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Integrating Open Education Resources in Teacher Education Classes

Jeffrey Kritzer
University of Nebraska – Kearney, Kearney, Nebraska

Phu Vu
University of Nebraska – Kearney, Kearney, Nebraska

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The term "Open Educational Resources" (OER) at UNESCO's 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries was coined to describe a new global phenomenon of openly sharing educational resources in 2002. In this context, OER was defined as ''the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes'' (UNESCO, 2002). Since then, integrating OER into classrooms has been one of the leading educational trends in higher education (Horizon Report, 2018). OER integration in the classroom has the potential to fuel collaboration, encourage the improvement of available materials, and aid in the dissemination of best practices (UNESCO, 2002; Winitzky-Stephens & Pickavance, 2017). Also, it can help cut costs for both the institutions and learners. (Becker, Cummins, Davis, Freeman, Hall & Ananthanarayanan, 2017; Hilton, 2016; Olcott, 2012). Given the promising advantages of OER, this emerging instructional method should have widely been adopted in education by instructors. However, as reported by educators and researchers (Browne, Holding, Howell & Rodway-Dyer, 2010; Kortemeyer, 2013), the adoption of OER has not been a mainstream instructional approach in classrooms as there have only been occasional attempts by enthusiastic educators. Within the scope of this study, OER is any material in the public domain with an open publishing license, allowing one to use and adapt it freely. OER could refer to full courses, open textbooks, videos, tests, software, syllabi, and lecture notes. (Griggs & Jackson, 2017; McGreal, 2012). This paper focuses on the use of OER in graduate Teacher Education classes.

Literature Review

Despite the recent explosion of web-based technologies, the dominant higher education pedagogy has been textbook-based (Rackaway, 2012). This practice had undergone recent scrutiny due to complaints about students leaving college with massive debts. While the cost of tuition and fees has been the primary problem, the expense of course textbooks and materials certainly has added to the problem. College bookstores have sought to profit off of students rather than support their needs (Okamoto, 2013). This affordability crisis led to the establishment of an Open Education movement. Since the early 2000s, there has become available a plethora of resources available for free "use, adaptation and distribution." Now, it is easy to access many open courses, textbooks, videos, and journal articles online (Anderson, 2017; Hilton, 2016).

Much of the available research into the use of OER has compared learning outcomes, student preferences, and faculty perspectives with traditional textbook-driven courses. As far as learning outcomes are concerned, the results of multiple studies have shown similar learning outcomes when comparing use of a traditional textbook with the use of OER (Choi & Carpenter, 2017; Grimaldi, Basu Mallick, Waters & Baraniuk, 2019; Grissett & Huffman, 2019; Hilton, Gaudet, Clark, Robinson, & Wiley, 2013; Hilton, 2016; Jung, Bauer & Heaps, 2017). Students and faculty both expressed high degrees of favorability to use of open resources (Anderson, 2017; Hilton et al., 2013; Hilton, 2016; Jaggars, Folk & Mullins, 2017).

Of course, the main reason for this OER movement has been to save students money, a consensus significant advantage of using OER (Hilton et al., 2013; Okamoto, 2013). The increase in OER use is particularly compelling considering the alarming percentages of students who have elected not to buy their required textbooks (Gurung, 2017; Jung, Bauer & Heaps, 2017).

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This movement has not been without its detractors. Despite the economic gain for students of not having to purchase textbooks, there is still a significant population that cannot afford computers or lack sufficient broadband access. The further people are enmeshed in poverty, the less likely they will have sufficient computer and literacy skills to benefit from OER. Moreover, despite general faculty approval of the use of OER over traditional textbooks, there are certainly issues of copyright, quality as well as possible cultural and language barriers (Anderson, 2017). There has also been the concern that students from low-socioeconomic backgrounds should have to settle for a less than ideal alternative if they cannot afford a traditional textbook, as many of the higher education textbooks have a plethora of teaching resources accompanying them (Gurung, 2017; Hilton, 2016).

In the field of Teacher Education, researchers, practitioners, and educators have also been very much concerned with course pedagogy when it comes to OER implementation. While some studies pointed to it being less effective for instructional purposes, others found its use not detrimental as long as it did not replace traditionally useful (textbook-driven) pedagogical methods (Rackaway, 2012). Knox (2013) warned that open education must also be combined with pedagogical proficiency, such as matching the course objectives to appropriate OER. A traditional textbook is often a crucial part of a course and often comes with teacher-friendly pedagogical aids such as PowerPoints and quizzes (Gurung, 2017; Pierce, 2016). The use of OER has been criticized for its lack of a standardized, quality control process, so if implemented poorly, it could adversely affect students (Pierce, 2016). It has also been criticized as being self-directed, but courses using OER can also include a specific set of directions for how students are to proceed through the course material (Knox, 2013). It is also confusing as to why so few studies have considered textbook difficulty factor, as some subjects are quite technical (Griggs & Jackson, 2017). Anderson (2017) presented the need for librarians to assist faculty with the use of OER. Since there has been little evidence that the use of a traditional textbook is far more effective than OER, students should not have to spend so much money on them (Gurung, 2017; Hilton, 2016).

Description of OER-Adopted Courses

In the spring of 2019, the first author undertook the process of converting two courses to those that only used materials that were free for students. This process accomplished two objectives: It served to update courses that had been taught for over five years each by the primary investigator. It also saved the students in these courses the money they would previously have to spend on textbooks. In the first course, Medical Aspects of Individuals with Disabilities, books that cost a total of $299 on Amazon and $166 on Barnes & Noble were replaced with free materials. In the second course, Bilingual Special Education, a textbook costing $252 on Amazon and $56 on Barnes & Noble, was replaced with free materials, per course syllabi.

Unfortunately, as opposed to many of the P-12 grade-level textbooks in Language Arts, Math, and Science available as OER, no such open textbooks are available for specific content areas of Teacher Education (e.g., methods, foundations) and Special Education (e.g., legal, behavior, collaboration, specific disabilities). So, the primary investigator had to rely on material from appropriate websites that match the university objectives of each course. For Medical Aspects, the instructor used curriculum from IRIS Center (“IRIS,” n.d.), National Association of Special Education Teachers (“NASET.org,” 2018), and YouTube (“YouTube,” n.d.). For Bilingual Special Education, curriculum from IRIS Center, National Association of Special

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Education Teachers, What Works Clearinghouse (Institute of Education Sciences, n.d.), Colorín Colorado, DIBELS (University of Oregon, n.d.) and Edshelf ("edshelf," n.d.) were used.

The IRIS Center and NASET sites provide up-to-date well-constructed modules on pertinent topics in Special Education for both school district personnel and higher education instructors. What Works Clearinghouse is a website with many interventions that can be of help to individuals at risk or with disabilities. Colorín Colorado provides a wide variety of materials for use with English Language Learners. DIBELS is a website out of the University of Oregon that provides instructional materials and progress monitoring for both English and Spanish Literacy. Edshelf has tutorials for a large variety of educational apps. Some of these websites contained a series, of course, appropriate stand-alone content modules with summative assessments for each module. If the student scored at least 80% correct on these assessments, they were awarded a "certificate" as well as full credit on the assignment when they submitted a "picture" of their certificate. If these modules did not include a "built-in" assessment, students were assigned to make a "content creation" on the material they felt necessary in that module, in the form of a "mind map," cartoon, video or infographic. These are formative assessments requiring the student to engage in "deep learning" on the content while at the same time adapting it to a product such as previously mentioned. While the instructor had to pay $59 for a year's membership to the National Association of Special Education Teachers website, the material in these courses was entirely free for students. Of course, some of the websites used in the courses were supported by advertising, which can be annoying to students.

Method

This qualitative research project examined the impact of OER-adopted courses on students' academic performances, instructors' performances, and students' perception of the use of OER in four graduate-level Teacher Education and Special Education courses at a midsize public university in the Midwest. Upon acquiring the instructor's permission to access course data and approval of the University's institutional review board (IRB), we collected three different data sources throughout the research project to make sure that the data sources are reliable and valid for data triangulation. These included students' final grades in four same course sections, two of which were OER- adopted, and the other two were traditional textbook-adopted. Secondly, the instructor's course evaluation of four same course sections, two of which were OER-adopted, and the other two were traditional textbook-adopted. At the University where those courses were offered, a standardized online course evaluation was sent to students when the semester was two weeks away from their conclusion. The online course evaluation was administered by the University without the instructor's involvement. Lastly, responses to an online survey administered to students who took the two OER-adopted course sections. All of the categorized data were then input to run descriptive and inferential analysis to find the answers to the research questions as presented in the findings section.

Results

The first aspect of impact we examined was students' academic performances by comparing students' learning outcomes in regular courses with traditional textbook and the same courses with OER adoption because, arguably, students' academic performances are always the center of any educational changes (Osmanbegovic & Suljic, 2012; Snyder et al., 2002). According to the instructor who offered those courses, the syllabus and expectations were precisely the same

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except for the fact that one course section required textbooks while another did not. Regarding students' demographics, most of the students in those courses were in-service teachers who were in their graduate program. To find this piece of information, students' final grades in four same course sections, two of which were OER- adopted, and the other two were traditional textbook-adopted, were collected, and an unpaired *t*-test was conducted, and its results are presented below.

Table 1
Descriptive Analysis of Students' Final Grades in Courses with and without OER

COURSES	*n*	*Mean*	*Std. Dev.*	*Std. Mean Error*
COURSE 1 NO OER	26	5.88	0.33	0.06
COURSE 1 WITH OER	25	5.88	0.33	0.07
COURSE 2 NO OER	16	5.31	1.7	0.43
COURSE 2 WITH OER	17	5.94	0.24	0.06

The results from the *t*-test indicated that there was no significant difference in students' final grades in courses without OER and courses with OER, $t = -1.095$, $p = .145$, and Course 2 without OER, $t = 1.508$, $p = .255$. Thus, the integration of OER into courses did not appear to affect students' final grades.

The second aspect of OER impact was the course evaluation completed by students at the end of the semester. In this research project, we were interested in whether the adoption of OER into courses had any impact on not only students in terms of their final grade but also the instructor in terms of the course evaluation. While the question of whether course evaluations is an effective and/or reliable method of assessment or not has been debated, course evaluations are still widely used in most universities for a variety of purposes including: faculty promotions, tenure, effectiveness of class materials, students' views on the effectiveness of the professor, improvements for future courses, institutional accountability, funding opportunities, etc. (Crews & Curtis, 2011; Guder & Malliaris, 2010). Table 2 below shows the results of the course evaluation in courses that adopted and did not adopt OER.

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Table 2
Mean Score of Course Evaluation in Courses

	Course 1		Course 2	
	No OER	OER-adopted	No OER	OER-adopted
Mean Course Evaluation	4.28	4.71	4.58	4.54

Since we obtained only the mean scores of the course evaluation in four courses to compare, we did not run the *t*-test. However, descriptive data in Table 2 could indicate that the difference in course evaluation between courses with and without OER is almost the same. Finally, an online survey about students' perception of learning in courses with OER was sent to students who took the OER-adopted courses when the courses were almost complete. The survey consisted of ten questions utilizing a five-point Likert-scale. For data computing and analysis, “Strongly Disagree” was designated as 1 while "Strongly Agree" was 5. The survey response rate was 100% (Course 1: 17/17 participants and Course 2: 26/26 students). Responses to survey questions are shown in Table 3.

In summary, the research data indicated that there was no significant difference between courses with and without OER adoption in terms of students' academic performance measured by students' final grades and instructor's performance measured by course evaluation. Also, students' responses to the survey revealed that they preferred OER-adopted courses.

Discussion

Even though statistical significance was not present within the comparison of OER and Non-OER instructor course evaluation and student grade means, the practitioner should take notice. If an OER-adopted course does not hurt students' academic performances and instructor's evaluation, and saves students money, given the current movement of affordable higher education, OER should be encouraged to be integrated into courses. Our survey results indicated that most students expressed strong agreement that the use of OER increased their participation, interest, engagement, and confidence.

Of course, it did take additional hours of preparation for the first author to convert traditional textbook-based courses to new OER courses. One had to examine the objectives for each course and ensure that each objective had a curriculum attached to it. Sometimes this was met with the frustration of having to search many sites to find suitable material, but the process was also quite productive in that it required the instructor to update all of the content of the course. Change is always challenging, but the appreciation expressed by students made the exercise all the more valuable.

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Table 3
Responses to OER Survey

	Survey Question	Mean
1	I would rather have a course with Open Education Resources than one with a traditional textbook.	4.43
2	It was important to me not to have to spend money on textbooks and instructional resources.	4.64
3	Using the open/free learning resources instead of a traditional textbook increased my participation in class.	4.53
4	Using the open/free learning resources instead of a traditional textbook increased my interest in the course subject.	4.67
5	Using the open/free learning resources instead of a traditional textbook increased my exposure to different ways of learning.	4.69
6	Using the open/free learning resources instead of a traditional textbook increased my satisfaction with the learning experience.	4.57
7	Using the open/free learning resources instead of a traditional textbook increased my engagement with the course lessons.	4.53
8	Using the open/free learning resources instead of a traditional textbook improved my grade.	3.98
9	Using the open/free learning resources instead of a traditional textbook built my confidence.	3.98
10	If there is one course section with the traditional textbook and the other with OER, I would choose the one with OER.	4.40

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An overwhelming percentage preferred OER and OER courses over traditional textbooks and courses that used traditional textbooks. It is quite impressive that the OER courses were well received by the students even though this was the first time that those courses were offered. It is, however, noticed that the students might also have the novelty effect for the first time being exposed to OER-based courses. The novelty effect is the tendency for performance to initially improve when new technology (in our case is the adoption of OER) is implemented, not because of any actual improvement in learning or achievement, but in response to increased interest in the new implementation (Gravetter & Forzano, 2018). Therefore, follow-up and longitudinal studies with large sample size are needed to confirm our initial findings. Students very much appreciate saving money when taking OER courses, as mentioned in our survey results, and that is what politics and educational administrators want to see. It is also important to note that student preference (saving money) does not necessarily equal better learning. Nonetheless, if the adoption of OER into courses did not affect the teaching and learning quality as in those courses in this study, OER adoption should be encouraged.

This study is limited by the small sample size and the fact that this is the first time that this instructor has implemented an OER approach. Results could have been impaired by typical first time problems, but students were very appreciative of not having to buy textbooks, and for the first implementation, these courses went quite well. This study also makes a critical contribution to the literature on online instructional pedagogy as it is the first study to explore the use of OER in the discipline of Teacher Education. Further research should focus on both the development of open textbooks for Teacher Education and the pedagogy involved in the implementation of OER online courses.

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