The Pedagogical Impact of Integrating Open Educational Resources in A College Course

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Abstract
The need for empirical evidence of the impact of open educational resources (OER) on teaching and learning is eminent as it highlights the necessity of shifting the focus from considering OER as merely open content to considering it as open educational practices (OEP). The current study represents the Local Impact Evaluation Phase of a larger Design-Based Research (DBR) study that sought to design an integrative OER intervention in a college course to promote open educational practices (OEP). This study aimed to evaluate the implementation of the OER intervention prototype in a college course. Pre- and post-course surveys, a focus group, interviews, and an artifact analysis were used to gather the data of this formative evaluation. The insights gained from this study offer educators and instructional designers guidance and best practices for integrating OER in a college curriculum, and a theoretical understanding of how learning environment-enabled OER use and creation can be designed to manifest in OEP.

Keywords: Design principles, Open educational resources, open pedagogy, open educational practices; student-created OER; threading across assignments.

Theoretical Rationale
In the literature regarding OER adoption in education, there is a consensus that we lack explicit evidence for the effectiveness of OER in teaching and learning contexts (Al Abri & Dabbagh, 2019; DeRosa & Robinson, 2017; Ehlers, 2011; Hegarty, 2015). This evidence scarcity lowers the perception of OER in higher education and limits awareness of the goals of OER and Creative Commons licensing among faculty and students in these institutions. These limitations of the OER movement have discouraged the widespread adoption of this novel pedagogical approach across higher education institutions (Allen & Seaman, 2016; Hilton, 2016; Pitt, 2015). Nowadays, the primary concern about OER use in teaching and learning is that these open and free resources are used to merely promote open access to knowledge (Ehlers, 2011). The need for evidence of the impact of OER on teaching and learning is eminent as it highlights the necessity of the emerging shift in ways of using OER in education contexts. Researchers (Ehlers, 2011; Geser, 2012) suggest that shifting the focus from considering OER as merely open content to considering it as open educational practices will lead to enhancing the quality of education. Masterman (2015) underlined that the openness attributes associated with OER can promote innovation in institutional pedagogy when OER is used in courses. Geser (2012) stated that applying OER as part of innovative ways of teaching and learning could change pedagogy and reinforce a user-centered approach to learning. Wiley (2017) asserted that the concept behind adopting open pedagogy with OER integration is not the usage of OER materials per se, but engaging in the 5Rs activities.
A likely explanation for the lack of evidence of OER’s impact is that faculty have used OER in a way similar to teaching with traditional textbooks. Hilton (2016) stated that “it is not clear how OER might have been used in each of the [OER initiatives]” (p. 587). DeRosa and Robinson (2017) suggest that open pedagogy uses OER as a bridge from seeing courses as a repository of content to creating an open environment with more collaboration and engagement in the world of knowledge beyond the classroom. Taken together, these findings suggest that OER’s transformative possibilities in teaching and learning must be scrutinized utilizing empirical methods. There also seems to be a definite need for formal guidelines for faculty to support the shift from OER to OEP. As a result, it is imperative to explore the design principles that can support these open educational practices in courses at the higher education level, and, in turn, to sustain continuous improvement in the OER movement.

**Local Impact Evaluation**

This Design-based research (DBR) was carried out using the four phases of the Integrative Learning Design Framework or ILDF (Bannan-Ritland, 2003). The Local Impact Evaluation Phase of the ILDF promotes formative evaluation, further testing of the implementation of the prototype intervention of OER, and refining the generated design principles. Thus, this Evaluation Phase sought to: (a) examine to what extent the OER intervention enhanced students’ awareness of OER and associated concepts; (b) explore the perceptions of students regarding the benefits and drawbacks of the OER intervention in supporting their learning; (c) explore the instructor’s perception regarding the effectiveness of the OER intervention in the course and the pedagogical models that might contribute to advance the usage and creation of OER; and (d) determine if there is evidence of a shift in the pedagogy of the course. This is the overarching research question guiding this phase of the DBR study:

How are the OER design principles operationalized and implemented in a college course?

Three sub-questions were investigated:

A. What are the perceptions of students regarding the benefits and drawbacks of OER design principles in supporting their learning?

B. What are the perceptions of the instructor regarding the effectiveness of the OER intervention in the course?

C. Is there evidence of a shift in the pedagogy of the course?

**Intervention Setting**

The research setting was the Advanced Instructional Design course offered in the Instructional Design and Technology master’s program at a mid-Atlantic research university. It is a 16-week course delivered in the Fall semester between August 27 and December 10, 2019. The main assignments of the course are designed to empower students to practice what they learn either individually or in groups. The first assignment is a group project where students select an example of a constructivist learning environment (CLE) and describe to what extent this example best represents the characteristics of constructivism. The second assignment is for individuals. Each student selects a constructivist-based pedagogical model (e.g., cognitive apprenticeship, community of practice), or an instructional strategy (e.g., collaboration, articulation, scaffolding), or a problem type (e.g., strategy problem, decision-making problem, design problem, dilemma) and writes a brief research paper about their selection. The third assignment is an individual or group project: students develop a proposal for designing a Technology Supported Constructivist Learning Environment (TSCLE) prototype. In regard to
OER integration, an OER intervention was created in the course LMS Blackboard, as shown in Figure 1. Students in this section of the course were provided knowledge, information, and instructions in relation to reusing and producing OER, alongside the instructions related to the 5R practices. In addition, links to specific information were embedded in the instructions of each assignment to ensure that students had access to the required information to complete the intended tasks.

Figure 1. Creating a section for OER intervention prototype in the Blackboard LMS

Recruitment of Participants
The target population of this phase of the DBR study was the Instructional Design and Technology master’s students enrolled in the Advanced Instructional Design as well as the course instructor. The sample for this phase is purposively a convenience sample because easy access to the participants was available through the instructor of the course. The only criteria for participants’ selection was their enrollment in and completion of the course. The participant students were the eight graduate students who enrolled in the course in the Fall semester of 2019. Of these eight participants, three (37%) were male and five (62%) were female. The majority of participants (62%) had professional work experience of more than 10 years, and 87% were part-time students. The participants had a variety of work experience: instructional designer, consultant, training instructor, instructional coach for world languages, specialist in human resource development, and administrative assistant. The involvement of the course instructor in this phase was limited to directing students toward the activities that were infused in the instructions of the main assignments and prompting them to respond and cooperate with the researcher of the study. The communications with students in relation to their fulfillment to publish and share their assignments under a CC license was limited to communication between students and the researcher, to avoid the instructor’s potential influence on students and to overcome the validity threats of bias and reactivity (Maxwell, 2013).
Study Design

The research method used in this Evaluation Phase was an exploratory case study, relying on a mixed-method (MM) design. This MM design occurred in sequences in which at least two strands were conducted chronologically. The sequential mixed-method design used in this phase encompasses: (1) a quantitative method (QUAN) involving a pre-course survey and a post-course survey to gather students’ awareness of OER and their perceptions about the effectiveness of the intervention integrating OER into the curriculum of the course; and (2) a qualitative method (QUAL) involving a focus group discussion, an intensive interview, and artifact analysis to explore and understand students’ and the instructor's experiences of embedding OER in OEP in the course, and to capture if a shift has been made to pedagogy of the course. In this study, the results of the focus group informed the formulation of the post-course survey questionnaire, and the results of both the post-course survey and the focus group informed the formulation of the interview questions. The final conclusion and inferences were reported based on integration of the results from both strands.

Data Sources and Research Instruments

The data sources used in the Local Impact Evaluation Phase of this DBR study were the OER renewable assignments of previous students that had completed this class. These assignments were uploaded to Multimedia Education Resource for Learning and Online Teaching (MERLOT). MERLOT is an online repository that provides access to OER. It is essential to have a collection of CC assignments prior to implementing the usage and creation of OER in a course. These CC assignments acted as a base for current students to practice the 5Rs instead of using them as merely models of best practices.

Two strands of MM design were used to gather data in this phase. Strand (1) included instruments of the pre-course survey, focus group discussion, and post-course survey that were used to collect data from the students. Strand (2) included two data sources: a semi-structured interview that was used to collect data from the course instructor, and an artifact analysis that was used to analyze structure of the course after integrating OER and the 5Rs into the course’s syllabus to look for evidence of a change in the pedagogy of the course. Table 1 shows the alignment of the research questions with the data sources and gathering intended data.

Specifically, the pre-course survey sought to measure students’ awareness of the concept of OER and its components before exposure to the intervention. Then, The focus group discussion was chosen to gather qualitative data in this phase concerning students' perspectives on the effectiveness of the generated design principles and OER intervention in supporting students’ learning. After that, the post-course survey was developed to obtain further information on the perceptions of students regarding the benefits and drawbacks of the generated design principles in supporting their learning. Then, A semi-structured interview was chosen to gather qualitative data from the instructor as a result of integrating the OER intervention in the course she taught. The face-to-face interview took place after completion of the course; Finally, the artifact analysis took place after designing and embedding the OER intervention in the course Blackboard.

Table 1

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data Sources and Instruments</th>
<th>Purpose</th>
</tr>
</thead>
</table>

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### Q. How are the OER design principles operationalized and implemented in a college course?

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre- and post-course surveys</td>
<td>Determine students’ awareness of the concept of OER and associated attributes.</td>
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<tr>
<td>Focus group</td>
<td>Examine the effectiveness of the generated OER design principles and OER intervention in supporting students’ learning and opening the practices of teaching and learning in the course.</td>
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<tr>
<td>Interview</td>
<td>Examine to what extent the OER intervention contributed to increase the awareness of OER and related concepts among students.</td>
</tr>
<tr>
<td>Artifact Analysis</td>
<td>Examine to what extent the intervention manifested in opening the practices of teaching and learning in the main assignments of this course, from the students' perspectives.</td>
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</table>

### a. What are the perceptions of students regarding the benefits and drawbacks of these principles in supporting their learning?

<table>
<thead>
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<tbody>
<tr>
<td>Pre-course survey</td>
<td>Examine to what extent the OER intervention contributed to increase the awareness of OER and related concepts among students.</td>
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<td>Focus group</td>
<td>Examine to what extent the intervention manifested in opening the practices of teaching and learning in the main assignments of this course, from the students' perspectives.</td>
</tr>
<tr>
<td>Post-course survey</td>
<td>Examine to what extent the design of the OER intervention made it easy to follow the planned instructions and activities related to the integration of OER and 5R practices in the main assignments of the course.</td>
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### B. What are the perceptions of the instructor regarding the effectiveness of the OER intervention in the course?

<table>
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<tr>
<th>Method</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Interview</td>
<td>Examine the effectiveness of the OER intervention in the course design based on the instructor's perceptions.</td>
</tr>
<tr>
<td></td>
<td>Explore pedagogical models that might contribute to advance the usage and creation of OER in college courses.</td>
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</table>

### C. Is there evidence of a shift in the pedagogy of the course?

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<tr>
<th>Method</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Artifact analysis</td>
<td>Capture if a shift existed to the pedagogy of the course, and to the instructions of the main assignments that were used to engage students in OER usage and creation.</td>
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### Procedure

At the beginning of the semester (August 28, 2019), the researchers introduced the OER intervention to students along with the course syllabus and encouraged them to explore the resources under the intervention section in Blackboard. Since the selected course was mostly delivered online, a narrated presentation was uploaded under the intervention section in
Blackboard to introduce students to the term OER and interrelated concepts including the concept of renewable assignments and students’ engagement in OER usage and creation. In addition, examples of CC assignments in MERLOT for students in previous classes were shown in order to practice the 5Rs such as reusing the previous renewable assignments in MERLOT as exemplary examples of the three main assignments, selecting one example of a constructivist learning environment (CLE) presentation for previous students that was published in MERLOT under CC license, and critique the selected example based on the criteria of the assignment, and cite and build on one of the previous research-brief assignments in MERLOT.

Because the OER intervention was embedded in the course curriculum, the instructions in relation to OER usage and creation as well as the 5R practices were infused in the instructions of the main assignments. To begin this process of evaluation, the researcher invited the participants via email early in the semester (week 3) to respond to the pre-course survey online via Survey Monkey. Results from this pre-course survey helped determine students’ awareness of OER and associated components, and the results also indicated areas in which the students were interested in further information.

Throughout the implementation of the OER intervention, the researcher observed students’ engagement in and execution of instructions related to the intervention via LMS Blackboard. Consequently, according to the communication between the instructor and the researcher, the researcher followed up students’ completion of related activities. In terms of encouraging students to share their assignments under a CC license, the researcher approached students via email after each assignment was completed and graded by the instructor, asking if they wanted to make their assignments OER and upload them to OER databases. To direct students for publishing OER renewable assignments, the researcher provided students detailed instructions that guided them to the process of attributing their work under a CC license and sharing them online in MERLOT and/or in OER Commons. An example of these detailed instructions is presented in Figure 2.

Later, in week 12, to explore students' perceptions based on their experiences in executing the activities related to the OER intervention, the researcher invited students via email to a focus group discussion and sent them the consent form for confirming their participation. The data was transcribed and analyzed immediately; the results of the data analysis informed the next data collection method, the post-course survey.

The post-course survey, developed based on the results obtained from the focus group data, was administered in week 16, near the end of the course. Open-ended questions were used to avoid missing data that might remain undiscovered through closed-ended questions. To understand and link the results of this post-course survey to the results obtained from the focus group on students’ perspectives, the data from the post-course survey was analyzed immediately after all students’ responses. Both of these results informed the formulation of the interview questions for the instructor. As a result, after the course completion, the researcher approached the instructor of the course via email and conducted a semi-structured interview. Finally, an artifact analysis was conducted to see if a change had been made to the original structure of the course after embedding the OER intervention in the curriculum. Sequential mixed data analysis was adopted to analyze the data of this evaluation phase (Teddlie & Tashakkori, 2009).
Hello Tom,

First of all, thank you for completing the online survey.

If you decided to share your final project under CC license, you can upload it in MERLOT or OER Commons or other OER database. The instructions are as follows.

- **Access Blackboard and download the components of the final project. You can combine it in any way do you prefer.**
- **Select the type of CC license in which you want others' future students in this class to use your work.** To learn more about different types of CC license, explore resources under student-created OER intervention (An Overview of Copyright and Creative Commons Licenses).
- **To create CC license for your final project, you can access (https://creativecommons.org/choose/), follow the instruction to select the type of CC license for your work. Your selected CC license will be created automatically in the website. Copy the license and paste it in your documents. The second option to create your CC license is to add CC add-in to the Microsoft office so, you can create your CC in the Word & PowerPoint presentation itself.**
- **After you created the CC license for your document, access MERLOT OR OER Commons to upload your assignments.**
  - To upload your assignment in MERLOT, you need to upload it in OneDrive or any other places where users can access to view and reuse it. Log in to MERLOT, select (add a material to MERLOT), and follow the instructions to submit it in MERLOT database. Also, you can explore resources under student-created OER intervention (How to use MERLOT: “How to add materials to MERLOT”).
  - To upload it in OER Commons, join the Advanced Instructional Design group in OER Commons and upload your assignment in this group. When you uploaded, it will appear pending for approval from the OER Commons administrator. It will take couples of days to be published in the database (no further actions are required).
- **After you completed publishing your assignments in any CC database, please, send me the URL of your publication to add them to the webpage of all CC assignments.**

If you have any questions, clarification or need further information, please let me know.

Thank you for your cooperation.

*Figure 2*. An example of the instructions the researcher emailed when inviting participant students to share their assignments under CC licenses.

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**Results**

The results obtained from the Local Impact Evaluation Phase revealed the following insights:

- Integrating OER into the Advanced Instructional Design course did not contribute to change in the current pedagogy of the course, but it did contribute to change in the main assignments’ instructions and guidelines in terms of the way the students conducted their assignments.

- OER intervention enhanced the students’ awareness of OER and associated attributes; however, no significant evidence was found regarding students’ understanding of the different types of CC licenses and the usefulness of InfoGuide in supporting students in executing their assignments.

- All students were unaware of the university’s ownership of the copyright.
• Students favored aligning everything and linking it together by making connections between knowledge across the assignments within a course and across the classes for the entire academic program through a platform or a database.
• There is a continuum of knowledge across the main assignments and learning activities within the selected course.
• Threading across assignments encouraged the instructor to generate new instructional strategies to encourage students to use the components of earlier assignments within the course in future assignments of the course in order to connect knowledge and understanding of the course topics and learning outcomes.
• Students endorsed students’ contribution to OER creation (renewable assignments), but they showed uncertainty about the quality and trustworthiness of the existing open content.
• Critiquing previous students’ renewable assignments in MERLOT helped students to look at examples of assignments from previous students in different disciplines at different levels, to think what the assignment is about, to execute their own assignments, and to provide comments to the original authors to improve their assignments.
• The perceived intention behind the 5Rs is to build on existing data and to explain what is new about it, beyond only remixing and revising. However, significant questions remain about the meaning and intention of some of the Rs, and differences between some of the Rs in the 5Rs framework are still unclear at this point, due to several challenges.
  o It is believed that the MERLOT database is not an ideal platform to encourage active participation in repurposing and creating OER, so there is a technology issue – a need for further development of the platform with more features.
  o The benefits that faculty and students will get from engaging in the 5Rs are unclear.
  o There is an endpoint for these renewable assignments, where their content has been repeatedly improved to the point that no further improvements can be made.
• Sharing teaching resources under a CC license is more practical for exchanging best practices of teaching strategies and building resources upon one another, along with sharing students’ assignments.
• Students and instructors favored mainstreaming the concept of threading assignments across classes for the entire Instructional Design and Technology program in the research university. However, that is difficult to accomplish, for several reasons:
  o There is an infrastructure issue with the academic institution, when the institution is based on a credit system and a course system.
  o It is difficult to thread assignments across pedagogical models.
  o Each assignment needs to adhere to the assignment's criteria for each class.
• Threading across assignments could influence the pedagogy of courses by supporting students in connecting their knowledge across the courses and within the courses. This could help students gain a better understanding of the course content and apply their understanding to the various assignments and projects in the program. In addition, building assignments upon one another could encourage students to share their assignments online under CC-BY instead of keeping them in the LMS. This in turn could encourage students to reuse and remix these published open resources.
• The use of OER in the course will only remain through showing students some exemplary assignments in MERLOT that are under CC-BY.
Students did not fully understand the concept of integrating OER and threading across assignments in the course until near the end of the course.

These are the main considerations for integrating OER into courses in higher education:

- The top management in an institution must embrace the philosophy and paradigm of OER and develop a policy of OER use and creation.
- The benefits of OER for instructors and students alike should be clearly explained.
- The course pedagogy should move toward a constructivist approach of teaching.
- Faculty need more specific guidelines, examples of best practices, and training on how to use OER and the 5Rs in the curriculum.

The instructions related to OER intervention were easy to follow, clear, and straightforward.

Finalized refined OER design principles and their implementation in the Advanced Instructional Design Course.

- To support the use and creation of OER, OER should be integrated into a course that is designed based on a learner-centered pedagogical model using the principles of a constructivist approach to teaching.
- OER should be embedded as a main component of the pedagogy of a course.
- OER integration into a course should support the use and creation of open content under an open license using effective and efficient OER databases.
- An in-person session should be used early in the course to introduce the OER term, related attributes, its operationalization, threading across assignments, and the benefits from engaging in OER use and creation.
- The goals of integrating OER into a college course should focus on making students knowledgeable about the term "open educational resources" and related concepts.
- Students should have the option to share their assignments under an open license and to select the appropriate license.
- The instructor should provide a collection of OER content as a starting point for embedding the 5Rs.
- OER content that is shared openly online should be reusable and end in a meaningful purpose for learning.
- Creating OER content is more effective through collaborative work between both faculty and students.

Conclusion

The evidence of this study shows that integrating OER into the Advanced Instructional Design did not change the current pedagogy of the course, but it did contribute to a change in the main assignments' instructions and guidelines in terms of the way the students conducted their assignments. In addition, the findings show that integrating OER use and creation provides opportunities to make connections between successive modules and assignments, and to build upon previous work. This suggests that engaging students in OER use and creation increases opportunities for sharing peer-reviewed open content and allows students to value their assignments and to build on their assignments within the course and across courses and semesters. Regarding the benefits of engaging instructors in OER use and creation, sharing
resources under an open license provides benefits for sharing teaching resources to be remixed and built upon by others.

Despite these findings, faculty in higher education contexts need more specific guidelines than those generated from this study. Best practice examples and training on how to repurpose OER by using the 5Rs in a course curriculum are recommended. Furthermore, students need examples of case studies of the iteration of revising and remixing activities with the existing assignments under open license, to encourage students to think of the process and understand how they can build on existing knowledge using OER.

References


