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Faculty Perceptions of Open Educational Resources Quality by Peer Review

Olga Maria Belikov

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of
Master of Science

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ABSTRACT

Faculty Perceptions of Open Educational Resources Quality by Peer Review

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In this paper, 936 faculty free response reviews of open textbooks from the Open Textbook Library were analyzed for content and themes. The reviews were completed by faculty members at institutions in the United States and Canada. The textbooks were evaluated regarding their comprehensiveness, content accuracy, relevance longevity, clarity, consistency, modularity, organization structure flow, interface, grammatical errors, and cultural relevance. The results of the reviews found that the across 9360 comments regarding the quality of open textbooks, of these comments 97.3% reflected adequate or exceptional reviews of the textbooks. Faculty often compared the texts to traditional textbooks and in all mentions of comparison, the open textbook were regarded to be of equal or superior quality. The results of this study aid in alleviating concerns regarding quality of Open Educational Resources (OER) and provide peer reviews that faculty who consider adopting these textbooks often request. Limitations of the study and further prescriptions for research regarding OER quality and peer review research have been explored in the study.

Keywords: open educational resources, open licenses, open textbooks, peer review

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CHAPTER 1: Introduction

For many students, continuing education beyond high school is a high priority that has shown to boost probability of economic prosperity and to provide more stable employment opportunities. Of the 2016 high school graduates in the U.S., 69.7% are currently enrolled in colleges or universities (United States Bureau of Labor, 2017). The price tag of higher education, however, is often an unattainable amount for many students who wish to receive an education. As of 2014, approximately 85% of students in the U.S. were receiving some sort of financial aid, indicating that the cost of education is burdensome to the majority of postsecondary students (National Center for Education Statistics, 2014). This, coupled with the fact that the cost of obtaining postsecondary education has risen over 538 percent since 1985 (United States Bureau of Labor, 2011) is creating an increasingly burdensome financial barrier that prevents many students from enrolling in or completing postsecondary degrees. A large percentage of the cost of attending college in the United States is the cost of textbooks. Students are asked to budget about \$1,230 - \$1,390 each year for textbooks (College Board, 2016). The College Board estimates that the same academic year, students at two-year colleges will be spending approximately \$3,520 on average. For these community college students, these textbook costs could amount to nearly a year of tuition.

A cost-saving alternative to traditionally copyrighted textbooks is the use of Open Educational Resources (OER). OER 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. 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. (William and Flora Hewlett Foundation, 2013)

A widely adopted form of OER in higher education is the open textbook (Allen & Seaman, 2016). The Babson Survey Research Group, in their bi-annual faculty survey on OER, references OER Commons observations in their study stating that

An emerging development in OER is open textbooks, which are textbooks that are freely available with nonrestrictive licenses. Covering a wide range of disciplines, open textbooks are available to download and print in various file formats from several web sites and OER repositories. Open textbooks can range from public domain books to existing textbooks to textbooks created specifically for OER. Open textbooks help solve the problems of the high cost of textbooks, book shortages, and access to textbooks as well as providing the capacity to better meet local teaching and learning needs. (Allen & Seaman, 2014, p. 4)

These textbooks are often accessed online but can be adapted, printed, and used in a variety of formats. Open textbooks encompassing a variety of subjects are freely available, especially in general education courses that have high levels of enrollment. There are a variety of repositories in which faculty members, students, administrators, and others can access and explore open textbooks including the Open Textbook Library, OER Commons, Cool4Ed, Wikimedia Commons, etc. Many faculty draw from repositories such as the Open Textbook Library to select resources for their classrooms.

Textbook selection is a decision made most often at the faculty level. Although many educators are suspicious of the quality of open textbooks because of their low cost, such textbooks are used in many courses with no evidence of negative impact on learning (Lovett,

Meyer, & Thille, 2008; Wiley, Hilton, Williams, & DeMarte, 2016). In other words, open textbooks have been found to be comparable in quality to non-openly licensed textbooks in terms of student outcomes. In a study that allowed 218 faculty members at various faculty levels teaching at public, private, two-year, and four-year institutions to share their views on OER in a free response format expressed one of their biggest barriers to OER adoption to be suspicion of quality due to lack of peer review, because they felt that they had not been vetted the way that a traditionally copyrighted textbook would be (Belikov & Bodily, 2016).

The present study is the analysis of peer reviews of textbooks found in the Open Textbook Library. In 2016, the Open Textbook Network provided small stipends for faculty to review a selection of textbooks in the Open Textbook Library. This study analyzes the results of those 936 faculty peer reviews of these open textbooks. The qualitative analysis of the peer review of open textbooks based on 10 frequently-used measures for textbook evaluation will present results that can allow higher education faculty to make informed choices of whether or not to adopt these effective and cost saving resources in their courses. Although studies exist regarding the efficacy and perceptions of OER, there are no present studies that have had faculty evaluate the actual quality of OER in all major domains of learning. The suspicion of quality of these resources that has not been quelled by presently existing efficacy studies presents the need for an analysis of quality of the resources themselves by expert peer evaluators. Thus, this study seeks to answer the question: *how do faculty members rate the quality of a wide variety of open textbooks?*

CHAPTER 2: Literature Review

There is a variety of literature relating to OER quality and other aspects of OER use. The primary strains of OER literature are (a) cost savings, (b) efficacy, (c) student perceptions, and (d) faculty perceptions (Bliss, Robinson, Hilton, & Wiley, 2013). I will now explore each of these areas in turn.

OER Cost Savings

Cost savings is a well-known benefit of OER adoption, and as a result, it is a major motivation for faculty adoption. Petrides, Jimes, Middleton-Detzner, Walling, & Weiss (2011) found that “cost reduction for students was the most significant factor influencing faculty adoption of open textbooks” (p. 43). Two examples of cost savings can be found in the following reports. In one OER initiative alone, the Kaleidoscope Open Course Initiative (KOCI) which had 3,967 students enrolled in courses that utilized OER, students saved a potential \$338,337.74 over the course of one academic year, which equals \$85.28 per student (Hilton, Robinson, Wiley, & Ackerman, 2014). This was compared to the cost of purchasing textbooks at full cost and doesn’t account for used textbooks, rentals, and other ways of obtaining textbooks for classroom use. OpenStax is another example of the impact of cost savings in the classroom. This open textbook publisher estimated that since its first textbook was released in 2012, it has saved students and faculty members approximately \$68 million in the form of the equivalent of over 690,000 copies of freely available textbooks (Straumsheim, 2016).

Similarly, a survey that sought to understand textbook purchasing behaviors of students and corresponding attitudes, as well as the effect on their instructors found that textbook costs were a major burden upon the 22,000 postsecondary students in the Florida Virtual Campus. The survey found that textbook cost was affecting student access, success, registration, and

completion of coursework that would lead to successful attainment of certificates and degrees. Although students were turning to a variety of alternative methods to reduce textbook cost such as downloading, sharing books, and buying used books, students still felt that textbook costs were burdensome. This was found by Florida Virtual Campus to be especially true for students at two-year colleges who are often more financially at risk than students at four-year year colleges. As they explain: “The results of the survey are sobering, as the findings suggest the high cost of textbook and instructional materials are forcing many Florida higher education students to make decisions that compromise their academic success” (Office of Distance Learning & Student Services, 2016, p. 3). Thus, the potentials of OER to alleviate the cost of higher education is a major motivator for OER adoption.

These cost savings can be impactful for students. One study by Paulsen and St. John (2002), found that students who are in lower socioeconomic status groups and working students are less likely to persist in their higher education by 16-17% for every 1,000 USD in tuition increase. With the College Board estimating between 1,200 and 1,400 USD allocated for student textbooks and materials every year, persistence probability for students who are poor and working-class may be affected by these cost savings. The savings that OER have afforded students as reflected in these studies, and the economically burdensome effect this may have on students outlined by college cost studies, shows that if OER are adopted, the cost savings have the potential be meaningful for students.

OER Efficacy

Despite such cost benefits, OER quality can be a major concern for instructors, and one way in which OER are often proven to be of quality is their tested efficacy in the classroom. Various studies have been conducted on this topic and have found that OER can both cut costs

and provide the same or better student learning outcomes. I will now provide a brief explanation of several of these studies to illustrate.

First, Bowen, Chingos, Lack, and Nygren (2012) conducted a study based on a Carnegie Mellon University course which was implemented in its hybrid and traditional forms across seven courses at six public university campuses in the Fall semester of 2011. That study sampled 3,045 students with a control group of 605 who were using OER and used regression analysis to compare the groups. The researchers found that students who were enrolled in courses that utilized OER exhibited no significant differences in learning outcomes from those who used traditionally copyright-restricted resources in their courses.

Second, in a study at Mercy College, Pawlyshyn, Braddlee, Casper, and Miller (2013) found that after 695 students participated in a course in which OER were utilized, they had higher passing rates in their introductory math course than those students that were enrolled in the same course using non-OER materials. Pass rates increased by 20% over the course of the study and after this study was over, the college decided to use OER in all of their introductory math courses due to the efficacy of the resources.

Third, Hilton and Laman (2012) conducted a study that focused on introductory psychology courses taught at Houston Community College. In the fall of 2011, 23 sections of a psychology course that totaled to students used an open psychology textbook. When the open textbook was introduced into the psychology course, it's use was correlated with an increase in class grade point average, an increase of the average student score on the final examination for the course that is used cross-departmentally, and a lower withdrawal rate for this particular psychology course.

Fourth, Robinson, Fischer, Wiley and Hilton (2014) examined the use of openly licensed science textbooks in secondary science subjects across a number of schools in a suburban school district in the state of Utah. This study used propensity score matching on groups to control for teacher effect, socioeconomic status, and eight other potentially confounding variables. There were 1,274 students in both the treatment and control groups in these public secondary schools. The results of the student's scores on end-of-year state-provided standardized test were analyzed and it was found that there were small but statistically significant differences between the two groups, favoring those who utilized OER for their science subjects.

Fifth, Fisher, Hilton, Robinson, and Wiley (2015) performed a follow-up to the aforementioned study and found that in two of the fifteen classes, students in the treatment group that utilized OER were significantly more likely to complete the course. Additionally, in five of the treatment class groups, students were found to be significantly more likely to receive a C- or better. In nine of the classes there were no significant differences, and in one class, control students were more likely to receive a C- or better, performing higher than those students in the treatment group. Similarly, in terms of the overall course grade and performance, students in 4 of the treatment classes received higher grades overall, 10 classes showed no significant difference, and students in 1 control class received higher grades than those in the treatment class. Researchers utilized propensity score matching before examining the number of credits students took in each of the semesters. Drawing from a sample of 16,727 students, the researchers matched 4,147 treatment subjects with 4,147 control students. There was a statistically significant difference in enrollment intensity between the treatment and control groups. Students in fall 2013 who enrolled in courses that utilized OER took on average two credit hours more than those in the control group, even after controlling for demographic covariates. ANCOVA

was used to control for differences in fall enrollment and to estimate differences in winter enrollment. Again, there was found significant difference between the groups, with treatment subjects enrolling in approximately 1.5 credits more than control subjects.

More recently, Hilton, Fischer, Wiley, and Williams (2016) studied students at Tidewater Community College, where students enrolled in “Z courses” were offered open textbooks at no cost, while students in the non “Z courses” courses used a textbook that they were required to purchase themselves for use in the classroom. Researchers studied the combined drop, withdrawal, and C or better grade analyses to estimate the impact of Z courses, or zero textbook cost courses. In the face-to-face courses (control n = 36,223; treatment n = 1,151) 59.8% of students in non-Z courses made it through the successive hurdles of drop, withdrawal and passing the class, compared with 66.4% of students in the Z courses, for a total difference of 6.6%. In the hybrid/online courses: (control n = 7,000; treatment n = 863) 54.2% of students who started in non-Zcourses successfully made it through the course with a C or better, compared with 59.8% of students in the Z courses, showing a total difference of 5.6% between the groups. The results of this study illustrated the potential efficacy of open textbooks in a large-scale higher education setting.

And finally, Ozdemir and Hendricks (2017) conducted a research study in which they examined over 51 e-portfolios written by faculty in California regarding perceptions of their use of OER in their college courses they taught. Only 55% of the 51 faculty who assessed the impact of adopting an open textbook on student learning outcomes, but all those who did assess these outcomes reported that they remained the same or improved. No respondents reported that student learning declined. The vast majority of faculty also reported that the quality of the textbooks was as good or better than that of traditional textbooks. Forty of the fifty-one

portfolios specifically addressed some of the students' attitudes toward the open textbooks used in their classes. In addition to positive perceptions of the textbooks by faculty members, the majority of students who used the open textbooks reported positive experiences with the open textbooks and only 15% of the e-portfolios included any negative student comments regarding the OER.

In addition, there have been a number of other studies conducted that have shown no significant differences when OER are used to replace other materials in courses (Allen et al., 2015; Lovett et al., 2008, Wiley, Hilton, Ellington, & Hall, 2012; Wiley et al., 2016). However, such studies have not generally taken into consideration the other teaching and learning benefits associated with OER adoption, such as customizability and adaptability, that have been suggested elsewhere (Kimmons, 2016). Taken together, these results suggest that open textbooks are performing just as well or better than their traditional copyright-restricted counterparts in the classroom.

Student Perceptions of OER

Despite such potential efficacy benefits that should make OER appealing to faculty, it is likely the case that the values that students place upon textbooks and their indicators of quality are often different than those of faculty members or instructors. Thus, student perceptions of open textbooks are also valuable to understand when evaluating the quality of OER. There are a number of studies that have looked at student perceptions of open textbooks once these textbooks were adopted in the classroom. A white paper released by the California OER Council (2016) focused on OER adoption in California higher education at various universities and colleges, which included results from 351 students. When students were asked if the OER textbook chapter(s) were better than the traditional, 42% said the OER textbook was better, 39% said they

were about the same, and only 11% rated the open textbook as worse than the copyrighted textbooks that they had previously been using. Although not all students felt the textbook was of the highest quality, 100% of respondents indicated that they would prefer to use an open textbook in the future. This suggests that cost and other factors outweighed the relatively few misgivings that some students might expressed about open textbook quality.

Similarly, another group of researchers surveyed 524 students in 13 different courses at Kansas State University regarding their use of OER. They stated that:

Students indicated that they were somewhat satisfied taking courses using [OER] and used them somewhat more to more than a normal textbook. Students rated the [OER] as good quality and indicated that they were somewhat easy to use. Students agreed that they preferred using [OER] instead of buying textbooks for their courses. (Delimont, Turtle, Bennett, Adkhiarki, & Linshield, 2016, p. 1)

This is likely because of cost savings and portability associated with use of these textbooks.

More recently, Illowsky, Hilton, Whiting, and Ackerman (2016) surveyed students who used an updated version of an OpenStax textbook. In response to the question, “How would you rate the quality of the texts used for this course?” 70% said it was about the same as the quality of comparable textbooks they have used in their other courses, 23% said it had better quality than comparable texts, and 7% said that that the quality was worse. Thus, students predominantly seemed to perceive the textbook to be of equal or better quality than traditionally copyrighted textbooks used in similar courses.

Furthermore, student voice in textbook selection, although not often considered, may be a valuable measure of indicators of quality in open textbooks. Woodward, Lloyd, and Kimmons (2017) conducted a study in which college students evaluated textbook quality based upon the

applicability of the content; the instructional value of the design; and the overall effectiveness of the pedagogical scaffolding in each chapter. Student perceptions of quality increased as more of these elements were present in each textbook. Students did however acknowledge that they could not evaluate textbooks for all aspects of quality, especially content accuracy, which is why faculty member expertise must remain a valuable element of quality assurance.

And in one final study, Hendricks, Reinsberg and Rieger (2017) examined the use of OER in a physics course at the University of British Columbia. One hundred and forty-three students completed surveys about the OER after having used the textbook in their classroom. When asked about quality of the open textbook in comparison to the textbooks students were accustomed to using, 93% of the students who used the textbook stated it was the same or better than textbooks in other courses. In addition to saving students approximately \$85,000 (CAD), the study noted that student final exam scores and grade distributions remained the same after OER adoption.

Taken together, these studies suggest that students have generally positive perceptions of OER, and that the OER equivalents to the textbooks they had traditionally been using were either of comparable or higher perceived quality.

Faculty Perceptions of OER

Even if students predominantly favor OER, however, such resources will not be adopted at scale unless faculty perceptions reflect similar attitudes toward cost savings, quality, and so forth. Studies on OER perceptions have been conducted with groups of faculty that have had a variety of experiences with OER and have also been targeted specifically to faculty who have focused experiences with OER. I will now discuss each of these groups in turn.

General perception studies. Allen and Seaman (2014) surveyed a nationally representative sample of 2,144 college faculty members regarding their perceptions of OER and found that although they seemed to have a generally positive perception of OER, very few were using them, with 26.3% of professors stating that traditionally copyrighted resources were superior and 15.3% rating traditional resources as having superior efficacy.

To understand why faculty might not be using OER even though they viewed them favorably, Belikov and Bodily (2016) found in a qualitative analysis of 218 faculty survey free responses that the primary barriers to OER adoption were a desire for more information (i.e., faculty wanted more information before they would be willing to adopt OER), lack of discoverability (i.e., faculty wanted to be able to easily find repositories of OER), and confusing OER with digital resources (i.e., faculty were unaware of the difference between copyright-restricted digital resources and OER). On the other hand, the top incentives identified in this analysis to overcome these barriers included student cost benefits (i.e., saving students money), student pedagogical benefits (i.e., faculty being able to make changes to OER to improve course content and instruction), and institutional support for the adoption of OER (i.e., whether in the form of course load reduction, curricular research assistance, or library support for finding and adopting OER).

In a similar study, Jhangiani, Pitt, Hendricks, Key, and Lalonde (2016) surveyed perceptions of faculty members in addition to usage and outcomes of OER. This was a study supported by BCcampus, which is a provincial post-secondary support organization in Canada, and at the time of that study, BCcampus had established the sharing and adoption of OER as a primary focus. As a result of their efforts, 77% of the 78 survey respondents had used OER, and most faculty respondents rated OER quality as comparable or superior to that of traditionally

copyrighted materials. It was also found that educators who had adopted OER rated the quality significantly higher than educators who had not and were using traditionally copyrighted materials.

Post-OER perception studies. Furthermore, a number of studies have looked at faculty perceptions after respondents had used OER in their classrooms. While both types of perception studies are valuable, these studies are more specifically informed by OER use and are a better gauge of perception based on interaction with the materials. I will now highlight six studies that look specifically at perceptions following OER adoption.

In the first of these studies, Bliss et al. (2013) reported the results of surveys regarding OER perceptions completed by 11 instructors and 132 students at seven different colleges. From the perspective of instructors, the perceptions of OER were generally positive. Over half of all instructors who used the OER in their classrooms reported that their students were equally prepared when OER replaced traditional texts. Additionally, almost one-third of faculty members stated that they felt their students were more prepared after using the OER, and there was only one instructor that indicated he felt the students were less prepared. Regardless of any perceived drawbacks of OER adoption, all 11 instructors surveyed stated that they would be very likely to use open textbooks in future courses they teach.

In an extension of the previously mentioned study, Bliss et al. (2013), studied OER adoption at a more expansive level, surveying 58 faculty members and 490 students across eight different colleges regarding their experiences using OER. Faculty results from this survey were that 55% of instructors reported that the open materials were of the same quality as the materials that had previously been used such as traditionally copyrighted materials, and 35% of faculty felt that the open materials were better in quality.

A third study that looked at faculty perceptions after adoption was conducted with faculty members using OpenStax College textbooks. Pitt (2015) administered two surveys to a total of 126 educators between the years of 2013 and 2015 in collaboration with the OER Research Hub and OpenStax College, a provider of open textbooks for college courses. Approximately 65% of the survey respondents reported that the OpenStax textbook aided them in meeting the needs of their diverse learners. There was a small number of participants that also noted that the open textbooks made teaching easier, enabled innovation, and changed their pedagogical approach positively. Of the total faculty participants, 65% perceived greater learning satisfaction for their students using OER, and nearly all the respondents shared that having used the OpenStax textbook increased their likelihood of recommending the open textbooks to peers and using them in the future.

A fourth study where perceptions of OER were studied after implementation was the Feldstein et al. (2012) study where OER were implemented across nine different business department courses at Virginia State University. Researchers found that students in the courses that used OER more frequently had better grades and lower failure and withdrawal rates than those who were in courses that did not use OER. The OER were found by 95% of users to be easy to use and by 78% of users to be more up-to-date than print textbooks. Perceptions of these textbooks were generally positive across students and instructors.

In one final study, Delimont et al. (2016) interviewed 13 Kansas State University instructors who had used OER in their courses. All but one said that they preferred the OER to a traditional textbook, and 84% indicated that the customizability of the resource was the reason for this preference. Of the 13 participants, all but one indicated that they planned to continue using the OER in their courses in replacement of copyright-restricted textbooks.

Thus, the research literature indicates that faculty perceptions of OER quality are positive once they are actually used in the classroom (Bliss et al., 2013; Jhangiani et al., 2016; Pitt, 2015). This suggests that future research on faculty use, perceptions, and peer review may ease some faculty apprehensions regarding OER quality and can encourage further adoption, improve perceptions by other faculty members, and increase cost savings for students.

Peer Review

Another measure of quality that is often used in addition to efficacy and perceptions, is the peer review of educational materials. Kimmons (2015) conducted a study in which K-12 teachers compared their traditional copyright-restricted texts to open textbooks and provided support to them in adapting these textbooks for diverse classroom needs. The study found that open textbooks were rated by participants as 22% higher than the copyright-restricted textbooks, the open/adapted textbooks were rated 16% higher than the open textbooks, and the open/adapted textbooks were rated by the teachers as 38% higher than the copyright-restricted textbooks. These findings indicated that participating teachers' perceptions of open textbooks were comparatively positive and that these perceptions only improved with increased exposure and adaptation.

Peer review of textbooks is often used as a measure of resource quality. Although peer review is often referred to as a trusted measure of quality, it is not a complete measure of quality that can span across the perceptions of all individual adopters of resources (Clements & Pawlowski, 2011). Although it may be helpful to have experts review a resource for something such as content accuracy, one expert may value something such as cultural relevance or visual design more than another. Although this is a limitation of faculty perceptions, general positive

perceptions, especially after using the textbook in the classroom, seem promising for use of OER in the classroom.

In the present study, we seek to use peer review as a partial measure of quality and utilize faculty as expert peer reviewers of open textbooks. We seek to do this by providing faculty with 10 measures of textbook quality upon which they will be required to rate the textbooks with additional room for comments about missing criteria and general perceptions of the textbook. Although some studies have surveyed general perceptions and efficacy of OER, there are no existing studies that have required faculty to evaluate the quality of the resources themselves. Thus, the present study seeks to fill this gap in the literature by having faculty conduct peer reviews to establish the quality of open textbooks provided in the Open Textbook Library.

CHAPTER 3: Methods

In 2015 and 2016, 936 higher education faculty members were contacted through their college administration by the Open Textbook Network and agreed to participate in the peer review of a selection of textbooks from the Open Textbook Library. This study is the analysis of the openly licensed pre-existing data set that resulted in these 9,360 peer review comments.

Data Collection

Faculty self-selected to attend workshops with the Open Textbook Network on OER adoption with the support of their institutions. Following this day-long workshop, faculty members were invited to participate in the review of an open textbook that was within their area of teaching expertise. Reviewers were offered a small stipend to compensate for their time participating in the study. The criteria upon which reviewers were asked to evaluate the textbooks were: comprehensiveness, content accuracy, relevance longevity, clarity, consistency, modularity, organization structure flow, interface, grammatical errors, and cultural relevance. All reviews were licensed openly under a Creative Commons attribution (CC-BY 4.0) license. This was found to be an exempt study by the Institutional Review Board, because the study was an analysis of pre-existing de-identified data. Reviewers were contacted by both the Open Textbook Network as well as BCcampus who were concurrently supporting the adoption, adaptation, and development of open textbooks through the province of British Columbia. The data were collected by the Open Textbook Network and BCcampus and released under Creative Commons 4.0 attribution (CC-BY 4.0) licenses and are publicly available online.

These evaluation criteria were based on the Open Education Resource Repository (OERR) Rubric developed in 2015 by BCcampus, an organization that “supports the work of the British Columbia post-secondary system in the areas of teaching, learning, and educational

technology” (BCcampus, 2016). BCcampus had modified the rubric from previous iterations that had drawn from The Saylor Academy, College Open Textbooks, and the American Library Association (ALA) Selection policy for selecting textbooks. The original rubric created by the ALA has been used to examine more than 24,000 scholarly and trade publications and was the tested measure against which all following rubrics were modeled (American Library Association, 2017).

Data Analysis

The primary analysis that was conducted on the peer reviews is a content analysis, open coding, and comparison of the free responses provided by reviewers. The qualitative data analysis software Dedoose was used to do this analysis (www.dedoose.com). A template analysis used to extract both themes and main ideas of the content as well as context information as latent content (Cassell & Symon, 2004; Crabtree & Miller, 1999). This explicit and latent content was explored through open coding and then through comparative coding through which an initial template was produced by two researchers and then improved upon through three iterations of templates, the final one of which was used to code the responses for themes and ideas.

Responses were be coded based on whether or not they meet faculty satisfaction for each category of evaluation in question. This was be done through hermeneutics, which is the study of human activity as texts with a view towards interpretation to find intended or expressed meanings (Kvale, 1996). For example, when faculty were asked about comprehensiveness, responses were coded as comprehensive and not comprehensive, meaning that the faculty did not find the textbook to meet their standards for that category. Responses were then coded for other main ideas outlined by the faculty members in their responses in an attempt to extract other themes that might emerge from free response. For instance, faculty may have made comments

about the graphics, glossary, writing style, a certain unit of the textbook, etc. Those comments were coded and those that fell under similar themes were grouped together for further thematic analysis.

The definitions for criteria can be found below in Table 1. A priori coding was used for the analysis regarding whether or not faculty members feel that the textbook meets a criteria. There were be three possible code levels that a response could receive for each category. Each code reflected a level of sufficiency for classroom use. For example, a comment in comprehensiveness could fall into the codes: (a) *sufficient without criticism*, (b) *sufficient with criticism* (few flaws/omissions), or (c) *not sufficient* (major flaws/omissions). If there are no mentioned issues with comprehensiveness, a code of *sufficient without criticism* would be applied to a response. If there are minor omissions mentioned, but the faculty member states that it does not impede their ability to use the textbook effectively, the comment would receive a code of *generally comprehensive*. If the comment states that the textbook they are evaluating is not suitable for use because of major flaws, this would receive the final code of *not comprehensive*. The same pattern of a priori coding will be applied across all 10 categories. All other comments and findings will emerge through open and comparative coding of these 10 categories and free response data.

Responses will also be coded based on comparison between open textbooks and traditionally copyrighted textbooks. Although participants were not explicitly required to compare the text to a traditional copyright-restricted textbook, many faculty members made the decision to do so of their own volition, and such comparisons were documented. Multiple codes may be applied to a single comment. For example, a review may have been rated as comprehensive but also may have been coded for having some organizational flaws. No code

was applied to the same free response twice. The codes were then grouped and analyzed based on their relationships to one another and reviewed for emergent themes.

Table 1

Coder Definitions of Evaluation Criteria

Code	Definition of Code
Comprehensiveness	Completeness in content material
Content Accuracy	Correctness of material
Relevance Longevity	Up-to-date and length of time it will be current
Clarity	Ease of accurate understand
Consistency	Uniformity of content and writing
Modularity	Degree to which content can be separated and used in its individual units
Organization, Structure, Flow	Sensibility of arrangement
Interface	Visual usability
Grammatical Errors	Accuracy of spelling and grammatical structure
Cultural Relevance	Sensitivity, inclusiveness, and applicability to various cultural groups

Rigor

Responses were coded by myself, the primary coder of these responses. A secondary coder, a research librarian and OER research fellow participated in the analysis of these reviews. Six hundred of the responses were coded individually by at two researchers through a multiple rater approach to attempt to accommodate for reviewer interpretation of results (Larsson, 1993; Scandura & Williams, 2000). Codes were then be compared to one another and discussed for interpretation until a consensus is reached on which codes are appropriate. This method with

which this was done is through consensus coding (Larsson, 1993). The conversations surrounding consensus coding informed some of the comparative coding, and the results will be presented as they pertain to significant findings. The remaining 336 comments were coded individually based on the consensus achieved through the template analysis approach.

Relevant themes regarding faculty perception of open textbook quality and their appropriate insights will be presented through codes, quotes, themes, and tables that show the representation of codes across the 10 measures of quality.

CHAPTER 4: Results

The data were analyzed by each individual evaluation criterion and are reported below. The comments regarding whether or not the textbooks were of usable quality in the classroom are reported as well as noted themes that emerged as each category was coded. Table 2 provides a summary of the overall ratings of quality across the ten evaluated criteria. Overall, the ratings were found to be of sufficient for classroom use, with fewer than 3% of comments describing any quality issues that would disqualify the textbooks from high enough quality for teaching and learning. I will now continue to discuss each of the individual categories in greater detail.

Table 2

Overall Sufficiency Ratings for Coding Categories

Category	Not sufficient	Sufficient w/ criticism	Sufficient w/o criticism
Comprehensiveness	6.3%	77%	16.7%
Accuracy	1.6%	26.2%	72.2%
Relevance	2.5%	18.2%	79.4%
Clarity	4%	24.6%	71.5%
Grammar	0.7%	23.9%	75.3%
Consistency	2.4%	25.4%	72.2%
Modularity	1.6%	9.5%	88.9%
Organization	2.4%	39.7%	57.9%
Interface	3.1%	45.2%	51.7%
Cultural Competence	3.1%	34.2%	62.7%
Overall	2.8%	32.4%	64.9%
Overall Sufficiency		97.3%	

Comprehensiveness

The textbooks were found to be comprehensive by 93.7% of faculty members (n = 877). Of all respondents, 16.7% found the textbooks to go beyond being of adequate comprehensiveness and rated them to be extremely or exceptionally comprehensive (cf. Table 3). There were only 59 faculty members who found the text to have major flaws and reported that it did not meet their standards of comprehensiveness. Of the reviews that found the text to not be comprehensive, the names of a few textbooks were repeated among multiple reviewers, which suggests that some textbooks for example, a public speaking textbook and one introductory statistics book, were proportionally more flawed than others.

Table 3

Coded Reviewer Comments on the Topic of Comprehensiveness

Theme	n	%	Example
Sufficient w/o Criticism	156	16.7%	“This textbook is amazingly comprehensive”
Sufficient w/ Criticism	721	77%	“The book is quite comprehensive, and covers similar materials to other public speaking texts”
Not Sufficient	59	6.3%	“The textbook does not cover all the material one would need to address in college algebra”

Along with rating comments on meeting standards for comprehensiveness, reviewers gave additional comments regarding the comprehensiveness of the texts. Of those that were considered comprehensive, some faculty had comments on minor flaws that prevented them from rating the texts as completely comprehensive. Three hundred and eighty-six faculty (55.7%) stated that there were minor omissions. These omissions could be a label missing on a

diagram, a graphic they thought should have been there, or a little bit of depth on one specific topic. Some example comments included the following:

- “The text covers each subject area appropriately. Images and diagrams are used appropriately to help explain the material, however, more pictures, figures, diagrams, tables, flow charts, and the likes could be used instead of lengthy descriptions, to address different learning styles of readers, and to make it a more interesting read”
- “It covers all the appropriate areas, but the coverage is a bit thin when it comes to examples.”
- “This provides an excellent level of detail for a non-majors biology course. Only a couple of areas were lacking (e.g., a very brief overview of membrane structure, and no mention of niche theory when discussing competition).”

These minor omissions did not prevent the faculty from finding the texts to be comprehensive, but they were commented on as improvements that could be made. Two hundred and twenty two faculty also stated that organization of these texts could be improved by adding more detailed indexes, putting glossaries at the end of the textbook instead of at the conclusion of each chapter, and moving some content from paragraph form to list form. There were other comments regarding minor omissions and organization, but all were of similar magnitude to the aforementioned comments. Forty reviewers mentioned no observed flaws, many explicitly stating that they could not find any issue with the comprehensiveness of the texts. Thirty four reviewers also noted that the comprehensiveness included a variety of supplemental materials such as assessments, activities, and other assignments for students to complete for credit or use for content review as follows:

- “This textbook is amazingly comprehensive--probably more than any teacher actually wants.”
- “This textbook was comprehensively organized and populated with topics”
- “This is a very comprehensive textbook that provides an appropriate balance between the different fields of biology”

One hundred and forty-eight reviewers compared the open textbook specifically to a traditionally copyrighted textbook. A theme of comparison to traditional texts emerged through all 10 measures of quality. All reviewers who compared the textbook to traditional print texts they have read said that they were comparable in comprehensiveness, with thirty-seven of those reviewers stating that the open text was more comprehensive than comparable texts. The faculty members responded with comments such as: “this wonderful book goes well beyond any communication text I have read or used as a professor.” Another faculty member stated that the text was even “more comprehensive than other books by the same authors.” Faculty also acknowledged many times that no textbook could ever encompass all comprehensive knowledge on a topic and still be an effective resource for learning. Overall, faculty overwhelmingly found these open texts to be comprehensive in a way that they would be useful in the classroom at least in a comparable manner to the traditional texts that many faculty members were measuring them against.

Accuracy

All 936 reviewers made comments on the accuracy of the textbooks they reviewed. 98.4% of the reviewers found the open textbooks to be accurate (98.4%; cf. Table 4). Six hundred and seventy-six (70.2%) reviewers stated the text was extremely accurate, and two hundred and forty-five found them to contain some minor inaccuracies, often noting that such

minor inaccuracies would come with any type of textbook. For example, after noting that there were minor inaccuracies in a text, a faculty member stated: “that being said, the hard-copy textbook that I currently use makes that mistake as well as several crucial other errors, so this OpenStax book ranks higher in accuracy.” There were two other reviewers that specifically compared the texts to traditionally copyrighted texts, stating that the open textbooks they reviewed are equally or more accurate. One reviewer stated that they “feel that the general content of the book is accurate and that the number of typo type errors so far is no different then [sic] what I have found textbooks from major publishers,” another stating that this was “one of the most accurate communications textbooks” that they had seen.

Table 4

Coded Reviewer Comments on the Topic of Accuracy

Theme	n	%	Example
Sufficient w/o Criticism	676	72.2%	“I found the text to be accurate and error-free with no discernible bias.”
Sufficient w/ Criticism	245	26.2%	“The vast majority of the text is accurate.”
Not Sufficient	15	1.6%	“I noted many errors in the text and I’m sure there are many more.”

Many faculty (n=312) shared their opinions of biases found in the text when they were making comments on accuracy. This emerged as a prominent code in the evaluations on content accuracy. Two hundred and sixty-seven found them to be unbiased, with forty finding them biased to some degree, fifteen of which thought that the texts were sometimes U.S-centric. Although this did not render the textbooks to be inaccurate, comments stating that “the only part

someone could claim was a bias was the use of U.S. data (for example, to show the prevalence of different blood types),” and that the “data and metrics [used] are best understood within the context of the United States.”

Overall, reviewers found the texts to be generally unbiased, with all biases discovered expressed to be minor and not precluding the texts from being considered accurate. A few faculty members also commented on the currency of the textbook they reviewed, with 334 stating the text was up-to-date, and 22 stating that there are minor updates that need to be made. Overall, faculty found the open textbooks they reviewed to be accurate, unbiased, and fairly up-to-date.

Relevance

Of the 936 reviewers, 914 evaluated the texts to be relevant (97.6%; cf. Table 5). There were reviewers (n=170) that found specific sections to be less relevant, encompassing only small portions of the content. These responses were coded as mostly relevant. Of those that found the texts to be mostly relevant, they identified only minor flaws in the relevance of the content and stated that this did not reflect upon the overall quality of the textbook. The remaining faculty members (n=743) found the texts to be relevant with no conditions placed upon their relevance.

All but 10 reviewers chose to comment on how up-to-date the text was. Twenty-three reviewers found the text to not be current, while the other nine hundred and thirteen reviewers stated that it was current. Although the majority of the reviewers found the text to be current, the longevity of the currency was a topic of note among 23.8% of reviewers, all of whom stated that the nature of the open textbook would make updates possible in the future. Some examples included the following:

- “The text is written in a way to update/modify the content easily and straightforward to implement.”

- “This book is a collection of articles, a format which allows it to be easily updated as needed; I don't see obsolescence as being an issue.”
- “Updates should be easy to perform due to the text's modularity.”
- “It is arranged in such a way that any necessary updates should be quite easy to implement.”

Table 5

Coded Reviewer Comments on the Topic of Relevance.

Theme	n	%	Example
Sufficient w/o Criticism	743	79.4%	“The content is up-to-date and relevant. It is arranged in such a way that any necessary updates should be quite easy to implement.”
Sufficient w/ Criticism	170	18.2%	“Content is up-to-date. However I did notice an example using data from 1915 to 1964. I feel the authors encourage the use of a graphing calculator and do not mention any other statistical software. I feel the text is arranged in such a way that necessary updates will be relatively easy and straight forward to implement.”
Not Sufficient	23	2.5%	“Content is marginally up-to-date. No attention is given to non-parametric methods, Bayesian estimation, multivariate distributions, to name a few areas. The amount of included exercises is unnecessarily overwhelming, making the text appear much longer than it actually is, and difficult to locate the actual text material. Examples are easy to update, but would benefit from reduction of their count. The text will not become obsolete any faster than similar introductory statistics books.”

There were 59 reviewers who compared the textbook to a traditional textbook, all of which stated that it was of equal or superior relevance. One reviewer stated that they “can say with 100% certainty that the OpenStax book has more clinical application than most physiology books I have ever reviewed.” Another review fell into the comparison category stating that they “thought the biotechnology chapter was particularly good, and better than [their] current textbook, which is not the most up to date, even in the newest edition.” Although there were some minor portions of the texts that were rated as less relevant, faculty members found the texts to be generally relevant.

Clarity

Faculty reviewers found the textbooks to be generally clear and concise in their writing. The majority of faculty (n=899) expressed that they thought the texts were clearly written, and only 230 of those found minor issues with clarity of the books (cf. Table 6). This included need for elaboration and detail that may have been lost in an attempt to be clear and concise. The primary sentiment among the reviewers was that the clarity and conciseness (commended by 15% of the faculty) were strengths of the open textbook they reviewed.

Of those who stated that the textbook was clear, a few reviewers made particular note of this clarity. Some examples of comments regarding exceptional clarity were:

- “The goal of this volume (as well as its companion volume) is to write for an audience of undergraduates. Consequently, the language is overwhelmingly clear and concise, but not patronizing or condescending.”
- “The book's clarity is one of its strongest attributes. Terms are always defined. Students will no doubt find the book's language accessible.”

- “This is one of the first things I noticed about the text. I really like the tone and style of the writing. It is clear and does not over-complicate ideas. The author clearly has experience with first-year writing students because it is written in a clear, accessible way.”
- “Clarity is a strong suit for this text. I did not locate any portion of the book that lacked clarity. Context was provided for examples of poor writing as well as for strong writing. Context was also provided for any specialized language.”
- “Appropriate language for the level of the audience is used. The chapters were easy to read and used discipline specific language when necessary.”

Table 6

Coded Reviewer Comments on the Topic of Clarity

Theme	n	%	Example
Sufficient w/o Criticism	669	71.5%	“I found the book very readable. There is little or no jargon.”
Sufficient w/ Criticism	230	24.6%	“Overall I think the book is clearly written. Occasionally I think it tries to put a bit too much detail into short paragraphs or short chapters and I am often telling students they may not need that specific term or section since they are struggling with just the basics. This is a common issue with all science textbooks”
Not Sufficient	37	4%	“I found the language used to be too technical for our typical college algebra student”

Seventy-four faculty members compared the textbooks that they were reviewing to texts they typically employ in the classroom. One reviewer stated that “this text is clearly written with

solid illustrations and examples. [They] believe students will find it much more engaging than the average textbook because the analogies are interesting - not bland like other textbooks [they have] reviewed.” Clarity was commended by 96% of reviewers and found to be a strength of the open textbooks.

Grammar

Responses were coded as *no grammatical errors* if they explicitly stated so, *few grammatical errors* if one or more grammatical errors was mentioned but reviewers expressed it did not interfere with the quality and readability of the book, and *many grammatical errors* if egregious writing mistakes were made that impede ability to use the textbook effectively in a classroom setting. All but seven (0.07%) of reviewers spoke highly of the grammar in the textbook, with many stating that they read through the entirety of the textbook and did not just skim for content review (cf. Table 7). A reviewer shared that “in reviewing this textbook, I literally found only one grammar mistake which is saying a lot because I was actually looking for them.” In a review of a grammar and writing textbook, a reviewer evaluated “grammar texts [as] especially need[ing] to be spotless,” indicating that they “spotted no errors, [and] most importantly, [that] there is consistency in structure and punctuation, for example in learning objectives from chapter to chapter.”

Of those who did spot minor errors, they indicated that these errors did not interfere with the quality of content or with the ability of students and instructors to learn from the textbook.

Comments expressed sentiment such as:

- “The text has occasional, relatively minor grammar and usage errors but not so many that they interfere with the readability of the text.”

- “ I did not become aware of any major instances of grammatical error that led to informational misunderstanding.
- “I did identify a few minor grammatical errors, but overall the writing and copy editing are well done. The only issues I noted were minor punctuation issues and a few awkward uses of brackets.”

Table 7

Coded Reviewer Comments on the Topic of Grammar

Theme	n	%	Example
Sufficient w/o Criticism	705	75.3%	“The text appears to have been impeccably edited.”
Sufficient w/ Criticism	224	23.9%	“The text has occasional, relatively minor grammar and usage errors but not so many that they interfere with the readability of the text.
Not Sufficient	7	0.7%	“The text contains numerous grammar and style errors, including punctuations weaknesses not acceptable in an academic textbook. The writing tone is informal, it contains colloquial language, slang and jargon which should be voided in formal writing.“

The cross comparison to traditionally copyrighted textbooks was present in the grammar section as well, where a faculty member noted that “there were a few grammatical errors, which is more than would be found in a commercial human physiology textbook.” This was one of the instances where faculty drew a comparison to comparable copyright-restricted textbooks that

stated the open textbook was of inferior quality. Faculty who spotted grammatical errors found them to be scattered and nondescript, rating open textbooks to be “of high quality in terms of grammatical evaluation.”

Consistency

Consistency could present a challenge in many of these open textbooks, which represent a collection of works from multiple authors. Most reviewers found the open textbook to be consistent, mentioning no inconsistencies and praising the book for accomplishing consistency despite having various authors (cf. Table 8). One faculty member stated specifically: “for having multiple authors, I thought the book was very consistent in style and approach.” Of those who stated there were minor inconsistencies they shared sentiments that you could tell there are different authors, but that it did not interfere with the quality of the text. Comments regarding the noticeable but not detrimental difference in voices included the following:

- “It shows sometimes that different authors worked on different sections of the book, which can be a problem especially when chapters discuss a theme that was already introduced or discussed in a previous section written by a different author. However, these differences are very subtle.”
- “As mentioned above, the text flow, tone, and phrasing changed several times in the text. This did affect consistency but unlikely to be noticed by a student over a whole year, just a reviewer reading the whole thing at one time.”
- “The text terminology and framework is fairly consistent. You can tell that each of the authors had a specific framework to follow in order to maintain the consistency of the text. You can tell that different people are writing each chapter; however the format is the same throughout. It may be one of the downfalls of the many author design of the text

that each chapter will read slightly different but the consistent format helps to alleviate most of it.”

Table 8

Coded Reviewer Comments on the Topic of Consistency

Theme	n	%	Example
Sufficient w/o Criticism	676	72.2%	“The book is consistent in language, terminology and framework that makes it easy to follow.”
Sufficient w/ Criticism	238	25.4%	“Excellent, but perhaps with a few minor quibbles on terminology.”
Not Sufficient	22	2.4%	“The writing style varied noticeably across certain chapters, which is to be expected to some extent with a team of authors. While some readers may not notice this, it would help students to have a more unified writing style to guide them as they proceed through the text.”

Comparison to traditionally copyrighted texts was noted here as well, with a statistics expert evaluating that “the authors do not deviate from terminology and framework that is used in any of the popular intro stat[istics] textbooks put out by mainstream publishers. The glossaries included could be used in any undergrad[uate] stat[istics] class that I have taught.” A reviewer even noted that the consistency of the text, in addition to the other evaluating factors, had convinced them to adopt this textbook for use in their courses.

Modularity

Modularity was one of the mostly highly praised categories amongst reviewers. The general sentiment may be captured by sharing a few statements:

- “The text can be used in its entirety, or just as easily, an instructor can assign specific sections/chapters to meet the needs of a particular course.”
- “The modularity is probably the best feature of this textbook,”
- “The modularity of this textbook is its greatest strength,”
- “this is where the book shines.”

There were 89 reviewers that found minor flaws in the modularity and 2 that found the text to only be able to stand alone. Of these faculty members who found flaws, 67 of them attributed this to formatting and the medium in which they were using the text (i.e. PDF) as opposed to flaws in the interdependency of the text (cf. Table 9).

Of those who compared the books to texts that they already use and have extensively reviewed, there were faculty that stated “the textbook's modularity follows the same order as most of the other texts used in [this area], and this modularity is as adaptable as other texts of its kind.” Another reviewer stated “I really appreciate that exercises aren't just randomly thrown in, as many published textbooks often do.” There were also two reviewers who were compelled to take advantage of the modularity and use portions of these texts in their courses, specifically their writing courses. Modularity was an evident strength of the open textbooks that was recognized by 98.4% of faculty reviewers.

Many reviewers specifically noted that the modularity existing in the textbook, along with the digital format in which many reviewers were accessing the textbook, would allow them to take the content that they found useful and use this content in the classroom. The OER in this

sense, was not only commended for its modularity but also provided the affordances for these faculty members reviewing the textbook to take advantage of the modular nature of the content.

Table 9

Coded Reviewer Comments on the Topic of Modularity

Theme	n	%	Example
Sufficient w/o Criticism	832	88.9%	“The format of the Textbook is highly modular. In general, each Unit/Chapter could stand alone is independent from the textbook as a whole.”
Sufficient w/ Criticism	89	9.5%	“The modularity is fine. Lots of scrolling is necessary if readers decide to not print the whole text.”
Not Sufficient	15	1.6%	“Modularity is not the best in the book. It takes time to explore and navigate through chapters. Once you are in a chapter then it’s pretty well organized.”

Organization

Organization was the category in which there was the highest number of faculty reviewers identifying flaws (42.1%; cf. Table 10). Of those reviewers, most found the organization flaws to be minor, and those faculty members often identified organization of chapters to be subjective and easily modifiable by the instructor of the course. One reviewer commented in their remarks that “there were a handful of times when I did not think the organization or flow of the units/chapters seemed appropriate. However, that can be true with all textbooks and the text does still provide the opportunity for the instructor to be flexible in what is

included during the course.” Thus, the positive reviews on modularity may alleviate such organizational flaws in the text, because they allow reorganization by professors teaching these textbooks.

Table 10

Coded Reviewer Comments on the Topic of Organization

Theme	n	%	Example
Sufficient w/o Criticism	542	57.9%	“The textbook is well organized and flows in a logical manner. The unit and chapter breakdown was very well done and organized appropriately.”
Sufficient w/ Criticism	372	39.7%	“There were a handful of times when I did not think the organization or flow of the units/chapters seemed appropriate. However, that can be true with all textbooks and the text does still provide the opportunity for the instructor to be flexible in what is included during the course.”
Not Sufficient	22	2.4%	“I would recommend an overall reorganization of the text.”

This category was where there were the most instances of comparison to traditionally copyrighted textbooks. Faculty members explained that:

- “the topics covered by this text are in the same order as other ... textbooks on the market, making the transition to a new text easier for the instructor in my opinion”
- “the book follows a similar (and logical) organization to other textbooks of its kind”

- “the book has the same structure as most ... books, ... with logical and clearly presented content that is easy to follow”
- “The book follows a similar (and logical) organization to other textbooks of its kind”
- “I have no special comments for this metric. The organization is on par with other majors level biology texts”
- “This book follow the traditional, and most widely used, manner of organization for the sequence of chapters and topics, which allows for a logical flow of content”
- “The topics follow the fairly standard structure of a[n] inclusive general biology text”
- “It mirrors the organization that is in all other biology texts I have reviewed”
- “the text is comparable to more other Introduction to Sociology texts out on the market today”

This sentiment was expressed across subjects including anatomy and physiology, writing, sociology, biology, public speaking, and others.

Interface

Faculty members reviewed these textbooks in a variety of formats including pdf with various readers, epub files, and print copies and viewed digital copies on tablet readers and even on cell phones. Reviewers viewed the text in a variety of formats, but overall, the textbooks were found to be functional. Mentioned problems with interface were identified to be formatting errors (n=275; cf. Table 11), and images/charts that are not of as high quality as professors would prefer for use in the classroom (n=156). Sentiments were quite varied in this format with some faculty members saying that “the text looks like a professionally published textbook,” and some sharing the opposite view that “the text ... does not feel like a traditionally published text book,

it feels notably lacking in images, color and typesetting. These are minor issues for me, in comparison to its usability, intelligence and cost, but should be noted.”

Although 48.4% of faculty members found flaws in the interface of these open textbooks, most shared the flaws with the contingency that “these are small issues that don't significantly affect the readability or usability,” and the interface did not impede them from being able to use them in the classroom.

Although open textbooks can be accessed in any format, they are most often accessed in a digital format. There were many comments (n=228) that noted specifically the ease of use afforded by the digital nature. Features such as ability to search, bookmarking, and the ability to copy and paste were noted as being especially positive when reviewers were commenting in this regard.

Table 11

Coded Reviewer Comments on the Topic of Interface

Theme	n	%	Example
Sufficient w/o Criticism	484	51.7%	“The text’s interface is clear and easily navigable.”
Sufficient w/ Criticism	423	45.2%	“Some illustrations took awhile to load, but other than that, I didn’t notice any interface issues.”
Not Sufficient	29	3.1%	“The online version has a number of interface issues.”

Cultural Competence

Cultural competence had the greatest diversity of reviews, but cultural backgrounds are diverse and more subjective than other questions, such as grammar or modularity. Cultural

competence included comments on cultural sensitivity, cultural relevance, and cultural inclusion. Of the 936 reviewers, 587 found the text to be culturally competent with no mentioned flaws (cf. Table 12). They commended the text on inclusion of people of various races, ethnicities, religions, genders, sexual orientation, physical ability, and language capacity in a mindful manner. Three hundred and twenty reviewers found the text to be culturally sensitive, but perhaps not as broadly relevant or inclusive. The comments regarding some instances were very wide ranging and often specific and can be illustrated as follows:

- “I sampled many figures. I noticed that there are fewer pictures of people than in other texts. I did notice that when there were images of patients, the patients were much more likely to be women. I noticed that photos of healthy, active people, particularly in sports, tended to be men. In fact I saw this several times, and the images of active men tended to be marathon runners. I would like the authors to revisit this issue.
- “The names used in exercises seem to be largely of European extraction, so more diversity might be helpful.”
- “The use of English units is only pertinent to a certain audience. Much of the data was from US sources. Many of the footnotes and cultural references are from US culture. More diversity would be useful. The book is not offensive.”
- “Although non-traditional learners and online learners are mentioned in a certain way, few of the examples relate to them.”
- “The textbook does include some sections which relate to non-traditional students, however, it does not always take into account many of the other exceptions that might be found throughout many diverse college populations from different areas of the country. This text is not culturally insensitive or offensive in any way.”

Eighteen reviewers found the text to be too US-centric, with many of them mentioning they would appreciate applicability in a Canadian context. The remaining of those who felt the text was flawed would have either preferred more mention of diverse groups or found the inclusion of too broad a variety of inclusions potentially distracting to readers of differing backgrounds. Twenty-nine reviewers found the text to be culturally incompetent, with only one saying that it was culturally insensitive.

Table 12

Coded Reviewer Comments on the Topic of Cultural Competence

Theme	n	%	Example
Sufficient w/o Criticism	587	62.7%	“I found the text to be culturally relevant and inclusive in general, and specifically in the examples of clinical conditions/diseases which affect some races/ethnicities more so than others.”
Sufficient w/ Criticism	320	34.2%	“The use of English units is only pertinent to a certain audience. Much of the data was from US sources. Many of the footnotes and cultural references are from US culture. More diversity would be useful. The book is not offensive.”
Not Sufficient	29	3.1%	“I found the text offensive because of the condescending nature of some comments, irrelevant humour, inside jokes, and treatment of the reader in a non-professional way.”

Of those who made the distinction between these open textbooks and comparable copyright-restricted texts, they shared a sentiment of positivity. An anatomy and physiology professor stated that, “this [open text]book does a great job at including images and line drawings of people from a variety of races. This may be the first physiology book that I have reviewed that takes these sensitive issues into account!” Another reviewer stated that “more than other texts I have read on this subject; it is inclusive of students from many different backgrounds.” Although views of cultural competency vary across individuals, the general sentiment across reviewers was that the books were culturally sensitive, and for the most part, met the qualifications for cultural competency.

CHAPTER 5: Discussion

The primary finding of this study was the assertion from a large number of experts that the OER they evaluated were of high quality. This substantiates previous perception studies of faculty and students that have found OER can be of high quality in comparison to traditionally copyrighted textbooks (Jhangiani, et al., 2016; Woodward, Lloyd, & Kimmons, 2017). However, there have not been studies, particularly with such a large number of participants, where subject matter experts who are familiar with comparable textbooks in the field evaluated the quality of textbooks based on a variety of different factors that contribute to textbook quality. This is important because when considering adoption of OER, faculty or administrators often express concerns regarding the quality of free online materials (Allen & Seaman, 2014; Belikov & Bodily, 2016). The evidence provided in this study shows that the overwhelming majority of subject matter experts evaluate these resources to be of high quality and seems to be more helpful than relying upon general perception studies to help quell the concerns of faculty who may be considering adopting open textbooks in their classrooms.

Furthermore, the nature of these qualitative reviews provides a more nuanced perspective on quality assessment (American Library Association, 2017; BCcampus, 2016; Open Textbook Network, 2016). Some previous studies have had evaluators use various Likert-scale items to evaluate open textbooks but have not solicited explanations for ratings (Kimmons, 2015). By forcing participants to provide comments for each rated item, however, this study provided insights into why faculty members thought these textbooks were of a certain quality. For instance, not only does this allow us to better understand why a review may or may not be comprehensive, but we also understand what specifically faculty members value about the

comprehensiveness of textbooks and where in each specific category the open textbooks struggled or excelled.

Although there were often flaws found with the textbooks, these flaws were most often minor, and the evaluators stated that they did not interfere with the ability for faculty members to use the textbook in the classroom. Examples of these minor flaws can include minor grammatical errors, the absence of certain supplementary materials such as graphs or images, a need for more diverse examples, and so forth. Faculty would often qualify the highlighting of these flaws by saying that the textbook would still be usable in the classroom, and a number of faculty asserted that making these changes would be attainable due to the nature of the format in which these OER are often accessed. Additionally, many faculty members stated that similar flaws are present in traditionally copyrighted textbooks and that with any textbook a certain amount of adoption for class use will need to be done. This corroborates results from other studies that show that perceived textbook quality is influenced by the context in which it will be used (Woodward, Lloyd, & Kimmons, 2017). For example, an introductory biology level textbook cannot ever be fully comprehensive of all biology related topics, so the faculty reviewer may not have rated it as entirely comprehensive, but it nonetheless covers a sufficient amount of topics and reflects the content of similar copyrighted textbooks.

There were some ways in which the OER were more often flawed and that was often in organization (flow) and consistency of writing. Having multiple authors, this is certainly an area in which OER can seem weaker than traditionally copyrighted textbooks, which might have a single author or a stronger editorial presence. This may represent a trade-off, however, with other aspects of quality. For example, the open textbooks performed comparably well in the criterion of modularity, where individual units can be easily taken out of the larger textbook and adopted

or adapted for use in the classroom. This suggests that overall quality of the textbook may represent a balancing act between multiple criteria which may have negative relationships to one another (e.g., increased modularity results in decreased consistency and vice versa).

Furthermore, although faculty members were only asked to rate the quality of the OER based on the 10 indicated measures, many reviewers took it upon themselves to compare the OER with traditionally copyrighted textbooks, and the free response forum allowed them to draw these comparisons unprompted. An important finding was that when compared to the other textbooks, OER almost always were found to be of equal or better quality (Kimmons, 2015; Woodward, Lloyd, & Kimmons, 2017). This assertion from individuals who have had experience with a number of popular textbooks in the field, some having even written their own textbooks, is another indicator that OER are comparable in quality to high cost alternatives that are financially burdensome for students and also corroborates earlier findings in K-12 settings (Kimmons, 2015).

One unexpected observation was the varying nature of comments surrounding the consumption of OER in a digital format. Although OER are not inherently digital in nature and can be printed and consumed in a variety of formats, OER are most often accessed in a digital format. Some faculty members do not feel as comfortable with this, making comments about the concerns of the ability of students to learn as well from a digital textbook. The digital format of a textbook, however, has been shown to have little impact on learning (Rockinson-Szapkiw, Courduff, Carter, & Bennett, 2013). In fact, in the case of OER, the digital format may actually improve student access to the textbook when students may previously not have been able to access it because of prohibitive cost (Donaldson, Nelson, & Thomas, 2012; Senack, 2014). Alongside cost savings and portability, there were a number of expressed benefits to using the

digital format. For instance, faculty stated that the digital format was more adaptable, searchable, distributable, and easier to integrate into existing classroom content. This is important, because the conversation surrounding OER often emphasizes that OER are not inherently digital in nature, and although this is true, the fact that OER are most often accessed in a digital format allows a set of affordances for both students and faculty to more effectively use the textbook for meaningful learning.

The findings in this study support the adoption of OER, especially in the digital format in which they are often used. The evaluated quality of OER by faculty members that stands up well against comparable textbooks that are frequently used in the classroom, paired with the cost savings for students, provides a strong argument for faculty and institutions to consider OER adoption.

Implications For Future Research

Although we often use peer review as a proxy for quality, there are other measures of quality that are often considered to be valid. This may include student performance measures after reading the text or other forms of analysis. Studies that seek to evaluate other measures of quality would be helpful to obtain a more holistic view of the quality of these open textbooks.

Furthermore, the faculty reviewing these textbooks were not necessarily adopting these books, and further studies regarding the adoption process and quality concerns and strengths found both during and after adoption would be helpful to understand the impact of these textbooks in practice.

Thus, some potential future research questions could include: (a) *what is the likelihood of faculty members adopting OER after reviewing content*, (b) *how do faculty members rate quality*

of textbooks after undergoing the adoption process, and (c) what measures of quality do faculty value in textbooks and how do OER perform in these categories?

Limitations and Delimitations

Despite the promising results of this study, there remain some limitations or delimitations to the methods employed in this study. First, faculty who decided to participate in the peer review of open textbooks may have been in greater favor of OER than the general population would have been. These participants had just completed an OER training provided by the Open Textbook Network, and this may have altered their opinion regarding open textbooks, specifically when comparing them to comparable copyright-restricted textbooks. Thus, although all the reviews were made by subject matter experts on provided evaluation criteria, some pro-OER biases may have influenced evaluations.

Second, this study is delimited to the United States and North American context. The population was entirely North American and predominantly from the U.S., so there may be limited international applicability of some of these reviews and the efficacy of these textbooks. Notably, this may most significantly affect criteria most closely connected to social factors, such as the cultural relevance criterion.

Third, researchers were OER research fellows who are immersed in the world of OER. Alongside interest in OER research and exposure to the community discourse fall certain assumptions and biases regarding OER. Although researchers made all attempts to separate personal assumptions and conduct double coding to ensure reliability, biases may not have been constantly checked by researchers and some personal perceptions may have been present in the lens of interpretation.

And fourth, as with all self-report data, peer reviews are subjective, and some faculty who consider using these resources may not find the textbooks to be of as high quality as these particular reviewers rated them. Thus, the interpretation of these free responses, despite all attempts to adhere to best practices of qualitative research and accommodations to human error, are somewhat open to human interpretation. To counteract this possibility, coding criteria, descriptions, and direct quotations are shared in detail to help ensure transparency and trustworthiness in results.

Conclusion

OER are alternatively licensed materials that can be used in place of traditionally copyrighted textbooks to increase cost savings, adaptability, and access to textbooks for students and faculty. These textbooks have been studied to be of perceived high quality by faculty members and students who have used these textbooks, and when used in the classroom they show no significant difference on learning or improve learning outcomes. However, some faculty are sometimes suspicious of the quality of these free online resources, and for this reason, the Open Textbook Library provided stipends to subject matter experts who have taught with similar content to provide reviews of a selection of open textbooks.

To do this, I employed template analysis to code 936 faculty evaluations of open textbooks. These were coded openly and comparatively to find themes and sentiments across the 10 review categories. The responses were coded by two researchers to ensure reliability between codes and themes. The results of sufficiency of quality were presented alongside other themes that emerged throughout the coding process.

The qualitative review and analysis of these evaluations of open textbooks provides insight into the perceptions of quality of open textbooks as asserted by subject matter experts.

The textbooks were found to be of high quality across 10 categories of evaluation, and over 97% of the time they were rated as being of high enough quality for classroom use. In instances where they were rated of sufficient quality with criticism, the criticisms were generally found to be minor and did not interfere with the ability of the textbook to be used for classroom teaching and learning. Additionally, when compared with traditionally copyrighted textbooks, the open textbooks were found to be of equal or better quality over 97% of the time.

This study, using peer review as a proxy for quality, illustrates the high quality of a number of open textbooks in the open textbook library that are a widely-used representation of the open textbooks that are currently being utilized by teachers and students throughout the United States. These quality ratings, alongside potential cost savings, can be seen as potential motivators for consideration of OER adoption by faculty and institutions and should help to counteract suspicions about OER quality among would-be adopters.

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APPENDIX: Evaluation Rubric

This review rubric was developed by BCcampus and is licensed under a Creative Commons 3.0 Attribution Unported license.

BCcampus, (2017). *What we do*. Retrieved from: <https://bccampus.ca/about-us/>

Comprehensiveness

The text covers all areas and ideas of the subject appropriately and provides an effective index and/or glossary.

Content Accuracy

Content is accurate, error-free and unbiased.

Relevance Longevity

Content is up-to-date, but not in a way that will quickly make the text obsolete within a short period of time. The text is written and/or arranged in such a way that necessary updates will be relatively easy and straightforward to implement.

Clarity

The text is written in lucid, accessible prose, and provides adequate context for any jargon/technical terminology used.

Consistency

The text is internally consistent in terms of terminology and framework.

Modularity

The text is easily and readily divisible into smaller reading sections that can be assigned at different points within the course (i.e., enormous blocks of text without subheadings should be avoided). The text should not be overly self-referential, and should be easily reorganized and realigned with various subunits of a course without presenting much disruption to the reader.

Organization Structure Flow

The topics in the text are presented in a logical, clear fashion.

Interface

The text is free of significant interface issues, including navigation problems, distortion of images/charts, and any other display features that may distract or confuse the reader.

Grammatical Errors

The text contains no grammatical errors.

Cultural Relevance

The text is not culturally insensitive or offensive in any way. It should make use of examples that are inclusive of a variety of races, ethnicities, and backgrounds.