

**The BENEFITS and CHALLENGES of Open Educational Resources (OER) and Open  
Educational Practices (OEP)**

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### **Abstract**

In this action research project, the benefits and challenges of using Open Educational Resources (OER) and Open Educational Practices (OEP) were examined for the CS120 Digital Literacy course at the LinnBenton Community College (LBCC) in Albany, Oregon. Two types of research data were gathered, quantitative and qualitative.

The quantitative data were based on the end-of-quarter metrics for the six established CS120 course outcomes (see appendix A). The participants for the quantitative data are the students from the eighteen CS120 sections which were taught during the 2016 calendar year (winter, spring, and fall). While the ten winter and spring CS120 sections used a publisher textbook and companion website material, the eight fall CS120 sections used OER material.

For the qualitative data, a student questionnaire was used (see appendix B). The participants of the qualitative data are the twenty-eight students in my two fall CS120 sections which read and signed the Student Consent Form (See appendix D).

The findings of this study indicated:

- 1) The quantitative data, based on course outcomes, were very positive. The data revealed that all six course outcomes improved in the fall quarter and each student saved \$162 on textbooks.
- 2) The qualitative data, based on a questionnaire, were also positive. The majority of the students stated that the OER-based course is well structured, accessible, easy to use, and the content covers all six course outcomes. One concern is that 57% of the students stated they missed having a physical textbook.

### **Statement of the Problem**

There has been considerable interest in Open Education Resources (OER), especially at higher-educational institutions, since the OER term was first adopted at a United Nations (UN) forum in Paris, France in 2002 (Murphy, 2013). According to Hylen & Schuller (2007), OER is “digitized material offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research.” The potential of OERs and associated practices to transform the global education landscape has been described as “immense” (Olcott, 2012). The interest in OERs has increased significantly over the last few years. So much so, that the state of Oregon, where I live and teach, has a formal OER program with a full-time program manager and an OER grant. The Oregon OER grant is focused on educating school administrators and instructors on OERs, as well as to financing the development of new OER courses. Over and above, the two community colleges where I teach (LinnBenton Community College and Lane Community College) also have OER programs focused on reducing the cost of textbooks by one million dollars annually by fall of 2017.

According to Murphy (2013), Open Educational Resources (OER) and Open Educational Practices (OEP) have the potential to lower costs and increase participation in higher education. Some of the OER advocates are hoping the intersection of fast, reliable, secure, and inexpensive Internet access with high-quality, low-cost OER courses, certificates and degrees will help to bridge the massive educational gap between the haves and the have nots.

While the OER advocates and literature cover a wide scope of objectives (everything from reduced textbook costs to reduced, or even free, higher-education), this action research project focused on only three objectives:

- 1) Compare and contrast the CS120 OER-based and CS120 publisher textbook-based course outcomes (using the quantitative data)
- 2) Quantify the textbooks savings (using quantitative data and simple math)
- 3) Breadth, depth, accessibility, and usability of OER-based course material (using qualitative data)

## **Review of the Literature**

### **Introduction**

There has been considerable interest in Open Educational Resources (OER) since the term was first adopted in 2002 at a United Nations Educational, Scientific, and Cultural Organization (UNESCO) forum in Paris on the impact of open courseware for higher education in developing countries (Murphy, 2013). It's important to note that at the present time, there is no universal definition of OER. According to Hylen & Schuller (2007), OER is “digitized material offered freely and openly for educators, students, and self-learners to use and reuse for teaching, learning, and research.” OER material could be an entire course delivered on a Learning Management System (LMS) platform or simply a digital textbook. Open Educational Processes (OEP) are the practices which support the creation, use, and management of OERs through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers of their life-long learning path (Andrade et al., 2011). The potential of OERs (Open Educational Resources) and associated practices to transform the global education landscape has been described as “immense” (Olcott, 2012).

While there is much excitement, optimism, and high expectations around the possibilities OER could bring, OER has its challenges and critics. For example, will American OERs be effective in Africa, Asia, and other parts of the world? How serious are the language barriers, and cultural issues? Will self-learners be able to succeed with no to little structure and supervision? What is the impact of OER on higher educational institutions, professors, pedagogy, textbook authors and publishers?

The intent of this Literature Review is to position OER as well as to elaborate on the benefits and challenges of OER.

## **OER Positioning**

OERs are part of a larger trend towards openness in higher education, which is based on the philosophy that knowledge should be freely available on the Internet at no cost to the user (Yuan, et al., 2008). This trend includes, but is not limited to, open content, open source software, open courseware, open access and more recently, open educational practices (Hylén, 2006).

According to Murphy (2013), Open Educational Resources (OER) and Open Educational Practices (OEP) have the potential to lower costs and increase participation in higher education.

Education is widely seen as an important means of addressing both national and international problems, such as extremism, crime, poverty and hunger (Thomas & McPherson, 2012). The United Nations, along with federal and state governments, are encouraging, nurturing and investing in OER development. They are hoping the intersection of fast, reliable, secure, and inexpensive Internet access with high-quality, low-cost OER courses, certificates and degrees will help to bridge the massive educational gap between the haves and the have nots. Over and above, OER is also seen as a natural evolution of Distance Learning (DL), which has opened the higher educational doors to millions of people all around the globe (including all of us in this course).

According to Tumoi (2013), the current higher educational institutions are solutions to historical needs, constrained by old and out-of-date educational models. Tumoi argues that OER is not just textbooks in cyberspace. If OER is anything, it is a part of highly complex and continuously evolving system that will continue to improve and play critical roles in the future of higher education. Furthermore, Tumoi defined four types of OER:

- 1) OER material that has no cost
- 2) OER material that can be used to pass a class and/or obtain a certificate or a degree

- 3) OER material that can be modified
- 4) OER material that can be redistributed.

### **OER Benefits**

Stanford's machine learning and artificial intelligence courses (Massive Open Online Course, MOOC) enrolled over 260,000 students from over 190 countries in autumn 2011, spinning off the two venture capital funded start-ups Coursera and Udacity (Tuomi, 2013). In the prototype MIT edX course, "Circuits & Electronics," a student obtained 100% on all assignments. He was a 15-year old boy from Nepal (Tuomi, 2013). Coursera, which provides a platform for universities to rollout their OERs, grew from just four founding partners to 33 in the first five months of 2014 (Hockings, et al., 2013). The Khan Academy (online OER courses) now provides over 3,400 courses and is used by over 3.5 million students each month (Hockings, et al., 2013). The educational literature is full of these and similar testimonies. These examples demonstrate the excitement and high expectation many feel about OERs. Based on literature reviews and my own experience, I believe the OER phenomena is its infancy stages and here to stay.

Currently, it's estimated that 5% or less of the world's population have access to post-secondary education (Pannekoek, 2012). If the OER-based higher educational model becomes the norm rather than the exception, we will truly be a part of a revolution in education. The OER movement may be creating a path to a possible and desirable, inspiring and even thrilling future that may allow a revolution in higher education (Phelan, 2012).

The OER University (OERu) is a partnership of five accredited tertiary institutions, which seek to provide low-cost pathways for students to achieve recognized credentials (McKenzie, 2011). Students would learn using OER material and pay only for assessment of

their assignments for academic credit. The potential for OER to contribute to massively reduced education costs and therefore much greater access to educational opportunities is commonly cited as a rationale for OER (Taylor 2007).

Openstax College, a Rice University initiative, provides free quality textbooks for dozens of courses. All Openstax textbooks are free, developed and peer-reviewed by educators to ensure they are readable, accurate, and meet the course scope and sequence requirements. Hundreds of universities worldwide use Openstax free/OER textbooks. In fact, free textbooks is the fastest growing and most exciting segment of the OER movement.

### **OER Challenges**

The simple provision of resources (e.g. money, construction material, or agriculture machines) to impoverished countries often leads to greater dependencies, rather than to sustainable development (Easterly, 2006). According to Richter (2012), this insight can be extrapolated to educational contexts. Without empowering educators to conduct the adaptation process themselves, purely offering resources for learning may prove less successful than desired, and any gains may be simply temporary. The current model of build it, OERs, and they'll come, will not work.

The OER movement makes presumptions about the ability of its learners to self-direct toward the predefined goals of established institutional assessment (Knox, 2013). Many educators argue that without professional career counseling, advising, encouraging, hand-holding, and tutoring, many students will become overwhelmed and dropout.

Another critical challenges to this new movement is that four out of five websites are in English, while only one in ten people on this planet speak this language (Quane, 2002). Quane argues that as long as educational material continues to be based on very few (Western

European) languages, access to higher education remains limited to people who have had the privilege to learn one of those elite (foreign) languages. In order for OERs to be effective in different parts of the world, they need to be translated into the local language.

According to Deyrich and Matas-Runquist (2006), languages not only mean different words, but also offer a different way to express thoughts and build sentences, and such ideas could be regarded as context specific. In view of this, it seems unlikely that contextual and language gaps can easily be managed and overcome by the producers of OERs in western countries. Over and above translating OERs into the local language, OERs must also adapt to the local culture and norms.

According to D'Antoni (2008), one of the primary challenges faced by the OER movement is that of long-term sustainability. Many higher educational institutions are grappling with the potential social, cultural, and economic implications of OERs and the changes that they need to make to current strategies and policies as a result (D'Antoni, 2008). In a nutshell, a serious obstacle to institutional adoption of OERs and OEPs is the potential lack of compatibility between the philosophies of OERs and existing cultures and priorities (Friesen, 2009).

## **Conclusion**

Are Open Educational Resources (OER) and Open Educational Processes (OEP) the next revolution in higher education? OERs are relatively new, and while there is considerable amount of research on this subject, the current data does not support drawing conclusions. Clearly, the OER movement is gaining momentum, and the level of energy, excitement and optimism around OER is very high. At the same time, there is no evidence of large scale migration to OER courses.

Currently, the low-hanging OER fruit and brightest star in the OER constellation is Open Textbooks. The OER textbooks are already making a considerable contribution to lowering the cost of textbooks. There is a massive effort, at the federal, state, and educational institutional levels to create high-quality OER textbooks and adopt them. Most colleges and universities already have programs in place to educate and encourage their professors and instructors to research, and where suitable open textbooks are available, embrace and adopt them. In most colleges and universities, a librarian is usually leading the OER textbook adoption program. It's important to note that open textbooks pose no threat to the higher educational institutions' cultures and finances.

Many higher educational institutions are experimenting with OERs and debating what their long-term position on OERs should be. MIT's and Stanford's Massive Open Online Courses (MOOC) are extremely popular and new courses are being added. The Khan Academy offers over 3,500 OER-based courses and has already benefited millions of self-learners. An entire ecosystem is being constructed around building, refining, delivering, adapting, and certifying OER-based learning. OER University (OERu) is a reality, an OER-based higher educational model, and will continue to play an important role in the future of higher education.

Earlier in this literature review, we talked about the challenges OERs face. While languages, cultures, quality, and ability of learners to navigate and self-direct are serious OER issues, no challenge is as serious as the cultural and financial threats OERs pose to higher educational institutions. It's easy to internalize the benefits to learners, but what are the incentives to higher educational institutions to morph into an OER-based model? The real question is, will the OER revolution reach its full potential without the full support and endorsement of the higher educational institutions?

### **The Need for Further Research**

While the OER movement is gaining worldwide interest and support, the number of available OERs increasing rapidly, and the quality of the OERs is steadily improving, many of the OER benefits and challenges remain unclear. Additional research is required to clarify and quantify the financial and educational benefits of OERs. For example, one research project could focus on quantifying the savings and educational improvements at some higher educational institutions where OERs have been adopted. Several higher educational institutions are offering OER-based degrees. Another research project could focus on how are those graduates, with OER-based degrees are doing compared to graduates with similar degrees from traditional higher educational institutions. Finally, additional research is need to clarify the language and cultural barriers to OERs and to identify practical methods and tools to widen their reach.

## **Methodology**

### **Participants**

This action research took place at the LinnBenton Community College (LBCC) in Albany, Oregon and was focused exclusively on the CS120 Digital Literacy course. The CS120 course is a required course for several degrees and certificates at LBCC. Twenty CS120 sections are offered each year, and they almost always fill up. About 90% of the CS120 students are recent high school graduates and about 10% are non-traditional students (older students preparing to enter the workforce or retooling for new careers). About 55% of the students are female and about 45% are male. About 80% of the students are white and about 20% are Hispanics, Asians, Blacks, and other minorities. Like many higher educational institutions, LBCC uses the course outcomes data to determine how well the course is meeting each of its established outcomes, to identify weaknesses in the course (any outcome with lower than 70% pass rate), and to use the data to improve the course effectiveness. In theory, the outcomes data is used for a Total Quality Control (TQC) process where at the end of each cycle, a college quarter, the course instructors perform a retrospective on what worked, what did not work, and what changes are needed to improve the course effectiveness and consequently, the six established course outcomes.

This action research collected two types of data:

- 1) The quantitative data were based on the six CS120 established course outcomes (see appendix A) for all eighteen CS120 courses taught during the 2016 calendar year (winter, spring, and fall). The course outcomes data is not collected for the summer sections. Each of the CS120 courses have a limit of twenty-four students, and by end of week seven, last date for students to drop without obtaining a grade, classes average about twenty students.

Each course outcome is based on how well a student performs on specific assignments, quizzes, discussion forums, exams, and/or projects. A score of 70% or above is a pass.

The course outcomes are entered into the LBCC Outcomes database by the CS120 instructors at the end of each quarter. The ten winter and spring CS120 courses used a publisher textbook and companion website material. The eight fall CS120 courses used OER material. The ten CS120 winter and spring courses had a total of 193 students and the eight CS120 fall courses had 152 students.

- 2) The qualitative data were based on a questionnaire (see appendix B). The questionnaire was conducted at the end of the fall quarter for the two CS120 courses I taught. The objectives of the questionnaire were to find out how students felt about the OER-based CS120 course and how the OER-based CS120 course compared to other textbook-based courses the students have taken and are currently taking. Out of the thirty-nine students in my two fall CS120 sections, twenty-eight students signed the Student Consent Form and completed the questionnaire.

### **Material**

For the quantitative data, I used the LBCC Outcomes database. All LBCC instructors (contract and adjunct) are required to enter course outcomes into the Outcomes database at the end of each quarter (summer classes are excluded). A web-based tool is available to enter and view the course outcomes data.

For the qualitative data, a questionnaire was developed and was conducted on the last day of the two CS120 fall sections I taught. The questionnaire was developed during the IRB process.

**Procedure**

For the quantitative data, the LBCC Outcomes database was used. Instructors use a web-based tool to enter the outcomes data into the Outcomes database. The tool prompts the instructor for the year, the quarter, the course (i.e. CS120), and the CRN number. After that, the established course outcomes will show up on the screen. The instructor will then enter the data for each course outcome. Different courses and instructors calculate the outcomes data differently. For the CS120 course, we used the Learning Management System (LMS) Outcomes feature where the course quizzes, assignments, exams, discussion forums, and final project are linked to the six different CS120 established course outcomes. This enables the instructor to easily and accurately extract the CS120 course outcomes data from the LMS and enter them into the LBCC Outcomes database.

For the qualitative data (thoroughness, usability, and accessibility), the questionnaire was distributed to the twenty-eight students who signed the Student Consent Form, a blank envelope was left on the instructor desk, the students were given ten minutes to answer all questionnaire questions, and the instructor waited outside the classroom until all students completed the questionnaire.

For the textbook savings data, simple math was used. The new OER-based CS120 course does not use a textbook or a publisher website. The 2016 winter and spring CS120 courses used a publisher textbook and a companion website that required a one-time access code. While the textbook could be bought used or resold at the end of the quarter, the one-time access code is “one-time.” Calculating the savings is simple math. Number of students times cost of the textbook plus one-time access code minus the value of the used textbook at the end of the quarter.

### **Findings**

The research study was completed in approximately three months – during the 2016 fall quarter. It took the LBCC Institutional Research (IR) team a couple of weeks, after the fall quarter ended, to cleanse and upload the 2016 fall outcomes data into the LBCC Outcomes database. Since all of the CS120 outcomes data for the 2016 winter, spring, and fall were in the LBCC Outcomes database and a web-based tool is available to extract the data, it did not take long to extract the quantitative outcomes data and load them into a spreadsheet. As far as the qualitative data, it took a few days to determine the desired categories, keys, then read and key each of the twenty-eight students' questionnaires, and to enter the data into a spreadsheet. Finally, the textbook savings were truly simple math.

**Research question one: Compare and contrast the CS120 OER-based and CS120 Textbook-based outcomes (using the quantitative data). What did the outcomes data reveal?**

All six CS120 fall quarter outcomes (OER-based course) improved over the CS120 winter and spring quarters outcomes (publisher textbook-based course). The improvements varied from 1.6% for outcome #1 to 20.1% for outcome #6. The average improvement for all six outcomes is an impressive 9.5%. Below, Table 1, is the CS120 outcomes table for winter, spring, and fall. The table below also includes a column to average each of the six outcomes for the winter and spring quarters and another column to calculate the delta for each of the six outcomes between 2016 fall and 2016 winter and spring. Finally, the table below includes a row, at the bottom, to calculate the overall average for each column.

Table 1					
<i>CS120 Outcomes for Winter, Spring, and Fall 2016</i>					
Outcomes	2016 Winter (101 students in 5 sections)	2016 Spring (92 students in 5 sections)	2016 Winter/Spring Average	2016 Fall (152 students in 8 sections)	Delta Between 2016 Fall and 2016 Winter/Spring
Identify current and future trends in computing and recognize various computing devices and their uses.	85.6%	76.0%	80.8%	85.0%	4.2%
Identify the parts of a computer and their features and functions and recognize the advantages and limitations of important peripheral devices.	83.4%	73.6%	78.5%	80.1%	1.6%
Identify and describe the features of desktop and specialized computer operating systems and understand the importance of system utilities, backups, and file management.	84.5%	71.0%	77.8%	86.2%	8.5%
Explain why the web is so important in today's society and why fluency in the tools and language of the Internet is necessary to be an educated consumer, a better student, an informed citizen, and a valuable employee.	80.9%	71.1%	76.0%	84.1%	8.1%
Understand what a computer network is, identify different types of networks, and recognize threats to security and privacy.	83.9%	60.1%	72.0%	86.3%	14.3%

Demonstrate the proper use of basic word processing, spreadsheet, and presentation software features.	68.1%	68.4%	68.3%	88.3%	20.1%
Overall All Average	81.1%	70.0%	75.6%	85.0%	9.5%

**Research question two: Quantify the textbooks savings (using simple math). How big are the textbook savings?**

The 2016 winter and spring CS120 textbook and companion website one-time access code costed each student \$197. Students could resell the used textbooks for \$35. The companion website access code is a one-time access code and could not be used by another student. Since the OER-based course has no textbook, each student saved  $(\$197 - \$35) = \$162$ .

LBCC offers the following CS120 sections each year:

- 1) Fall quarter = eight sections
- 2) Winter quarter = five sections
- 3) Spring quarter = five sections
- 4) Summer quarter = two sections (not captured into Outcomes database)

Table 2 below, calculates the annual CS120 textbook savings:

Number of CS120 sections per Year	Average Number of Students per CS120 Section	Savings per Student	Total Savings per Calendar Year
20	20	\$162	\$64,800

As you can see from the above table, the \$64,800 of textbooks savings per year is excellent news for the LBCC students. About 70% of the LBCC students are on some form of financial aid. This is a \$64,800 the students don't need to spend, borrow or pay interest on.

**Research question three: Breadth, depth, accessibility and usability of OER material (using qualitative data). What did the questionnaire data reveal?**

First, the desired categories and the keys had to be established (see appendix E), Next, the twenty-eight students' questionnaires had to be read carefully and keyed. Finally, the data were captured into the two parts table below, Table 3. The questionnaire questions were open-ended and the students were encouraged to answer all questions. Some students wrote brief answers, and other students did not answer all questions. Please note, just because a student did not state an opinion about a particular point (for example, course outcomes), it does not mean the student agreed or disagreed. Please keep that in mind as you read the data below. This is what the qualitative data revealed:

- 1) 93% (26 out of 28) of the students appreciated not having to pay \$197 for the publisher textbook and companion website. No surprise here. Reducing the cost of textbooks is a primary goal of the OER initiatives.
- 2) 86% (24 out of 28) of the students stated that the OER-based course covered all six course outcomes listed in the course syllabus. This is very good news, since the success of the course is determined by the number of students that pass each of the six established course outcomes.
- 3) 64% (18 out of 28) of the students stated the OER-based course was well structured and easy to follow. Again, this is good news. Over and above having good content breadth and depth, the course was designed with accessibility and usability in mind.

- 4) 46% (13 out of 28) of the students appreciated the OER-based course being web-based (accessible from any location and any device with Internet access).
- 5) 57% (16 out of 28) of the students missed having a physical textbook. This was a surprise and a remedy needs to be investigated
- 6) 21% (6 out of 28) of the students stated that the web-based course required Internet access to use. I believe this is an overlap with the previous item (missing a physical textbook).
- 7) 14% (4 out of 28) of the students stated the course contains too much content and an equal number of students stated that the course does not contain enough content. Since the same number of students are on opposite sides of this metric, more data is needed.

Question	High Quality OER	Easy to Use OER Website	Web-Based Product (Liked no textbook)	OERs Covered all Course Outcomes	Free (OER-based)	Liked Video Tutorials
In your experience in this OER-based courses, please name 3 specific things you like about using OER-based material?	7	18	13			9
In your experience in this OER-based courses, please name 3 specific things you didn't like about using OER-based material?						
In your experience in other publisher textbook-based courses you have taken, please name 3 specific things you liked about using the textbook based materials?						
How well do you think the course OER material covered the course outcomes (outcomes are listed in the syllabus)?				24		

How much money did you spend on textbooks this quarter (provide total cost of textbooks and number of credits – do not include this course)?					26	
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Table 3						
<i>Students' Questionnaire (28 students participated) – Part 2</i>						
Question	Liked Interactive Buttons	Missed Having a Textbook	Required Internet Access	No Internet at Home	No Enough Content	Too Much Content
In your experience in this OER-based courses, please name 3 specific things you like about using OER-based material?	3					
In your experience in this OER-based courses, please name 3 specific things you didn't like about using OER-based material?			6	1	4	4
In your experience in other publisher textbook-based courses you have taken, please name 3 specific things you liked about using the textbook based materials?		16				
How well do you think the course OER material covered the course outcomes (outcomes are listed in the syllabus)?						
How much money did you spend on textbooks this quarter (provide total cost of textbooks and number of credits – do not include this course)?						

## Discussion

### Summary

In order to effectively answer the research questions, “The BENEFITS and CHALLENGES of Open Educational Resources (OER) and Open Educational Practices (OEP)” multiple measures were collected and entered into spreadsheets. Then, the data were carefully analyzed and synthesized to identify the benefits and challenges of using OER material for the LBCC CS120 Digital Literacy course. To further clarify and quantify the research question, three measurable sub questions were identified:

- 1) Compare and contrast the CS120 OER-based and CS120 publisher textbook-based course outcomes using quantitative data.
- 2) Quantify the textbooks savings using quantitative data.
- 3) Breadth, depth, accessibility, and usability of the CS120 OER material using qualitative data.

The CS120 course quantitative outcomes data revealed improvements in all six established CS120 course outcomes. This is extremely important since the institution relies on these metrics to determine the effectiveness of each course. The outcomes improvements varied from 1.6% for outcome #1 to 20.1% for outcome #6. The average improvement for all six outcomes is an impressive 9.5%. There are several reasons for the course outcomes improvements:

- 1) The publisher textbook is 597 pages and the companion website added more readings for each textbook chapter. The publisher textbook included a great deal of granular detail, which made it a poor fit for a Digital Literacy course. For example, one chapter covered the four different numbering systems (decimal, hexadecimal, octet, and binary) and how

to convert back and forth between all four. Clearly, this level of details only adds confusion and frustration in a Digital Literacy class. The publisher textbook also included MS Word, MS Excel, and MS PowerPoint assignments, but did not teach the students how to use these MS Office suite applications.

- 2) The OEB-based material is entirely web-based, modular, and each module included a completion check off option. The students could read the module and/or just watch a short module summary video. Many of the modules included interactive buttons which enabled the student to dive deeper into areas they are interested in. None of the modules were longer than a few pages, and none of the modules videos were longer than five minutes. The OEB-based material also covered the required MS Office suite applications for this course (MS Word, Excel, and PowerPoint).
- 3) The publisher textbook-based course divided the assignments, quizzes, exams, and projects between the LBCC course Learning Management System (LMS), the publisher LMS, and paper assignments. This was very confusing to students.
- 4) The OER-based assignments, quizzes, exams, discussion forums, and projects were within the LBCC course LMS shell with clearly marked due dates and completion check boxes.

The textbook savings quantitative data revealed that each OEB-based course student saved \$162. In an environment where the cost of higher education is increasing at a faster rate than the cost of living and about 70% of the LBCC students are on some form of financial aid, this is indeed excellent news. The CS120 Digital Literacy course is a required course for many LBCC degrees and certificates. LBCC offers twenty CS120 sections each school year. The

annual textbook savings are \$64,800. This is \$64,800 the LBCC students don't need to spend, borrow, or pay interest on.

The CS120 OER-based questionnaire qualitative data revealed more good news. Twenty-eight, out of thirty-nine students, in the two fall CS120 sections agreed to participate. This is what the qualitative questionnaire data revealed:

- 1) The OER-based course was well structured, easy to follow, and use (18 students), accessible from any platform with Internet access (13 students), most modules included short summary videos (9 students), and the OER-based course content covered all six established course outcomes (24 students). Over and above, 3 students stated that they liked the interactive buttons, which enabled the student to dive deeper into areas they are interested in. The CS120 OER-based course designers had taught the CS120 publisher textbook-based course multiple times and were well aware of the course issues and students complaints. When the CS120 OER-based course was designed, it was designed to address all of the known textbook-based issues. Those issues included too much content, 597 pages and an additional companion website, not covering the MS Office Suite, assignments spread across two Learning Management Systems (LMS) and paper, and heavy dependency on reading (no modules summary videos and interactive buttons).
- 2) On the other hand, 16 students missed having a physical textbook. A few students stated that a physical textbook is more accessible. A few other students stated that a physical textbook is easier to use in order to search and find the desired information. Finally, most of the 16 students missed having a textbook to write on. It's possible to create a companion textbook; however, there is no method to incorporate videos, interactive

buttons, and automatic completion check boxes into a physical textbook. 16 out of 28 students is a strong indicator and a solution will be researched.

### **Limitations**

This action research project was conducted over one college quarter (three months). The quantitative research population size was 152 students, in eight different sections of the same CS120 Digital Literacy course. The 8 sections were taught by five different instructors. The qualitative research population size was 28 students, in two different sections of the Digital Literacy course. The two sections were taught by the same instructor.

Clearly, data from a single college quarter and a relatively small population size, especially for the qualitative research, leave one with questions and concerns about the confidence level of the drawn conclusions. Still, since the quantitative research sample size was a healthy 152 students, across eight sections, taught by five different instructors, the confidence level in the research conclusions are relatively high. As far as qualitative research, the population size was relatively small, and many of the participating 28 students did not take the time to reflect thoughtfully about the questionnaire questions, and write detailed answers. Therefore, the confidence in the qualitative conclusions are not high. Finally, the action research was conducted over one college quarter (fall 2016). Conducting the same research over an entire school year, three quarters, would have increased the population size and improved the confidence in the research conclusions.

### **Implications**

Despite the research limitations in the above section, the research conclusions are positive and very encouraging. The textbooks savings of \$64,800 annually are real and substantial. The average score improvements of 9.5% across the seven established course

outcomes are also real and substantial. The student questionnaire revealed additional Universal Design benefits (web-based, interactive buttons, and videos).

As stated earlier, the number of quality OERs is increasing rapidly, available on the Internet, easy to find, and often comes packaged in a Learning Management System (LMS). While more OER research is needed, the results of this action research project supports expanding the number of OER-based courses. I have already converted a second course I teach, CS244 Project Management, to OER-based course, as well as looking at OERs for other courses, and encouraging and working my colleagues to follow suit.

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## Appendix A

## CS120 Course Outcomes

- 1) Identify current and future trends in computing and recognize various computing devices and their uses.
- 2) Identify the parts of a computer and their features and functions and recognize the advantages and limitations of important peripheral devices.
- 3) Identify and describe the features of desktop and specialized computer operating systems and understand the importance of system utilities, backups, and file management.
- 4) Explain why the web is so important in today's society and why fluency in the tools and language of the Internet is necessary to be an educated consumer, a better student, an informed citizen, and a valuable employee.
- 5) Understand what a computer network is, identify different types of networks, and recognize threats to security and privacy.
- 6) Demonstrate the proper use of basic word processing, spreadsheet, and presentation software features.

## Appendix B

## End of Quarter Students' Questionnaire

- 1) In your experience in this OER-based courses, please name 3 specific things you like about using OER-based material?
  
  
  
  
  
  
  
  
  
  
- 2) In your experience in this OER-based courses, please name 3 specific things you didn't like about using OER-based material?
  
  
  
  
  
  
  
  
  
  
- 3) In your experience in other publisher textbook-based courses you have taken, please name 3 specific things you liked about using the textbook based materials?
  
  
  
  
  
  
  
  
  
  
- 4) How well do you think the course OER material covered the course outcomes (outcomes are listed in the syllabus)?
  
  
  
  
  
  
  
  
  
  
- 5) How much money did you spend on textbooks this quarter (provide total cost of textbooks and number of credits – do not include this course)?

## Appendix C

## Dean Consent Form

The College of St. Scholastica  
1200 Kenwood Ave  
Duluth MN 55811  
(800)-447-5444  
**Dean Consent Form**

Dear Mr. Becker,

I am contacting you to ask for your permission to complete my Masters of Education research project through the College of St. Scholastica (CSS). My advisor is Dr. Neil Witikko (nwtikko@css.edu), an Associate Professor in the Education Department at CSS and will help guide me through the research process. The research I will be conducting will be based on comparing the CS120 fall course results to the previous CS120 course results. I would like to ascertain the benefits and challenges for using OER-based course material. Over and above the end-of-the quarter students' evaluations, I plan to develop a questionnaire to find out more about the students' impressions about publisher textbook-based vs. OER-based courses.

I will inform the students about my research during the first day of classes. I'll ask the students to sign a consent form. The consent form will state that I'll not be publishing any of the students' names or relevant information in my research papers. At the conclusion of my research, I will share my results with you. I plan on conducting my research during the fall quarter of 2016.

If you see this as a valid and appropriate field of research, please forward your consent by signing below so that I may continue with the completion of my masters' program study.

Thank you for your time.

Ziko Rizk

I agree to consent to the above mentioned research study and I will be notified of the results of this study when completed.



---

Dave Becker, Dean of Business, Applied Technology, & Industry Division

## Appendix D

### Student Consent Form

The College of St. Scholastica  
1200 Kenwood Ave  
Duluth MN 55811  
(800)-447-5444  
**Student Consent Form**

#### **INTRODUCTION**

My name is Ziko Rizk. Over and above being your CS120 course instructor, I'm also a student working toward my Masters of Education at the College of St. Scholastica (CSS). For my Masters of Education degree, I'm working on a research project on the benefits and challenges of Open Educational Resources (OERs). The CS120 course is based on OER-based material and I would like to use the course results for my research. Toward the end of the quarter, we will conduct the usual end-of-quarter students' evaluation and a short questionnaire I have developed.

Please take whatever time you need to discuss the study with anyone you wish. The decision to allow me to use your evaluation data in my research is up to you.

#### **WHAT IS INVOLVED IN THE STUDY?**

This is a regular college course with quizzes, assignments, and exams. We will be using the school Learning Management System, Moodle, for this course. We will also be using the end-of-quarter students' evaluation form. The one additional task, if you choose to participate in the research, is a short questionnaire I'll conduct at the very end of the course.

#### **RISKS**

None. As far as I can tell.

#### **BENEFITS TO TAKING PART IN THE STUDY?**

Help me with my research project. Over and above my work towards my Masters in Education, I plan to share my experience my dean and faculty members.

#### **CONFIDENTIALITY**

Your name and relevant information will not be used when the results of this study are published. Every effort will be made to keep personal information confidential.

#### **YOUR RIGHTS AS A RESEARCH PARTICIPANT?**

Participation in this study is voluntary. You have the right not to participate at all or to change your mind during the quarter. Deciding not to participate or choosing to leave the study will not result in any penalty and it will not harm your relationship with me.

#### **CONTACTS FOR QUESTIONS OR PROBLEMS?**

Call me, Ziko Rizk, at 541-917-4273 or email rizkz@linnbenton.edu if you have questions about the study. Or you can contact my immediate professor at the College of St. Scholastica, Neil Witikko by email: nwickko@css.edu.

The College of St. Scholastica  
1200 Kenwood Ave  
Duluth MN 55811  
(800)-447-5444

**Permission to Participate in Research**

I *Denae Marie Wyrkopp* agree to participate in the research study described in this form.

Your Signature

*Denae Marie Wyrkopp*

Date

9/29/16

## Appendix E

## Student Questionnaire Coding Table

Table 4	
<i>Student Questionnaire Coding Table</i>	
Code	Description
QOER	High Quality OER
EOER	Easy to Use OER Website
NOBK	Web-Based Product (Liked no textbook)
AOUT	OERs Covered all Course Outcomes
FREE	Free (OER-based)
VIDO	Liked Video Tutorials
INTB	Liked Interactive Buttons
MTBK	Missed Having a Textbook
REQI	Required Internet Access
NOIH	No Internet at Home
NOEN	No Enough Content
TOOM	Too Much Content