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Torrey Trust
torrey@umass.edu

Robert W. Maloy
University of Massachusetts Amherst, rwm@educ.umass.edu

Sharon Edwards
University of Massachusetts Amherst, sedwards@educ.umass.edu

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College Student Engagement in OER Design Projects: Impacts on Attitudes, Motivation, and Learning

Corresponding Author:

Torrey Trust, Ph.D.
University of Massachusetts Amherst
Teacher Education & Curriculum Studies
813 North Pleasant Street
Amherst, MA 01003-9308, USA
torrey@umass.edu
ORCID ID: 0000-0001-5421-2197

Robert W. Maloy, Ed.D.
University of Massachusetts Amherst
Teacher Education and Curriculum Studies
813 North Pleasant Street
Amherst, MA 01003-9308
rwm@umass.edu

Sharon Edwards, Ed.D.
University of Massachusetts Amherst
Teacher Education and Curriculum Studies
813 North Pleasant Street
Amherst, MA 01003-9308
sedwards@educ.umass.edu

Abstract: Open educational resources (OERs), which are teaching, learning, and research materials that are openly licensed, are growing in popularity in higher education. Previous studies have focused on faculty and student perceptions and use of OERs. This study offers a transformative new way to incorporate OERs into college courses by engaging students in active learning through the design of OERs for a global audience. This paper presents post-course survey data collected from 69 undergraduate and graduate students from six different courses that featured OER design projects, including: 1) an open online course about designing digital media for teaching and learning; 2) online tools for teaching and learning website; 3) history/social studies wiki pages; 4) educational film project; 5) open online course about professional learning networks for educators; and 6) teaching with technology eBook. Findings indicate that shifting students' roles from consumers to producers of OERs increased motivation, improved attitudes about learning, aided the achievement of course learning objectives, and supported the development of valuable skills for 21st century success.

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The “future of education is open” declared scholars Young, Daly, and Stone (2017). Open educational resources (OER) and open educational practices can increase societal equity (Pelletier et al., 2021), democratize teaching and learning (Wickline, 2013), foster culturally relevant, personalized educational experiences (Van Allen & Katz, 2020), and empower teachers and students alike (Pelletier et al., 2021). Open education, noted Green and Vézina (2020), “is not a short-term fix to a passing problem—it is a long-term solution to ensuring equitable, inclusive access to effective educational resources and learning opportunities” (para. 7).

Open educational resources (OER), which are teaching, learning, and research materials with open licensing, have been identified as a key technology that will have a significant impact on the future of education (Pelletier et al., 2021). Typically delivered to students in the form of digital course materials, textbooks, and Creative Commons images or videos, OER offer teachers and students exciting ways to harness the vast resources of the Internet for learning. Several studies have shown that OER adoption in higher education courses can save students money, increase engagement, facilitate learning, and improve access to courses (Florida Virtual Campus, 2019; Griffiths et al., 2018; Hilton III, 2020). However, if open education “is framed only as the adoption and use of OER or open textbooks, we miss an opportunity to consider how openness may also afford new modes and approaches to teaching and learning” (Paskevicius & Irvine, 2019, p. 1).

In this study, we offer a look at how students engaged as curators and designers of OERs through project-based learning as part of an open educational practice. Specifically, we examine how student participation in these OER design projects influenced their attitudes, motivation, learning, and development of 21st century skills.

Review of the Literature

Project-Based Learning

Project-based learning (PBL) is an instructional approach that engages students in learning through real-world, meaningful projects. Incorporating PBL into college courses can improve student engagement, motivation, and learning (Ngereja et al., 2020; Song et al., 2020) and support the development of 21st century (aka “soft”) skills, such as problem-solving, time management, organization, teamwork, and creativity (Dogara et al., 2020; Trust & Maloy, 2017; Wurdinger & Qureshi, 2014; Warr & West, 2020). Having college students engage in OER curation and creation as part of their courses serves as a way to make project-based learning a direct part of their educational experience.

OER and Open Educational Practices

OER have specifically been defined as “teaching, learning, and research materials that are either (a) in the public domain or (b) licensed in a manner that provides everyone with free and perpetual permission to engage in the 5R activities [retain, reuse, revise, remix, redistribute]” (Creative Commons, n.d., para. 2). To date, most studies related to OER use in higher education have predominantly focused on college students as consumers of OER materials or on instructors’ perceptions of designing and using OER (e.g., Bloom, 2019; Tlili et al., 2019).

While it is clear that OER adoption in higher education settings can benefit educators and students alike, what is less clear is what happens when the use of OER moves from a simple substitution -- where instructors replace textbooks and other materials with open resources -- to an open educational practice where instructors involve students in the active curation and design of OER learning materials. Open educational (teaching and learning) practices have been defined broadly as those that open up content to students not on campus, incorporate or encourage others to use open content, make knowledge publicly accessible, and happen through collaboration with other practitioners and within open networks (Beetham et al., 2012). In this study, students’ projects involved the use, curation, and creation of openly licensed materials to make knowledge publicly accessible and to open up content to a broader audience, including students and educators worldwide. Since these OER design projects were part of an open educational practice, we will discuss insights and relevant findings from previous studies about open educational practices and open pedagogy.

Open educational practices and open pedagogy can support student agency and social constructivist learning and knowledge sharing, while also shifting the teacher-student power dynamic to that of co-learning and co-constructing knowledge (e.g., Baran and AlZoubi, 2020; Cronin & MacLaren, 2018; Paskevicius & Irvine,

2019b). Students value open pedagogy because it is engaging, personalized, and relevant to their lives (Hilton III et al., 2019). Some students have reported that open pedagogy increased their interest in learning (Hilton III et al., 2019). The action of curating OER can support students' knowledge building and increase their awareness of open access, open licensing, and OER socioeconomic impacts (Baran & AlZoubi, 2020). While the action of editing a popular OER, such as Wikipedia, can help students feel like they are making a meaningful impact on the world, while also supporting the development of their technical literacy skills (Azzam et al., 2017).

While there are perceived benefits to shifting to open pedagogical approaches alongside the use of OER, there are also several challenges that can negatively impact student success and learning. While editing Wikipedia pages, medical students struggled both with the difficulty of assignment itself (i.e., engaging in deep thinking to write medical information for a public audience on Wikipedia) and with the collaborative, peer-review aspects of the work (Azzam et al., 2017). Some students have found that engaging in renewable assignments is "exceedingly difficult...not only because they'd largely never been asked to do an assignment like that, but because it required higher-order cognitive tasks" (Bloom, 2019, p. 349). Additional challenges to open educational practices and renewable assignments, as identified by students, include a lack of structure or scaffolding from the instructor (Hilton III et al., 2019), struggling with technical and information literacy skills (Hilton III et al., 2019; Azzam et al., 2017; Baran & AlZoubi, 2020), concerns regarding assignment grading (Paskevicius & Irvine, 2019), difficulties associated with participating in group work (Azzam et al., 2017; Baran & AlZoubi, 2020), and concerns with being required to openly publish work (Baran & AlZoubi, 2020; Hilton III et al., 2019).

In summary, scholars have found that both project-based learning and open educational practices can improve student learning, motivation, and development of 21st century skills. However, to date, there is a dearth of research that looks at open educational practices through the lens of student engagement in project-based learning (Clinton-Lisell, 2021). Specifically, how does engaging students in project-based learning to design OER materials for a global audience influence their attitudes, motivation, skill development, and learning? This paper seeks to address this gap in the literature by examining students' reflection upon their engagement in OER design projects. The following research questions guided this study:

- 1) How do OER design projects shape students' attitudes and motivation for learning the course content?
- 2) What skills do students develop while engaging in OER design projects?
- 3) What do students learn from OER design projects?

Methods

In this exploratory qualitative research study, we analyzed post-course survey data from undergraduate and graduate students who engaged in six OER design projects between Fall 2015 and Fall 2019. These OER design projects empowered learners to curate and create meaningful OER to support educator and student learning worldwide. Rather than simply consuming information from an OER, students engaged in self-directed, collaborative, project-based learning with and about OERs to deepen their understanding of the course content. With more than 1.2 million combined views, these projects were not simply "disposable assignments" (Wiley et al., 2017, p. 62); instead, these "renewable" or "open" projects were opportunities to make a lasting impact on a global scale (Bloom, 2019; Wiley et al., 2017). In the following section we will discuss the six different types of OER design projects in our study, including: 1) A digital media online course; 2) Online tools for teaching and learning website; 3) History/social studies wiki pages; 4) Campus resources film project; 5) Professional learning networks for educators online course; and 6) Teaching with technology eBook.

OER Design Projects

Digital Media Design Course. In fall 2015, as part of a graduate-level educational web design course, 12 students developed and facilitated a 5-week OER online course about designing digital media for teaching and learning (<https://blogs.umass.edu/digitalmediacourse>). Students followed the ADDIE instructional design model (analysis, design, develop, implement, evaluate) to build a high-quality, open, accessible, easy to navigate online course (Trust & Pektas, 2019). The instructor selected a Creative Commons (CC) license for the online course – CC BY NC SA 4.0 – which allows anyone to retain, reuse, revise, remix, and redistribute the course materials as long as they give attribution, do not make money from it, and share any materials they create using the course content under the same license. With this predetermined CC license, students had to

make sure the content they created for the course was also openly licensed. As such, students learned how to find, create, and remix OER materials to develop the course content, learning activities, and media for the course.

Students engaged in multiple rounds of designing and revising their materials, based on peer review and instructor feedback, until their materials were approved by the instructor to be included as part of the course. When the course launched, students worked in shifts to provide timely responses to participants' assignments and posts in the online course community for the entire 5-week course. A total of 480 current and future educators from around the world enrolled in the course and 48 completed the entire course, including all 12 learning activities. The course website was viewed by more than 1,000 individuals during the time it ran. According to post-course survey data, participants reported that they were able to achieve the course learning objectives, meet their professional goals, and grow their practice as educators (Trust & Pektas, 2019). The open online course was awarded an ISTE Online Learning Network Award and AECT Division of Distance Learning Crystal Award - 2nd Place.

Online Tools Site. In fall 2016, as part of an Online Tools for Learning & Instruction course, students designed pages for an OER website featuring detailed reviews of popular digital tools and apps for teaching and learning (<https://blogs.umass.edu/onlinetools>). Students selected four tools and created comprehensive review pages for each one, which included a summary of the tool, a snapshot of critical information (e.g., privacy policies, accessibility, ease of use, type of learning theory supported, class size), OER multimodal content (e.g., CC images, videos, and infographics), learning activity ideas for multiple subjects, resources and links to relevant websites, step-by-step instructions for how to set up the tool, and related research. The instructor selected a CC license for the Online Tools site (i.e., CC BY NC SA 4.0) meaning that students had to ensure the materials they curated and created for their pages were also openly licensed. Students engaged in peer review and several rounds of revisions based on instructor feedback to ensure that their pages were high-quality, reliable, and easy to understand before their pages were published on the website. Every year, students in that class add more pages to the website, which has been visited by more than 1.1 million people located across 6 continents since 2016.

History/Social Studies Wiki. In a New Developments in History and Political Science Education course in spring 2017, students contributed online resources to an educational wiki (<https://resourcesforhistoryteachers.pbworks.com/>). Students researched, reviewed, and posted learning materials to individual wiki pages for learning standards from U.S. history, world history, government, geography, and economics. To provide resources for the wiki site, each student posted 3-5 online resources offering historically accurate information about people, places, and events. Resources included primary sources, timelines, historical biographies, multicultural histories, videos, images, and interactive learning materials. While the wiki has a CC license (i.e., CC BY NC SA 4.0), the resources posted include a mix of copyrighted media, OER media, content written by students, and links to external resources. When adding to the wiki pages, students are encouraged to look for openly licensed materials or, if they wish to include copyrighted materials, they must determine whether the fair use doctrine applies.

Campus Resources Film Project. In an educational film production course in spring 2017, a group of 16 undergraduate and graduate students designed videos about campus resources, such as Library Services, Student Legal Services, Ombuds Office, Office of Family Resources, Career Services, and the Center for Counseling and Psychological Health. Students conducted Internet research and worked with subject matter experts to design a script and storyboard about their designated campus resource. They collected OER materials, including video, audio, and images, and recorded their own audio and video. Then, they compiled their materials into a 3–7-minute video about their campus resource. While students were required to use OER materials, rather than copyrighted ones, in their videos, they could choose whether to post their videos under a CC license on YouTube. Most students opted not to post their videos under a CC license, however, all of the students listed their videos as “public” rather than “unlisted,” or “private.” Their videos were added to an interactive campus map on Google My Maps, which is publicly available (http://bit.ly/trust_umasscampusmap) and has more than 700 views.

Professional Learning Networks (PLN) for Educators Online Course. In spring 2017, as part of a graduate-level educational web design course, students designed a 5-week OER online course to support educators in evaluating and expanding their professional learning networks (PLNs) (<https://blogs.umass.edu/plncourse/>). Students worked in small groups to design one week each for the course. They conducted Internet research, read scholarly journal articles, and interviewed subject matter experts to learn about their topic. Since the course was designated by the instructor to be open access with a CC BY NC SA 4.0 license, students were tasked with curating and creating openly licensed multimodal materials (e.g.,

videos, infographics, posters), text-based content, and learning activities that would support course participants in meeting the learning objectives for their week of the course. Each group engaged in multiple rounds of revision, based on peer review and instructor feedback, until their materials were approved by the instructor to be included as part of the course. In a different semester, the course was run by a graduate student for 75 current and future educators. Post-course survey data indicated that the course positively influenced educators' growth of, and learning engagement with, their PLNs (Trust & Prestridge, 2021).

Teaching with Technology eBook. In fall 2019, undergraduate and graduate students in a Teaching and Learning with Technology course wrote and designed chapters for an OER eBook that focused on how to teach with digital tools and apps (<https://edtechbooks.org/digitaltoolsapps>). Students worked collaboratively in groups to conduct Internet research, read scholarly journal articles, interview subject matter experts, and curate information and resources for their designated chapter topic. Since the eBook was designated by the instructor to be open access, students were tasked with curating and creating openly licensed media, including GIFs, videos, and infographics, to enhance the reading experience of their chapter. Each group engaged in peer review and several rounds of revisions based on instructor feedback to ensure that their chapters were high-quality, reliable, and easy to understand. Even though the eBook had a CC BY NC SA 4.0 license, students could choose a different CC license for their specific chapter; however, none of the students selected this option. The lead author received an OER grant from the university library to support the copyediting and publishing of the eBook. It was published online in May 2020 and has been viewed more than 32,000 times and downloaded 7,000 times.

Data Collection

In 2015, after students developed the Digital Media Design OER online course, the first author drafted a survey to learn about students' thoughts and experiences related to the project. The design of the survey was informed by the criteria for electronic survey design (Dillman et al., 2014). The survey consisted of 1 multiple answer prompt that featured a list of 28 21st century skills (e.g., creativity, communication, critical thinking) and 14 content-specific skills (e.g., instructional design, teaching, multimedia production) and several open-ended prompts about learning (e.g., "Please describe the 3-4 most important things you learned from the course project"). The list of 21st century skills was developed by conducting a content analysis of various websites, blogs, and journal articles about 21st century skills, life skills, and soft skills and identifying the most commonly cited skills (e.g., Binkley et al., 2011; Gerstein, 2013; Lai & Viering, 2012; National Research Council, 2011). Once the first author secured approval to conduct this study from the university's Institutional Review Board, they created a digital version of the survey using the Qualtrics commercial survey platform and asked students to complete the survey during or after class at the end of the semester.

While most of the survey questions stayed the same for the remaining OER design projects, there were two multiple choice questions added regarding attitudes and motivation (e.g., "How did participation in the class OER eBook project shape your motivation to learn?"). Additionally, the list of content-specific skills was determined by the OER design project. For each of the remaining 5 OER design projects, the authors secured approval from their university's Institutional Review Board before asking students to complete the survey.

Participants

A total of 69 students - undergraduate and graduate - from across 6 courses completed surveys. Table 1 provides an overview of the courses, number of students enrolled, and number of students who completed surveys. All of the students were either planning to become educators (undergraduate students) or already working in the field of education (graduate students). The surveys were completed anonymously to protect students from instructor coercion. While student demographic data is not available, the courses each enrolled students from several different majors and programs, including education, math, nursing, French studies, communication disorders, history, political science, classics, and English. The students were located at a large land-grant public university in the Northeastern U.S. The university undergraduate population has slightly more students who identify as female (54%) than students who identify as male (46%). In terms of the racial-ethnic demographics, 60% of students at the university are white, 11.7% are Asian, 8.6% are Hispanic, 6.9% are international, 4.8% are Black or African American, and 3.3% are multi-ethnic (University Analytics and Institutional Research, 2021).

Table 1

Course and Participant Data

| Course Title | Semester & Year | # Participants | # Enrolled in Course |
|---|-----------------|----------------|----------------------|
| Educational Web Design | Fall 2015 | 12 | 12 |
| Online Tools for Learning & Instruction | Fall 2016 | 15 | 18 |
| Educational Web Design | Spring 2017 | 11 | 15 |
| New Developments in History and Political Science Education | Spring 2017 | 10 | 15 |
| Educational Film Production | Spring 2017 | 15 | 16 |
| Teaching and Learning with Technology | Fall 2019 | 6 | 18 |

Data Analysis

We adopted an interpretivist perspective (Erickson, 1986) to guide the data analysis in order to socially construct an understanding of our students' experiences as they were situated within the contexts of our courses. We did not aim to make generalizable claims from our sample of students, instead we aimed to engage in a systematic inquiry into the post-course survey data to provide insights to other educators and scholars with similar interests and goals. For this study, we sought to better understand students' perspectives regarding their engagement in project-based learning as part of an open educational practice.

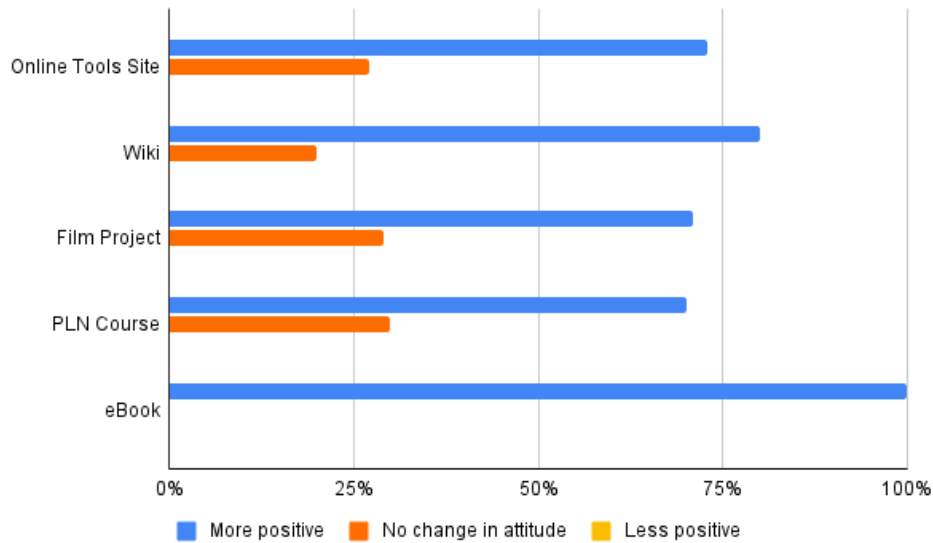
We generated descriptive statistics for the multiple choice and multiple answer prompts. For the open-ended questions, we conducted a thematic analysis (Braun & Clarke, 2006) to identify common patterns and interesting themes. Following Braun and Clarke's process for a thematic analysis, we organized the open-ended data from each of the six surveys into a single spreadsheet, read through the data and generated a list of initial codes, reviewed and discussed the list of codes to identify broader themes, and selected compelling examples of the themes to highlight in this paper. For instance, the initial codes of communication, accountability, collaboration, and teamwork were grouped into the overarching theme of "group work." In the following section we will discuss our findings based on the descriptive statistics and thematic analysis.

Results**RQ1: How do OER design projects shape students' attitudes and motivation for learning the course content?**

Students in five out of the six courses surveyed were asked to evaluate how participating in an OER design project influenced their attitudes and motivation toward learning course content. A total of 42 out of the 55 students surveyed (76%) indicated that the OER design project positively influenced their attitude about the course content, while 13 (24%) reported no change in attitude. There were no reports that the OER design projects negatively impacted student attitudes. Looking across the course data, the level of positive influence on attitude ranged from 70% of the students who participated in the PLN course project to 100% of the students who engaged in the eBook project (see Figure 1).

Figure 1

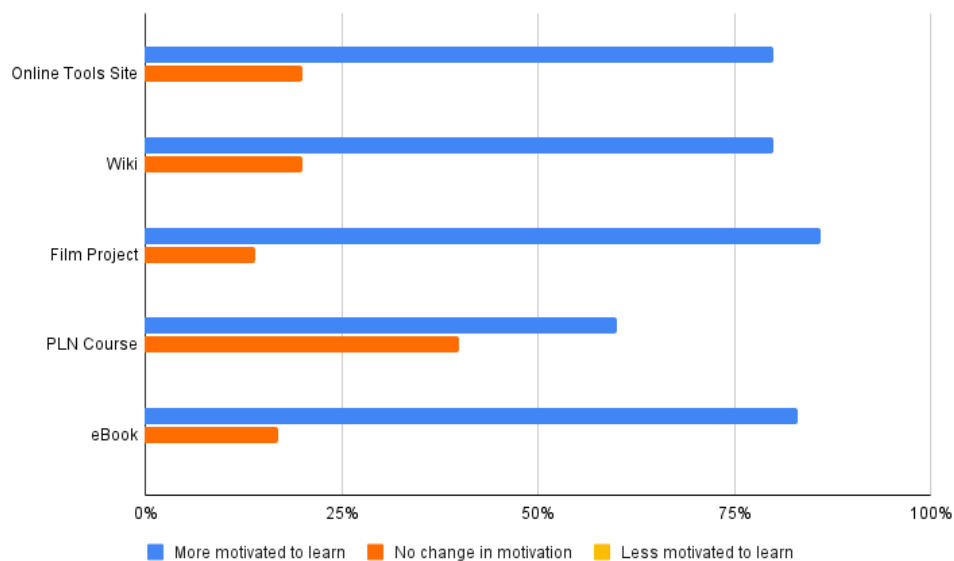
Impact of OER Design Projects on Students' Attitudes About Learning the Course Content



In terms of motivation, 43 out of the 55 students surveyed (78%) indicated that the OER design project positively influenced their motivation to learn the course content, while 12 (24%) reported no change in motivation, and none of the students reported a negative change in motivation. The level of positive influence on motivation ranged across the courses from 60% of the students who participated in the PLN course project to 86% of the students who engaged in the film project about campus resources (see Figure 2).

Figure 2

Impact of OER Design Projects on Students' Motivation to Learn the Course Content



While students did not specifically respond to a prompt about why they felt their attitudes and motivation did or did not change, their responses to the prompts: "How did your learning experience in this course compare to your learning experiences in other courses?" and "What suggestions do you have for improving the course or

course project?” revealed several themes related to attitudes and motivation, including: experiential learning, group work, project focus, and scaffolding and structure.

Experiential Learning

Several students commented on the value of the hands-on, experiential learning afforded by the OER design projects. For instance, one student wrote: “I really appreciate project-based learning. I participated in all the stages of the project and then I found a chance to use my theoretical knowledge practically. It had a huge impact on my learning,” while another student shared that the OER design project offered, “a level of academic and experiential application that I have not seen in any other classes. This class is truly the way of the future as we change our ideas of what it is to learn and grow in the 21st century.” Many students noted that they were excited about and motivated by the OER design projects because they could learn by doing real-world projects and applying theory to practice.

Group Work

Students reported both positive and negative experiences with group work. For example, one student commented: “When doing collaboration work, you really need to cooperate with your team members, which I feel was lacking. I feel I learned less compared to other classes.” In contrast, another student wrote: “I was inspired throughout this course because of the level of collaboration. It was impactful for me to feel like a problem solver, creator, and researcher in this classroom. This class provided the kind of environment in which I hope to work in post-graduation: one of creativity, support, and collaboration.” These two contrasting quotes exemplify how group work might positively or negatively impact students’ attitudes about and motivation for learning during OER design projects.

Project Focus

Some students reported that having a predetermined topic, such as an open online course about PLNs or a film about campus resources, negatively impacted their motivation to learn. For instance, one student shared how the campus resources film project reduced their motivation to learn: “the project of the course didn’t motivate me much. I would have preferred an individual project of my own choice for my educational video production project.” While another student advised: “the theme for the course project should be chosen by the students (my opinion of course). In my case that would have me more motivated and engaged in this class.”

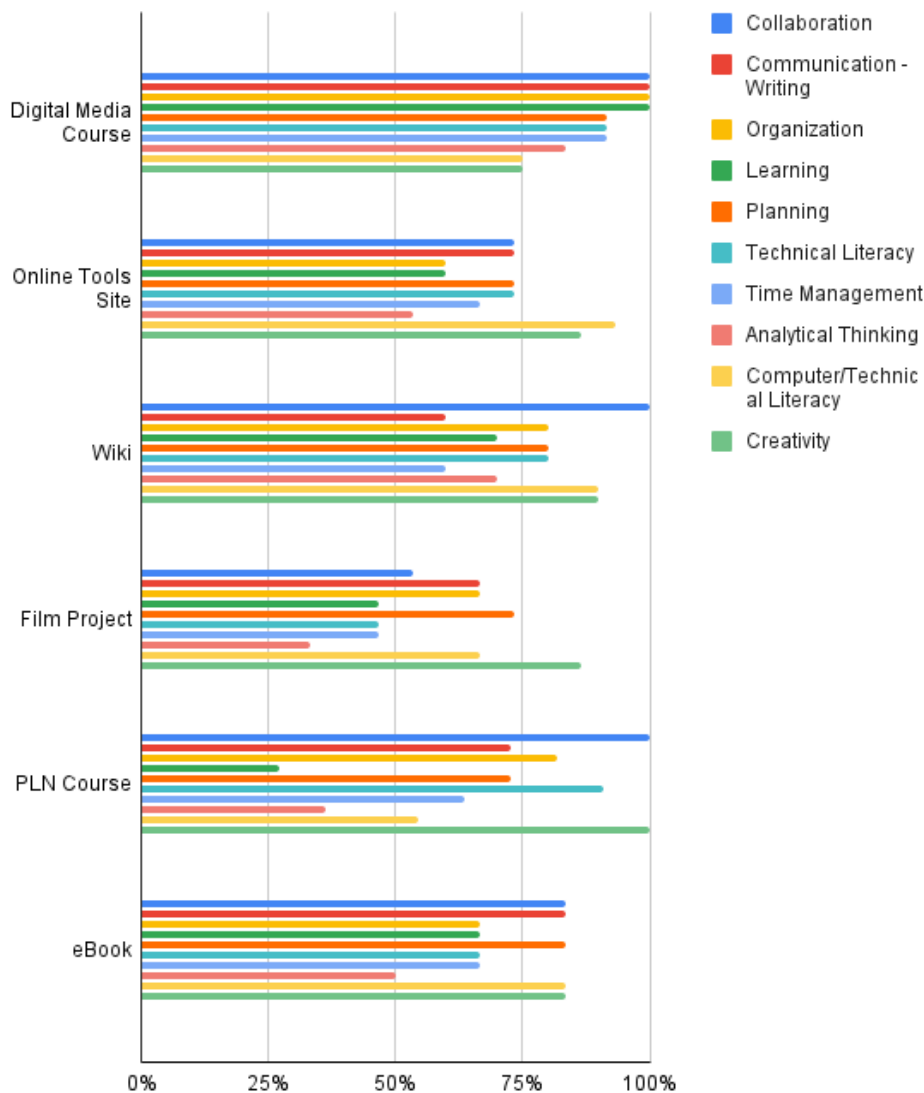
Scaffolding and Structure

The self-directed learning aspect of the OER design projects seemed to play a role in shaping some students’ attitudes and/or motivation. For instance, one student wrote: “I was surprised how little scaffolding there was for some tasks. There is a certain amount of sink-or-swim in that expectations are high that we either have or can find someone to help us with the complex skills like html or instructional design, or even the simpler ones like using google documents instead of moodle. I find this energizing, but also daunting.” Interestingly, this individual felt that the “sink-or-swim” self-directed learning experience made it both more challenging and more exciting to learn. Another student wrote that “it would have been better to have more guided practice with things,” indicating that more scaffolding and structure in OER design projects might have positively influenced their attitude and motivation to learn.

In summary, most students reported that engaging in OER design projects positively influenced their attitudes and motivation. Several students commented positively about the practical, hands-on, experiential, project-based learning opportunity provided by the OER design projects. However, students also highlighted factors, such as group work, lack of scaffolding, and project focus, that seemed to negatively impact their attitudes and motivation in some contexts. These findings indicate that OER design projects could benefit from finding the right mix between student choice and teacher-designed projects, independent work and group work, and self-directed learning and teacher-led learning.

RQ2: What skills do students develop when participating in OER design projects?

Students in all six courses were asked to identify from a list which 21st century skills and content-based skills they felt they developed while engaging in the OER design project. The percent of students who selected



When looking at the top 10 21st century skills by OER design project, the data presents an intriguing picture. The skills students reported developing varied significantly by project (see Table 2). For instance, the top three identified skills for the wiki project were collaboration, research, and multicultural awareness, while the top three identified skills for the online tools site project were technical literacy, creativity, and collaboration. Both projects asked students to conduct Internet research to curate and prepare information to be presented to educators on an open access site, however, most students in the online tools site project felt they were able to develop their creativity and technical literacy skills, which were not as commonly reported for the wiki site project. Meanwhile, the wiki project was the only OER design project where most students identified multicultural awareness as a skill they developed. This was a direct result of the project design, which asked students to identify multicultural stories, hidden histories, and diverse resources for the wiki.

Table 2
Students' Reported Top 10 Skills Developed in Each OER Design Project

| | Digital Media Course | Online Tools Site | Film Project | Wiki | PLN Course | eBook |
|----|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 1 | Collaboration | Technical Literacy | Creativity | Collaboration | Creativity | Creativity |
| 2 | Organization | Creativity | Planning | Research | Collaboration | Collaboration |
| 3 | Communication - Writing | Collaboration | Organization | Multicultural Awareness | Teamwork | Planning |
| 4 | Learning | Planning | Communication - Writing | Creativity | Organization | Technical Literacy |
| 5 | Planning | Teamwork | Technical Literacy | Technical Literacy | Planning | Communication - Writing |
| 6 | Teamwork | Communication - Writing | Problem Solving | Planning | Communication - Writing | Research |
| 7 | Time Management | Networking | Collaboration | Organization | Time Management | Personal Management |
| 8 | Analytical Thinking | Information Literacy | Critical Thinking | Communication - Verbal | Flexibility | Leadership |
| 9 | Creativity | Time Management | Communication - Verbal | Teamwork | Technical Literacy | Organization |
| 10 | Technical Literacy | Organization | Time Management | Critical Thinking | Personal Management | Teamwork |

Out of the 28 21st century skills listed, the least commonly selected were those not explicitly required to complete the OER design projects, such as mentoring ($n=20$; 29%), negotiation ($n=23$; 33%), leadership ($n=24$; 35%), and networking ($n=28$; 41%). Additionally, less than half of the participants, on average, felt that they were able to develop their decision-making ($n=29$; 42%) or independence ($n=30$; 43%) skills. This is likely due to the collaborative nature of the OER projects and, in some cases, that the project topic had already been selected by the instructor. Less than half of the participants ($n=31$; 45%), on average, also indicated that they developed multicultural awareness.

Students were also asked to identify content-specific skills that they developed by engaging in the OER design project (see Table 3). The list of skills included in each survey varied based on the project, although some skills were included in every survey. The most commonly developed content-specific skill, on average, was using technology for teaching ($n=33$; 72%). This was followed by multimedia production ($n=48$; 70%), ability to apply knowledge in real world settings ($n=32$; 58%), and evaluating technology ($n=25$; 57%). These findings indicate that educational OER design projects can support students' development of both technical (e.g., multimedia production) and professional (e.g., teaching with technology; evaluating technology) skills.

Table 3*Students' Reported Course Content-Specific Skills Developed While Working on an OER Project*

| | Digital Media Course # | Digital Media Course % | Online Tools Site # | Online Tools Site % | Wiki # | Wiki % | Film Project # | Film Project % | PLN Course # | PLN Course % | eBook # | eBook % |
|---|---------------------------------|---------------------------------|------------------------------|------------------------------|-----------|-----------|----------------------|----------------------|--------------------|--------------------|------------|------------|
| Multimedia Production | 7 | 58% | 5 | 50% | 14 | 100% | 12 | 80% | 5 | 45% | 5 | 83% |
| Using Tech for Teaching | No Data | - | No Data | - | 9 | 64% | 13 | 87% | 6 | 55% | 5 | 83% |
| Ability to Apply Knowledge in Real World Settings | No Data | - | 5 | 50% | 6 | 43% | 10 | 67% | 7 | 64% | 4 | 67% |
| Teaching | 8 | 67% | No Data | - | 4 | 29% | 5 | 33% | 2 | 18% | 3 | 50% |
| Evaluating Tech | No Data | - | No Data | - | 3 | 21% | 13 | 87% | 4 | 36% | 5 | 83% |
| Marketing | 2 | 17% | | | 2 | 14% | 1 | 7% | 1 | 9% | 1 | 17% |
| Web Design | 5 | 42% | 4 | 40% | 0 | 0% | 12 | 80% | 10 | 91% | 2 | 33% |

RQ3: What do students learn from OER design projects?

In an open-response section of the surveys, students were asked to comment on the most important things they learned from the OER design project. Students' responses were as diverse as their projects and often aligned with the learning objectives for the courses in which they were enrolled. For instance, students in the Educational Film Production class reported learning about scriptwriting, storyboarding, lighting, shooting, and editing videos. While students in the Educational Web Design courses reported learning about instructional design models (e.g., ADDIE) and teaching practices (e.g., Universal Design for Learning) that supported online course design. In the Online Tools for Learning and Instruction course, students' responses centered around evaluating the privacy and accessibility of digital tools and teaching with online tools, which aligned with the course learning objective: "Identify, evaluate, and employ web-based tools to enhance teaching and learning."

Even though students' responses were diverse, and varied from project to project, there were three common themes that spanned across the projects and courses: 1) collaboration and teamwork; 2) pedagogical tools and strategies; and 3) designing OER.

Collaboration and Teamwork

The importance of teamwork, communication, and collaboration came up repeatedly in comments by students. Several students cited learning about the benefits of teamwork and collaboration. For example, one student wrote they learned that "everybody knew something valuable, and working collaboratively helped us build something bigger together." Some students commented about how their teams served as a sounding board for ideas and insights. For instance, one student noted "how useful it is to talk through my ideas and share ideas. There is so much growth in that creative, community building" while another student wrote: "my team was not perfect, but they provided me a lot of feedback and insights while discussing the content." Other students cited learning how to collaborate (e.g., "I learned how to collaborate with my classmates and adopt their strengths to improve effective learning") and support their peers' learning (e.g., "I learned how to give positive, responsible, constructive feedback. How to be patient, and understand that we all have different abilities, strengths and weaknesses").

Pedagogical Strategies and Tools

Students who worked on the OER design projects also found themselves reflecting upon ways to improve their own pedagogical practices as current or future educators. For instance, one student wrote that working on the eBook project “has made me think deeper about education in all aspects. I have used what I have learned in this course to have deeper conversations in other classes about how the education system can move to a more productive teaching environment than just teaching to the test.” Another student who worked on that same project commented: “Teaching cannot be about repeating and reproducing content over and over again. Teaching and learning must have a transformative or creative purpose.” While a student who participated in the online tools site project reflected: “I was familiar with the learning environments but did more thinking about the student-centered (learner-centered) environment in this class and why it is so important.” For these current and future educators, the experiential aspect of OER design projects led them to begin examining and reflecting on their pedagogical practices and strategies.

In addition to reflecting on and developing their pedagogical skills and knowledge, students reported gaining new skills and perspectives related to teaching with technology. For example, a student who worked on the film project learned that “the intersection of education and technology is powerful and absolutely necessary in K-12 education.” While a student who worked on the online tools site project reflected that it is important to “ensure that you are not simply using an online tool as a substitute for another medium” and also reported learning “the many ways that online tools could be employed in the classroom beyond simply presenting information to the students.”

Designing OER

Across the surveys, students commented from a designer’s perspective about how to create OER to aid teaching and learning. One participant shared: “I learned what educators are looking for while creating design products.” Another student recognized how course designers face the “challenge of scope - covering a lot of content versus reducing the content and simplifying the content.” A third student commented on the importance of knowing “what principles to consider when we design an educational product.” Several students also mentioned learning new instructional design strategies, such as the Made to Stick model (Heath & Heath, 2007) and Universal Design for Learning (CAST, Inc., 2021) principles. Some students specifically mentioned learning how to design openly licensed materials. For instance, one student wrote that the three most important things they learned from the OER design project were: “Accessibility issues, Copyright issues, Creative commons.”

In summary, when asked to identify the most important things they learned from the OER design projects, students’ responses varied with many of them focusing on skills and knowledge specific to the course content, indicating that the projects supported the achievement of course learning objectives. However, several students’ responses went beyond course learning objectives and centered on skills such as how to work as part of a team, think critically about their practice as a current or future educator, and design OER materials. Based on these findings, it appears that the OER projects both supported students in meeting course learning objectives and helped students develop additional skills relevant to their lives and future careers.

Discussion

To date, open education research has tended to focus on faculty and student use of, and perceptions, towards OER (e.g., Hilton III, 2020; Tlili, 2019). Our study brings new insights regarding what happens when students are engaged in OER design projects, specifically those that engage students in project-based learning as part of an open educational practice. Based on our data, we present three key findings that add to and build on prior literature.

First, students’ engagement in OER design projects seemed to positively impact their attitudes, motivation, and learning. These findings align with previous studies. Specifically, that project-based learning in college courses can improve student engagement, motivation, and learning (Ngereja et al., 2020; Song, 2020) and that open pedagogy can increase student interest in learning (Hilton et al., 2019). Students in the study reported high levels of engagement with the course material and positive shifts in attitudes about and motivation for learning the course content. One explanation for this strongly positive student response might be that students were asked to shift from being passive receivers of information to active creators of authentic digital materials. Another explanation might be that students’ attitudes and motivation piqued because they were engaged in practical, real-world creative application of knowledge, as several students commented positively about the experiential, project-based learning aspect of the OER design projects. Far too often, students are given disposable assignments, which when read or viewed by just the student and instructor, “add no value to

the world” (Wiley, 2013, para. 4). However, in these OER design projects, like many of the other projects in the open educational practices literature (e.g., Azzam et al., 2017; Wiley et al., 2017), students were given the opportunity to be part of something that had a broader impact on their local or global community. OER design projects can serve as a means for students to be part of something that lasts long after their course ends and can be utilized by people from around the world (Hendricks, 2017), and this might improve motivation, attitudes, and learning.

Second, OER design projects can prepare students for 21st century success. Students reported developing the very competencies and fluencies that educators and employers believe students need to be successful in today’s digital age economy and society (Wilkie, 2019). Students most frequently cited developing creative thinking, collaboration, planning, technical literacy, communication, organization, and teamwork skills. These findings align with previous studies, which have shown that student engagement in project-based learning supports the development of creative thinking, collaboration, and problem-solving skills (Dogara et al., 2020; Wurdinger & Qureshi, 2014; Warr & West, 2020) and that open educational practices can support the development of collaboration and technical literacy skills (Azzam et al., 2017; Baran and AlZoubi, 2020). Given that the majority of employers struggle to find college graduates with the soft skills needed to succeed in their organization (Wilkie, 2019), there is a clear need for students to be given the opportunity to develop 21st century (or “soft”) skills in college courses and this study demonstrated that OER design projects can meet that need.

Third, designing education related OER can help current and future educators reflect upon and expand their pedagogical knowledge and OER awareness. The students in this study were planning to become or were already working as educators in K-12 or higher education settings. The OER design projects placed students in dual roles as both producers and learners of educational content, similar to the Wikipedia editing assignment (Azzam et al., 2017). As students went about curating and creating OER materials, they began critically examining their own experiences as learners and educators while at the same time envisioning how the materials they were designing might impact other students and teachers. They were engaged in learning about education by actually designing educational materials - a form of pedagogical learning in action - and this deepened their thinking about and understanding of the course content. Additionally, several students mentioned learning about OER, copyright, and Creative Commons licensing, which aligns with previous research demonstrating that open pedagogy can increase open access awareness (Baran & AlZoubi, 2020). Since there is a “growing need to establish literacies around open education, copyright, social media and networked learning as a foundational skill” (Paskevicius & Irvine, 2019b, p. 8), OER curation and design projects might be one way to meet this need.

Implications for Practitioners

While students reported mostly positive experiences with the OER design projects, there were several challenges identified that align with previous studies. Namely, that students struggled with the lack of structure and scaffolding (Hilton III et al., 2019) as well as collaboration and group work (Azzam et al., 2017; Baran & AlZoubi, 2020). Some students found the groupwork aspect of the OER design project to be so challenging it negatively impacted their attitudes and motivation. For OER design projects that include group work, students could benefit from direct instruction regarding how to participate as a productive and proactive team member. Or, instructors might add an independent activity or task as part of the OER design project so that it has both independent and group work. Students also reported yearning for more direct instruction on the technical aspects of design. Instructors might consider ways to incorporate mini-lectures, scaffolding, one-on-one mentoring, or even peer-driven instruction to improve students’ technical design skills before launching them into an OER design project.

Several students also mentioned wanting to choose the focus of their project, a challenge not previously identified in prior literature. When incorporating OER design projects into courses, instructors must weigh the pros and cons of having a predetermined topic or project for students to work on with supporting student-empowered, choice-based learning. In cases where students add to the same project each semester, such as a wiki or eBook, students can be given a choice in what and how they would like to contribute to the OER design project. In instances where the project has a predetermined topic, such as an online course about a specific issue, student choice could be brought in through different roles (e.g., multimedia developer, content writer) or digital tools that students get to use to participate in the project. Incorporating more choices into project-based learning and open educational practices might increase student agency.

There were other challenges identified in the literature that were not found in this study, including student concerns with being required to openly publish work (Baran & AlZoubi, 2020; Hilton III et al., 2019),

struggling with the cognitive demands of higher-order thinking (Azzam et al., 2017; Bloom, 2019), and difficulties identifying credible sources. It might be that these concerns were not expressed because students were not specifically asked to identify challenges related to the OER projects in the surveys.

One final consideration, which was not a challenge identified by students, but instead an issue that arose from the review of the data, was that only one of the six projects had a direct focus on diversity, equity, and inclusion. As such, students in this one project were more likely to report developing multicultural knowledge. Given the importance of diversity, equity, and inclusion, instructors should emphasize this in OER design projects in order to prepare learners for success in a multicultural world.

Limitations and Future Research

This study was limited by a convenience sample of students who opted into completing the post-course surveys. Therefore, the data does not reflect the perspectives of all of the students who worked on the OER design projects. Additionally, students who opted into completing the survey might have been more motivated to present a positive picture of their experience. While the data still yielded helpful insights regarding students' experiences and perspectives, this study could have been improved by randomly sampling the population of students who engaged in the OER design projects.

Additionally, while this exploratory study offers initial insights about OER design projects, there is much more to be learned. For instance, are there differences in outcomes based on demographics? Previous research showed that the inclusion of OER (Colvard et al., 2018) and creative design projects (Civitas Learning, 2021) in college courses have an even greater impact on learning and success for traditionally marginalized students. Future research might explore demographic-related differences in student motivation, attitudes, and learning. Furthermore, this study raised several questions, such as: What, specifically, did students learn about OER and open licensing? How might students' motivation and attitudes toward learning with OER change based on whether they are reading, remixing, or designing OER and whether they are given a choice in determining what type of license they wish to use for publishing? What aspects of the OER design process influenced changes in attitudes and motivation (e.g., designing for a real-world audience? Learning design techniques? Creating a digital artifact?)? How does independent versus group work influence student learning, motivation, and attitude in OER design projects? How might instructors alleviate concerns that have surfaced from prior literature, such as worries regarding publishing openly and the grading of open pedagogy projects? And how does student use of OER created by their peers influence their learning (Wiley et al., 2017)? These questions offer a starting point for scholars to deepen the collective understanding of project-based learning as part of an open educational practice in a college setting.

Conclusion

This study demonstrates that shifting students' roles from consumers to curators and designers of OER can positively impact students' motivation to learn, attitudes about learning, and development of valuable 21st-century skills that will prepare them for life, work, and citizenship in an ever-changing future. Additionally, the student designed OER projects, which have garnered more than one million combined views, demonstrated that the creation of OER "have the potential to give people everywhere equal access to our collective knowledge and provide many more people around the world with access to quality education" (Wickline, 2013, para. 2). Ultimately, project-based learning that happens as part of an open educational practice not only benefits students in higher education but also breaks down the walls of the classroom to support education on a global scale. Based on our findings, we agree that an open education movement "with students is much more effective than without, and creating and revising OER can be a valuable way for students to learn and to have their work make a larger impact than just earning them a grade" (Hendricks, 2017, para. 2).

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