toronto-based Top Hat, along with major OER search engines that include OASIS, OER Metafinder, OER Commons, and Open Professional Education Network should be made easily discoverable on institutional websites.

2. A multipronged approach should be taken for OER faculty awareness-building and adoption activities. First, administrators and faculty administrators at colleges and universities should develop a multiyear initiative around OER and OEP/open pedagogy that includes personnel and monetary resources. The first year would be planned differently, based on the level of OER resident expertise at the institution. As an example, if the institution lacked knowledge and expertise of OER, the first year could be spent identifying faculty, librarians, instructional designers, and educational technologists with interest in learning about OER and OEP. An OER learning community could be established and a learning plan designed for the first part of the year. If expertise and experience with OER existed at an institution during the first year, the institution would create an OER initiative team, with representation from faculty, staff, students, administrators, the bookstore, faculty development, academic affairs and student affairs, and IT/academic technology. Whether resident expertise exists or not, it would be beneficial for the OER initiative team to attend conferences and invite OER consultants to provide workshops on theoretical and applied knowledge. During year one, working groups could be established to develop overall action plans that include a communications plan, a needs assessment and program assessment plan, and, for the novice institutions, a group to plan learning community activities to increase the knowledge base. There would be an awareness campaign organized by marketing, public relations, and communications staff in communication with OER faculty, instructional designer and librarian experts who would create a strong web presence that includes research on the positive impact OER for students and faculty. Also, during year one, the campus OER experts would make

departmental and unit presentations to faculty and other stakeholders. It would be important to gather the voices of students and include them in data-gathering activities. Other activities during year one would include a needs assessment with surveys, focus groups, and interviews with faculty and students; meetings with potential OER partners such as the library, the bookstore, academic technology, the faculty senate, and the faculty development unit; and planning for hands-on learning activities in year two.

During the second year, the OER initiative team would transition from planning to implementation. With a robust web presence, promotional materials in place, and an enthusiastic and trained group of partners, the institution could move from basic awareness to adoption activities. There should be a host of kickoff activities in which the promotional materials developed from year one could be proactively promoted. If the budget allows, an event or series of events, with guest speakers to highlight important aspects of OER and OEP could be implemented. At the very least, general workshops, webinars, and training materials and tutorials would be completed and implemented. There are a number of training resources available, such as Open Washington, a self-paced tutorial for OER, and the comprehensive suite of professional development offerings from OER Commons. During the second half of year two and during year three, targeted efforts at disciplinary-based adoptions of OER materials should be launched. These projects could range from reuse of existing open textbooks and materials to teams that revise, remix, or redistribute OER. For example, faculty could take advantage of a 2018 $5M federal OER grant awarded for the LibreTexts Initiative to bring together faculty, students, and developers from

institutions across the nation to develop quality open textbooks. Over time, occasional showcases of faculty adoptions, an annual faculty institute to promote faculty adoption, and a training program for faculty OER champions are additional programs that would advance and sustain OER efforts. Providing incentives, such as release time or stipends for this work is critical to faculty adoption efforts. Institutions do not need to recreate the wheel as there are effective models of OER adoption for faculty and administrators to review. For example, the California State University's Affordable Learning Solutions Initiative has been implemented for 8 years and has a roadmap with components to help faculty lower the cost of materials to ensure an affordable education for students. It also has provided data on the outcomes of its efforts on its website.

3. When faculty members decide to adopt OER, they can engage the content using the 5Rs: retain, reuse, revise, remix, or redistribute. At each stage of engagement, whether faculty members simply decide to create and retain their open content or remix it with existing content, the quality of the content is central. Senior administrators should provide an infrastructure that supports OER assessment and evaluation activities for key OER stakeholders (e.g., faculty, librarians, academic technology staff, and accessibility experts). The activities could include the following:
    a. Form an internal institutional group that creates rubrics or checklists for quality. These products could cover accuracy, fitness for purpose, and the reputation of the author.

b. Set up a discipline-based peer-review process for new and adapted OER. This has potential for heightened collaboration and resource-sharing among colleagues in departments and throughout the institution.
c. Provide professional development on how to create rubrics and undertake peer-review projects and other assessment measures.
d. Incentivize stakeholders to participate in these quality assessment activities. For example, providing release time or stipends for participation.
e. Provide an icon or symbol system to communicate that the OER has been assessed and the mechanisms by which they have been assessed.
f. Develop and implement a communication plan to promote the quality resources and insure that faculty who adopt or adapt OER understand the basic criteria for assessing its quality.

4. Open pedagogy is a framework that does not yet have an agreed-upon definition within the scholarly open education community. As such, institutions should focus their efforts on awareness raising and professional development activities that help faculty to delve into this concept as a viable praxis to advance OE, OER, and open pedagogical practices. This could include faculty development workshops on this topic from consultants who have expertise on open pedagogical practices, learning communities, and communities of practice and having faculty sponsor group discussions on this burgeoning topic with colleagues. Also, those researchers who have contributed to the body of literature on OE, OER, and OEP, should continue the discourse concerning the place of open pedagogy within these other interlinking concepts to explore how it can advance the cause of openness, OE, and OER. These

illuminating conversations could continue informally on social media platforms such as Twitter, Facebook, and blogs, or formally during conference presentations or at unconference events. Librarians have a role to play in supporting the information dissemination component of open pedagogy, with the use of research guides that provide definitions and links to resources on this topic.

5. Institutions should encourage and support the creation of faculty learning communities for OER and open pedagogical and educational practices. Also, department chairs should encourage and support faculty in creating learning communities. Potential activities undertaken by the faculty learning communities could include workshops and webinars on these concepts and the benefits of faculty learning communities to engender faculty interest. Modest monetary incentives to promote faculty participation in OER learning communities could be employed early on to facilitate the uptake of this idea. The literature and the expert panel recommendations support the idea of faculty gathering in functional or disciplinary groups to create, re-use, or revise OER. Major attributes of open pedagogy include open collaboration and open resource sharing. Faculty learning communities organized around OER and open pedagogical and educational practices would advance adoption of OER.
6. Institutions should encourage, recognize, and support early adopters of OER at all levels of the organization so that they may promote their colleagues to adopt. In order to do this, senior administrators need to provide release time and a stipend to assist early adopters in being champions for OER adoption on their campuses. Faculty development centers should collaborate with faculty OER early adopters to conduct workshops and one-on-one assistance to faculty willing to explore OER adoption.

Also, faculty OER adopters should be allowed to make presentations at faculty senate meetings, department meetings, and at meetings in which the institution's curriculum decisions are made. These early adopter champions should also be given financial support to attend and present at relevant events, such as OER, higher education, and discipline-based conferences.

7. Institutions should provide faculty members release time and/or stipends to support their development of ancillary materials to accompany textbooks. A major reason why faculty are reticent about adopting OER, particularly open textbooks, is because many commercially published textbooks are accompanied by relevant ancillary materials that provide faculty with a convenience factor. Although the expert panel identified this as one of the most important research findings, they were not confident that institutions would follow through. This is likely due to the tension between what faculty perceive as competing demands on their time versus their inherent responsibility to produce ancillary materials to fit local teaching needs for their courses and departments. This tension notwithstanding, the reality is that some support needs to be provided in order to advance faculty adoption of OER. Therefore, this is a critical resource-based action for institutions to address and that they need to support in teaching-intensive and research-intensive contexts.
8. Institutions should transparently and authentically acknowledge and reward OER and open pedagogical practice activities at every level, from senior administrators to department chairs. Openness, in all of its many facets, is transforming higher education. Thus, institutions should encourage, support, and acknowledge these activities. This proactive support and promotion would encourage faculty to adopt

because it would send a message that OER adoption is important and valued. Also, acknowledgement and reward events should be conducted in a manner that is meaningful to faculty members. This acknowledgement and reward system could include valuing these activities in reappointment and tenure activities, in recognition ceremonies, in release time assignments, and in monetary awards. A small body of research spoke to the need for faculty acknowledgement of and rewards for this important teaching function, particularly in light of the "publish or perish" mentality that pervades all research-intensive institutions, and increasingly teaching-intensive universities as well. If OER creation, reuse, and revision activities were acknowledged and rewarded by institutional policy and decision makers, then perhaps, that would move the needle on funding or release time for these activities.

Recommendations for Further Research

Based on the research findings, conclusions, and limitations of this study, the researcher recommends that further research be conducted in the area of faculty adoption of OER in order to broaden the praxis and understanding of OER within the higher education and offers recommendations on the following topics:

1. This study focused on the recommendations of faculty to advance faculty adoption of OER in higher education institutions. A replication of this study with higher education administrators and policy makers would provide additional lenses through which to view the activities needed to advance OER in the higher education arena over the next 10 years. The OER higher education faculty experts identified activities that were particularly relevant to their sphere of influence. However, an exploration of the opinions of decision-makers and policy-makers could uncover the higher level

policy, resource, political, and infrastructure components that need to be addressed in order for the advancement of faculty adoption.

2. The literature reflected differences in the adoption rate and practices of community college faculty versus faculty working at 4-year institutions. Further research on the strategies and practices of community college institutions with respect to OER is needed to clarify the types of activities in which they are engaging in support of OER faculty adoption and the targeted activities faculty in community college think would be needed in order to advance faculty adoption.
3. The higher education landscape is comprised of a number of different structural types that hold slightly different missions. In particular, there exist different types of 4-year institutions. Consequently, additional research on faculty adoption of OER that would take into account the varying higher education environments in which faculty reside, such as research-intensive, teaching-intensive, for-profit, not-for-profit, private, and public, should be conducted in order to provide insights into the impact that the differing policies, norms, culture, politics, resources, and infrastructure components have on faculty adoption of OER. These elements could be done in isolation; however, comparative studies would add value and increased understanding; for example, a comparison of faculty adoption at research-intensive versus teaching-intensive institutions or for-profit and not-for-profit universities and colleges would enhance the understanding of OER adoption.
4. What is absent from the literature on OER is an examination of faculty adoption from a change model perspective. The models and theoretical frameworks typically utilized to examine faculty adoption of an innovation are tied to technology

innovations. For example, the technology acceptance model (TAM) or the unified theory of acceptance and use of technology (UTAUT) model is common when studying faculty adoption of technology. For other types of innovation adoptions, Rogers's (2003) diffusion of innovations theoretical framework is the most prevalent choice. Future studies should explore the change processes that faculty undergo during an adoption process using the concerns-based adoption model (CBAM).

5. There were unexpected findings with respect to the research findings on which the expert panel came to consensus. In particular, no administrative/institutional activities were agreed upon as being very important and likely to be implemented, despite the fact that in the majority of higher education institutions faculty engage in a shared governance decision-making role with senior administration. Given that the institutional support component is key to OER adoption effectiveness, it is recommended that a qualitative study, using faculty interviews, be conducted to further elucidate the thoughts, concerns, and opinions of the OER higher education expert panel with regard to the role that institutions should play concerning OER adoption and the potential agency that faculty might exert within their shared governance role.
6. A number of systems have developed and implemented affordable learning and/or OER programs to advance faculty adoption of OER (e.g. the California State University, Georgia, North Dakota, the State University of New York). It is recommended that multiple-campus case studies be conducted within these systems to identify best practices for adoption of OER that can serve as a model for other institutions.

7. Research should be undertaken that examines the idea of faculty receptivity or resistance to adoption of OER. A search of the term "faculty receptivity" across various multidisciplined databases from 1970 to 2018 produced 1,126 results, indicating that little research has been done on this topic generally. Also, a search for the phrase "faculty resistance" produced only 466 results. Adding OER produces zero results in both cases. Attitudes toward change regarding adoption of OER are among the dimensions of change that are important in understanding faculty adoption of OER.
8. OER is not only being adopted in higher education; rather there has been an aggressive uptick of OER adoption by educators in the K-12 arena in recent years. The Elementary and Secondary Education Act (ESEA) authorizes funding for K-12 public school textbooks for student use. However, this is not the case with private schools. A replication of this study with educators in K-12 in private schools that do not receive governmental funding for textbooks would contribute an additional viewpoint from the educators who are tasked with teaching students who will feed into postsecondary schools.
9. A study should be conducted in order to develop a model for open pedagogy and/or OER-enabled pedagogy. The literature on open pedagogy is emerging. A model would facilitate uptake of this potentially vital concept to OE and OER.

Concluding Remarks and Reflections

The impetus for this study arose from a conversation that I had with a faculty member in 2010. I had just completed my 2-minute elevator speech about the benefits of using an open textbook instead of a commercially published option. It is commonly cited

that a college education will substantially increase an individual's ability to live a higher quality of life, financially and socially. I perceived the use of OER as a "no-brainer" in the pursuit of making education more affordable and therefore, more attainable to students so that they could fulfill their academic dreams, and ultimately, the American Dream. This faculty member's response took me aback; she talked about the full array of ancillary materials provided by publishers and alluded to a lack of time to replace what was freely supplied by publishers, given the competing demands on her time. In this study, I set out to gain a better understanding of the resource, professional development, infrastructure, policy, political, and pedagogical changes that would need to be addressed in order for the needle to be moved significantly on faculty adoption of OER. What I discovered in the course of my research was multifaceted. First, adoption of a new idea involves change by the participants; change is very difficult and is typically resisted by those being asked to engage in change. Second, I understood, through my comprehensive look at the literature, that a move to OER is part of a larger, transformational movement in higher education that concerns openness, broadly, and transformative changes needed with regard to a host of areas surrounding openness: education, pedagogy, research, technology, and resources, among others. I understood that my original overly simplified thesis which was, "OER will facilitate an affordable education for students and therefore should be fully embraced and implemented by higher education faculty" had many complex and complicated strands that needed further development. From my perspective, this is only the beginning of my research in this area. I desire to understand more fully the change process for faculty and the higher level transformational changes that need to occur for OER adoption to be truly successful. In particular, the change

process that needs to occur so that faculty, particularly those in teaching-intensive settings, embrace their responsibilities for creating or locating open content or developing ancillary materials to accompany standard textbooks, needs to be addressed. Otherwise, faculty will continue to feel challenged by competing demands on their time to locate, use, revise, or re-mix OER and will locate the responsibility to the purview of commercial producers. The completion of this study has motivated me to delve further into these aspects.

The research prominently speaks to the transformational activities being undertaken recently and what is needed in the future to dynamically transform education. Opening up educational opportunities so that they embody the open ideals of freedom, transparency, sharing, collaboration, empowerment, and participatory technologies, coupled with applying the important attributes for cultural change that are included in Anderson and Anderson's (2010) change model and the CBAM are critical to advancing OER. OER is part of a larger movement toward openness in education. Standing alone, it will not reach its greatest potential; however, situating itself within the larger open education movement and aligning itself with open pedagogy and open educational practices will enable OER to take a permanent place in a transforming educational landscape. In addition, more research on changes that need to occur at the organizational and individual levels should facilitate an enhanced understanding of OER adoption and promotion. As a transformational change leader, I am committed to embracing big visions or Jim Collins's BHAGs—big, hairy, audacious goals—in order to stimulate transformative advancement of open education, OER, and OEP (Collins & Porras, 2002).

It is the fulfillment of this goal that will enable future generations of students and learners to realize their potential and fulfill academic and lifelong learning dreams.

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APPENDICES

APPENDIX A

Synthesis Matrix

Author	Transform Higher Education Landscape	Openness/ Open Education	Overview of OER Movement	OER Faculty Awareness	OER Adoption Facilitators	OER Adoption Barriers, Challenges	OER Adoption Motivators for Use	Innovation , Adoption, Diffusion Theories	Change, Faculty Change Theories	Open Pedagogy/ Educational Practices
Adams Becker et al. 2017	X									
Allen & Seaman, 2011				X						
Allen & Seaman, 2012				X						
Allen & Seaman, 2014				X						
Allen & Seaman, 2016				X						
Anderson & Anderson, 2010									X	
Atkins, Brown, & Hammond, 2007			X							
Baker, 2014		X								
Bali, 2017										X
Baraniuk, 2008		X								
Batson, Paharia, & Kumar, 2008	X									
Blessinger & Bliss, 2016		X								
Boyne, 2005								X		
Brown & Adler, 2008	X									
Browne et al., 2010						X				
Butcher, 2011, 2015			X							
Camilleri & Ehlers, 2011										X
Conole, 2013										X
Craig & Williams, 2015	X									
D'Antoni, 2009a			X	X						
D'Antoni, 200b			X	X						
Denis et al., 2002								X		
Durlak & DuPre, 2008								X		
Ehlers, 2011										X
Falconer et al., 2016										
Fitzgerald et al., 2002								X		
Fonseca, 2011								X		

Author	Transform Higher Education Landscape	Openness/ Open Education	Overview of OER Movement	OER Faculty Awareness	OER Adoption Facilitators	OER Adoption Barriers, Challenges	OER Adoption Motivators for Use	Innovation , Adoption, Diffusion Theories	Change, Faculty Change Theories	Open Pedagogy/ Educational Practices
Fullan, 2016									X	
Geser, 2007		X	X							
Greenhalgh et al., 2004								X		
Hall, Dirksen, & George, 2013									X	
Harley, 2008	X					X				
Hegarty, 2015										X
Hodgkinson-Williams, 2010					X	X				
Hord et al., 1987									X	
Hylen, 2006			X							
Iiyoshi & Kumar, 2008		X								
Ikahihifo, 2017			X							
Jhangiani, 2016					X	X				
Johnson et al., 2016	X									
Johnstone, 2009			X							
Kahle, 2008		X								
Kamenetz, 2010	X									
Kardasz, 2013								X		
Kelly, 2014					X	X	X			
Kernohan & Thomas, 2012			X							
Kumar, 2012	X									
Lane, 2007									X	
Leef, 2016	X									
Liang, 2005			X							
Loucks, 1979									X	
Lucas, 2000									X	
Marcy, 2014	X									
Martin, 2017			X							
McKerlich et al., 2013			X	X						
McQuiggan, 2006				X	X	X	X			

Author	Transform Higher Education Landscape	Openness/ Open Education	Overview of OER Movement	OER Faculty Awareness	OER Adoption Facilitators	OER Adoption Barriers, Challenges	OER Adoption Motivators for Use	Innovation, Adoption, Diffusion Theories	Change, Faculty Change Theories	Open Pedagogy/ Educational Practices
Meiszner, 2011		X								
Meiszner & Glott, 2011		X								
Mtebe & Raismo, 2014a						X				
Mtebe & Raismo, 2014b						X				
Mulholland & Roscorla, 2016		X								
Ngimwa & Wilson, 2012				X		X	X			
Nie, 2012			X							X
Oblinger & Lombardi, 2008								X	X	
Olcott, 2012			X							
Organisation for Economic Co-Operation and Development, 2007										
Paradis, 2014			X	X						
Paskevicius, 2017										X
Pawlowski, 2012						X				
Peres, 2010								X		
Petrides, 2011			X	X						
Porter, 2013										
Reedy, 2014			X			X				X
Rogers, 2003								X		
Rolfe, 2012				X						
Saveri & Chwierut, 2011								X		
Schuwer, 2017										X
Schlater, 2011							X			
Smith & Casserly, 2006			X							

Author	Transform Higher Education Landscape	Openness/ Open Education	Overview of OER Movement	OER Faculty Awareness	OER Adoption Facilitators	OER Adoption Barriers, Challenges	OER Adoption Motivators for Use	Innovation, Adoption, Diffusion Theories	Change, Faculty Change Theories	Open Pedagogy/ Educational Practices
Spilovoy & Seaman, 2015			X	X	X	X	X			
Staley & Trinkle, 2011	X									
Straub, 2009								X		
Surry & Ely, 2002								X		
Thoms & Thoms, 2014				X		X				X
Tuomi, 2006			X							
Tuomi, 2013	X									
UNESCO & Commonwealth of Learning, 2015			X							
Watts & Economou, 2015	X							X		
Wejnert, 2002								X		
Weller, 2013		X								
Wiley, n.d.			X							
Wiley, 2010	X	X								
Wiley, 2014			X							
Wiley, 2017										X
Wiley & Gurrell, 2009			X							
The William and Flora Hewlett Foundation, 2013			X							
The William and Flora Hewlett Foundation, 2015			X							
Wisdom, et al., 2014								X		
Wooley, 2013									X	
Zijdemans Boudreau, 2014		X								

APPENDIX B

OER Higher Education Expert Panelists

1. Renee Aitken, PhD
   Colorado State University Global Campus
   Director of Assessment and Education

2. Juville Dario-Becker, PhD
   Central Virginia Community College
   Professor, Science Math and Engineering Department

3. Julie Evey, PhD
   Kent State University, Geauga
   Professor of Psychology

4. Lesley Farmer, EdD
   California State University, Long Beach
   Professor of Library Media

5. Larry Green, PhD
   Lake Tahoe Community College
   Professor of Mathematics

6. Leslie Kennedy, EdD
   California State University, Chancellor's Office
   Director, Affordable Learning Solutions
   California State University, Long Beach
   Part-time Faculty

7. Lisa Lindgren, PhD
   College of St. Benedict / St. John's University
   Associate Professor

8. Ronald Mayne, PhD
   Life University
   Assistant Professor, Health Sciences/Professions and Nursing

9. Jane Moore, PhD
   California State University/MERLOT
   Director, MERLOT Editorial & Professional Development Services
   University of Western Ontario
   Visiting Professor

10. Cyril Oberlander, MLIS, MS
    Humboldt State University
    University Library Dean

11. Dana Ospina, MSIS, MA
    California State University, Dominguez Hills
    Digital Initiatives Librarian

12. Lynn H. Ritchey, PhD
    University of Cincinnati
    Professor of Sociology

13. Aline Soules, MSLS, MA, MFA
    California State University, East Bay
    Library Faculty

14. Luz del Carmin Vilchis Esquivel, PhD
    National Autonomous University of Mexico
    Professor

15. Suzanne Wakim, MS
    Butte Community College
    Biology Faculty/OER Coordinator

16. Teresa M. Wolfe, PhD
    Portland Community College
    Department Chair & Instructor, Medical Laboratory Technology

APPENDIX C

Round 1 Questions

Delphi Study Round One Survey Monkey Questionnaire

Introduction

This research study utilizes a Delphi technique to gain insight into faculty adoption of OER at colleges and universities in the United States over the next ten years.

This is the first round questionnaire and is one of three that you will complete. Please complete the questionnaire by **[date]**.

1. Please provide your three-digit identification code: _____

2. What are four to six activities that you believe should be implemented in order to advance faculty adoption of OER over the next ten years in public colleges and universities in the United States?

Note: For purposes of this study, *advance faculty adoption of OER is defined as faculty moving beyond basic awareness of OER to actionable, observable activities related to OER that include using reusing, retaining, revising, redistributing, or remixing OER.*

Activity One [open comment box]

Activity Two [open comment box]

Activity Three [open comment box]

Activity Four [open comment box]

Activity Five [open comment box]

Activity Six [open comment box]

Thank you very much for your expert opinions.

APPENDIX D

Round 2 Questions

Delphi Study Round Two Survey Monkey Questionnaire

Introduction

This research study utilizes a Delphi technique to gain insight into faculty adoption of OER at colleges and universities in the United States over the next ten years.

This is the second round questionnaire and is the second of three that you will complete. Please complete the questionnaire by **[date]**.

1. Please provide your three-digit identification code: _____

Instructions

For each of the activities listed below:

a. Please rate the importance of the activities identified in Round One to advance faculty adoption of OER over the next ten years, using a 10-point Likert scale.

1 (Lowest Importance) to 10 (Highest importance)

b. Please rate the likelihood of implementation of the activities identified in Round One to advance faculty adoption of OER over the next ten years, using a 0 (zero) to 100 **percentage** scale.

0% (least likelihood) to 100% (Greatest likelihood)

List of Activities

Activity

Please rate the degree of importance (1=low; 10= high)

1 2 3 4 5 6 7 8 9 10

Please rate the likelihood of implementation (0%=low; 100%= high)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

APPENDIX E

Round 3 Review of Expert Panel Responses

Delphi Study Round Three Survey Monkey Questionnaire

Introduction

This research study utilizes a Delphi technique to gain insight into faculty adoption of OER at colleges and universities in the United States over the next ten years.

This is the third round questionnaire and is the final of three that you will complete. Please complete the questionnaire by **[date]**.

1. Please provide your three-digit identification code: _____

Instructions

In Round One you were asked to identify four to six activities for *advancing* faculty adoption of OER.

In Round Two you were asked to rate the importance and likelihood of implementation of the aggregated activities identified in Round One.

In this third round, you are being asked to compare your ratings for importance and likelihood of implementation for each of the identified activities from round two to the median rating of the entire expert panel.

After comparing this information for each activity, you will have the opportunity to either keep your rating or to revise it. **However, you are under *no* obligation to change your ratings. If you choose to keep your rating the same, you may select "I do not want to change my rating" and the survey will direct you to review the next activity.**

Example:

Please consider whether or not to revise the rating of the following activity:

Activity

Degree of importance (1=low; 10= high)
Your Score: [number]
Expert Panel Median Score: [number]

Likelihood of implementation (0%=low; 100%=high)
Your Score: [number]
Expert Panel Median Score: [number]

Please select one of the following options:
I do not want to change my responses. (Directed to next statement)
I do want to change my responses. (Directed to a screen where they adjust ratings)

Optional Comments regarding this activity:

[open ended comment box]

APPENDIX F

IRB Approval

From: **Institutional Review Board** <my@brandman.edu>
Date: Fri, Mar 9, 2018 at 10:58 AM
Subject: BUIRB Application Approved As Submitted: Stephanie Brasley
To: <sbrasley@mail.brandman.edu>
Cc: <pwhite@brandman.edu>, <buirb@brandman.edu>, <ddevore@brandman.edu>

Dear Stephanie Brasley,

Congratulations, your IRB application to conduct research has been approved by the Brandman University Institutional Review Board. This approval grants permission for you to proceed with data collection for your research. Please keep this email for your records, as it will need to be included in your research appendix.

If any issues should arise that are pertinent to your IRB approval, please contact the IRB immediately at BUIRB@brandman.edu. If you need to modify your BUIRB application for any reason, please fill out the "Application Modification Form" before proceeding with your research. The Modification form can be found at the following link: https://irb.brandman.edu/Applications/Modification.pdf.
Best wishes for a successful completion of your study.

Thank you,
Doug DeVore, Ed.D.
Professor
Organizational Leadership
BUIRB Chair
ddevore@brandman.edu
www.brandman.edu

APPENDIX G

Invitation to Participate in an OER Delphi Study E-mail Memo

Invitation to Participate in an OER Delphi Study Email Memo

Dear Dr./Mr./Mrs./Ms.

I hope this email finds you well.

Stephanie Brasley is a doctoral candidate at Brandman University and also Dean of the University Library at CSU Dominguez Hills. Stephanie has been a strong supporter of OER as a library dean for many years and she is conducting a Delphi study for her dissertation on faculty adoption of open educational resources (OER). This study will ask a panel of higher education faculty experts with experience and expertise concerning OER to identify activities that will advance faculty adoption of open educational resources (OER) at colleges and universities in the United States over the next ten years, and the importance and likelihood that the identified activities will be implemented.

As a MERLOT peer reviewer or AB 798 coordinator, you have been identified as an "expert" on faculty use of OER. For the purposes of this study, *experts* **are OER faculty practitioners who possess knowledge of or have extensive experience with faculty adoption of OER at universities and colleges within the United States. They are faculty working in higher education environments who have been involved in OER adoption, implementation, or sustainability activities for at least five years.**

I would like to invite you to be a member of the expert panel. The OER Delphi study will consist of three rounds of electronic questionnaires, with each round taking approximately 20 minutes to complete.

I have nominated you as an expert on OER adoption. If you agree that you meet the stated criteria for an expert and are able to lend your expertise to this OER study, please contact Stephanie directly at sbrasley@mail.brandman.edu.

Cheers,

Gerry

Gerard L. Hanley, Ph.D.
Assistant Vice Chancellor, Academic Technology Services
Executive Director, MERLOT (www.merlot.org)
Director, SkillsCommons (www.skillscommons.org)
California State University, Office of the Chancellor

APPENDIX H

Informed Consent to Participate

Consent to Participate in Research Study

[This Consent form will be sent electronically to participants using Survey Monkey, URL: [https://]]

Introduction

You are being asked to participate in a research study entitled *Advancing Faculty Adoption of Open Educational Resources in Higher Education: A Delphi Study* by Stephanie Sterling Brasley, BA, MLS, a doctoral student in the School of Education at Brandman University.

Purpose of the Delphi Study

The purpose of this Delphi study is to identify and describe the perceptions of Open Educational Resources (OER) higher education experts regarding the activities needed at colleges and universities in the United States in order to advance faculty adoption of OER over the next ten years. Also, this study will examine those activities that are most important and have the greatest likelihood of being implemented.

Research Study Procedures

You will be asked to complete three questionnaires in three rounds over the next four weeks. The questionnaire for each round should take approximately 20 to 30 minutes to complete.

The timeline for the three rounds is tentatively as follows:

Round One: [Dates]. In Round One you will be asked to provide four to six activities that you believe will advance faculty adoption of OER in colleges and universities in the United States over the next ten years.

Round Two: [Dates]. In Round Two, you will be provided an aggregated list of the expert panel responses. You will be asked to rate the importance of each activity and the likelihood of that activity being implemented.

Round Three: [Dates]. In Round Three, the researcher will provide your feedback on your responses and those of the other members of the expert panel. You will have the opportunity to change your original response, should you elect to do so. Also, you will have the opportunity to provide written comments on any of the activities that are of particular interest to you.

Potential Risks and Discomforts

Participation in this study requires minimal risk to participants. The Delphi technique enables structured questioning, anonymity, and controlled feedback. As such, the researcher anticipates minimal discomfort when responding to the questionnaires. Nevertheless, the researcher acknowledges that the expert panel may experience minimal discomfort when responding to questionnaires.

Potential Benefits to Participation

The focus of this study is on faculty adoption of OER in postsecondary institutions in the United States. Expert panel members will be drawn from OER faculty practitioners working in these institutions. The data collected may provide insights into activities needed for OER adoption that might prove valuable to you and to your institutions.

Expert Panel Participant Identification and Anonymity

During the data collection process, each expert panel member will use a unique three-digit code. The researcher will safe-guard the three-digit codes in a password-protected file to which only she has access. This three-digit code was provided in the Participation in OER Delphi study email sent on [date].

Researcher's Contact Information

Stephanie Sterling Brasley, the researcher, may be contacted at any time if there are questions or concerns regarding this study. Stephanie's contact email is sbrasley@mail.brandman.edu and her cell phone number is XXX-XXX-XXXX and she will endeavor to answer all communications within 24 hours.

You may also contact Dr. Patricia White, the researcher's dissertation chair, at pwhite@brandman.edu.

Expert Panel Participant Withdrawal

I understand that I may refuse to participate in or I may withdraw from this study at any time without any negative consequences. Also, the investigator may stop the study at any time. I also understand that no information that identifies me will be released without my separate consent and that all identifiable information will be protected to the limits allowed by law. If the study design or the use of the data is to be changed I will be so informed and my consent obtained. I understand that if I have any questions, comments, or concerns about the study or the informed consent process, I may write or call the Office of the Vice Chancellor Academic Affairs, Brandman University, 16355 Laguna Canyon Road, Irvine, CA 92618 Telephone (949) 341-7641. I acknowledge that I have received a copy of this form and the Research participant's Bill of Rights."

Participant Consent

I have reviewed and understand my rights as a research participant. By selecting the "AGREE" button you are indicating that you have read the informed consent and the information in this document and that you voluntarily agree to participate. Also, selecting "AGREE" will

indicate that you have received and read the Participant Bill of Rights, sent as an email, along with the instructions for accessing this consent form.

If you do not wish to participate in the survey, you may decline participation by clicking on the "DISAGREE" button.

If you have additional questions regarding your participation and would like to have the researcher contact you, please select the "contact" button.

____AGREE

____DISAGREE

____CONTACT. I would like the researcher to contact me to discuss further my participation.

APPENDIX I

Research Participants' Bill of Rights

BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD

Research Participant's Bill of Rights

Any person who is requested to consent to participate as a subject in an experiment, or who is requested to consent on behalf of another, has the following rights:

1. To be told what the study is attempting to discover.
2. To be told what will happen in the study and whether any of the procedures, drugs or devices are different from what would be used in standard practice.
3. To be told about the risks, side effects or discomforts of the things that may happen to him/her.
4. To be told if he/she can expect any benefit from participating and, if so, what the benefits might be.
5. To be told what other choices he/she has and how they may be better or worse than being in the study.
6. To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study.
7. To be told what sort of medical treatment is available if any complications arise.
8. To refuse to participate at all before or after the study is started without any adverse effects.
9. To receive a copy of the signed and dated consent form.
10. To be free of pressures when considering whether he/she wishes to agree to be in the study.

If at any time you have questions regarding a research study, you should ask the researchers to answer them. You also may contact the Brandman University Institutional Review Board, which is concerned with the protection of volunteers in research projects. The Brandman University Institutional Review Board may be contacted either by telephoning the Office of Academic Affairs at (949) 341-9937 or by writing to the Vice Chancellor of Academic Affairs, Brandman University, 16355 Laguna Canyon Road, Irvine, CA, 92618.

Brandman University IRB Adopted November 2013

APPENDIX J

Initial Test, SurveyMonkey and Demographic Survey

Delphi Study Survey Monkey Initial Test: Demographic Survey

(The Survey Monkey URL will be sent in the Initial Test email)

Instructions

Thank you again for agreeing to participate in this Delphi study on advancing faculty adoption of OER in colleges and universities in the United States.

This is an initial test that simulates the Survey Monkey form that OER expert panel members will utilize during each of the three rounds in this Delphi data collection process. This initial test also includes a demographic survey.

Please respond to each question and then select "SUBMIT" by [date].

1. Please provide your contact information.

Name

Email Address

Phone Number

2. Please select the category that best describes your institution

____2-year public college – Associates granting college

____2-year private college – Associates granting college

____4-year public college or university – Masters/doctoral granting (fewer than 20 doctoral degrees)

____4-year private college or university – Masters/doctoral granting (fewer than 20 doctoral degrees)

____4-year public universities (Awards at least 20 research/scholarship doctoral degrees, excluding professional practice doctoral-level degrees)

____4-year private universities (Awards at least 20 research/scholarship doctoral degrees, excluding professional practice doctoral-level degrees)

3. Please select the category that best describes your discipline area

Natural Sciences____

Behavioral and Social Sciences _____

Arts _____

Humanities_____

Health Sciences/Professions and Nursing _____

Education _____

Business, Management, Public Policy _____

Library and Information Science _____

Other: _____

4. Please select the category that best describes your faculty designation:

Part-time faculty _____

Full-time faculty lecturer _____

Tenure-track faculty _____

Tenured faculty _____

5. Please select the number of years as a faculty member:

1-2 _____

3-4_____

5-7_____

8-10_____

11-14_____

15+ _____

6. Please select the number of years of experience working with OER”

5-6 _____

7-8 _____

9-10_____

10+ _____

7. Will you be available to participate in all three rounds of the Delphi study during the months of mid-March to mid-April?

Yes _____

No _____

8. Did you experience difficulty accessing or completing this survey

Yes _____

No _____

If yes, please explain (comment box)

9. Please use the comment box below for questions, concerns, or additional comments regarding the study:
[comment box]

APPENDIX K

Delphi Study: Round 1 Email

Date
To: [OER expert panel member]
From: Stephanie Sterling Brasley
Subject: OER Faculty Adoption Delphi Study – Round One Questionnaire
Three Digit Participant Code: XXX

I would like to thank you for agreeing to participate in the study on faculty adoption of OER in colleges and universities in the United States.

You may access the Round One Survey Monkey questionnaire at the following web link: [URL]

You will be asked to identify four to six activities for *advancing* faculty adoption of OER. For the purposes of this study, *Advancing Faculty Adoption of OER is defined as* ***faculty moving beyond basic awareness of OER to actionable, observable activities related to OER that include using, reusing, retaining, revising, redistributing, or remixing OER.***

If you have any questions or concerns, please do not hesitate to contact me at sbrasley@mail.brandman.edu.

Thank you,

Stephanie Sterling Brasley
Doctoral Candidate
Brandman University

APPENDIX L

Delphi Study: Round 2 Email

Date
To: [OER expert panel member]
From: Stephanie Sterling Brasley
Subject: OER Faculty Adoption Delphi Study – Round Two Questionnaire
Three Digit Participant Code: XXX

I would like to thank you for agreeing to participate in the study on faculty adoption of OER in colleges and universities in the United States.

You may access the Round Two Survey Monkey questionnaire at the following web link: [URL]

In round one, you were asked to identify four to six activities for *advancing* faculty adoption of OER. The Expert Panel responses have been aggregated and form the basis of the Round Two questionnaire.

In Round Two you will be asked to rate the importance of and likelihood of implementation of the activities submitted in Round One.

If you have any questions or concerns, please do not hesitate to contact me at sbrasley@mail.brandman.edu.

Thank you,

Stephanie Sterling Brasley
Doctoral Candidate
Brandman University

APPENDIX M

Delphi Study: Round 3 E-mail

Delphi Study: Round Three Email

Date
To: [OER expert panel member]
From: Stephanie Sterling Brasley
Subject: OER Faculty Adoption Delphi Study – Round Three Questionnaire
Three Digit Participant Code: XXX

Thank you very much for agreeing to participate in the study on faculty adoption of OER in colleges and universities in the United States and for completing this third and final round. The last round of a Delphi is the point at which experts may look to consensus, to the degree possible, concerning activities.

You may access the Round Three Survey Monkey questionnaire at the following web link: Please complete by Wednesday April 25, 2018.

In this third round, you will be provided your individual median scores that you rated for degree of importance and likelihood of implementation for each identified activity from round two along with the collective median score of the entire expert panel. For the purposes of this study, the median score, which is a measure of central tendency, will be utilized to demonstrate the aggregate ranking of the group for each activity.

At this time, you will have the opportunity to compare your individual median score to that of the expert panel and make any desired changes. **However, you are not required to make any changes to your scores**.

Also, for each activity statement, an optional comment box is provided should you desire to provide additional comments of particular interest to you.

If you have any questions or concerns, please do not hesitate to contact me at sbrasley@mail.brandman.edu.

Thank you,

Stephanie Sterling Brasley
Doctoral Candidate
Brandman University

APPENDIX N

Original List of 76 Round 1 OER Adoption Activities From Expert Panel

1. Continue to develop consortial or campus publishing programs (need not be in the model of a university press) to support the creation of upper-division and specialized OER—not just textbooks, but customized digital learning objects that meet the needs of upper division curricula.
2. Campus support for structured faculty learning communities that provide professional development and education about discovery, adaptation, versioning, and pedagogy. While often led by libraries, OER learning communities benefit greatly from the participation of academic technology, disability resources, and faculty mentors. Learning communities create a network of support both, intellectual and technical, for faculty looking to move beyond a straightforward adoption.
3. Demonstrated interest and investment on the part of campus administration to collect data and publicize the value of OER for student success, retention, and graduation.
4. Recognition of OER contributions in the RTP process—faculty may be willing to do a one-off exploration or pilot without reward, but to achieve sustained buy-in, faculty need to receive meaningful recognition for their efforts.
5. Develop file format best practices for creating and adapting OERs. When faculty encounter obstacles to adaptation and use, either because of unfamiliarity with a file format or an inability to use content in a desired format or platform, this can create a barrier to adoption.
6. Funding faculty for the time and challenges for redesigning their curriculum to accommodate OER.
7. Creating zero textbook cost pathways within majors.
8. Scaling the adoption of OER within departments.
9. Funding the development of additional OER broadening the offering beyond GE courses.
10. Expanding access to more quality OER for more disciplines.
11. Recognition of OER adoption as innovation and student support in the RTP process.
12. Advertising.
13. Test banks.
14. Workshops on OER.
15. Engaging early adopters.
16. Having great OER resources available.
17. Garnering Administration support.
18. Librarians involved in selecting materials.
19. Presenting information to faculty to support the use of OER.
20. Statewide and nationwide organizations (Such as OpenStax and MERLOT) that develop maintain and host OER for the most commonly taught courses.
21. Department meetings where at least a full hour is reserved for the discussion of OER adoption.
22. Discipline specific work groups that create and curate OER materials for that discipline and then share the work in their state or national discipline conferences.
23. Stipend opportunities for faculty who are interesting in exploring OER.

24. Faculty need more texts in areas not yet covered well by OER. Incentives (cash/time) are needed to encourage faculty to write such texts.
25. A key problem for faculty using OER is the lack of ancillaries (test banks, problem sets, etc.). Faculty need incentives (cash/time) to develop such ancillaries to the core texts.
26. Peer review is another key issue for OER. Many faculty are still distrustful of OER. Faculty need incentives (cash/time) to engage in peer review of OER.
27. Retention, Tenure, and Promotion criteria often still lack credit for writing OER, peer-review of OER, etc. Efforts should be made to engage with academic governance to address this lack.
28. Few campuses have embedded the entire OER adoption process into academic governance. Without faculty on board, through academic governance, it's difficult to make the kind of inroads to acceptance that are needed. Efforts should be made to create academic governance committee(s) to address this. Example: CSUEB's Affordable Learning Solutions Subcommittee.
29. There are state laws (CA, perhaps other states?) that now require that students be informed of courses that offer OER; however, more effort is needed to ensure that students, themselves, participate in this process. A student representative on an academic governance committee is one way to put students and faculty together; however, students are off "doing their own thing" when it comes to promoting OER. More effort is needed to combine those efforts so that faculty, students, and academic staff are not working on different tracks.
30. Use of social media tools to create OER.
31. Incorporate course activities to get students to generate OER.
32. Training on revising, redistributing, remixing of OER.
33. Awareness and promotion of OER (most don't know what it is).
34. Training on what OER is/is not & value/benefit to students.
35. Release time to create OER.
36. Faculty Development workshops on how to use OER in the classroom.
37. Virtual webinars on using OER in the classroom.
38. FlipGrid (or similar) videos demonstrating the use of OER in the classroom.
39. Newsletters indicating the cost savings for students when faculty use OER in lieu of textbooks.
40. Seminars/workshops/webinars for instructional designers to help them understand the value and use of OER.
41. Educating -benefits of OERS.
42. Educating - how to create.
43. Educating - how to modify.
44. Educating - where to locate.
45. Show how to locate high-quality OERs.
46. Provide criteria for evaluating OERs.
47. Provide a collection of videos that showcase how faculty incorporated OERs.
48. Provide research showing the benefits of OERs -- and research-based factors that optimize their incorporation.
49. Provide syllabi that show best practices in incorporating OERs -- including reasons that they are effective.

50. Provide URLs of collections of high-quality, peer-reviewed OERs (e.g., MERLOT).
51. Mandates from administration.
52. Peer pressure from colleagues.
53. Demands from students for free or affordable course materials.
54. Collaboration among practitioners from different institutions.
55. Cross-discipline collaboration within institution.
56. Developing new content.
57. Support from administration for the effort of finding / utilizing.
58. Support from librarians.
59. Ease of finding useful/quality OER (the sheer number can be overwhelming).
60. OER that really are free (some only have free sections).
61. Training.
62. Actualization.
63. Awareness.
64. Practice.
65. Evaluation.
66. Criticism.
67. Share OER content with other instructors teaching the same course.
68. Revise content as required to fit the instructor's emphasis and teaching style.
69. Review the OER content when planning syllabi, assignments, and class exercises.
70. Retain location information on the OER content.
71. Hands-on Faculty Workshops (search, evaluate, adapt, create).
72. Combine with course transformation, faculty development, student success and online learning strategies.
73. Develop ancillary / interactives, or partner with Lumen, OpenStax, etc.
74. Research impact on students and faculty.
75. Develop multi-institutional strategies, for example, Open SUNY Textbook.
76. Adopt open pedagogy practices.

APPENDIX O

Aggregated List of 35 Documents Organized Into Themes

Delphi Study: Open Educational Resources (OER) Faculty Adoption

Expert Panel Activities to Advance Faculty Adoption Organized by Themes

Theme I: Administrative and Institutional Activities

1. Provide administrative support to collect data and publicize the value of OER to promote student success, retention & graduation.
2. Advocate that administration mandate faculty involvement in OER activities.
3. Showcase faculty exemplars and highlight best practices on incorporating OER into courses
4. Form partnerships with OER providers (e.g. Lumen Learning, OpenStax, MERLOT, etc) that develop, maintain, and host OER for most commonly taught courses.
5. Develop multi-institutional strategies OER adoption (e.g. Open SUNY Textbook, CSU Affordable Learning Solutions).
6. Develop file format best practices for creating and adapting OERs to reduce faculty obstacles when they try to adapt and use OER materials created by others.
7. Continue to develop consortial or campus publishing programs to support the creation of specialized OER (i.e. beyond textbooks), such as customized digital learning objects, that meet the needs of upper division curricula.

Theme 2: Professional Development for 5Rs, searching and locating Quality OER

8. Provide training/workshops in multiple delivery formats on creating, revising, remixing, redistributing, OER.
9. Provide training on searching, locating, and evaluating OER.
10. Provide institutional support for OER learning communities for professional development.

Theme 3: Discovery, Access, and Quality of OER

11. Provide access to OER collections that contain high quality, peer reviewed OER materials (e.g. MERLOT)
12. Increase the quality of OERs that are created and currently are made available
13. Provide criteria to faculty for evaluating OER

Theme 5: Faculty Incentives and Awareness-Building of OER

14. Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation.
15. Provide faculty with research and research-based factors on OER that underscore benefits of OER use in order to optimize their incorporation.
16. Provide faculty funding and/or release time to write texts, develop ancillary materials (e.g. test banks, problem sets, participate in OER peer review activities, and in course redesign projects.

Theme 7: Academic Governance & Retention, Tenure, and Promotion

17. Engage academic governance (e.g. Academic Senate) in OER process by forming OER governance committees.
18. Utilize academic governance structure to advocate for changes to the retention, tenure, and promotion processes that recognize faculty contributions to OER creation, adaptation, and use.

Theme 8: Student Involvement in OER

19. Engage students in the OER Adoption process. (E.G. representation on academic governance committees).
20. Enable student feedback on OER course evaluation forms so that faculty can include the information in retention, tenure, and promotion files.
21. Students should increase their demands for free and/or low-cost affordable learning materials.
22. Provide opportunities for students to generate quality OER during their classes.

Theme 9: Department and Discipline-based Activities

23. Set aside a meaningful portion of department faculty meeting time to discuss ways to use and scale OER within courses.
24. Create discipline-specific workgroups that create and curate OER to be shared at the institutional, statewide, and national levels/conferences.
25. Share OER content with instructors teaching the same courses.
26. Create more OER for other disciplines and within majors

Theme 10: Faculty OER Development Activities

27. Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions.
28. Exert peer pressure with colleagues to engage in OER activities.
29. Review and revise OER content to align with course activities and instructor's teaching style.
30. Adopt open pedagogy practices.
31. Engage in research that highlights the impact of OER on students and faculty.
32. Create zero textbook cost pathways within majors.

Theme 12: Faculty Partners

33. Engage librarians as selectors and advocates for OER adoption
34. Create OER professional development opportunities for instructional designers to facilitate their understanding of its value
35. Encourage partnerships with Academic Technology, Disability Resources, and faculty mentors to increase OER adoption.

APPENDIX P

Aggregated List of 35 Round 1 OER Adoption Activities From Expert Panel

Delphi Study: Open Educational Resources (OER) Faculty Adoption

Activities Identified by the Delphi Expert Panel to Advance OER Faculty Adoption

(For Round 2, Rate Importance (1-10) and Likelihood (0% to 100% on Survey Monkey Form)

1. Provide administrative support to collect data and publicize the value of OER to promote student success, retention & graduation. **Importance**_____ **Likelihood** _____
2. Advocate that the administration mandate faculty involvement in OER activities. **Importance**_____ **Likelihood** _____
3. Showcase faculty exemplars and highlight best practices on incorporating OER into courses. **Importance**_____ **Likelihood** _____
4. Form partnerships with OER providers (e.g. Lumen Learning, OpenStax, MERLOT, etc) that develop, maintain, and host OER for most commonly taught courses. **Importance**_____ **Likelihood** _____
5. Develop multi-institutional strategies OER adoption (e.g. Open SUNY Textbook, CSU Affordable Learning Solutions). **Importance**_____ **Likelihood** _____
6. Develop file format best practices for creating and adapting OERs to reduce faculty obstacles when they try to adapt and use OER materials created by others. **Importance**_____ **Likelihood** _____
7. Continue to develop consortial or campus publishing programs to support the creation of specialized OER (i.e. beyond textbooks), such as customized digital learning objects, that meet the needs of upper division curricula. **Importance**_____ **Likelihood** _____
8. Provide training/workshops in multiple delivery formats on creating, revising, remixing, redistributing, OER. **Importance**_____ **Likelihood** _____
9. Provide training on searching, locating, and evaluating OER. **Importance**_____ **Likelihood** _____
10. Provide institutional support for OER learning communities for professional development. **Importance**_____ **Likelihood** _____
11. Provide access to OER collections that contain high quality, peer reviewed OER materials (e.g. MERLOT). **Importance**_____ **Likelihood** _____
12. Increase the quality of OERs that are created and currently are made available. **Importance**_____ **Likelihood** _____
13. Provide criteria to faculty for evaluating OER. **Importance**_____ **Likelihood** _____
14. Increase faculty awareness of the value and benefits of OER to students, student success, and retention and of OER as an educational innovation. **Importance**_____ **Likelihood** _____
15. Provide faculty with research and research-based factors on OER that underscore benefits of OER use in order to optimize their incorporation. **Importance**_____ **Likelihood** _____
16. Provide faculty funding and/or release time to write texts, develop ancillary materials (e.g. test banks, problem sets, participate in OER peer review activities, and in course redesign projects. **Importance**_____ **Likelihood** _____
17. Engage academic governance (e.g. Academic Senate) in OER process by forming OER governance committees. **Importance**_____ **Likelihood** _____
18. Utilize academic governance structure to advocate for changes to the retention, tenure, and promotion processes that recognize faculty contributions to OER creation, adaptation, and use. **Importance**_____ **Likelihood** _____
19. Engage students in the OER Adoption process. (E.G. representation on academic governance committees). **Importance**_____ **Likelihood** _____
20. Enable student feedback on OER course evaluation forms so that faculty can include the information in retention, tenure, and promotion files. **Importance**_____ **Likelihood** _____

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21. Students should increase their demands for free and/or low-cost affordable learning materials. **Importance**_____ **Likelihood** _____
22. Provide opportunities for students to generate quality OER during their classes. **Importance**_____ **Likelihood** _____
23. Set aside a meaningful portion of department faculty meeting time to discuss ways to use and scale OER within courses. **Importance**_____ **Likelihood** _____
24. Create discipline-specific workgroups that create and curate OER to be shared at the institutional, statewide, and national levels/conferences. **Importance**_____ **Likelihood** _____
25. Share OER content with instructors teaching the same courses. **Importance**_____ **Likelihood** _____
26. Create more OER for other disciplines and within majors. **Importance**_____ **Likelihood** _____
27. Engage faculty OER early adopters in activities to facilitate expansion of OER adoption at institutions. **Importance**_____ **Likelihood** _____
28. Exert peer pressure with colleagues to engage in OER activities. **Importance**_____ **Likelihood** _____
29. Review and revise OER content to align with course activities and instructor's teaching style. **Importance**_____ **Likelihood** _____
30. Adopt open pedagogy practices. **Importance**_____ **Likelihood** _____
31. Engage in research that highlights the impact of OER on students and faculty. **Importance**_____ **Likelihood** _____
32. Create zero textbook cost pathways within majors. **Importance**_____ **Likelihood** _____
33. Engage librarians as selectors and advocates for OER adoption. **Importance**_____ **Likelihood** _____
34. Create OER professional development opportunities for instructional designers to facilitate their understanding of its value. **Importance**_____ **Likelihood** _____
35. Encourage partnerships with Academic Technology, Disability Resources, and faculty mentors to increase OER adoption. **Importance**_____ **Likelihood** _____

APPENDIX Q

Modified IRB Certification

BRANDMAN University Chapman University System

BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD
Request for Modification of Approved Project

Investigators must submit the Request for Modification for when any document or procedure within the IRB approved protocol is revised. There is only one exception to this rule, specifically where the change is necessary to eliminate apparent immediate hazards to the subjects. In such cases, the investigator must submit a report to IRB explaining the protocol deviation. Amendments involving minor changes that pose no more than minimal risk to subjects will be reviewed on an expedited basis. Changes may not be implemented until final written IRB approval is received.

INSTRUCTIONS: The entire form must be completed. Submit this application with the following:

- If the consent has been modified, submit a copy of the modified form with the changes marked, plus an unmarked copy
- A copy of the modified research protocol
- A summary of protocol modifications

PRINCIPAL INVESTIGATOR (Last, First, M.I., Degree)	BUIRB PROJECT NUMBER	DATE
Brasley, Stephanie, Ed.D	299	5/15/18
PROJECT TITLE		
Advancing Faculty Adoption of Open Educational Resources in Higher Education: a Delphi Study		

1. BRIEF DESCRIPTION OF ORIGINAL PROTOCOL: (Attach additional sheets as necessary)

When I submitted my original BUIRB documents for my Delphi study, I submitted the following email message to accompany the third round of the study (please see attached).

2. DESCRIBE THE MODIFICATION(S) REQUESTED. INCLUDE REASONS FOR THE CHANGE(S).

Prior to the beginning of the study, I am to send each expert panelist a "Participation in OER Delphi Study email that explains that the Delphi technique is a consensus-building and forecasting tool. In this initial email, I explain that at the conclusion of the rounds, the desired outcome will be consensus around those activities that would need to occur to advance faculty adoption of open educational resources. However, since there is nearly a month's time lapse between this initial email and the Round 3 email, I think that it is important to reiterate the goal of a Delphi method. Also, in the original version of the email, I did not fully explain the purpose of the median score that is provided in Round 3. Finally, I would like to provide participants the opportunity to make comments on any of their ratings in Round 3. Hence, I am proposing the following revisions to the Round 3 email, highlighted in yellow (please see attached).

3. WILL THE MODIFICATION(S), IN YOUR OPINION, INCREASE OR DECREASE THE RISK OF HARM TO THE SUBJECTS? ☐ Increase ☐ Decrease ■ No change

Explain (attach sheets as necessary):

4. WILL THE MODIFICATION(S) ALTER THE APPROVED CONSENT FORM? ☐ Yes ■ No

If yes, attach original and one copy of a revised consent form, with additions and deletions clearly marked, to this form for review and approval.

5. DID ANY UNANTICIPATED PROTOCOL DEVIATIONS (INCLUDING ERRORS AND ACCIDENTS) OCCUR SINCE THE LAST REVIEW? ☐ Yes ■ No

If yes, summarize all protocol deviations (attach sheets as necessary):

6. HAVE UNANTICIPATED RISKS OR SIGNIFICANT NEW FINDINGS BEEN DISCOVERED SINCE THE PREVIOUS BUIRB REVIEW THAT MIGHT AFFECT THE SUBJECTS' WILLINGNESS TO CONTINUE PARTICIPATION? ☐ Yes ■ No

If yes, complete the following:

a) Explain the risks or findings in detail (Attached sheets as necessary):

b) Do these risks or finding require modification of the informed consent form?
☐ Yes ☐ No

c) Were subjects notified of these risks or findings? ☐ Yes ☐ No

d) Were subjects reconsented? ☐ Yes ☐ No

I certify that none of these changes have been made and that no changes will be implemented prior to IRB review and approval.

Principal Investigator: Stephanie S Brasley Digitally signed by Stephanie S Brasley Date: 2018.05.16 11:57:45 -07'00' **Date** 5/16/18

BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD
REQUEST FOR MODIFICATION OF APPROVED PROJECT

☑ The modification/amendment described on page 1 qualifies for and has been approved by expedited review.

☐ The modification/amendment described on page 1 has been reviewed and approved by the Brandman University Institutional Review Board.

☐ The modification/amendment described on page requires additional changes to secure approval.

COMMENTS:

Approved!

Devore, Douglas Digitally signed by Devore, Douglas DN: cn=Devore, Douglas, o=Brandman University, ou, email=ddevore@brandman.edu, c=US Date: 2018.05.16 12:12:52 -07'00'

May 16, 2018

Chair, Brandman University Institutional Review Board **Date**

Brandman University IRB Adopted November 2013

APPENDIX R

Frequency Distribution Tables

Table R1

Round 2 Frequency Distribution Table: Importance

Research Finding										
	10	9	8	7	6	5	4	3	2	1
1	6	4	2	0	0	0	0	3	1	0
2	0	1	1	4	1	0	1	0	3	5
3	7	4	0	3	1	0	0	1	0	0
4	2	3	3	3	0	1	0	2	1	1
5	5	4	2	2	0	0	0	1	2	0
6	5	4	0	0	3	2	0	1	1	0
7	5	3	2	3	1	0	0	1	0	1
8	7	2	2	2	2	1	0	0	0	0
9	7	4	2	3	0	0	0	0	0	0
10	4	4	5	2	0	0	0	1	0	0
11	8	5	2	0	0	0	0	1	0	0
12	8	3	3	0	1	0	0	0	1	0
13	2	2	6	1	1	0	0	2	1	1
14	8	2	1	3	1	0	0	1	0	0
15	5	2	3	4	0	0	1	0	1	0
16	8	3	1	1	1	1	1	0	0	0
17	3	2	1	1	1	2	3	0	1	2
18	6	2	3	2	0	1	0	0	2	0
19	3	2	2	1	3	2	1	2	0	0
20	5	1	2	0	2	2	1	1	1	1
21	3	3	2	1	2	1	0	1	3	0
22	2	2	4	2	0	2	2	2	0	0
23	3	2	5	0	2	0	1	0	2	1
24	2	6	3	3	2	0	0	0	0	0
25	8	3	5	0	0	0	0	0	0	0
26	8	1	2	2	1	1	1	0	0	0
27	4	2	6	2	1	1	0	0	0	0
28	0	0	2	3	2	4	0	0	2	3
29	5	2	5	2	0	0	1	1	0	0
30	6	3	3	1	1	1	0	1	0	0
31	2	2	5	3	0	1	2	1	0	0
32	5	2	2	3	1	0	0	3	0	0
33	4	3	4	1	1	1	1	0	0	1
34	7	1	2	3	1	0	1	1	0	0
35	5	3	2	2	0	2	1	0	0	1

Table R2

Round 3 Frequency Distribution Table: Importance

Research Finding										
	10	9	8	7	6	5	4	3	2	1
1	6	4	2	0	0	1	0	2	1	0
2	0	1	1	3	1	0	1	1	3	5
3	7	4	0	4	0	0	0	1	0	0
4	2	3	3	4	0	2	0	1	1	0
5	4	6	3	1	0	0	0	0	2	0
6	4	5	2	0	1	2	0	1	1	0
7	5	3	2	3	1	1	0	0	0	1
8	7	2	2	2	2	1	0	0	0	0
9	7	4	2	3	0	0	0	0	0	0
10	4	4	6	1	0	0	0	1	0	0
11	8	6	2	0	0	0	0	0	0	0
12	8	4	3	0	0	0	0	0	1	0
13	2	2	6	1	1	0	0	2	1	1
14	8	3	2	1	1	0	0	1	0	0
15	5	2	3	4	0	0	1	0	1	0
16	9	2	2	1	2	0	0	0	0	0
17	3	2	1	2	1	2	3	0	1	1
18	6	2	4	1	0	1	0	0	2	0
19	2	2	2	1	4	3	0	2	0	0
20	5	0	2	0	4	1	1	1	1	1
21	3	3	2	2	2	0	0	1	3	0
22	2	2	4	2	0	3	2	1	0	0
23	3	2	7	0	1	0	1	0	1	1
24	2	6	4	3	1	0	0	0	0	0
25	8	4	4	0	0	0	0	0	0	0
26	8	1	3	1	1	1	1	0	0	0
27	4	2	7	2	0	1	0	0	0	0
28	0	0	2	3	2	4	0	2	0	3
29	4	2	5	3	0	0	1	1	0	0
30	6	3	4	0	1	1	0	1	0	0
31	2	2	5	4	0	0	2	1	0	0
32	4	2	3	3	1	0	0	3	0	0
33	4	3	3	1	1	2	1	0	0	1
34	7	1	3	2	1	0	1	1	0	0
35	7	2	2	2	0	1	1	0	0	1

Table R3

Round 2 Frequency Distribution Table: Likelihood of Implementation

Research Finding											
	10	9	8	7	6	5	4	3	2	1	0
1	1	2	1	1	2	3	1	2	1	2	0
2	0	1	0	0	0	4	2	1	2	3	3
3	1	5	3	1	2	4	0	0	0	0	0
4	1	2	1	5	0	2	1	0	2	2	0
5	2	3	1	3	1	2	1	0	0	3	0
6	2	1	2	1	1	1	4	1	1	2	0
7	1	2	1	1	4	2	2	1	1	0	1
8	4	2	3	3	2	1	1	0	0	0	0
9	5	1	4	4	1	1	0	0	0	0	0
10	1	2	2	4	5	0	0	2	0	0	0
11	8	3	1	1	1	1	0	0	1	0	0
12	1	1	1	5	1	2	1	1	2	0	1
13	3	2	2	2	2	1	0	1	1	1	1
14	4	1	2	6	1	1	1	0	0	0	0
15	1	3	4	2	2	1	1	1	0	1	0
16	1	2	0	2	0	4	2	2	1	1	1
17	1	1	0	2	5	0	0	1	3	3	0
18	1	0	1	2	2	3	1	2	1	3	0
19	2	0	1	2	4	3	0	2	1	1	0
20	1	0	3	1	3	2	0	2	2	2	0
21	1	2	2	2	1	1	3	1	3	0	0
22	0	2	2	1	2	2	4	2	1	0	0
23	0	2	1	1	3	2	2	1	2	2	0
24	0	1	2	2	4	1	1	0	3	2	0
25	4	3	1	2	1	4	0	1	0	0	0
26	2	2	2	1	1	2	4	3	0	0	0
27	1	2	5	1	3	2	1	0	1	0	0
28	0	0	0	1	0	4	4	2	2	2	1
29	2	2	2	2	0	2	2	0	3	1	0
30	1	0	2	4	2	2	2	2	1	0	0
31	0	0	4	2	1	3	1	1	2	2	0
32	3	3	0	2	1	2	1	1	2	1	0
33	2	3	1	2	2	3	1	0	1	1	0
34	2	1	4	1	1	0	2	2	2	0	0
35	2	2	2	3	1	2	1	2	0	1	0

Table R4

Round 3 Frequency Distribution Table: Likelihood of Implementation

Research Finding											
	10	9	8	7	6	5	4	3	2	1	0
1	1	3	1	2	2	3	1	2	1	0	0
2	0	1	0	0	0	4	1	3	2	2	3
3	1	5	4	2	1	3	0	0	0	0	0
4	1	2	1	5	2	3	1	0	0	1	0
5	3	3	2	2	2	1	1	0	0	2	0
6	2	1	2	1	1	1	4	1	1	2	0
7	1	2	1	1	4	2	3	1	0	0	1
8	4	2	3	4	1	1	1	0	0	0	0
9	5	1	5	3	1	1	0	0	0	0	0
10	1	2	2	4	5	0	0	2	0	0	0
11	8	5	0	1	1	1	0	0	0	0	0
12	1	1	1	5	2	2	1	1	1	0	1
13	3	2	2	2	3	0	0	1	1	1	1
14	4	1	2	6	1	1	1	0	0	0	0
15	1	3	4	2	3	0	1	1	0	1	0
16	1	2	1	2	0	5	1	2	1	0	1
17	1	1	0	2	5	1	0	2	2	2	0
18	1	1	1	2	2	2	1	3	1	2	0
19	1	0	0	3	5	4	0	1	1	1	0
20	1	0	3	1	3	2	0	3	2	1	0
21	1	2	2	1	1	2	3	1	3	0	0
22	0	2	2	1	2	2	5	1	1	0	0
23	0	2	1	2	2	3	2	1	2	1	0
24	0	1	2	2	4	1	2	1	3	0	0
25	4	3	1	3	1	2	0	2	0	0	0
26	2	2	0	2	1	3	3	3	0	0	0
27	1	2	4	2	4	2	1	0	0	0	0
28	0	0	0	1	0	4	4	2	2	2	1
29	2	2	1	3	1	3	1	0	2	1	0
30	1	0	2	4	2	3	2	1	1	0	0
31	0	0	4	2	1	3	2	1	2	1	0
32	3	3	0	2	1	2	1	1	2	1	0
33	2	3	1	2	2	4	1	0	0	1	0
34	2	1	4	1	1	1	2	2	2	0	0
35	2	1	2	3	2	3	2	0	0	1	0

APPENDIX S

NIH Certification

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Stephanie Brasley** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 07/21/2014

Certification Number: 1507074

"B