

Students as OERs (Open Educational Resources) co-creators

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Abstract— Open educational resources (OERs) have been around for around 20 years and their use has not fully reached its true potential, according to education specialists. This paper presents the results of a study of creating Open Educational Resources together with students, with the purpose of reusing them in future iterations of Higher Education programs. The students have to become co-creators of learning content, as part of their year assignment in several Science, Technology, Engineering, Math (STEM) programs, both at bachelor and master levels. Our study seeks to identify if creating original OERs as multimedia artifacts will facilitate students' understanding of open education principles and apply them in the future. We tested several approaches on how to realize this assignment, individual or in pairs, one OER per team or several OERs, and we applied connectivism theory as to validate our results. The results of our study indicate that by exposing students to open education, encouraging them to become OER co-creators and allowing them to connect in multiple ways, improves their digital lifelong learning abilities and inspires them to use open education principles or resources in their quest for knowledge.

Keywords- *OER, eLearning, Open Education, Connectivism, co-creators*

I. INTRODUCTION

Open educational resources have been around for approximately 20 years and their use has not fully reached its true potential, according to education specialists [1].

One definition for open educational resources (OER) in existing literature presents them as being “materials used to support education that may be freely accessed, reused, modified and shared by anyone”[2].

As defined by the William and Flora Hewlett Foundation and UNESCO, open educational resources are: teaching,

learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge [3].

The concept of OER and the work of the OER movement draw on the principle of ensuring the right to education for all (as stated in the United Nations' Universal Declaration of Human Rights)[4]. Therefore, the OER movement argues that educational materials should be freely available for learners and teachers as a fundamental human right[5].

Using Open Educational Resources (OERs) provides opportunities for collaboration both in the class and beyond, by extending the OERs rules also into lifelong learning. Many universities have embraced open education principles and tools, as OERs for common learning activities with students also as learning motivation method.

Even if OER are high on the agenda of some educational policies of universities shifting from OER production towards Open Educational Practices (OEP), empowering learners to take up OEP is not yet widespread.

There are many identified reasons why OERs are not as popular as it was expected. Nie noted multimedia skills, knowledge of copyright law and licensing practices, and search ability as barriers [6]. Murphy [7] notes time, organizational culture, and availability of resources as being significant barriers. De Liddo [8] confirms this higher education cultural barrier of “opening up” and suggests technology aimed at connecting and collaborating could minimize this.

Pawlowski [9] suggested that one factor which could further the adoption of OER is increased emotional ownership, defined as “the degree that individuals perceive that knowledge or resources belong to them” [10]. Pawlowski [9] outlined a four-phase collaborative development cycle for OER:

Design & Develop ⇒ Redesign ⇒ Reuse ⇒ Republish

In this cycle, emotional ownership can increase as reuse and republishing occur in their respective communities. Pawlowski concluded that OER collaborators must be encouraged, engaged, and supported throughout the OER development process [9].

Following Wiley [11], we define disposable assignments as those assignments that both faculty and students understand will ultimately be thrown away. Essays and practice problems are examples of assignments that frequently fit into this category – students spend significant time and energy doing this work, faculty spend significant time and energy grading this work, and then it gets returned to students who throw it away. While there is likely a learning benefit to students who complete these disposable assignments, literally throwing away 2 million hours of work each semester (as a rough calculus of a higher education program total) seems like a missed opportunity.

To contrast disposable assignments, we define renewable assignments as those which both provide a learning benefit to the student and result in OER that provide a lasting benefit to the broader community. Assigning students to create, revise, or remix OER results in an artifact that can be used both to evaluate student learning and increase the diversity of voices and perspectives available for study by later students [12].

To seek if these assumptions are correct, we run a study in the autumn of 2019 with more than 120 students at different STEM programs both at bachelor and master levels in a Romanian university, Politehnica University of Timisoara.

These research questions guided this study:

- How will creating original OERs as multimedia artifacts facilitate their understanding of open education principles and apply them in the future?
- Will students identify the process of creating an OER as an effective motivator to learn new tools and to prove their abilities in web technologies development?
- Are there differences for students participating as a team member or alone, in a structured online learning activity?
- How do students’ express innovation and creativity by creating learning content as Open Educational Resources?

II. METHODOLOGY

Continuing with our research related to different blended learning strategies and scenarios in Science, Technology, Engineering, Math (STEM) related education [13] [14] [15]

[16], we focused part of our research into OER creation in a partnership between teaching staff and students.

The students have to become co-creators of learning content, as part of their year assignment in several STEM programs, both at bachelor and master levels. We tested several approaches on how to realize this assignment, individual or in pairs, one OER per team or several OERs, and we applied connectivism theory as to validate our results.

Connectivism is a hypothesis of learning which emphasizes the role of social and cultural context. Connectivism was introduced in 2005 by two publications Siemens’ Connectivism: Learning as Network Creation [17] and Downes’ An Introduction to Connective Knowledge [18] and it has evolved since then in a method of “through which teaching and learning using digital technologies can be better understood” [19]. As Downes states: “at its heart, Connectivism is the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks”.

Two understandings guide Connectivism. First; decisions are based on rapidly altering foundations; and second; the ability to draw distinctions between important and unimportant information is vital. [19] argues that “In the current dynamic context for learning and education, Connectivism alone is insufficient as a theory to inform learning and its technology-enabled support in an internetworked world.” Connectivism requires teachers and students to adapt to new learning situations.

This study operationalizes several principles of Connectivism:

- Learning and knowledge rest in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources
- Capacity to know more is more critical than what is currently known
- Decision-making is itself a learning process.
- Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality.

III. THE STUDY

One of the groups was supposed to independently create two OERs with the same topic but on two separate templates. The templates were offered in multimedia formats, and examples were provided as well by our teaching staff. Students received classes regarding open licenses and creative commons. Organizations such as Creative Commons preserve the rights of the authors by providing a variety of licenses that allow them to choose the conditions for sharing their work. Their mission is to “develop, support and steward legal and technical infrastructure that maximizes digital creativity, sharing and innovation” [20].

Each OER had to contain three learning materials:

1. Script of the OER (as a formatted text).
2. The project realized in SnagIt.

3. The video clip realized based on the screen capture of the script operations (exported from Snagit).

A. Realization of the script

In order to reach the final goal of the OER, intermediate steps must be established. To set the steps:

1. Set the starting page (URL, title, description);
2. Within the page, the points of interest are established (text field, checkbox, label, button, link, etc.), in the order in which they will be highlighted;
3. For each point of interest on the page, a short descriptive text is made (ex: "Click here to access the next section");
4. Repeat points 1, 2 and 3 for each page included in the tutorial;
5. At the last step, a concluding text is displayed.

Script example:

To perform the ABC operation, the following instructions will be performed:

- ✓ Page 1: <https://abcdef.gh> | Starting page, which ...
 - The checkbox with the label "DEF" is highlighted
 - This text is displayed: "Check the box DEF"
 - The link with the text "GHI" is highlighted
 - This text is displayed: "Click on the GHI link"
- ✓ Page 2: <https://ijklmn.op> | The page for changing the settings, which ...
 - The field with the name "JKL" is highlighted
 - This text is displayed: "Complete here ..."
 - The save button is highlighted with the text "Save ..."
 - ✓ This text is displayed: "To save the changes, click here".
- ✓ Page 3: <https://qrstuv.wx> | Confirmation page | It contains the message of the platform that the changes have been saved
 - This text is displayed: "The changes have been saved"

B. Screen capture

Based on the previous script, the screen capture of the step by step described operations is made.

Technical details:

- ✓ Only a window with the content of the web page of the platform will be captured, at a resolution of 1280 x 1024 px.
- ✓ The sounds will be represented by clicks or keystrokes.
- ✓ The texts will be inserted on a white background and a blue border.
- ✓ The start (splash-screen) and final images will be provided and integrated on a fade-in basis.

IV. CREATION AND EVALUATION OF OERS

After the students created the OERs, they were evaluated both by teaching staff and also their peers. They were encouraged to improve their OERs by solving various issues which emerged during their presentations. Some of the OERs referred to web technologies, to different tools, (Figure 1) other to the use of our university educational system.

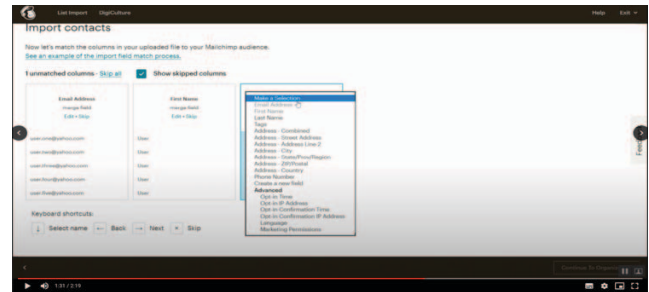


Figure 1. Students' OERs – web tools

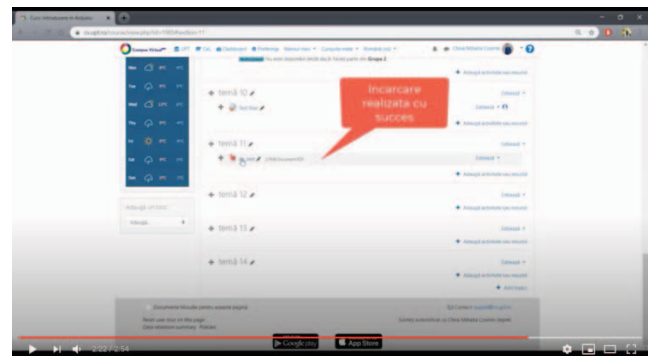


Figure 2. Students' OERs – tutorial for UPT Virtual Campus

A qualitative survey was designed by the teaching staff and students completed it after finishing their assignments.

The questionnaire was created by our eLearning specialists, based on previous work and existing literature questions related to OERs. We chose only what we considered were the most relevant aspects of research, limiting to 13 questions and an estimated time of 5-10 minutes for completion. We received 53 answers.

First, we enquired the students how useful they find OERs in general, asking them to rate them from 1 to 5, 1

meaning not very useful and 5 meaning very useful. A total of 94% of respondents said OERs are useful and very useful.

Then the students had to choose if OERs should replace existing traditional teaching methods, complete existing traditional teaching methods, be used only optionally or disappear from teaching. 91% agreed that OERs should complete existing teaching methods, 6% think OERs should replace existing methods and 3% think OERs should disappear from teaching.

We asked which parts of the educational process could happen online and got the following results: theoretical courses (87%), independent evaluation of knowledge (79%), extra independent study (77%), study groups (40%), exams (34%), practical laboratories or workshops (34%) and tutor consultations (21%).

Participants stated that the OERs they are interested in are video (96%), images (57%), graphics (53%), virtual labs (49%), presentations (49%), text (47%), audio (42%) and tests (28%). No one is interested in glossaries anymore, and everyone chose at least one option, both findings confirming the results we received for the following past years.

Furthermore, we asked them to say what OERs they created for their projects: video (94%), text (75%), audio (26%), infographics (11%) or other (4%).

Moreover, the students had to rate from 1 to 5, 1 being the lowest and 5 the highest score the following related statements of the creation of the OERs: it was difficult to create, it was fun to create, it will be useful for me in the future, it will be useful for future students, the activity fostered peer collaboration, the activity helped me learn new things.

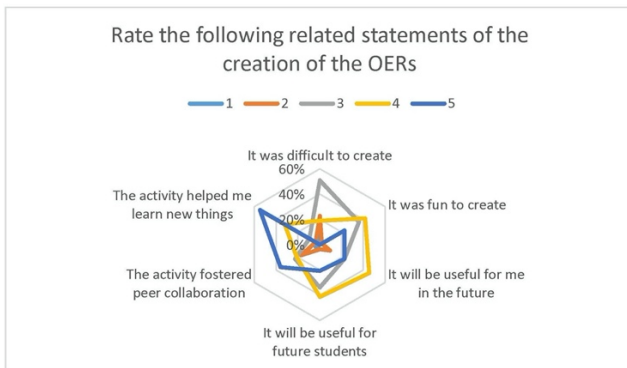


Figure 3. "Rate the following related statements of the creation of OERs" question results.

87% of survey participants said they had to use new technologies for this assignment. The tools used for the creation of the OERs were Camtasia (72%), Snagit (43%), Adobe Premiere (13%), ScreenRec (9%), Filmora (8%), Powerpoint (6%), Flashback Pro (4%), Flexclip (2%), Bandicam (2%), Movie Maker (2%) and Moravi (2%).

19% of participants worked alone and 81% worked in pairs.

The participants were required to rate again from 1 to 5, 1 being the lowest and 5 the highest, how much would the

following factors increase the use of OERs: academic quality, time of finding, researching and choosing the resources, knowledge of the OER, desire to reduce costs for students, hardware/software for using OERs, support from the teacher, support from peers, formal recognition (ex. grades), informal recognition (ex. badges).

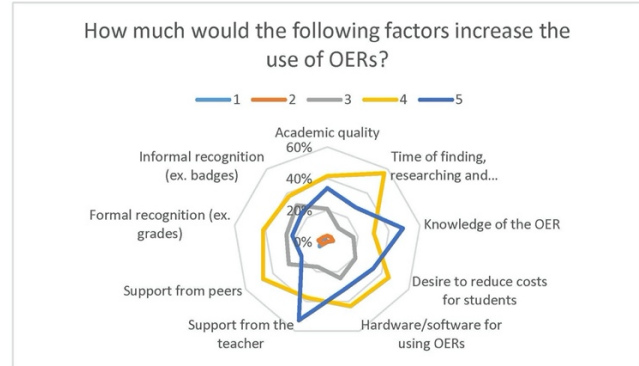


Figure 4. "How much would the following factors increase the use of OERs?" question results

Afterwards we enquired into the communication methods used by students who worked in teams. 69% used Facebook Messenger, 3% used WhatsApp, 3% used Skype, 3% used collaborative documents (ex. Google Drive), 6% used other online chat tools and 46% first communicated via online and then met up live to work on the OER project.

The participants declared that they spent working for the project of OER creation 6-8 hours (29%), 4-6 hours (29%), 2-4 hours (14%), more than 10 hours (14%), 8-10 hours (11%) and 1-2 hours (3%).

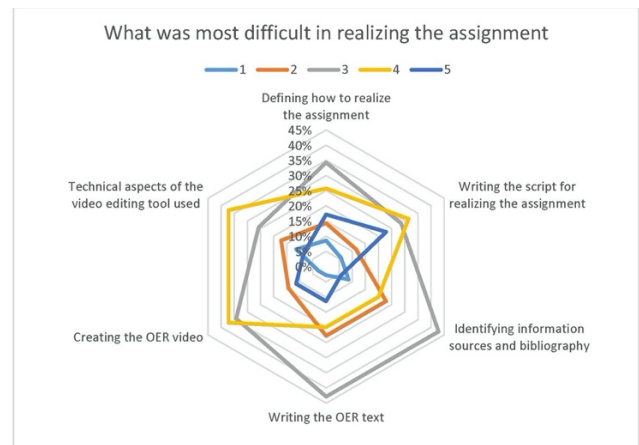


Figure 5. "What was most difficult in realizing the assignment?" question results

We also wanted to find out what the students found most difficult into realizing the task, asking them to rate from 1 (not difficult) to 5 (very difficult) the following: defining how to realize the assignment, writing the script for realizing the assignment, identifying information sources and bibliography, writing the OER text, creating the OER video

and the technical aspects of the video editing tool used. As the students identified the most difficult “writing the script for realizing the assignment” with 24% and then “creating the OER video” we can conclude that the using creative skills and also advanced digital skills as video editing, are among the most difficult for OER development. But, as students managed to finalize this assignment and receive a passing grade, we can conclude that they all manage to overcome these difficulties and acquire important creativity and digital skills.

Finally, there were other questions in this questionnaire, not included here as – their self-evaluation of the impact of web technologies, their knowledge on different topics, digital and soft skills of their understanding of open education, how their experience was, and we investigated their intrinsic motivators. These results will be analyzed in a further publication.

V. CONCLUSION

The assignment requires students to create, curate and publish an OER by using established and emerging open educational and digital media tools in independent way. Students were impressed by the fact that they could create their own artifacts with some ease due to the capabilities of advanced apps and the ubiquity of mobile devices. They used a variety of tools, apps, software to create their OERs, allowing them to seamlessly connect knowledge, tools, apps and new digital abilities. It is also interesting to note that as their reflection over the entire assignment process was induced by these questions, several have pointed that this has proven as a challenging but rewarding activity, with the final result being reused and integrated in further educational activities.

We revisit and analyze, in the context of OERs creation, some of the principles of Connectivism, which were present in our study:

- Learning and knowledge rest in diversity of opinions – by allowing students to adapt their assignment best to the delivery of a creative, multimedia artifact
- Learning is a process of connecting specialized nodes or information sources – as students used a variety of 5-12 tools and information structures (books, articles, Wikipedia, etc) to produce the OERs
- Capacity to know more is more critical than what is currently known – as students understood that for producing OERs more in depth knowledge was needed, even for topics considered familiar
- Decision-making is itself a learning process – students took decision on tools, script, method, production.
- Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality – as students reflected on the acquired knowledge and the assignment process.

The results of our study indicate that by exposing students to open education, encouraging them to become OER co-creators and allowing them to connect in multiple ways, improves their digital lifelong learning abilities and

inspires them to use open education principles or resources in their quest for knowledge.

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