Bridging Educational Emergency to Digital Pedagogies

Proceedings of the BRIDGES Symposium, Vipava, Slovenia, September 2022

Editors

Maka Eradze
Anja Poljanar
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Donatella Solda
Andrea Tinterri
Anna Dipace

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octaedro@octaedro.com
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Contents

Transitioning from "traditional" to the "new normal" - what is in between?

An editorial to BRIDGES symposium proceedings Vipava, Slovenia

Maka Eradze[1], Anja Poljanar[2], Manuel León Urrutia[3], Nic Fair[3], Ayse Saliha Sunar[4], Donatella Solda[5], Andrea Tinterri[1], Anna Dipace[1]

[1] The University of Foggia, Italy

[2] Jozef-Stefan-Institute, Slovenia

[3] The University of Southampton, UK

[4] Bitlis Eren University, Turkey

[5] Future Education Modena, Italy

Abstract. The COVID-19 medical emergency resulted in a similar educational emergency, as educators and learners at all levels were rapidly required to transition into online digital spaces, use digital tools and services that they may not have been familiar with, and adopt digital pedagogies that they may not have been used to. This created uncertainties, bringing challenges and opportunities, and shed light on the affordances and constraints of digital tools. The Erasmus+ BRIDGES project has taken a research-led approach to understand the experiences of educators during the emergency remote teaching (ERT) period in order to inform practices, professional development, and support needs in the post-lockdown, post-digital higher educational (HE) landscape. The BRIDGES Symposium has therefore brought together HE practitioners worldwide to reflect on the lessons learned. This editorial will briefly report on the findings of this project, and

the emergent themes of the symposium, and pose critical questions on lessons learned and the possible futures of digital education in multinational settings.

Keywords: emergency remote teaching, BRIDGES, faculty development

1. Introduction

The educational emergency caused by the pandemic in 2020 changed traditional learning practices overnight in higher education institutions as well as in schools (Fullan, 2020; Ryberg, 2021; Eradze et al., 2023a), 2023b)]. Most educators and researchers have taken this educational emergency as a challenge (Al-Freih, 2022), while others have seen some opportunities in it, pointing out the magnifying glass effect it had on the field of digital education and education in general (Albó et al., 2020; Luik & Lepp, 2020; Johnson et al., 2022; Kaden, 2020; Eadze et al., 2021; León-Urrutia, 2022; Eadze et al., 2022).

The present proceedings of the BRIDGES symposium in Vipava, Slovenia offer a reflection on what happened during the educational emergency, the practical implications and lessons learned during the lockdowns, and what valuable insights can be taken from these experiences.

2. The project BRIDGES

The Covid-19-induced emergency shift to online learning was a phenomenon that prompted Higher Education Institutions (HEIs) to move to remote instruction overnight. On the one hand, the Covid-19 educational emergency created several opportunities for online learning while also highlighting many pre-existing issues. Transitioning to online learning involves careful planning and [re]design processes, especially when university curricula are designed for face-to-face (F2F) teaching and learning. We went through the first phase called Emergency Remote Teaching (ERT) in the spring semester of 2020, with a specific term coined to indicate a lack of preparation, design, and student-centred approaches. It is important to note, however, that this circumstance

has offered chances for the adoption of digital pedagogy and the promotion of digital literacy: the vast majority of academic faculty have previously experimented with ERT. However, in order to deploy online learning, academic staff members require ongoing assistance and professional development opportunities to help them move from ERT to online learning.

The project's major goal is to promote the transition from Emergency Remote Teaching to Digital Education using evidence-based, open, and creative teaching and learning techniques. Its ultimate purpose is to increase educational quality despite current variations in European educational systems, giving equal chances for personal growth for all European citizens. Approaches inspired by neuroscience and cognitive sciences (for example, cognitive load theory) add a much-needed empirical base to educational practice, yet there is mounting evidence that educators lack the knowledge of cognitive processes to apply this knowledge to learning designs. Nonetheless, evidence-based approaches can provide tools and best practices to assist instructors in dealing with the new reality that has evolved with ERT: although teaching was previously primarily synchronous, the change to distant learning presents new issues for both students and instructors. Zoom fatigue exists as a result of ERT, and digital pedagogy must account for this cognitive load, attention span, and metacognitive skills.

This project presents a holistic method, based on a needs-based approach, to assist universities in transitioning from ERT to carefully designed and implemented online learning, thereby contributing to their digital readiness. Furthermore, open practices, backed up by connectivist approaches and open educational resources (OERs), will ensure that the project's immediate and long-term objectives and beneficiaries are met. The project's goals will be met through research and developing a Framework for faculty development. To achieve the main goal, the project (a) provides educators with solid scientific knowledge on the functioning of learning and memory, including the required theoretical framework to understand why this knowledge is instrumental to provide quality learning; knowledge on the innovative, digital pedagogies contextualised in specific authentic use cases; digital competencies through tutorials, (b) develops a community of practice approach, helping lec-

turers and educators to apply such scientific knowledge to enhance their current teaching strategies, and (c) creates taxonomies and contextualises specific tools and platforms to support open educational practices.

As for the research results of the project, the main outcome comes from a qualitative study that was conducted. Participants from five countries were asked about their remote teaching experiences during the lockdown, as well as their thoughts on the future support requirements for ideal online educational circumstances. Following a thematic template analysis of their responses, it was discovered that current support systems are insufficient to promote the abilities required for this much-expanded cohort of higher education instructors. Faculty needs guidance that helps them in their busy schedules with case-based and problem-oriented digital learning scenarios [11]. The research presents a framework for this new cohort of online HE educators to develop fresh pedagogical, technological, and organizational competencies. The research-driven Faculty Development Framework (Fig. 1) [12] has become the basis to drive the development of the Digital Hub, which connects practices, tools, contextualization and theoretical knowledge to help develop digital educational innovation in HEIs.

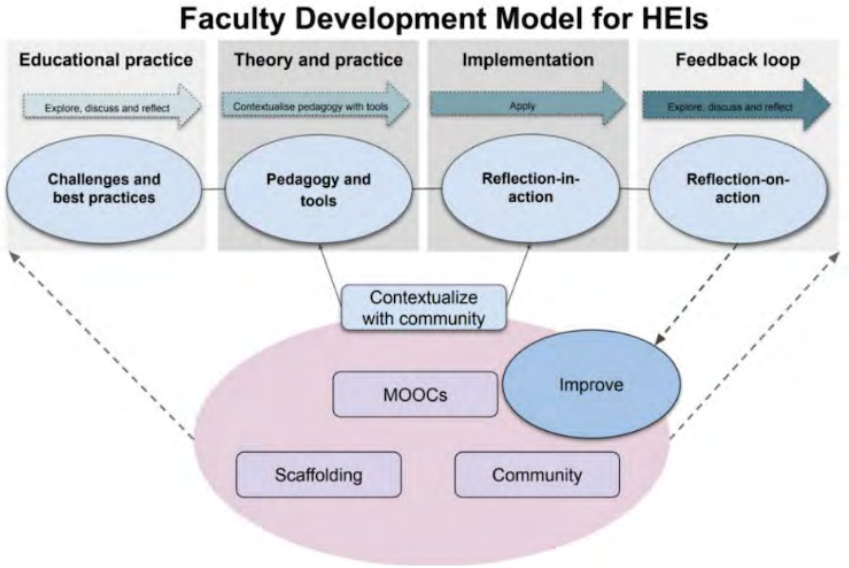

Fig. 1. Faculty development model for digital educational transformation (from [12])

Through the first BRIDGES symposium, the project was able to expand its impact beyond European borders. The BRIDGES consortium also gained valuable insights and potential educational resources that will inform the development of the BRIDGES educational resources and hub. Practitioners across Europe and beyond will be able to share insights, resources, and best practices related to the transition from Emergency Remote Teaching to Online Learning through this platform.

3. The BRIDGES symposium

In September 2022, the BRIDGES team had the opportunity to hold its second project management meeting in conjunction with the Open Education for a Better World (OE4BW) conference hosted by the University of Nova Gorica and the Jožef Stefan Institute, both of which are BRIDGES partners. The meeting took place in Vipava, a picturesque Slovenian town adorned with stunning bridges.

From September 20th to 22nd, 2022, a hybrid event was held with over 200 attendees participating both in-person and online. The event consisted of presentations of OER projects developed through the 2022 OE4BW Mentoring Programme in the form of short pitches. The event was held in conjunction with the Online Learning Symposium, which focused on the theme of “Bridging Educational Emergency to Digital Pedagogies” and featured research and experience track papers covering various topics related to digital pedagogical practices. Keynote speakers delivered talks on a range of subjects, including the role of Open Education in emergencies such as COVID-19, best practices in open pedagogy, leadership and language issues in open education and inclusive knowledge societies, open-source authoring tools for creating open educational resources, and the application of visual communication technologies in education.

Within the OE4BW conference, the BRIDGES project organized a special track focused on addressing the challenges associated with bridging Emergency Remote Teaching to Online Learning, which was discussed widely both nationally and globally. The track was led by members of the BRIDGES consortium and featured 21 research and experience papers presented across five sessions.

The BRIDGES symposium was organized as a multiplier event, with the intended outcome of disseminating the project to a wide range of relevant practitioners, including UNESCO chairs for Open Education. Many of these practitioners have since volunteered to share resources through the BRIDGES hub, while others have benefited from the project's research outputs.

Overall, 10 out of the 21 submissions received for presentation were selected for publication in the proceedings. The symposium had two tracks - a practitioner track (5) and a research track (5) - the contributions of which are reflected in the following papers that are overviewed in the upcoming subchapters.

3.1. Overview of research papers

As far as the research track is concerned, Yadav and Nath presented a research paper aimed at establishing a model of student engagement in MOOCs to discover the factors leading to student involvement. According to the findings, intellectual engagement and socio-emotional engagement in MOOCs are the two aspects that contribute to student engagement. The study's findings will help MOOC administrators improve the online teaching-learning process in higher education. The research paper by Oliver and Dhakulkar presents qualitative research that reports on the process and subsequent evaluation of a project. To that end, the qualitative inductive analysis included open-ended questionnaires completed by the initiative's fellows, artefacts, and reflections from the fellowship's organizers. The conclusions reported in this research pertain to how such a fellowship can be carried out in circumstances similar to those of this South African university. The varied and diversified environment of this university influenced how OER were treated. Furthermore, the article explores several special problems in terms of specific abilities required for lecturers, language and localization, the importance of student voice and agency, and self-directedness. The article proposes practical suggestions for OER incorporation. A research contribution from Sneh Bansal reflects on the MOOC for the professional development of teachers in inclusive education created through open education resources to train professionals, teachers, and adults in

the education of children with disabilities. The paper covers the design and course structure of the MOOC produced for teachers on an open platform, as well as the participants’ participation and involvement level in the activities, including their perception of the course values and professional takeaways. The contribution has implications for administrators, academics, and stakeholders in planning and designing unique and engaging professional development programs for lifelong learning. A study conducted by Souza and Amiel reports on the results of in-depth interviews with a group of seven educators who were enrolled in an open education leadership course to learn how (1) they define Open Educational Practices (OEP), (2) what types of qualities open educators possess, and (3) what kinds of practices open educators engage in. The study found that OEP is viewed as a practice related to providing access to knowledge, fostering discourse and respect, and respecting the contributions of all subjects in the development of knowledge. Empirical studies of OEP can help us better conceive how OE is being implemented and provide more insight into how professional development can be conducted. A study by Vuletich and Farrell aimed to make recommendations for an approach to OER program assessment that is based on existing OER and library assessment frameworks, with a focus on cost savings.

3.2. Overview of practitioner papers

Practitioner papers vary in their contributions. A case study from Gomes and Deshmuch outlines the development and adaptation of a skill-based online theatre course that was previously offered in an in-person setting for second-year undergraduate students pursuing a Bachelor’s degree in foreign languages at Goa University, India. The course designers’ procedures were seen to be organic, but similar to Design-Thinking cycles and instructional design models. The case study results highlight the use of multilingualism in fostering student inclusion, lowering attrition rates, and enhancing student involvement in the course. Rao and Parashar presented a solution to a problem where teachers use diverse content development methods and accessibility and built-in functionalities of such tools to address accessibility are not well understood by tools/

software, LMS technologies. The presented course includes a variety of topics, and learners will be guided to create accessible e-content by engaging and interactive content. Kanaan et al presented a software called ScenoClasse that assists primary school teachers in creating, sharing, and adapting CT-related instructional scenarios. ScenoClasse includes a set of descriptions to assist teachers in the scenario construction. These characteristics were identified through a user-centered design process with 22 elementary teachers, enabling the customization of situations based on the teachers' needs and preferences. So far, 30 additional teachers have tried ScenoClasse and given favorable feedback on its usability and utility. D'Souza et al shared their experience in designing and implementing an initiative - the Maharashtra State Development of Educators and Enhancement in Delivery (MS-DEED) Program developed by the Indian Institute of Science Education and Research (IISER) Pune in collaboration with the Maharashtra State Faculty Development Academy (MSFDA). MS-DEED provides online and in-person training on successful digital pedagogies, active learning methodologies, inquiry-based hands-on-minds-on education, and formative assessment approaches in undergraduate STEM disciplines aligned with NEP 2020 concepts. Since its debut in 2021, the MSDEED online program has trained over 1000 teachers, including those from rural locations, while also networking and preparing them for the future mixed form of instruction. Suzana Loshkovska presented the experience of integrating Moodle plug-ins to facilitate the sudden switch to ERT, such as those for organizing video conferencing and improving assessment functions. The report details the transition from traditional to fully online learning.

4. Conclusions

The re-organizational practices during ERT have varied across institutions, as highlighted in the practitioner and research papers. Not only have new lines of research emerged from these practices, but new avenues for innovation have also opened up. It is important to reflect on and learn from these experiences as we move forward in the years to come.

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Behind the screen:
Collaborative development of an online theater course

Natasha Maria Gomes[1], Ajita Deshmukh[2]
[1]Goa University, Goa, India
[2]MIT-ADT University, Pune, India

Abstract. This case study outlines the development and adaptation of a skill-based theater course offered in the online mode during the academic year 21-22 to undergraduate students pursuing Bachelors in foreign languages at Goa University, India. The study highlights the presence of two distinct phases in collaborative course design. These phases when carried out remotely were characterized by synchronous and asynchronous collaboration techniques that the instructors used while designing and developing the course. Similarly, collaboration was employed by the students while brainstorming, practicing, and rehearsing for the final class performance. It was observed that the processes followed by the course designers were organic but similar to Design-Thinking cycles and instructional design models. The results of the case study bring to the fore the use of multilingualism in fostering the inclusion of students, lowering the attrition rate and increasing student participation in the course.

Keywords: Experience, online course design.

1. Introduction

The COVID-19 pandemic and subsequent lockdowns have had a profound impact on all aspects of life, including the university education system. In India, emergency remote teaching was initiated within three weeks of the first lockdown to ensure that learning did not come to a

halt. Educators used a variety of platforms and teaching strategies in the online mode during this unprecedented situation.

2. Context of the Study and Literature Review

This case study focuses on the development and adaptation of a skill-based theatre course 'Language on Stage' offered in an online mode in Semester 1 of the academic year 2021-2022 to students (n=13) pursuing Bachelors in either French or Portuguese in regular mode at Goa University, India. The course aimed to improve language fluency, communication skills, and creative expression through the conceptualization and staging of a play. Additionally, the course was designed to provide students with an opportunity to connect with peers, express their emotions, and receive support during the pandemic.

The main challenge in adapting the course was to design it to meet the demands and constraints of online learning. A theatre course involves working on facial expressions, body movements, space awareness, and "tuning" with co-performers on stage, which are difficult to replicate in an online setting. Factors such as students' age and experience, internet connectivity, and device availability needed to be considered while adapting the course to the online mode.

Trentin highlights that the online course design process involves not only creating the course plan and deciding on the communication architecture and dynamics but also the inclusion of strategies to facilitate learning (Trentin, 2002). Collaboration, reflection, mentoring, and problem-solving are all evidence of high-level learning outcomes and an effective course (Dole & Bloom, 2009). However, interviews with instructors revealed that they didn't explicitly use instructional design models while developing online courses through the design process including key features of the ADDIE model (Baldwin et al., 2018). In order to teach effectively online, "the capacity to design courses well is frequently the greatest limiting aspect" (Fink, 2003). Students become disinterested and learning suffers in a poorly planned course (Koszalka & Ganesan, 2004).

3. Methods and Processes

3.1. Design of the Study

The Case study method was found to be appropriate since this study is an empirical inquiry investigating a contemporary phenomenon within a real-life context (Creswell, 2013; Pandya, 2015). The qualitative descriptive nature, considering the unitary nature of each component for analysis which was the aim of this study, consolidates the choice of case study as the research method for this study (Creswell, 2013). Since the researchers were also the course designers, ethnographic insights could be incorporated into the case study method.

3.2. Research Questions

This study attempts to answer the following research questions:

- RQ1. How have instructors collaborated in the design and adaptation of a skill-based course?
- RQ2. What are the strategies used to adapt a skill-based course online?
- RQ3. What are the perceptions of instructors and learners about the adaptation of the course?

4. Process: Setting the Stage

The course was conducted by a team of four instructors. The lead instructor was aware of the constraints of conducting the course in the online mode and hence voice acting and puppets were included as alternatives. Subsequently, two co-instructors were onboarded for their expertise in the use of puppets (puppet theater) and voice-over art, respectively. The third co-instructor was onboarded to provide language support to certain students. These instructors were adept at conducting online courses, and each instructor conducted their classes as per their domain of expertise, according to the course objectives. Interlinked modules of the

course necessitated regular communication among the instructors for a seamless course experience.

Popular communication tools were appropriately used for convenience, with the goal of providing both asynchronous and synchronous communication channels. These channels were utilized for communication between instructors and students, as well as among instructors and students themselves. WhatsApp groups and individual chats, as well as Google Meet, were used for virtual meetings, class sessions, practice sessions, and performances. The use of Google Classroom facilitated student submissions, access to learning materials, doubt-solving, and focused discussions. Instructors and students used telephonic calls as needed. Additionally, a range of G Suite collaboration tools were used for various elements of the course.

5. Analysis: Behind the Screen

Adaptation and development of the course for the online mode followed the Design Thinking cycles (Pan, 2020). The following process diagram (Fig 1) attempts to answer all three research questions.

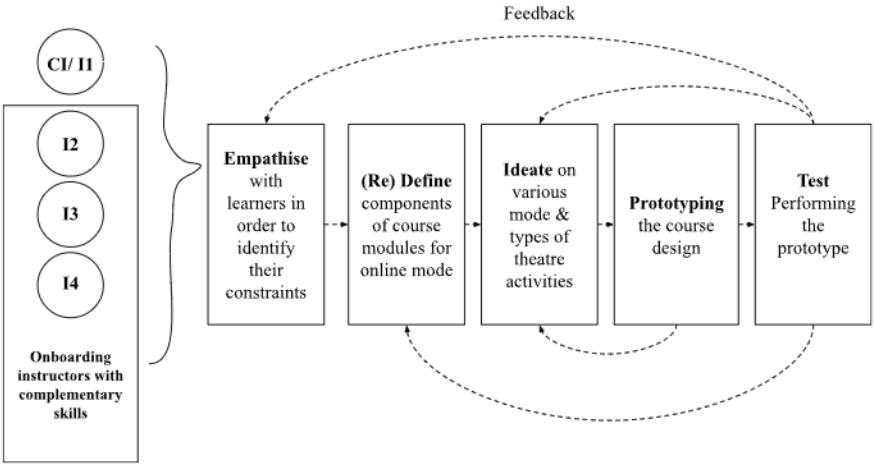

Fig. 1. Adaptation and development process of the course based on the Design-Thinking cycle. (CI=Course Instructor, Instructor=I)

5.1. Empathize

The course instructor team discussed the constraints encountered by students mentioned in section 2. Data from a class survey on accessibility to tools and the internet were considered while conducting the course. The team of instructors with varied experiences and viewpoints ensured diversity and inclusion in the course.

5.2. Define

While the course objectives were defined in the prescribed syllabus, the instructors brainstormed and adapted the course to suit the pandemic-imposed constraints. One of the key adaptations was the inclusion of communication tools and easy-to-use, familiar platforms to ensure ease for a maximum number of students. Considering the non-availability of bandwidth and devices, as per the PRAGYATA guidelines issued by the Government of India (Government of India, 2020), it was unanimously decided to include asynchronous submissions and interactions on the platform. Submissions in formats such as text, audio, and/or video, as per the affordances of the platform, were accepted. Orientation of students on the usage of these tools was incorporated into the design of the course.

5.3. Ideate

The on-screen movements and expressions are limited compared to those on stage. All the co-creators, being practitioners of theater at different levels, were aware of how the Art and Theater world had adapted to the pandemic-enforced 'new normal'. Taking cues from that and the limitations of students, the course was converted into a format that included puppets and emphasis on voice acting, as opposed to full-body movements, which were included in the offline format.

Initial online meetings and WhatsApp chats among the instructors were used to discuss all the possibilities in the online format. The instructors demonstrated the components of theater practices that could be used in online performances during synchronous classes. Recorded

sessions of each instructor were shared with the students and the course instructor team. These theater practices were applied by students in their performances. To ensure the engagement of the maximum number of students, group performances were preferred over monologues. The ideation process is the crux of the Design-Thinking process that drove the course restructuring and adaptation in this case. Camera hesitancy of students was addressed by including puppet theater and voice acting.

5.4. Prototype

This Design-Thinking process reflected the inadvertent use of the ADDIE model of instructional design as also indicated in the previous studies [3]. As often experienced anecdotally, instructors imbibe existing models in their instruction without explicitly focusing on one model.

5.5. Test

The pandemic-enforced emergency remote teaching did not allow the instructors to test the design of the course before launching the adapted course. The user (student) inputs were collected based on the issues encountered by them. These issues were addressed during the orchestration of the course. Feedback from students was sought for accessibility, tech comfort, asynchronous learning, instructor presence, and other aspects. The instructors regularly shared their experiences and the feedback received from students. When required, the issues were defined, and various ideas were proposed before iterating the course design and orchestration. It was decided to include multilingual texts for inclusion and reduction of attrition as recommended by the NEP 2020 [10]. This mirrors the Design-Thinking approach where the prototype is put to the test, and suitable modifications based on the feedback are carried out.

In addition to verbal and written feedback, learners maintained a drama journal that was shared with the course instructors. The learners reported that they felt more confident performing on-screen after the course. They initially found the activities challenging due to the use of various tools but soon became conversant with the tools with peer support. The instructors also observed a marked improvement in the

performances of the students in their final performances as compared to those during practice sessions in terms of fluency, ease of students using intonations, facial expressions, and voices to portray various characters, and manipulation of puppets.

6. Conclusion and Future Research

Using the Design-Thinking process for course design is an approach that is not commonly followed in formal academia. The formal education system typically involves co-creation within the same institution, and the inclusion of an external instructor has little scope for modifying the course. The experience of co-creation of the skill-based course was new for the instructors. Design-thinking cycles were used to adapt the skill-based course to the online mode. It should also be noted that as this was a course with little focus on theoretical components, it could have made the frequent adaptation of the course easier. The small class sizes definitely aided the dynamic adaptation and conduct of the course. Various online engagement trends, the use of household items for storytelling, and theater practices were incorporated during the conduct of the adapted course. Orientation of students towards using tech tools laid the groundwork for the familiarity of the tech tools to be used. Hand-holding and demonstrations by instructors and peers proved to be effective. The perception of the students and instructor was found to be favorable towards the adaptation of this online theater course.

This is a unique instance where instructors from different educational institutions, at different locations, co-create and adapt a course through remote collaboration. This could be exemplary and prompt academia to explore such possibilities in other subject domains and contribute to the vision of NEP2020, by breaking barriers of subject domains, geography and timelines. However, further research is required into the application of this co-creation model based on Design-Thinking for the more theoretical subjects as well as large student groups would give deeper insights, strengthening this model.

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BRIDGES

ScenoClasse:

A Web app to create, visualize, share and adapt scenarios for teaching the computational thinking in elementary school

Malak Kanaan[1], Amel Yessad[1], Mathieu Muratet[1,2]

[1]LIP6, Sorbonne Université, Paris, France

[2]INS HEA, 92100 Suresnes, France

Abstract. Many resources for teaching computational thinking (CT) have been proposed in order to improve the culture and assist the teaching of this novel subject in elementary schools. However, these resources are often difficult to use in class because they are ill-adapted to teachers' contexts (time constraints, learner levels, spatial organization of the class, etc.), or teachers lack training to teach CT concepts. Facilitating the training and support of elementary school teachers in this field therefore becomes essential.

In our research, we tackle the following issue: Do assisting tools in constructing pedagogical scenarios support novice teachers in teaching CT and improve their professional practices? In this paper, we present ScenoClasse, a web app that is an assisting tool for elementary school teachers to create, share, and adapt pedagogical scenarios related to CT. Within ScenoClasse, a set of descriptors is available to assist teachers in scenario construction. These descriptors have been identified from a user-centered design process with 22 elementary teachers and allow customization of scenarios according to the teacher's needs and preferences. So far, 30 other teachers have tested ScenoClasse and provided us with positive feedback about its usability and utility.

Keywords: Experience · Teaching computational thinking · Elementary school · Assisting scenario construction · Pedagogical resources

1. Pedagogical and Technological background

Computational thinking (CT) is a focused approach to problem-solving, incorporating thought processes that utilize abstraction, decomposition, algorithmic design, evaluation, and generalizations [Wing, 2006; Pal, 2022; Selby et al., 2013). Over time, the teaching of CT has been introduced into the elementary school curriculum (Baron & Drot-Delangue, 2017). This paves the way for many institutional and associative initiatives that offer learning resources to improve the culture and teaching of CT. However, these resources are difficult to use in class because teachers lack training to teach CT concepts.

Initiatives like "Hour of code"[1], "Scratch junior"[2], "1,2,3 Codez"[3] offer learning activities of CT, but need to be articulated in pedagogical scenarios, since scenario-based teaching not only allows teachers to adapt pedagogical resources to their preferred way, it also helps students to go in depth with any topic (Pal, 2022).

Therefore, to support elementary school teachers in teaching CT, previous research resulted in a scenario description model (see Fig. 1) (Brunet et al., 2020), which was identified from a user-centered design process with 22 elementary teachers (ibid.; S'Enjourn et al., 2021). This model contains a set of descriptors that allows teachers to orchestrate activities within pedagogical scenarios to facilitate their use and establish CT concepts with their students.

We developed a web app called ScenoClasse that relies on this scenario description model. It assists teachers in focusing on the content and pedagogical aspects of the scenario while creating their own scenarios or modifying and adapting existing ones.

1. https://hourofcode.com/fr consulted on March 20,2022
2. https://www.scratchjr.org/ consulted on March 20, 2022
3. https://fondation-lamap.org/projet/123-codez consulted on March 20, 2022

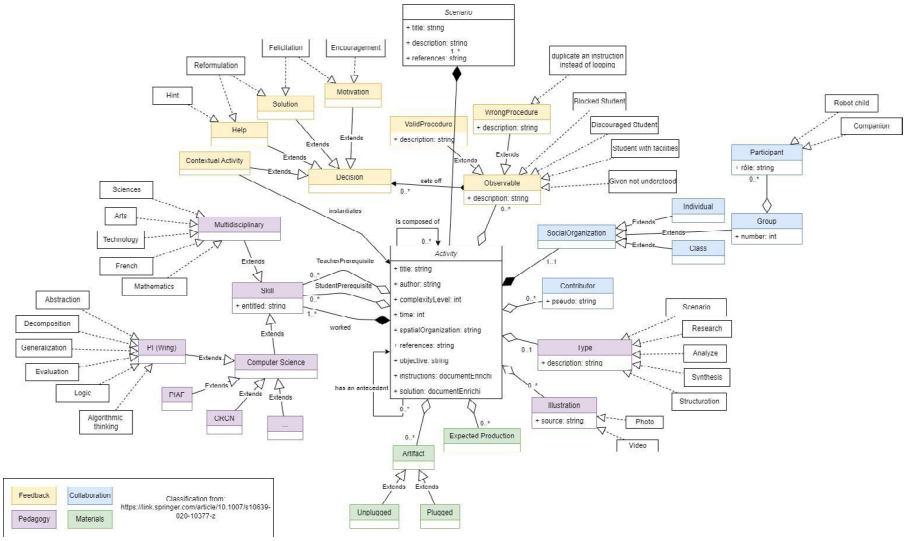

Fig. 1. Model of scenario description (the colored rectangles represent the descriptors of an activity and the white ones represent the possible values for these descriptors).

2. Description of the web app ScenoClasse

This paper presents ScenoClasse, a web app that aims to support elementary school teachers in creating, adapting, sharing, and visualizing pedagogical scenarios for teaching CT. To achieve this, the web app was developed using PHP 7.4 and MySql, with the Slim framework for the backend and CSS, AlpineJs, and Quill for the frontend. It was developed based on the scenario description model (see Fig. 1) (Brunet et al., 2020) and the classroom orchestration principle (Dillenbourg &Jermann, 2010) to help novice teachers take ownership of scenarios.

The main objective of scenarios is to encourage and assist elementary school teachers, with little training and little familiarity with CT skills, to implement CT activities with their students. Teachers can use ScenoClasse in order to reuse and adapt activities and scenarios that have been built by others, to build their own scenarios and to share them with other teachers as well. Each teacher can give feedback and comment on each shared scenario in order to share his/her experience after using a scenario with students.

We have implemented three modes to use ScenoClasse: the consultation mode when teachers can only consult and comment scenarios, the editor mode that allows teachers to clone and edit scenarios, and finally the creation mode to let teachers create their own scenarios from scratch. In the following section, we will describe each of these modes in more detail.

2.1. Consultation mode

Foremost, the consultation mode allows the view of scenarios. On the main page of ScenoClasse, teachers can find scenarios already created and made public by their authors (see Fig. 2). They can view and browse an existing scenario, create a new scenario, or duplicate an existing one to adapt it for their own needs and context.

Fig. 2. Scenarios made public by their authors on the main page of ScenoClasse

Teachers can categorize their scenarios using tags, which allows for easy searching of scenarios that share one or more keywords. Furthermore, teachers can view a scenario by browsing through its different activities and their descriptors.

The scenario clearly specifies what students will learn, including the objectives and skills addressed within the activities. The activities with-

in a scenario are displayed on a timeline from top to bottom, as shown in Figure 3. By clicking on "VIEW," teachers can access the details of a particular activity. This opens a dialog box containing the various descriptors for that activity.

Fig. 3. Timeline and activities of a scenario using ScenoClasse

Additionally, ScenoClasse offers several ways to export the scenario.

- **Textual Document:** Firstly, teachers can export a textual document of the scenario which can be printed and used in class as a preparation sheet for the session.
- **Visualization:** Secondly, teachers can visualize the scenario in two ways: by scanning a QR code or by clicking on a button that redirects them to a new responsive page where they can access a summary of activities and the structure of the scenario. By clicking on a particular activity, they can access its details. Moreover, teachers can add com-

ments or feedback on the session and share them with other teachers to improve the class flow.

- **Slideshow:** Lastly, teachers can project the scenario in class as a slideshow, which contains information on the activities, instructions for the students, and the solution of the activities that can be shown or hidden.

2.2. Editor mode

The Editor mode allows the cloning and adapting of existing scenarios. To edit an existing scenario available on ScenoClasse home page, teachers have to clone this scenario, a copy of it will be created allowing teachers to access it and adapt it to their needs.

Teachers can modify the general description of the scenario by clicking on the small icon next to the scenario title. They can also modify an activity by changing its different descriptors. For instance, they can give a new title for the activity, specify if it is mandatory or optional, whether it is a class, group, or individual activity. They can also provide a detailed description, instructions given to the students, solutions, and specify the level of complexity of an activity, skills worked on or prerequisites for the teacher and students, objectives, and spatial organization of their class. Moreover, they can specify whether they have online resources or if they need materials, and if they expect student productions. Additionally, teachers can specify the contributors to this activity and share advice or good practices with other teachers who would be interested in their scenario. This allows them to manage certain situations that may arise in class, such as a blocked or discouraged student or technical problems with the materials used.

Teachers also have the ability to view, clone, and delete individual activities within a scenario. Cloning an activity can be helpful if the teacher plans to have multiple instances of the same activity, perhaps for different groups of students. Teachers can also move activities to different positions within the scenario by dragging and dropping them, allowing them to create simultaneous activities or reorder the sequence of activities.

2.3. Creation mode

Teachers can create a new scenario on the main page. They will be redirected to a new page where they can provide the general description of their scenario: a title, an author, a target audience, keywords, and a brief description that is visible to teachers who want to read, clone, and adapt it. After this, they will be redirected to a new page where they can add all the detailed information for each activity based on the descriptors of the model presented above.

2.4. Creating an account

In order to facilitate the appropriation of ScenoClasse, the application is fully functional without the creation of an account. A teacher can create, visualize and clone scenarios even if s/he is not logged. Unique URL is associated with each scenario and a teacher can use it and share it freely. If the teacher chooses to create an account, s/he will find more easily edited scenarios again.

3. Preliminary Tests and Future Work

So far, previous versions of the current app Web have been tested by two groups of elementary teachers (22 master's students and 8 teachers) in order to test the usefulness and usability of ScenoClasse. The tests were in the format of a workshop and were carried out by using Scenoclasse and filling in a questionnaire. The results showed that users found ScenoClasse usable (SUS usability score=70.83), useful, they stated their intention to use it to create and adapt scenarios, and will recommend it to their elementary teacher's colleagues. Following that approach, a new development iteration of ScenoClasse took place based on the feedback and the corrections indicated by the users.

We are designing a new test with more groups that should answer our next research questions: Can recurring patterns of interactions emerge from the use of ScenoClasse by teachers? Are they correlated with teacher practices? If so, what kind of support should be provided

to teachers (especially novices) to help them develop a pedagogical scenario?

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Designing and Publishing Accessible E-Content

Mrs. Sushumna Rao[1], Dr. Babita Parashar[2]
[1]Justwrite.in, Hyderabad, India
[2]Manav Rachana University, Faridabad, India

Abstract. As the world of the web plays an increasingly important role in teaching and learning environments, especially with the pandemic bringing technology and digital content closer to the teaching-learning community, accessibility becomes a critical aspect. In principle, the power of the web lies in its universality and accessibility, regardless of disability (Tim Berners-Lee, W3C Director). However, in practice, not all digital content available is accessible to everyone. Many teachers and content developers are not familiar with accessibility principles and features, even in simple applications like MS Word. As part of the OE-4BW project, we have developed a course on Designing and Publishing Accessible E-Content. Today's teachers are involved in creating/building online active learning environments using various content development tools and LMS technologies, yet many are not aware of accessibility and the built-in functions of such tools to address accessibility. This course will have various interesting and interactive content to guide learners on creating accessible e-content.

Keywords: Accessibility, Accessible document creation, Accessible content

1. Introduction

The Sustainable Development Goal 4 (UNESCO, Leading SDG 4 - Education 2030, 2022), which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, along with the 17 other goals of the 2030 Agenda for Sustainable Development, are directly related to education. This makes education a crucial issue for the agenda. One of the key targets of SDG4 is to ensure inclusive and quality education for all and promote lifelong learning (UNESCO, Leading SDG 4 - Education 2030, 2022).

Recognizing the importance of education, a course idea was submitted to the OE4BW mentoring Programme 2022. The idea was selected among many others from Asia, and a course was developed around it. This paper discusses the need for awareness about accessible content creation among teachers and describes the processes involved in designing, developing, and delivering the course on Designing and Publishing Accessible E-Content (DAPAE) online.

This course is aligned with the targets specified in the UN SDGs, particularly SDG 4 which aims to provide inclusive and equitable quality education and promote lifelong learning opportunities for all, as well as SDG 16 which promotes peace, justice, and strong institutions. The 17 sustainable development goals contain 169 specific targets, many of which directly refer to persons with disabilities in addition to SDG 4 and SDG 16. For example, Goal 3 focuses on good health and well-being for all, and Goal 10 focuses on reducing inequality (Saines, 2021). With the central transformative promise of the 2030 agenda for sustainable development and its sustainable development goals being "Leave no one behind," a course on Designing and Publishing Accessible E-Content was developed and delivered, targeting digital content developers, including teachers.

2. What is OE4BW?

Open Education for Better World (referred to as OE4BW) is a tuition-free international online mentoring program aimed at unlocking the potential of open education in achieving the UN's Sustainable Development Goals (SDGs). It provides an innovative approach to building Open Educational Resources (OERs) by connecting developers of educational materials with experts who volunteer as mentors. OE4BW pairs project leaders with project mentors, scholars, and practitioners in their respective fields from across the globe. The program is six months long and emphasizes collaborative efforts to achieve quality education (OE4BW, 2022).

3. Background

In academic contexts, accessibility for handicapped students means that the learning process, including its instructional materials and methods, should be modified to meet the requirements of all students, including those who have impairments. Despite having the same educational needs as everyone else, persons with disabilities are less likely to enroll in school, graduate, and as a result, they may have trouble obtaining employment in the future (Ingram, 1971; Iwarsson & Ståhl, 2003; WHO, 2011). Numerous international policies have emphasized the significance of ensuring equitable learning experiences for all students, regardless of their differences, including the United Nations 2030 Agenda for Sustainable Development (United Nations, 2015) and the UNESCO Education for All initiative (World Declaration On Education For All, 1990). Nevertheless, a large number of schools and institutions fall short in addressing equitable access, particularly with regard to students with disabilities (Xiangling Zhang A. T.-W., 2020), in part because these student groups do not have access to good teaching strategies and material. The Online Accessibility Initiative (WAI) of the World Wide Web Consortium (W3) has established a number of standards in the domain of web accessibility that may be used with educational content. These standards include WCAG 2.0, which has gained widespread acceptance

and adoption (W3C) and is based on four principles that provide the building blocks enabling anybody to access and utilize websites. Twelve recommendations and 61 success criteria are offered based on these four principles, and they are divided into three levels of conformance: AAA (highest), AA or A (lowest), and AA or A (Xiangling Zhang A. T.-W., 2020).

4. Designing, Development and Implementation and Evaluation

Nowadays, e-learning and e-content are widely used to improve the quality of education and reach as many students as possible. The pandemic has accelerated the use of e-learning. The primary element of e-learning is the use of computer technology and the internet (Aboagye, 2020). However, the majority of e-learning content or e-content created is really inaccessible to those with disabilities and fails to take into account their unique needs, which is a fundamental issue. For example, when linking a URL, we have to consider all users, as some may use a keyboard to access them or a screen reader to announce the links. Following accessibility guidelines (Microsoft, 2022), one should avoid link text like "Click Here," "More," and "Read More." This basic knowledge is necessary for every teacher in today's world as they are actively involved in creating e-content. A mandatory pretest was conducted prior to the course start date, asking participants questions on accessibility awareness. The results of the test emphasized the need for this course on accessibility awareness. For example, one question asked "Which of these is a better way to describe a hyperlink in a document?" with options "Click Here," "Read More," "Click Me," "Click This," "None of These," and "All of These." The analysis showed that 48% of respondents chose "Click Here," 8% chose "Read More," 4% chose "Click Me," 4% chose "None of These," and 36% chose "All of These." This shows that there is a lack of awareness about creating accessible links among teachers and emphasizes the need for training and courses to create awareness about accessible e-content.

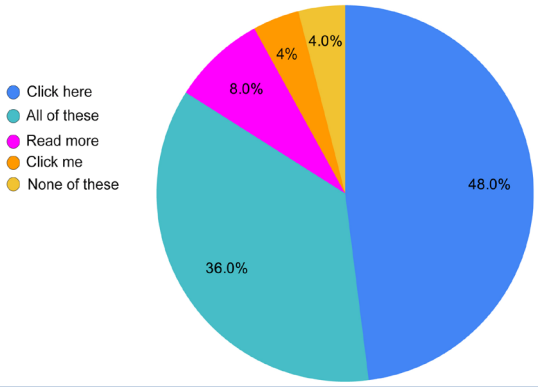

Figure 1. Which of these is a better way to describe a hyper link in a document?

An instructional design model that has endured the test of time and is still in use is ADDIE - Analyze, Design, Develop, Implement, and Evaluate. It was followed to design the course, and the Learning designer was used for initial course design and planning (Sushumna, 2022). The majority of the design focused on knowledge acquisition and practice opportunities for learners. The course was offered in a fully online blended mode with optional synchronous weekly sessions, giving participants an opportunity to meet the expert or facilitator.

To maximize user engagement, every module has a discussion forum and a practice quiz with unlimited attempts. Messaging and communication options used were a WhatsApp group and the built-in messaging/communication options of the platform. Course access was provided only to those who completed a pretest.

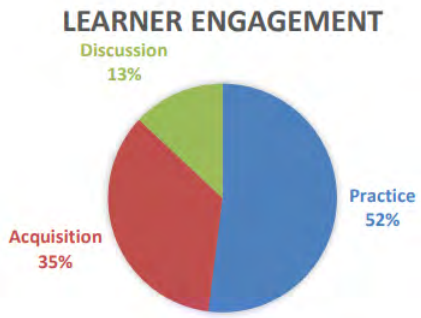

Figure 2. Course Design Analysis

The course comprises four modules and requires 15 hours of participants' time spread across four weeks. The learning objectives include defining web accessibility principles, explaining the steps involved in creating accessible documents and multimedia, using the Accessibility Checker in Microsoft applications, listing general assistive technologies used on the web, exploring web accessibility standards and checks, and finally creating accessible e-content. A certificate of completion or participation criteria is planned, jointly awarded by justwrite.in and the Special Education Department of Manav Rachana University, Faridabad, India. Learners who complete all the resources and tasks will receive a completion certificate along with a badge, whereas those who complete at least two modules will receive a participation certificate.

Figure 3. Completion Certificate

We distributed a brochure among our group along with a QR code for registration. Within a week, we received an overwhelming response. The course started on August 26th and is still ongoing, ending on September 26th. We have received around 127 registrations, with 50% of them being faculty and 39.7% being students. The remaining participants are from other backgrounds such as research scholars, content developers, recent

college graduates, an LMS administrator, an advocate, and a principal. We have participants from across India and even one participant from Sudan.

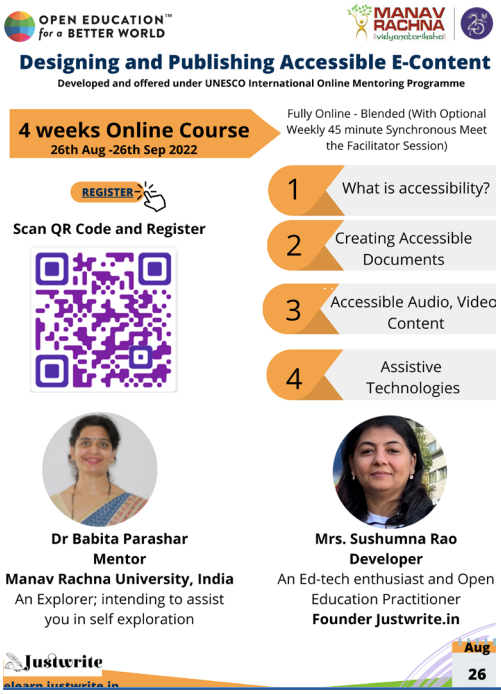

Figure 4. Course Brochure

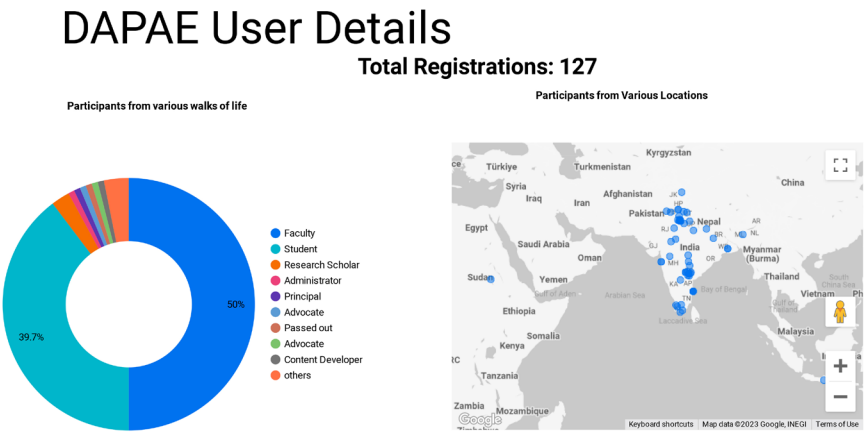

Figure 5. User Details

The course is offered on elearn.justwrite.in, which is a Moodle platform. We made every effort to ensure that each activity and resource is accessible. As this is a fully online course with optional synchronous sessions, there is very little opportunity for participants to get to know each other and understand each other's views. To facilitate communication and encourage participants to express their views and introduce themselves, we have set up a meet and greet discussion forum. Many interesting conversations have arisen in this forum, beyond just introductions. For example, a teacher from India talked about the RPWD Act and how ICT can help to create an inclusive classroom.

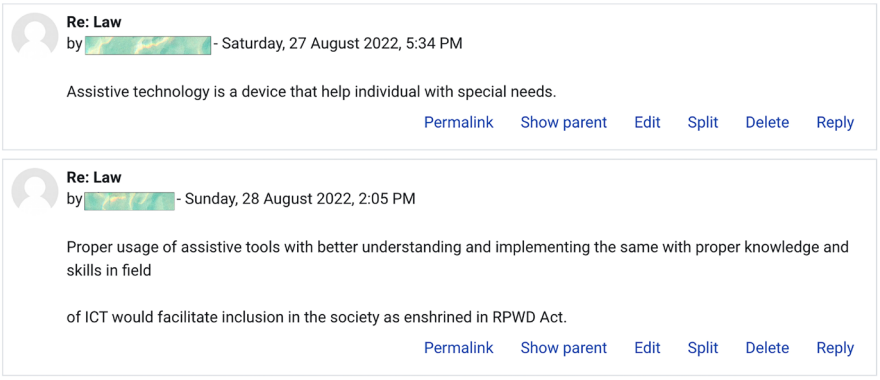

Figure 6. Discussion Forum-Meet and Greet

More than 50% of the participants had never used the Accessibility Checker in MS Word when creating content, and the majority of them had never even heard of it.

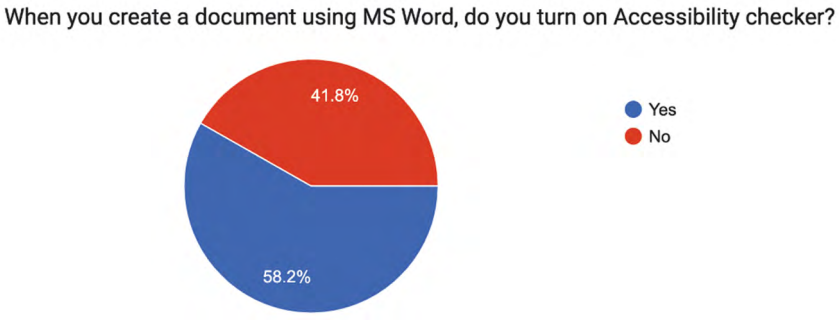

Figure 7.

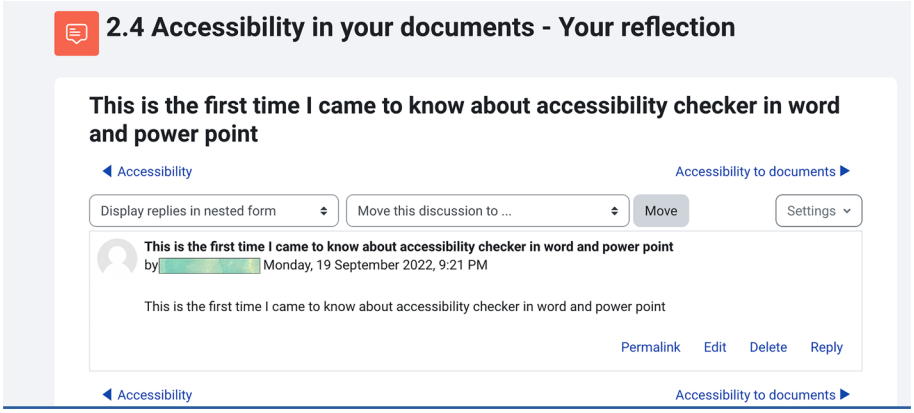

Figure 8.

Each module includes resources and tasks with clearly stated completion criteria. As this course is aimed at adult learners, most of them were given the option to self-mark their work as complete. This approach allows participants to self-direct and complete the course within the allotted time.

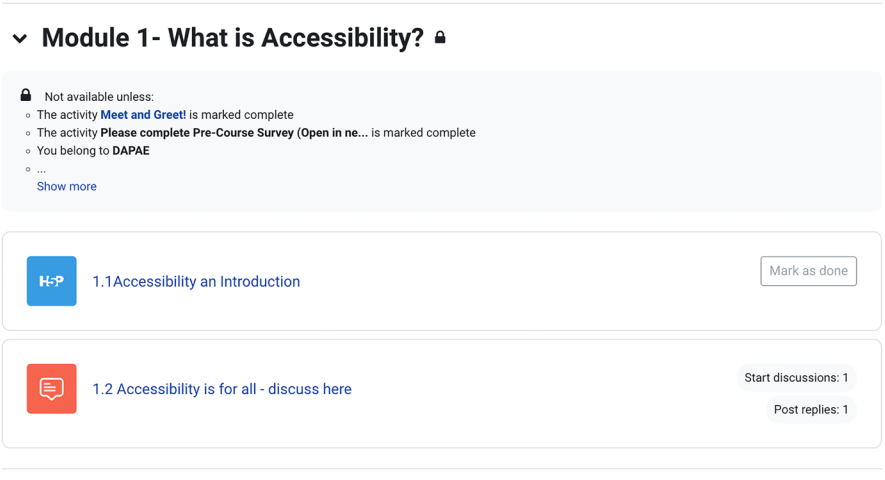

Figure 9. A screenshot of a Course module depicting the completion criteria

As a final assessment, a timed assignment was given to the learners. Once they opened the assignment file, they had two hours to complete it. The assignment required the learners to work on an inaccessible presentation and submit it as an accessible presentation, along with listing

any five inaccessible issues they found. Feedback was given while grading in both audio and textual format.

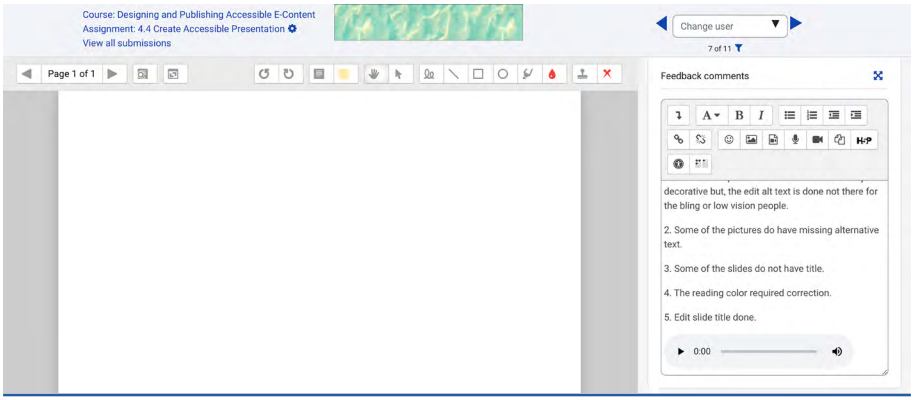

Figure 10. Assignment feedback

After completing the course, post-tests and course feedback were collected, which provided very encouraging responses for the course to be run again and again. Pre and post-test results showed that learners have gained an understanding of the basics of creating accessible e-content.

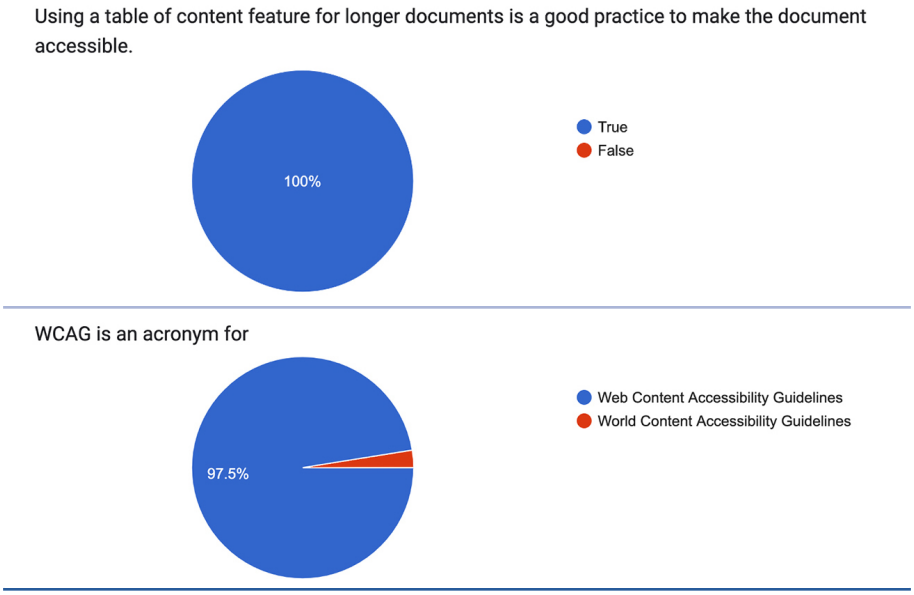

Figure 11a.

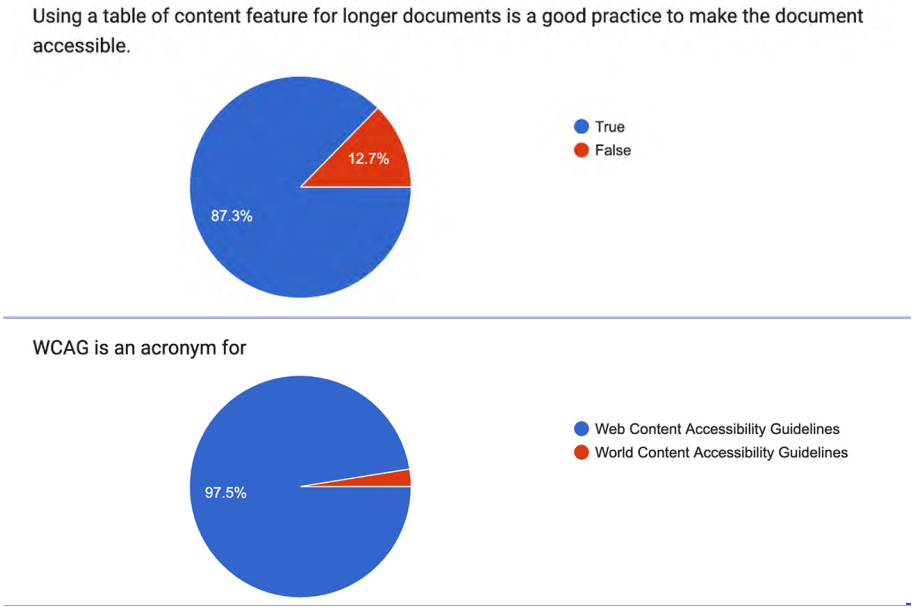

Figure 11b.

The feedback showed that the course is a need of the hour and helped participants to learn about various accessibility issues, tools, and techniques to fix them. The tasks given also helped them to apply this information in practice.

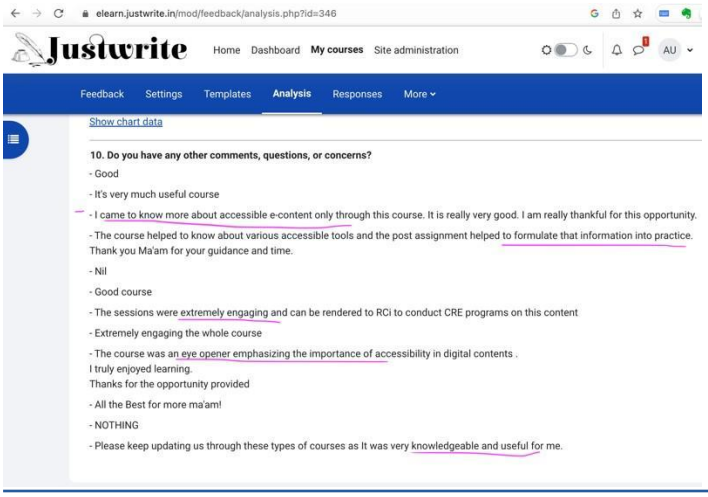

Figure 12.

5. Conclusion and future directions

In addition to contributing knowledge about accessible content creation guidelines freely and openly to a global community, which can be used and changed as per the requirement, the course is released under the (CC BY SA) Creative Commons Attribution-ShareAlike 4.0 International License. Anyone can log in as a guest and download the course content. We are committed to maintaining this course by updating the content as and when necessary, which allows for the ongoing quality, relevance, and sustainability of this OER. The resources of the course have been compiled into an open book and released under the (CC BY SA) Creative Commons Attribution-ShareAlike 4.0 International License.

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Enhancing Digital Pedagogy Skills of Higher Education Teachers in the context of Indian National Education Policy 2020

Roshan D'Souza[1], Asim Auti[2], Neeraja Dashaputre[2], Manawa Diwekar-Joshi[2]

[1]Sophia College (Autonomous), Mumbai – 400026, India

[2]Indian Institute of Science Education and Research (IISER) Pune - 411008, India

Abstract. The Sustainable Development Goal 4 (SDG4) of the UN has been adopted by India to ensure inclusive, equitable, and quality education and to promote lifelong learning opportu-nities by 2030. Since 2015, various initiatives have focused on bringing reforms and innovations in the education system, such as shifting from rote learning and learning-for-exams to inquiry-based teaching-learning processes, developing 21st-century skills in students, emphasizing formative assessment and evalu-ation, and providing professional training for teachers. India's National Education Policy (NEP) 2020 has proposed many changes in the mainstream education system, such as redesign-ing the existing curriculum framework to promote the objective of SDG4 by incorporating Open Distance Learning (ODL) and online programs. Therefore, it is necessary to upskill the HEI teachers through various initiatives to hone their technological-pedagogical-content knowledge, thereby enhancing their com-petencies in using innovative methods such as inquiry- and problem-based learning effectively, in online, offline, and blended modes. This would offer more flexibility and autonomy to the learners. We would like to share the experience of design-ing and imple-

menting one such initiative - Maharashtra State Development of Educators and Enhancement in Delivery (MS-DEED) Program by the Indian Institute of Science Education and Research (IISER) Pune with Maharashtra State Faculty De-velopment Academy (MSFDA). MS-DEED offers a series of online and offline workshops on effective digital pedagogies, ac-tive learning strategies, inquiry-based hands-on-minds-on edu-cation, and formative assessment methods in undergraduate STEM subjects aligned with NEP 2020 principles. Since its in-ception in 2021, the MS-DEED online program has trained over 1000 teachers, including those from rural areas, networking, and training them for the future blended mode of learning using various open online education resources. The program is now entering into its Level 2, where participating teachers will be trained to create online resources, such as developing e-content and online courses.

Keywords: Experience, SDG4, National Education Policy (NEP) 2020, MS-DEED Programme, MSFDA, blended learning.

1. Introduction

The Indian National Education Policy 2020 is the first education policy of the 21st century and aims to address the many growing developmental imperatives of the country. This policy proposes the revision and revamping of all aspects of the education structure, including its regulation and governance, to create a new system that is aligned with the aspirational goals of 21st-century education, including SDG4, while building upon India's traditions and value systems. The fundamental principles that will guide both the education system at large and the individual institutions within it include an emphasis on conceptual understanding rather than rote learning and learning-for-exams; creativity and critical thinking to encourage logical decision-making and innovation; and continuous professional development of teachers and faculty who are acknowledged as the heart of the learning process in this document. Higher Education Institutions (HEIs) will have the option to run Open Distance Learning (ODL) and online programs, provided they are accredited to do so, in order to enhance their offerings, improve access,

increase Gross Enrollment Ratio (GER), and provide opportunities for lifelong learning as envisaged in SDG 4 (NEP, 2020).

The recent pandemic has partly improved the digital pedagogical skills of many teachers. In this regard, the National Education Policy 2020 recognizes the importance of leveraging the advantages of technology to equip teachers with alternative modes of quality education whenever and wherever traditional and in-person modes of education are not possible. Teachers require suitable training and development to be effective online educators, as it cannot be assumed that a good teacher in a traditional classroom will automatically be a good teacher in an online classroom. The NEP 2020 calls for rigorous training of faculty in learner-centric pedagogy and technological skills to become high-quality online content creators themselves, using online teaching platforms and tools (NEP, 2020).

Acknowledging the critical role of faculty in achieving the goals of higher education, various initiatives have been introduced, including those aimed at providing faculty with professional development opportunities. This paper highlights the experiences shared of one such faculty development initiative - the collaboration of The Indian Institute of Science Education and Research (IISER) Pune with the Maharashtra State Faculty Development Academy (MSFDA) - from the year 2021, to develop and run a comprehensive professional development program: Maharashtra State Development of Educators and Enhancement in Delivery (MS-DEED) Program for the in-service undergraduate/postgraduate (UG/PG) teachers. The program aims to create a dynamic ecosystem of high-quality education through training and upskilling of UG/PG teachers from HEIs in Maharashtra over the period of 3 to 5 years and has already trained over 1000 teachers.

The MS-DEED programme caters to the skill development needs of the faculty working in universities and colleges. The program's goals focus on supporting skill development and capacity building of teachers and, in turn, students in alignment with NEP 2020 principles. One way to strengthen these educators is to expose them to modern inquiry-based teaching skills, research-based hands-on laboratory techniques, subject/field experts in science and education, and core philosophies of science and mathematics education.

2. MS-DEED Program Structure

The implementation of the program is based on a two-layered structure, as illustrated in Figure 1. Four teachers, preferably one from each STEM faculty, are nominated by the HEIs to attend the online Level 1 workshop. Based on pre-decided criteria, a limited number of teachers from this group will be selected for Level 2. Upon successful completion of Level 2 training, these teachers will be recognized as Master Trainers.

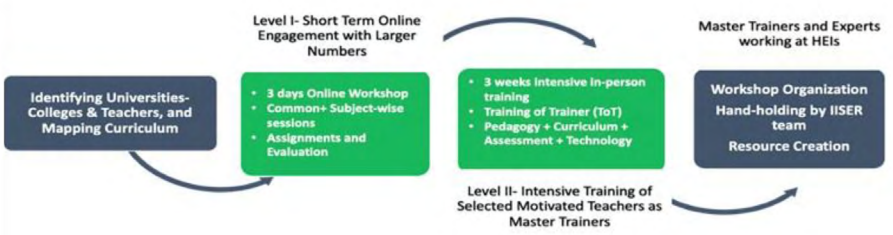

Fig. 1. Implementation of the MS-DEED programme

3. Strategies to Overcome the Challenges of The Online Mode of Level 1 Workshops

As the participant teachers ranged from diverse backgrounds with respect to subject expertise, teaching experience, language proficiency, socio-economic zones, and geographical areas, most sessions were conducted in multilingual settings (English, Marathi, and Hindi). Participant teachers were also asked to fill out a questionnaire detailing their background, teaching experiences, and expectations from the workshop before the workshop began, and this information was used to design the sessions. An additional introductory session was arranged one day prior to the workshop to discuss the expectations of participants and workshop organizers, which included some ice-breaking activities and orientation on the use of certain apps and features of the online platform Zoom, such as breakout rooms, Zoom polls, etc., to be used in most sessions.

The participant teachers came from diverse backgrounds with varying levels of subject expertise, teaching experience, language proficiency, socio-economic status, and geographical locations. As a result, most sessions were conducted in multilingual settings (English, Marathi, and Hindi). Before the workshop began, participant teachers were asked to complete a questionnaire detailing their background, teaching experiences, and expectations from the workshop. This information was then used to design the sessions. An additional introductory session was also arranged one day prior to the workshop to discuss the expectations of participants and workshop organizers. This session included ice-breaking activities and an orientation on the use of certain apps and features of the online platform Zoom, such as breakout rooms and Zoom polls, which were used in most sessions.

We applied simple but effective strategies that were directed towards fostering interactivity on the online platform. The first half an hour of the workshop was allotted for participant feedback of the previous day's session. Co-creation of knowledge being the overarching philosophy of the workshop, various activities and assignments in the sessions were focused on teachers sharing their experiences through multiple virtual applications such as Mentimeter (WordCloud, Map, Polls), Padlet boards, and Google Classroom features. In-built features of the Zoom app such as zoom chat, emoticons helped in keeping the sessions interactive.

4. Designing the Workshop Contents to Promote Digital Pedagogical Skills

4.1. Inquiry-based Learning (IBL)

Inquiry-based learning (IBL) was the major focus of the sessions in order to facilitate the incorporation of innovative pedagogies in light of NEP 2020, a new and forward-looking vision for India's Higher Education System that calls for key changes to the current system such as revamping curriculum, pedagogy, assessment, and student support for enhanced student experiences. The importance of appreciating the role of different disciplinary backgrounds in dictating the relevance and sig-

nificance of incorporating IBL in their field was addressed by taking very simple yet enlightening examples such as surface tension of liquids, electromagnetic radiation, and ecological modeling with context in physics, chemistry, and biology.

4.2. Student-Teacher Role Play

To demonstrate the effective use of simulations in teaching science concepts, a session was included that demonstrated the use of PhET Interactive Simulations and CT-STEM lessons[4][5]. The use of simulations is not a new concept in teaching science topics; however, finding the correct simulations and incorporating them effectively to promote inquiry and critical thinking skills can be a challenge. Our approach to conducting this session was to demonstrate how a teacher and a student would interact while using this digital pedagogical tool to enhance learning through an inquiry-based approach. One of the trainers would take on the role of a teacher, while another trainer would be in the role of a student, effectively demonstrating how the teacher, through open-ended questioning, could guide the student to investigate while playing with simulation variables to find the answers to their questions. This approach would enable the teacher to guide the student towards higher-order thinking skills and assess them while they are learning.

4.3. Moving Beyond the Online Space

The forced online mode of student engagement during the pandemic has come under critical evaluation by many education and subject experts, and the limitations of online education have been extensively discussed in recent literature (Wong, 2007; Pei & Wu, 2019). Therefore, in the MS-DEED program, which focuses on a Hands-on-Minds-on philosophy, various non-digital activities were also included with a low-threshold-high-ceiling approach. The approach included tasks requiring participants to draw and label with pen and paper, as well as conduct some hands-on experiments with apparatus available at home. For example,

4. PhET Homepage, https://phet.colorado.edu/
5. CT-STEM Homepage, https://ct-stem.northwestern.edu/

we designed a very simple experiment where the teachers counted the number of drops that could be filled on a coin surface with solutions like soap water, tap water, and salt water to estimate how surface tension depends on additives in water. The class data generated by this experiment conducted by teachers was analyzed, and results were discussed which emphasized data representation methods towards developing data literacy as a 21st-century skill.

4.4. Maintaining Rigor and Individuality

Day 2 of the workshop was dedicated to subject-specific tools for effective teaching in Physics, Chemistry, Life Science, and Mathematics through a mix of innovative pedagogies. During the 'Learnings from Exemplars' session, the participants were segregated into subject-specific groups, and sessions were conducted in four separate sections via the Breakout Room (BR) of the Zoom platform. Experienced subject experts conducted the BR sessions dedicated to subject-specific, in-practice examples of teaching that helped participants understand the effectiveness of elements of inquiry-based pedagogy such as context, problem, methodology involving hands-on experiments, and evaluation of student output.

4.5. 'EnGaugement'

Assessments play a central role in tracking the progress of the teaching-learning process. The backward design of teaching promotes determining the final learning outcomes of the lesson, followed by an assessment process and then working on the delivery and assignments. In this strategy, active learning methods are very important for engaging students, and for teachers, it is essential to assess the progress by means of in-class ongoing, formative assessments. EnGaugment mode is a process of joining active learning student engagement while gauging students' progress using formative assessments (Handelsman et al., 2005; Daugherty, 2006). This concept was addressed in detail while conducting a dedicated session on Assessment: Purpose and Strategies, wherein a few examples were shared that were based on EnGaugement activities.

The focus of such activities was twofold: one, to help students create their own understanding and get immediate feedback on the same, and two, to help teachers make course corrections and additions to their own sessions.

5. Encouraging Implementation and Building Community of Practice

Changing and updating established practices takes time and continual efforts, and the same is true for teachers as for any other profession. By design, four participants from each college were chosen for the workshop to ensure internal support as they start implementing various pedagogies in the classroom. The theme of Day 3 sessions was centred around this objective. A brainstorming session on 'Blockers and Enablers' was followed by a session on 'Setting SMART Targets and Action Planning and Implementation at Colleges', which discussed the strategies to be employed by this critical mass of trained teachers to take their learning from these workshops forward to their institutional level.

6. Concluding Remarks

Reflection, adaptation, and course correction were important aspects of this series of workshops. Right from the beginning, the workshop sessions and assignment activities were planned using EnGaugement methods to understand the progress. This helped gain the confidence of the participants that these were doable practices and not just concepts achievable only under ideal situations. Through sharing their experiences of this workshop with their colleagues, it could become a successful model of collaborative teaching-learning processes.

The positive feedback received through the sharing of experiences verbally and the end-of-course survey has been very encouraging. This initiative has helped reach out to teachers of higher education institutions from both urban and rural setups. Besides being a professional development program, it has also served as a platform for addressing

issues of teachers, brainstorming the use of local resources in the context of classroom activities, promoting the mental well-being of teachers, and incorporating effective online and blended pedagogical practices in classrooms, to name a few. India is progressing step-by-step through such initiatives to accept the newer challenges of higher education, following the guidelines of NEP 2020 with diligent efforts of the teacher community and the required support from the system.

Acknowledgement

We would like to acknowledge the MSFDA for the financial support and IISER Pune for the infrastructure and other resources provided to conduct the series of Level 1 workshops under MS-DEED Program.

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BRIDGES

From traditional to complete online study

A case study of the Faculty of Computer Science and Engineering in Skopje

Suzana Loshkovska
Ss. Cyril and Methodious University, Faculty of Computer Science and Engineering, Skopje 1000, Republic of North Macedonia

Abstract. Applying technology in learning has been a long-standing practice at the Faculty of Computer Science and Engineering in Skopje. Projectors and smart tables were a must in the classrooms, and Moodle was our primary LMS, integrated into our university information system. We used Moodle to store and distribute learning materials and for assessment purposes. Many of our courses employed computer-based assessments using a combination of Moodle assessment tools in both asynchronous and synchronous contexts. However, the COVID pandemic completely changed the context of education at the faculty. We switched from a traditional learning approach with some blended learning activities to complete online education. To facilitate this transition, several plug-ins were added to Moodle, such as those for establishing video conferences and improving assessment features. Although we already had extensive experience with Moodle, we still needed to adapt to the current situation. This paper describes our journey from traditional to complete online learning.

Keywords: COVID-19, online education, Moodle, experience.

1. Introduction

The COVID-19 pandemic has affected every aspect of human life. Measures to reduce the adverse effects of the illness led to the temporary closure of educational institutions worldwide. To ensure the continuity of the education process, our faculty moved from traditional face-to-face to complete online learning.

Although the transition was abrupt, our faculty succeeded in switching to only online learning within a week. To transform the learning process, we used our previous experience and equipment—a combination of face-to-face education and online learning that we used even before the pandemic. Our students were familiar with Moodle as the primary learning management system. Many courses use technology for assessment, even in face-to-face settings. However, we needed to address challenges by providing the complete technical infrastructure for online education, utilizing technological tools, and helping the teaching staff adjust to the changes.

In this article, we will describe the steps taken for the transition. The paper is organized as follows: the next section contains a brief description of the pre-COVID-19 state. The third section describes common challenges we faced in transferring to online learning. The fourth section depicts the current state and our solution, together with several examples of how we solved the problems. The paper ends with a conclusion and references.

2. Pre COVID state

To understand the context before the COVID-19 pandemic, we will briefly describe the Faculty of Computer Science and Engineering's technological infrastructure, equipment, and educational process. As the largest technical faculty in the Republic of North Macedonia with more than 3000 actively enrolled students, we had a good technological infrastructure and equipment. All classrooms were equipped with projectors and smart tables, and fast wireless internet inside the campus was accessible to faculty, staff, and students. We have six computer-equipped lab-

oratories, three with 40 working spaces and three with 20, and a decent amount of computer equipment that supports the learning process. The faculty established its computer centre with six employees to support the technological infrastructure. The centre is responsible for equipment, computer network, and all necessary software solutions.

The faculty uses Moodle as the LMS and a customised information system to support the educational process and administrative work. Moodle serves as a repository for all courses at the faculty. In the beginning, we used the same installation of Moodle for delivering course materials and as an assessment platform. After spotting several security problems during exams, the faculty installed a second copy of Moodle dedicated only to assessment with additional security restrictions. We used Moodle tools in both asynchronous and synchronous contexts and for formative and summative assessment. At the beginning of the pandemic, we used two servers for Moodle installation used for learning (Moodle-LMS), four servers for Moodle installation used for exams (Moodle-exams), and 16 servers for Big Blue Button (BBB) for both Moodle installations. Additionally, we used one server for load balancing of Moodle servers, one for load balancing of BBB sessions, and one for video recordings.

All students have licensed software provided by the faculty. The faculty provides Microsoft licenses (including Windows, Office Tools Suite, and Visual Studio) and JetBrains tools. Some courses, such as Visualization, provide licenses of required tools (Tableau) only for course-enrolled students. The rest of the courses use open software tools.

Before the pandemic, lectures, exercises, and exams were held in classrooms or computer laboratories, and materials were mainly delivered through Moodle. Formal summative exams were held on campus, and all exams were proctored following strict rules defined in the faculty accreditation documents. Many teachers used technology in their courses and introduced a blended learning approach in their classes using Moodle features. Additionally, many professors conducted research in the field of technology-supported education. The faculty participated or was the principal in many international and national educational projects. Several doctoral theses related to online learning were defended under the mentorship of the faculty teaching staff. The faculty even

has accredited and offers undergraduate and graduate study programs for the education of computer science teachers, both for primary and secondary schools. These programs offer several courses related to technologically supported learning.

3. Pandemic related challenges

Even though blended learning was not new for us, this sudden transformation has caused substantial challenges for all (students, teachers and administration). The problems listed below were compiled from similar worldwide lists (Sir John, 2020; Heng & Sol, 2020; Mahyoob, 2020; Mukhtar et al., 2020).

Challenges for students. One of the most crucial problems our students faced was related to their socioeconomic situation and equipment availability. As students' dormitories were closed, the majority of them returned home. Some students from low socio-economic families could not afford a broadband connection, particularly those living in small villages, even though 79% of Macedonian households had Internet access in 2020[6]. Considering that we are a faculty of computer science and engineering, students were expected to own devices such as computers/laptops or tablets. We also did not anticipate any problems related to software, as all students have licenses for the required tools.

Challenges for teaching staff. The new context required the teaching staff to rapidly change their practices, including daily tasks and responsibilities. Challenges included creating accessible materials, recording lectures and captioning videos, adopting a flexible approach to student participation, and adjusting the assessment process.

Challenges for faculty. The biggest challenges for the faculty were establishing a stable and fast Internet connection, ensuring the possibility of video conferencing, and maintaining the academic schedule on time.

6. https://www.statista.com/statistics/702236/household-internet-access-in-north-macedonia/, last accessed 2022/6/1.

One of the biggest challenges for everyone was the assessment process. Assessment became more complicated as it had to be conducted online, and new approaches were necessary. Challenges related to assessment can be summarized as follows: ensuring sufficient technological infrastructure to support online examinations, postponing examinations that cannot be organized within predefined terms, and modifying the assessment process for courses when classical assessment was not possible or was inappropriate.

4. Current state

This section will focus on our changes towards online learning and how we overcame existing challenges in chronological order.

The first obstacle we needed to solve was the selection of a tool for video conferencing. In the beginning, some of the professors and assistants used tools like Google Meet (free), Microsoft Teams (the faculty, staff, and students have licenses for Microsoft tools), and Zoom (with limited time for video conferencing for the free version). But within a week, our computer center came up with a solution and added a BBB plug-in to Moodle. As mentioned before, the 16 servers were dedicated to BBB's proper functioning at the start.

BBB has functionalities suitable for videoconferencing in educational institutions. It provides the possibility to record the conference, manage the presence and visibility of participants, and has a built-in whiteboard. This plug-in allowed us to exchange real classrooms and laboratories with virtual space and continue the educational process. At first, there were no changes in the academic schedule, and we continued the process without any obstacles.

BBB didn't solve all of our issues, especially those related to public defences of diploma, master, and doctoral theses. BBB was integrated within Moodle, and users must be enrolled to participate in the video conference. In these cases, we still use Google Meet, Zoom, or Microsoft Teams.

Several other challenges occurred at this point. Problems related to the equipment for online learning and the stability of the Internet

connection were quietly solved by our computer centre. The initial infrastructure was changed, and we now have four Moodle-LMS servers, four Moodle-exams servers, and one database server. BBB is hosted on separate servers for Moodle-LMS and Moodle-exams. For Moodle-LMS, we use eight servers, one server as the load balancer of servers, and one for recordings. For Moodle-exams, we use ten servers and one for the load balancer and exam recordings. The problem with a stable Internet connection to the faculty servers was solved by supporting our university internet network with additional links obtained directly from the biggest internet providers in the country.

Meanwhile, the academic staff faced another problem. For the time being, we didn't change much of the teaching approach (we still used presentations and lecturing via video conferences). The issue on which we should make a consensus was recording the lectures. Options were to pre-record the lessons and use the lecture time for consultation, record the lecture itself, or avoid recording altogether. All options have advantages and disadvantages that apply in our case. Recorded lectures provide additional material for the students, especially those with an unstable internet connection or those who could not attend the lessons; the same recording can be used in the future. But in this case, we feared many students would be absent from the lessons.

On the other hand, skipping the recording should force students to attend the lectures and be proactive by asking questions about complex material. In the end, each professor decided what to do according to the course type, the material's difficulty, and the number of groups in which the students are divided (for some lessons, we have up to 16 groups). I selected the approach of recording the lectures. For courses with multiple groups, I recorded lectures for all groups. To avoid too many copies of the same thing on the servers after finishing all lectures in a week, I selected one of the recordings and erased the rest. I haven't used the recordings from the previous year in the next.

The next big problem was assessment. Although we extensively used technology for exams, we faced several challenges in dealing with this situation. Considering that our institution should follow the rules of the higher education law and that we are obliged to perform certain activities at a specific time, this problem seemed difficult. The solution was

not straightforward. Some of us completely changed the assessment process from proctored, well-defined exams to non-proctored assignments, quizzes, projects, and seminar works. The transition was not easy because we needed to change almost everything related to the assessment process, including the type and format of the assignments, define new rules, and provide mechanisms that efficiently find possible cases of plagiarism and discourage cheating. The course in Computer Graphics is an example where the assessment, which included a proctored exam, was transformed into a process with quizzes, assignments, and a project. After two consecutive years, this year, a proctored exam for part of the course was reintroduced. We returned to the proctored exam because we acquired knowledge and skills on how to proctor exams, including working with different computer apps and libraries (OpenGL, in this case).

Most courses kept the concept of classical exams, so we worked on finding solutions to organize them in the online environment. The problems we faced, besides those mentioned in the previous section, also included organizational issues because of the number of students. For example, in the courses Structured Programming and Object-Oriented Programming, which are compulsory in the first year, more than 1000 students are enrolled each year. In that situation, we decided to postpone the first semi-final examination period and to start carefully by conducting only a few exams for the courses in several different contexts. This first experience led to additional work for our computer center. They needed to solve the problem of expanding the options for Moodle and find a way to proctor the exams. Different types of questions for Moodle quizzes were added very fast, together with the tool CodeRunner for the programming courses.

The Moodle quizzes are mostly used for rapid assessments and were mainly held without proctoring. Some courses use quizzes as an elimination tool, so only students who score a certain number of points can take the final exam. To avoid opening additional material during quizzes, the students must install the Safe Browser tool on their computers. This tool is used in non-proctored quizzes because it allows only one active window on the computer. To prevent cheating and increase quiz security, we added time limitations to online quizzes, created an item pool, and presented quiz questions randomly.

Students are divided into virtual rooms for the proctored exams with one responsible faculty staff. Proctoring is performed by monitoring both the profile view of the students shared by mobile phone and shared computer screen. To enable this kind of monitoring, students should use DroidCam in combination with the ManyCam tool. Additionally, students must install and use software that shows the keyboard interaction (echoes the keys pressed by the user). The students can select one of the options: for Windows-based computers, they can use Carnac; for macOS X – Keycastr and Linux – Screenkey. All exams are recorded, but those recordings are available only on request under particular circumstances (especially when there is a suspicion of cheating). They can be viewed only by the computer centre staff. Rules that deal with lost connection and the submission process were also defined. However, complete exam security is impossible even if all of these measures are provided. To increase exam security, we even use the approach of taking exams with open books. This isn't a new approach at the faculty, and we extensively use this approach, especially in programming courses or courses where problem-solving knowledge and skills are more important than the reproduction of material.

The socio-economic problems related to a non-stable Internet connection and inadequate exam equipment were solved by allowing students to come to the faculty to take exams physically. The rules for using computer laboratories were defined and adjusted each time according to the pandemic rules defined for the educational institution in the country.

5. Conclusion

The COVID-19 pandemic has made online learning the new normal. Online learning has brought about many challenges for educators and students, including limited technological infrastructure and capacity, socioeconomic factors, lack of experience in conducting online assessments and supervision, and extra workload for teachers and education staff.

This paper briefly depicts our path from traditional to complete online learning. Even though this was a challenging process, we successful-

ly transformed the educational context of the faculty. Some of the choices made may be better, but they are all results of the specific context of the faculty and its accreditation documents. Although many faculties in North Macedonia have returned to traditional learning, we are still online because of primarily organizational issues and a large number of students.

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Development of Student Engagement Model in Massive Open Online Courses

Aarti Yadav[1] ✉, Sanchaita Nath[2] ✉

[1] Department of Teacher Education, School of Education, Central University of Haryana

[2] Department of Teacher Education, School of Education, Central University of Haryana

Abstract. This research aims to develop a model of student engagement in MOOCs that identifies the factors leading to student engagement. The study's purpose is to conceptualize student engagement in MOOCs and to identify the major components that promote it. The proposed student engagement model in this study is based on Ruiqi Deng's MOOC Engagement Scale (MES), which measures learner engagement. Student engagement is divided into four categories: behavioral engagement, cognitive engagement, emotional engagement, and social engagement. An adapted questionnaire called the "MOOC Engagement Scale (MES)" was used to collect data from 240 students who completed at least one MOOC course. Based on descriptive and inferential statistics, the validity and reliability of the questionnaire were checked, and the results show that academic engagement and socio-emotional engagement in MOOCs are the two contributing factors to student engagement. The study's findings will support MOOC administrators in improving the online teaching-learning process in higher education.

Keywords: Research, student engagement, massive open online courses, academic engagement, socio-emotional engagement

1. Introduction

The teaching-learning process is undergoing tremendous changes due to advanced technological inventions in education. Technology is advancing considerably faster and in different ways than before. The advances in science and technology have led to the development of new technologies in all areas of life, including education, which are increasingly being used for various purposes. One of the recent advances in the field of education is addressing the goals of accessibility, flexibility, and quality education through Massive Open Online Courses (MOOCs). MOOCs have completely transformed the teaching-learning process, and the Government of India (GoI) is taking a keen interest in harnessing the power of ICT to address its educational issues. One such GoI initiative is SWAYAM (Study Webs of Active Learning for Young Aspiring Minds), a major Indian government initiative that provides an integrated platform founded in India and a gateway (portal) for online courses at all levels of higher education, secondary school, and skill training (Mondal & Majumdar, 2019; Majumdar, 2021).

The focus of the teaching-learning process has shifted from teacher-centric to student-centric, and the same is expected to be followed in online courses. The involvement of students in their learning process is a critical component in the transition from traditional to online learning. Therefore, engaging students in their learning process is a significant factor in improving their academic outcomes. The literature reflects several benefits of student engagement in the form of better grades, retention, improved self-efficacy, self-esteem, student well-being, institutional reputation, and transformative learning (Bowden, Tickle & Naumann, 2021; Wang and Degol, 2014). The National Assessment and Accreditation Council (NAAC) in India conducts student satisfaction surveys to obtain feedback related to learning and evaluation, which helps in upgrading the quality of higher education. As student engagement and student satisfaction are related to each other, their feedback on satisfaction in terms of teaching and evaluation can be further used by higher education institutions to adopt and design activities to promote student engagement.

1.1. Meaning of student engagement

It is important to understand the meaning of student engagement as defined in the literature to further understand its role in improving education quality. Student engagement in learning refers to a student's willingness to engage in various learning activities that are part of their daily routine in a traditional classroom, such as attending different classes for different subjects, submitting required work for different subjects, and following directions given by teachers in the classroom (Nystrand & Gamoran, 1992). The National Survey of Student Engagement (NSSE) is a survey of best practices for student engagement, and its reports provide insight into how students use their time while in higher education, with the understanding that some use their time to benefit more than others. The five benchmarks associated with NSSE are the level of academic difficulty, active and collaborative learning, students' connection with teachers, meaningful educational experiences, and a supportive campus atmosphere (Mandernach, 2015). Student engagement is a form of learning that influences an individual and their participation in educationally purposeful activities. It is based on specific assumptions that are related to constructive methods. There are joint propositions in the sphere of learning, and these are mostly dependent on the institutions and instructors who provide students with the conditions, opportunities, and expectations to engage in higher education. Furthermore, in the topic of engagement, individual learners are ultimately the agents (Coates, 2005). Student engagement originally referred to the level of attention, passion, optimism, interest, and curiosity that students display when learning or being taught, but it has now expanded to include the level of motivation (Deng et al., 2020). Students become more engaged when they make a psychological connection to their education. They work hard to understand what their school has to offer. Students are most engaged when they are completely immersed in their work, persevere in the face of several problems and hurdles, and take obvious pleasure in completing their assignments (Wikipedia).

It is easy to confuse engagement with the activity that students are primarily involved in. The term "engagement" generally refers to "active participation." It typically requires students' attention and presence. It

also requires that the learner is committed to the activity and sees some intrinsic value in what they are being asked to do. Engaged students not only complete the task set before them correctly, but they also do so diligently and enthusiastically, and this is an important aspect of engagement in the field of education, as well as in other fields.

On the other hand, students perform various tasks because they believe the activity is linked to a near-term goal, and they place value on it (Ranjan, 2001, p. 64). Student engagement is defined by an Australian survey on student engagement as students' engagement in various activities and conditions that are likely to result in good learning outcomes (Coates, 2009), and it measures six engagement scales. These are related to the academic challenge, which is tied to the degree to which it is typically associated with expectations and assessments, challenge which are linked to the students' learning. One of the components is active learning engagement, which refers to students' multiple efforts to actively develop their knowledge. The interaction between instructors or staff members and students is the next component, which is mostly determined by the level and nature of the students' interactions with teaching personnel. Finally, enriching the educational experience by involving students in a variety of educational activities is another component.

1.2. Student engagement in MOOCs

The concept of student engagement becomes more significant in designing MOOCs, especially in times when the University Grants Commission (UGC), in light of the National Education Policy 2020 (NEP 2020), prescribes universities to offer 40% of credits through online mode and accept credits of online courses in academic bank credit scheme. Indian universities have been revising their curriculum in light of the above recommendations, and thus, these guidelines will certainly create an urge to develop and adopt MOOCs on a mass level in universities. In such times, it becomes important to create an understanding among faculty about the nuances of student engagement so as to create engaging online courses for reaping maximum benefits.

1.3. Status of MOOCs in India

According to Brouns et al. (2014), a MOOC is defined as "an online course designed for a large number of participants that can be accessed by anyone anywhere, as long as they have an internet connection, is open to everyone without entry qualifications and offers a full/complete course experience online for free" (BizMOOC, 2019). MOOCs are able to accommodate students with similar interests from various backgrounds, experiences, and locations around the world (Kurt, 2021). Most of the courses are open to people from all walks of life. MOOCs are open-access, asynchronous online courses aimed at enrolling hundreds or thousands of students at once (Kurt, 2021). A variety of learning resources such as recorded video lectures, online tests, and online readings, as well as varying levels of student-instructor and student-student participation, are created for online courses (Kurt, 2021). The four-quadrant approach is popularly used to develop MOOCs worldwide, and the four quadrants include e-tutorials, e-content, discussion forums, and assessments.

According to a report from the Class Central database, over 59,000 MOOCs have been provided on MOOC platforms including all online learning platforms from all over the world. Some of the popular platforms are SWAYAM and NPTEL in India, JMOOC and gacco in Japan, Fisdom in Korea, ThaiMOOC in Thailand, IndonesiaX in Indonesia, Edraak (Arabic) in Jordan, Campus-Il in Israel, and OpenLearning in Japan. These are some of the MOOC platforms in Asia, excluding China. In India, SWAYAM and NPTEL are the two platforms for MOOCs. SWAYAM was launched in 2017 and offers over 2253 courses taught by around 1,300 instructors from over 203 Indian universities. The student enrollment on SWAYAM has crossed 21 million, and with growth at this rate, it will soon be the world's largest MOOC platform in the coming times (Shah, Pickard and Ma, 2022).

Given the importance placed on online education in general, the Ministry of Education of the Government of India has devised many policies and programmes for school and higher education to popularize online education through MOOCs, which will aid in giving need-based and long-term education to the masses. As a result, the introduction of MOOCs in India under SWAYAM (Study Webs of Active Learning

for Young Aspiring Minds) to expand sustainable and lifelong learning opportunities for Indian learners could be very beneficial in building a skilled workforce in a young country like India.

MOOC developers use various techniques such as interactive course content and discussion forums to engage learners, and recognition of credits earned through MOOCs motivates them to complete the course. Building engagement in the course has been recognized as a determining factor in addressing the problem of low completion rates and building motivation among learners to complete the course (Freitas, Morgan, and Gibson, 2015; Meaghan and Sara, 2022). The present study is, therefore, conducted to understand the components of student engagement in MOOCs.

2. Need and Significance of the study

The significance of the study in today's context can be understood through the lens of upheavals in the Indian online educational scenario due to COVID-19 and recommendations by UGC and NEP 2020, which are as follows:

The UGC document "Curriculum Framework and Credit System" (https://www.ugc.ac.in/pdfnews/8126011_Draft--curriculum-framework-credit-struture-FYUGP.pdf) mentions a feature of the curriculum that facilitates switching to alternative modes of learning (face-to-face, ODL, online learning, and hybrid modes of learning). UGC also recommends that no university can deny a student credit mobility for courses taken through the SWAYAM platform. In light of this development, many universities have modified their syllabus and integrated 40% online content and also prepared a list of courses available on SWAYAM that can be offered to students.

In a notice dated 20th May 2021, UGC mentions that all higher educational institutions are allowed to teach 40% of the syllabus of each course in online mode and the rest 60% in offline teaching. UGC also shared a concept note on blended learning, discussing the ways and means of adopting blended learning for improving flexibility, learner centricity, and student engagement in courses.

The current wave of online courses is also evident in the field of teacher education, where various MOOC portals provided by the Ministry of Education are used for teacher training programs and standardized training programs. The DIKSHA portal, an initiative of NCERT, is an online national repository of high-quality resources for teachers and school education. It also provides the massive teacher's professional development program NISHTHA (National Initiative for School Heads and Teachers' Holistic Advancement) for elementary grades, secondary, and foundational literacy and numeracy (https://diksha.gov.in/about/).

In this surge of technology in all areas of education, educators must be prepared to navigate and succeed in the online upheaval of the educational system, in which MOOCs are major players. This is impossible without the assistance of a solid student engagement strategy, student satisfaction, course design, such as OERs, and appealing course design based on the four quadrants of MOOCs. Therefore, given the current situation, this research is essential.

This research aims to help developers understand the student engagement patterns, such as behavioural, social, emotional, and cognitive engagement of learners (Kumar & Kumar, 2020). The behavioural engagement will assist in comprehending students' involvement in various forms of academic activities as well as their efforts to complete academic tasks. The cognitive engagement will aid in understanding how students' abilities, motivation, and methods are integrated and utilised in their learning. Social engagement will help understand students' connection with instructors and classmates, as well as their contribution to the frequent debate. Emotional engagement will aid in determining students' level of self-motivation and attempting to determine their inspiration for the course they have already completed.

3. Dimensions of student engagement

In MOOCs, engagement is typically measured by whether or not students complete learning activities such as watching lectures and completing assignments. Low involvement is used to identify at-risk students. However, studies of school engagement have mostly proposed

that engagement has three components: behavioural, cognitive, and emotional, as well as participation or interaction engagement, skill engagement, academic, emotional-peer relationship, and emotional faculty relationship engagement. Researchers must assess both behavioural and cognitive engagement in MOOCs to investigate and quantify the importance of cognitive engagement in MOOCs. The involvement also demonstrates whether cognitive engagement contributes additional information that can help predict academic progress (Pelletier et al., 2016).

To assess students' cognitive and behavioural components of involvement, several authentic, validated, and reliable survey instruments are available. Various studies have been conducted using classroom engagement metrics and direct observation of students' behaviour employing observation protocols (Kothiyal et al., 2013). Sun and Bin (2018) found that the characteristics of learning behavioural engagement had an impact on students' perseverance and different learning outcomes. Behavioural engagement suggested more active performance, extending an effective behaviour state, despite being the main driving force of student actual achievement.

This research is mostly based on behavioural engagement, which focuses on different learners' adaptive adjustment processes in order to evaluate trade activities. MOOCs in the classroom are a unique concept with different educational implications and virtuality. The major goal of this research is to create an automatic form of evaluation model for students' learning based on behavioural engagement data from MOOCs. Behavioural participation in MOOCs is based on behavioural data, so that an exceptionally intelligent base for monitoring can be formed, and various tailored learning behavioural engagement help may be supplied. Academic accomplishment, teaching technique innovations, reflecting the degree of support, and the promotion of students' learning in various educational establishments are all elements that influence behavioural engagement in the learning process.

Miles worked on this engagement as well, referring to on-time completion of tasks, learning task persistence, participation, and effort, all of which were sometimes independently or simultaneously associated with cognitive ability and scholastic successes (Miles & Stipek, 2006; Li & Lener, 2013). Furthermore, researchers have developed a learning

behavioural engagement model and plan, a behavioural strategy, task execution, and evaluation, all of which are linked to sustainability, reflection, initiative, and concentration (Bolliger & Wasilik, 2009).

4. Models of Learning Satisfaction

The researcher examined several prominent models related to student engagement to determine the most important elements of engagement indicated in various models. Models are effective in identifying unique essential patterns linked with various teaching and learning processes, as well as defining the precise parameters of student engagement.

4.1. Construction of Learning Behavioural Engagement Periodic Feedback Model

This model relies on empirical data analysis and delivers engagement feedback regularly. This model defines several characteristics, including sustainability, initiative, reflection, and concentration, which primarily characterise learning's behavioural engagement. Learning behavioural engagement, periodic feedback, and information-sharing activities are all part of this approach. This technique is mostly dependent on behavioural engagement. Periodical feedback is used in the middle layer. The outer layer is built around information sharing. The first layer is linked to a conceptual paradigm shift and a change in learners' cognitive structure. Individual learning is tied to the intermediate layer, which also creates and sustains a higher level of learning behavioural engagement. The outermost level is linked to the continual coherence and restructuring of the learning behavioural sequence that is influenced by the subject, object, community, tool, intermediary, mixed learning environment, and other aspects to suit the learning demands very purposefully.

4.2. Learner-Centric MOOC Model

Learning Dialogue (LeD), Learning by Doing (LbD), Learning Extension Trajectories (LxT), and Learner Experience Interaction (LxI) are the four main aspects of the LCM model. To bring all of these elements together,

a new dimension called Orchestration was created to show the overall picture of the LCM model (Murthy et al., 2018).

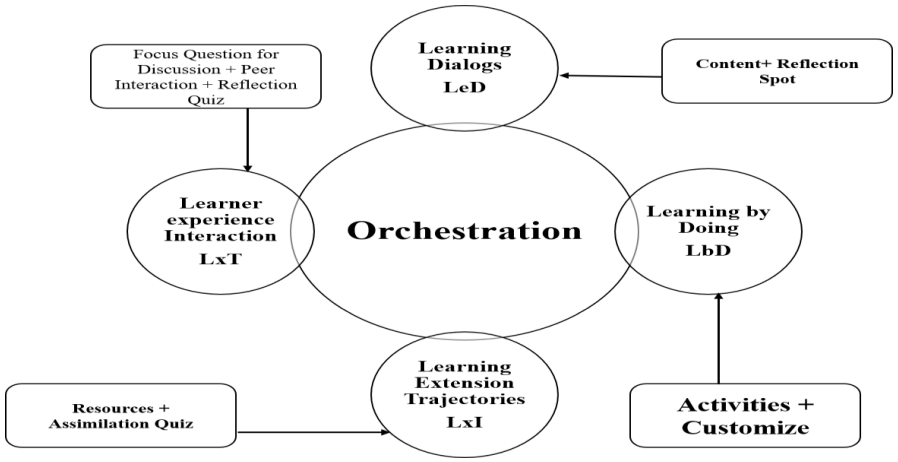

Fig. 1. Learner-Centric MOOC Model

4.3. Pedagogy of learner Experience Interaction (LxI)

The essence of MOOC pedagogy has been amplified from being instruction-focused, which is primarily teacher-centred, to learning-focused, which is primarily learner-centred (Conole, 2014). The technology affordances of discussion forums in the MOOC platform extend the nature of pedagogy for leveraging connectivist principles of autonomy, connectedness, diversity, and openness (Downes, 2010). Learner experience interaction pedagogy is primarily created as a learner-centric MOOC pedagogy to increase peer connection in order to achieve the goals of peer learning by motivating involvement and anchoring in the discussion forum. There are three basic structuring factors in learning experience interaction, which are as follows: 1) The teacher develops a focus question to use as a discussion starter in the MOOC platform; 2) MOOC participants usually drive the discussion forum, which is facilitated by course staff according to learners' needs; 3) The instructor primarily uses the reflection quiz to encourage discussion. This highlights the dynam-

ics of learner experience interaction, emphasizing the importance of each MOOC platform.

To continue the debate, the instructor proposes various focus questions and interaction guidelines, allowing enough various perspectives from MOOC learners to build a shared platform as a crucial option when structuring the focus questions.

4.4. MOOC engagement scale (MES)

To assess learner engagement, the study constructs and validates a MOOC engagement scale (MES) developed by Deng et al. The scale's initial questionnaire items were created after evaluating relevant research and validated student engagement constructs. A modified scale creation approach was then used, which included two focus group interviews (n = 10) as well as an exploratory survey (n = 12), an expert review (n = 10), a pilot survey (n = 15), an item purification study (n = 590), and construct validation research (n = 303).

The scale's final version has four dimensions: behavioural engagement, cognitive engagement, emotional engagement, and social engagement. The goal of this scale is to gain a better understanding of how difficult it is to conceptualize and measure learner engagement in Massive Open Online Courses (MOOCs). The researcher finishes with suggestions on how the MES might be used to measure MOOC engagement patterns and investigate the relationship between learner engagement and other key teaching and learning characteristics.

Because they are overt and easily recognized, behavioural and social engagement are frequently employed to measure MOOC engagement. Positive MOOC learning outcomes, such as academic achievement and course completion, are predicted with higher levels of behavioural and social engagement. In MOOC studies, cognitive and emotional engagement are sometimes disregarded.

5. Objective of the study

The objective of the present study is to create a model of student engagement in MOOCs.

6. Methodology

The present study utilizes the descriptive survey method to investigate student engagement in MOOCs. The study population comprises learners from all over India who have completed at least one course on various MOOC platforms. Purposive sampling is used to collect data from MOOC students who meet the study's criteria. The population includes students from all over India who have completed one or more MOOCs. The researcher contacted 7 course coordinators from different online platforms, and 4 of them responded and agreed to participate in the study. Finally, data was collected from 240 participants, consisting of 132 males and 108 females from various age groups and educational backgrounds, representing the final sample.

To measure student engagement, the researcher utilized the "MOOC Engagement Scale" (MES) developed by Deng et al. in 2020. The tool consists of twelve questions that assess students' behavioural, cognitive, emotional, and social involvement in MOOCs. The MOOC Engagement Scale was validated as a tool for assessing students' engagement using Cronbach's alpha values (Chang & Chen, 2011). The values for behavioural, cognitive, emotional, and social involvement were 0.72, 0.70, 0.73, and 0.83, respectively. The MOOC Engagement Scale's total Cronbach's alpha score was 0.83, indicating a good level of internal consistency (Fraenkel & Wallen, 2003).

7. Statistical Analysis and Interpretation

The MOOC Engagement Scale's validity and reliability tests, with Cronbach alpha coefficient and further principal component analysis, were conducted to validate the test in the Indian context and develop a student engagement model consequently. (Fields & Bisschoff, 2014). Validity refers to how well an instrument measures what it was designed to assess, while reliability refers to an instrument's capacity to measure consistently (Tavakol & Dennick, 2011).

In terms of student engagement in MOOCs, the score of the KMO measure of sample adequacy value of the 12 components is 0.887, which

is higher than 0.65 for student involvement in MOOCs, as shown in the table below. This figure is adequate and ideal, according to Field (2005). If the KMO measure of sampling adequacy is greater than 0.65, principal component analysis can be performed. The KMO score is 0.88 which is higher than 0.65, and the interpretation of the score is good. The result of Bartlett's sphericity test is 0.000, indicating that the factors have a significant value and p.05; hence, the representative of the sample is eligible for principal component analysis (Malhotra & Dash, 2012). The Chi-square of 1696.102, and the p-value of.000 indicates that there is a good chance of getting this result. The KMO and Bartlett's Test values were tabulated in for this study.

Table 1. KMO and Bartlett's Test of Student Engagement

Kaiser-Meyer-Olkin Measure of sampling Adequacy	.887	
Bartlett's Test of Sphericity	Approx. Chi-Square	1696.102
	df	66
	Sig.	.000

Variance is measured in significantly bigger units (for example, metres squared) than the standard deviation. The variance number is more difficult to grasp intuitively since the units of variance are substantially larger than the units of a typical value in a data collection. As a result, the standard deviation is frequently used as a primary measure of variability. A total number of variance values were tabulated in for this study.

Table 2. Reliability Statistics of Student Engagement

Cronbach's Alpha	N of Items
.928	10

The above table checked the reliability of the result of the item for the respective tool. In the case of reliability, we use Cronbach's alpha and the result showed 0.928, which is more than 0.75. It showed a positive result of reliability. The developed tool will show the same result on the different samples of the same population.

Table 3. Total Variance Explained of Student Engagement

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
SE1	6.326	52.715	52.715	6.326	52.715	52.715
SE2	1.049	8.741	61.455	1.049	8.741	61.455
SE3	.994	8.281	69.737			
SE4	.781	6.508	76.245			
SE5	.580	4.833	81.078			
SE6	.475	3.962	85.040			
SE7	.443	3.694	88.734			
SE8	.380	3.167	91.901			
SE9	.358	2.979	94.880			
SE10	.275	2.290	97.170			
SE11	.185	1.545	98.715			
SE12	.154	1.285	100.000			

Extraction Method: Principal Component Analysis.

The fundamental goal of the principal component analysis (PCA) is to determine the most successful dimensions of MOOC student engagement. The data were analysed using SPSS-22 to summarise the questionnaire's 12 variables, revealing student engagement in MOOCs. Under exploratory component analysis, the data were submitted to PCA. According to the cumulative percentage, 61.45% is an excellent number for determining a tool's validity, and it demonstrates that the validity of the question refers to how well a method measures what it is supposed to measure. The first factor accounts for the majority of the variance, accounting for 52.71 percent of the overall cumulative percentage of 61.45 percent. Variables 1,2, 3,4,5,6,7,9,10, and 11 are classified under component 1 in the preceding tables of Principal component analysis, while variables 8 and 12 are grouped under component 2. Component matrix values were tabulated in for this study.

Table 4. Component Matrix of Student Engagement

Statement	Components	
	Factor 1	Factor 2
SE1	.643	
SE2	.788	
SE3	.768	
SE4	.805	
SE5	.786	

SE6	.825	
SE7	.836	
SE8		-.598
SE9	.834	
SE10	.788	
SE11	.704	
SE12		.800

Extraction Method: Principal Component Analysis.

The above table shows 12 items of Student Engagement are grouped under two dimensions depicting that in the present research context, the four dimensions used in MOOC engagement scale (MES) created by Deng et al.,2020, are reduced to two dimensions namely, academic engagement and socio-emotional engagement (as shown in the image below).

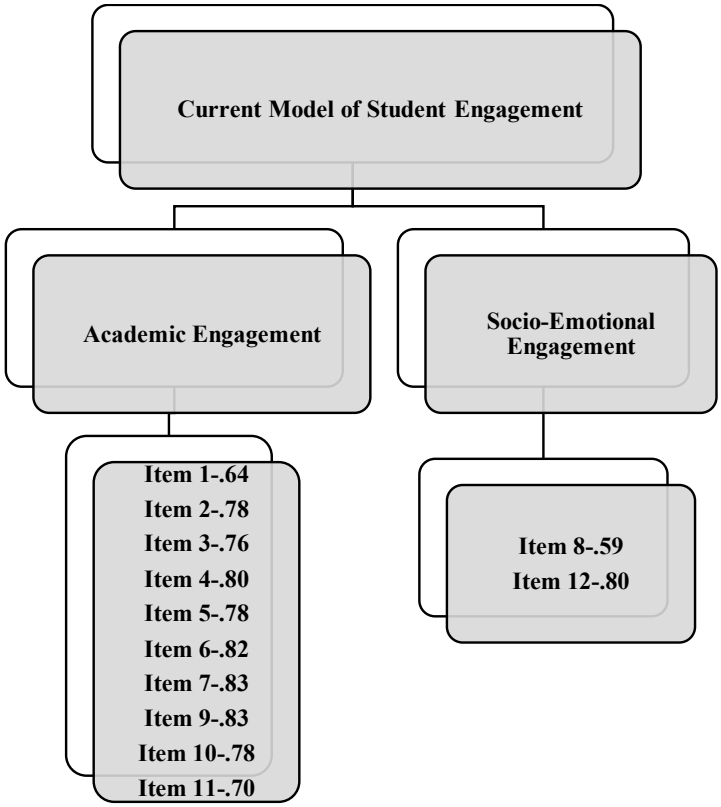

Fig. 2. Model of Student Engagement

The table above shows that component (factor)1 represents academic engagement, in which students are involved in various aspects such as time management for massive open online courses, taking notes during classes, revisiting notes during assessment preparation, searching for additional information, being inspired to learn more, and participating in the discussion forum. Students connect with peers to exchange learning materials and the course is fascinating are components of factor 2 which shows the socio-emotional engagement of students with course.

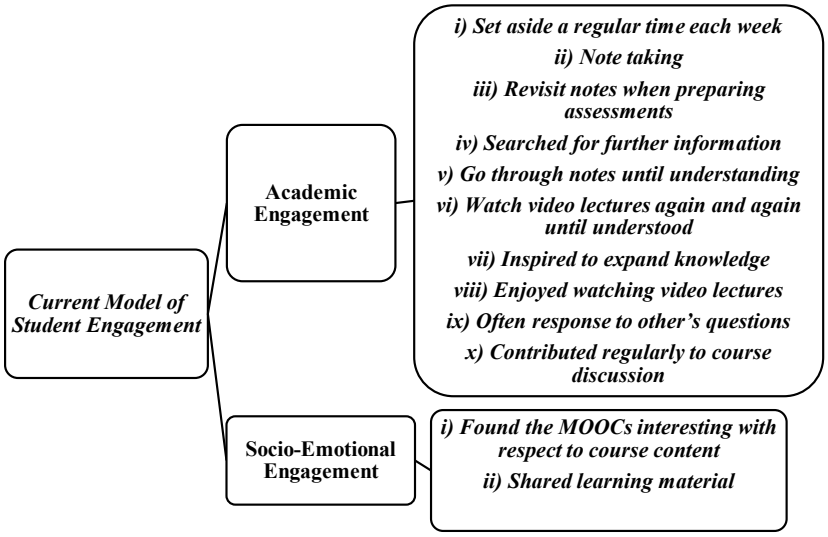

Fig. 3. Current Model of Student Engagement

8. Discussion and Conclusion

A new model of student engagement is created in the study comprising of two components: academic engagement and socio-emotional engagement. At the outset, based on the review of related literature, the researcher proposed a model of student engagement based on four dimensions: behavioural, cognitive, emotional, and social. However, Academic engagement and socio-emotional engagement are the only two types of student involvement that emerged in the present study con-

ducted on Indian students. Given the importance of these two elements in Indian students' MOOC participation (as found in the study), they should be considered significant during course design and development. The various ways in which students show academic engagement in the course are: set aside regular time for each work, take notes and revisit notes while preparing the assignment, search for additional information, watch video lectures repeatedly, respond to questions raised by peers, and contribute regularly in course discussions (Chiu, 2021; Erdogdu & Çakıroğlu, 2021; Deng et al., 2020; Deng et al., 2019; Conole, 2016; Dixson, 2015).

Academic engagement, according to the literature review, refers to knowledge-related interaction, completing tasks on time, participating in various activities related to the course, taking pride in the quality of work produced, feeling proud of accomplishments, investing in one's learning outcome, and proactivity, which means that some students take real initiative. The ways to academically engage as suggested by literature resonate with the academic engagement model provided in this study. Mentors should assist students in setting goals until they are able to take a more active role in their learning. Course directors must provide opportunities for students to seek out new information and learn more than they have been taught. Learning with passion is a true excitement and enthusiasm for the subject or activity being studied. Students must be enthusiastic about learning and doing more. Enthusiasm indeed generates enthusiasm, and course directors, teachers, and mentors are all enthusiastic about teaching. Students will experience similar feelings during the learning process (Hew, 2014).

Students who participate in MOOCs will have more patience in learning topics, whether for themselves or their classmates. It has the general feel of a lively group of students. This is because people who appreciate something are more willing to put up with fatigue or slow development (Lan & Hew, 2020). Coordinators should have that type of patience when teaching new concepts to students, and students should understand the material well. Coordinators, mentors, and professors must remind students that learning a new topic can take a long time, so they should read it again and again. Students who are enrolled in online classes will be focused and enthusiastic about participating in discus-

sion forums, projects, and assignments (Martin & Bolliger, 2018). Students who engage in online courses are always comfortable and calm, which makes understanding easier and more fun than for others in whatever they are learning throughout sessions. These characteristics are truly connected to the items of academic engagement presented in the current model, such as searching for additional information when puzzled, going over notes until understanding, and watching video lectures repeatedly, all of which are linked to patience and a desire to learn. Regularly contributing to course discussion and frequently reacting to other students is connected with participation (Muthuprasad et al., 2021).

Another element of student engagement highlighted in the study is socio-emotional engagement, which is based on self-awareness, self-management, social awareness, relationship skills, and responsible decision making, according to the literature. The second element of student engagement reflected in the present study is socio-emotional engagement, which incorporates all of these factors (Hoyt et al., 2020). It is named socio-emotional engagement as it encompasses elements such as engagement with course content and sharing learning materials with others.

The study's findings provide crucial information on ways to engage students with the course, informing online course designers and developers to design engaging course experiences by considering the elements of student engagement presented in the study.

9. Limitations and Suggestions for Further Research

The fact that students' complaints related to course participation were not addressed in this study is considered a limitation. Given this constraint, we propose that future research focuses on recreating the study by including complaints and suggestions from learners. Replicating this study, this time focusing on different indicators to measure the structures to obtain scales of reliability above 90% for all components, is another subject for future research. The findings of this study should be considered in MOOC curriculum or course development, technology development, or any other enhancements to increase student en-

gagement, which would eventually lead to a greater completion rate of several MOOC programs and a higher output rate. To properly reflect student engagement in an open distance education setting, the sample size should be increased, and more variables should be selected. Furthermore, including postgraduate students in the study will make it more comprehensive.

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Optimising an open education fellowship:

Promoting open education at a South African university

Jako Olivier[1], Amit Dhakulkar[1]

[1] Research Unit Self-Directed Learning, Faculty of Education, North-West University, South Africa

Abstract. A need emerged at a South African university to increase the use of and scholarly activity around open educational resources (OER). This was highly relevant because, despite the increasing interest in OER internationally, not all higher education institutions have fully embraced open education. Consequently, an institution-wide fellowship was launched at the identified university, through which 16 staff members from different disciplines were financially supported and received a range of webinars and online workshops to embrace open education. Apart from empowering staff members in terms of OER and open licensing, there was also an emphasis on fostering open educational practices and capacitating staff to research their open educational activities. This paper involves a qualitative study reporting on the process followed and the subsequent evaluation of the initiative. To this end, the qualitative inductive analysis involved open-ended questionnaires completed by the fellows who were part of the initiative, produced artifacts, as well as reflections from the organizers of the fellowship. The findings presented in this paper relate to how such a fellowship can be executed in contexts similar to this South African university. The unique diverse milieu of this university informed the way in which OER were approached. Furthermore, some unique challenges in terms of specific skills needed by lecturers, language and localization, the role of student voice and agency, and self-directedness are discussed. The paper con-

cludes by making practical recommendations for OER integration in higher education institutions.

Keywords: research, open educational resources, staff development, open education, open educational practices

1. Introduction

With an increased interest in open educational resources (OERs) in higher education worldwide, there have been many attempts to promote the use of OERs in such contexts. Consequently, this paper engages with the scholarship of promoting OERs within an institution (Hollister & Patton, 2021; Schleicher et al., 2020). Within this context, an OER Fellowship was started at a South African university with the aim of expanding interest and practices for open education. This fellowship was part of an institutional effort to promote openness and foster open practices among teaching staff. To this end, this paper is driven by the following research question: How can an open education fellowship be optimized in promoting open education at a South African university?

2. Literature overview

2.1. Open educational resources

Over the last decade and a half, open educational resources (OERs) have become increasingly used across the world. OERs are defined in terms of certain licensing conditions which allow them to be used, copied, modified and redistributed. There are several definitions of OERs, but the core idea remains a suitably open license under which it is released. The UNESCO declaration (UNESCO, 2019) defined OERs as

> 'learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released

under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others' (p. 5)

There are several OER repositories that cater to various subjects and educational levels. However, most of the OERs are produced in the Global North and may be set in contexts that are unfamiliar to learners in the Global South. Since the licensing conditions allow for remixing, translation, and recontextualization of resources, it is possible to adapt them to different social milieus. In the Global South, OERs can be instrumental in reaching underserved sections that lack learning resources. In the African context, several projects such as OER Africa, TESSA, Siyavula, ROER4D, and the Digital Humanities OER Champions initiative are working to produce content that is culturally and contextually specific.

Although cost is a significant factor in the acceptance of OERs, the pedagogical practices associated with OERs are also important to reconsider traditional teaching and learning practices. These practices are discussed in the next section.

2.2. Open educational practices and open pedagogy

Closely intertwined with OERs is the broader idea of open educational practices (OEPs). OEPs are made possible by the conditions inherent to OERs. They are defined as "a range of individual and collective practices inherent in conceptualizing, creating, adapting, curating, and sharing OER" (Wolfenden & Adinolfi, 2019)

Several challenges have been identified for the use, adoption, contextualization, and creation of OERs in the African context (Thakrar et al., 2009). These challenges can be categorized into infrastructural, personal, and institutional challenges (Hodgkinson-Williams & Arinto, 2017; Mays, 2020). Among the institutional challenges, one of the most crucial factors is the lack of affirmative action in the form of enabling policies and practices by the institution (Cox & Trotter, 2016). These may include the university being the copyright holder for all works, no support being provided for faculty members who want to use or adopt OERs, and no clear policy regarding OERs (Cox & Trotter, 2016; Czernie-

wicz et al., 2017). One of the recommendations to overcome this challenge has been to provide affirmative action in the form of incentives to faculty members to adopt OERs and OEPs.

3. Methodology

In this basic qualitative study (Merriam, 2009) which was underpinned by interpretivism as a research paradigm, open-ended questionnaires were completed by 8 participants out of the 16 fellows. Non-probability sampling by means of purposive sampling was employed, as the focus was on the 16 fellows who took part in the project, and the responses were obtained from those who opted to provide informed consent and take part in this study.

The qualitative data was collected from a self-designed open-ended questionnaire that gauged the participants' views regarding the OER Fellowship. In order to ensure the trustworthiness of the data analysis, credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1986) were considered. In terms of the credibility of the analysis, there was ongoing engagement of the researchers with fellows and the project, in addition to cross-checking of researcher reflections and participant open-ended questionnaire data. Furthermore, transferability was ensured by means of thick, descriptive data used for this paper. Finally, dependability and confirmability were ensured by means of an audit trail (ibid.).

4. The open educational resource fellowship

Given the background and the potential benefits of OERs and OEPs, incentivizing their use, adaptation, and creation may be a possible way to enhance their uptake. Our approach, reported in this article, was to create an OER Fellowship for staff members of the university, providing financial and technical support for using, adapting, and creating OERs. The rationale for the Fellowship was not limited to supporting the use and creation of OERs but also aimed to create a network of scholars

working in this area, appreciate the work already being done, and introduce and support research on OERs at the university. In the following section, we discuss some of the key elements of this fellowship and its implementation. These aspects may help others who wish to initiate similar schemes at their institutions.

4.1. Nature and focus of the fellowship

The OER Fellowship was advertised to all staff members pf a specific South African university's three campuses. Lecturing staff members could apply individually or as a part of a group, ideally consisting of up to four members. These groups could include staff members from support departments or external experts, with the only condition being that the main applicant must be a staff member of the university. The fellowship had both monetary and support incentives:

- a grant of R40 000 for OER development (adaptation, text editing and/or research expenses) for individuals or groups working on a project;
- funds for online conference attendance and presentation (R7 000);
- opportunities to attend workshops on OERs, open licensing and open pedagogy;
- support to create or adapt OERs;
- support and workshops on how to research OERs and write up the research;
- writing a book chapter on the process or evaluation of the use of the OER.

The application for the fellowship included a small write-up by the applicants on the potential projects they would carry out if selected as fellows. The submitted applications were reviewed, and finally, 11 fellowships were awarded. Out of these 11 fellowships, seven were awarded to individuals, and four were awarded to groups. The fellows came from different faculties within the university and also approached the creation of OERs in varied ways. Out of the 11, seven projects involved students in the projects, while the remaining four were driven by the staff members themselves. Table 1 gives an overview of the different projects

that were selected. We see that each project had a different approach to OERs and also produced different types of OERs. For example, the list includes a multilingual glossary, an open textbook, software, a website, as well as courses from a variety of disciplines such as journalism, health sciences, linguistics, philosophy, music, education, social care, and political science. Some of the fellows were already aware of OERs, and some were even actively working towards completing their OERs. Thus, the overall group of fellows was mixed in their awareness about OERs and OEPs.

Table 1. The projects selected in the Fellowship, the fellows and their focus.

Project	Fellows	Focus
1. Decolonising the South African journalism curriculum through student co-creation	Individual	Student and lecturer
2. OERs as a tool to create awareness around infectious diseases with a focus on HIV/TB/Coronavirus	Group	Lecturer
3. Designing an OER as part of a technology-enhanced practice environment developing the oral interactional competence of beginner language learners	Pair	Lecturer
4. The state of online open educational resources for training dietitians in research methods	Individual	Lecturer
5. Population and development OER	Individual	Lecturer
6. Opening to Kindness: Creating tools for the pedagogy of kindness	Individual	Lecturer
7. How decolonial practices can assist in researching OERs	Individual	Lecturer
8. Stories students tell about their learning experiences of using OER in a Music education module	Individual	Student
9. A hi pfumelani as renewable assessment for political science: Disagreement as a self-directed learning strategy	Individual	Student
10. Undergraduate health and social care students perspectives on developing Open Educational Resources	Group	Student
11. Multilingual Philosophy Glossary: Towards a Socially Just Pedagogy	Group	Lecturer

The selected applicants were briefed as a group about the overall fellowship scheme, the support they would receive, and the expectations/outcomes from them. The fellows also had had individual meetings with the researchers to understand their projects in a better way (see Table 1).

4.2. Objectives of the fellowship

The objectives of the OER Fellowship had a holistic goal towards creating an ecosystem around OERs rather than just their creation and use. These objectives are in line with the university's policy approach towards OERs. The university's *Open Educational Resources Declaration* in 2018 (North-West University, 2018) unequivocally states the policy level support for OERs:

> The North-West University supports and promotes the creation, reuse, revision, remixing, redistribution and retention of OER for appropriate modules of formal academic programmes and for CE offerings within an Open Licensing framework. (p. 2)

Also, the university's *Teaching and Learning Strategy 2021-2025* (North-West University, 2020) explicitly affirms

> 6.7 An enabling teaching and learning environment
>
> The NWU strives to create an enabling teaching and learning environment for its staff and students on all its campuses and in all modes of provision through:
>
> Participation in the open educational resources initiative, through the use and development of open educational resources and open source systems to enhance access for staff and students to an extensive range of high quality and affordable learning resources.

Thus there existed policy level support for this initiative. The OER Fellowship had clearly defined objectives in the terms of reference for the fellowship. These objectives included spreading awareness and advocacy of open education in general and OERs and OEPs in particular and providing support for the use and creation of OERs by the selected fellows. These objectives were:

- informing lecturers about the opportunities in the use/creation of and research on OER as well as open pedagogy in terms of self-directed multimodal learning;

- supporting the establishment of champions to promote OER in faculties;
- providing support towards OER research practices;
- creating an opportunity for scholarly discourse around OER and related research;
- supporting lecturers to present on their OER activities at a national conference; and
- supporting lecturers to conduct and complete a publication on the use/creation of OER.

Also, certain commitments were undertaken from the fellows which included: (1) following the training as set out for this fellowship, (2) completing an OER for the selected module(s), (3) conducting research and (4) making the OER available under a Creative Commons License.

Another integrated aim of the Fellowship was to inculcate aspects of self-directed learning (SDL) during the process. SDL is "a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975). SDL becomes increasingly important in online learning environments, and a link between OEP and SDL has been established (Oliver, 2020; Morgan, 2016). In the context of this project, we looked at inculcating SDL at two levels: one for the participating lecturers (the fellows) and their students (when the OER involved students as co-creators).

4.3. Workshops and Seminars

To fulfill these objectives, different approaches were taken. Several workshops and webinars were arranged to provide varied perspectives on several important concepts. The workshops and webinars were conducted by some of the leading voices in the field of open education and presented the ideas in a nuanced manner. The webinars and workshops were open in the sense that anyone was welcome to attend them, while the individual meetings were closed and compulsory for the fellows. The workshops and webinars covered topics such as OER and open pedago-

gy, open practices, open licensing, researching OER and OEPs, student advocacy in OERs, open textbooks, open-source authoring tools, OER quality frameworks, and research using the COUPE framework (cost, outcomes, use, perception, and engagement).

The timelines for the overall OER Fellowship are shown in Figure 1.

Figure 1. The timeline for the OER Fellowship.

4.4. OER outcomes and research

As mentioned earlier, the Fellowship had different types of outcomes, the obvious one being the creation of new OERs under the aegis of the OER Fellowship. But other than this, the outcomes also included research on the process of the Fellowship conducted by the authors and research by the fellows which culminated in a book titled Contextualised Open Educational Practices: Towards Student Agency and Self-Directed Learning (Olivier et al., 2022) about the project with chapters authored by the fellows and the researchers. These chapters describe the process

of creating OERs from the fellows' perspective and highlight aspects of self-directed learning in conjunction with OERs and OEPs.

The research on OERs in this project happened on two distinct levels. The fellows, as a part of the project, did research with their own students or their own thought processes while creating OERs. This process culminated with the publication of a book containing this research. The other level was the research done by the authors (researchers) who initiated this project. For example, this paper is a part of the second level of research. Thus, the project also fostered and created scholarship in OER research. The research done by the authors is described in the following section, which includes an analysis of the feedback from the fellows about the project.

4.5. A Process view of OER Fellows Project

Figure 2 presents a process view of the project, indicating various components, agents, and relationships between them. The researchers, lecturers (fellows), and students are the main agents in the project. The research (in green) and the development processes (in red) and their products (in ovals) are also indicated. The two instances where self-directed learning takes place are shown, one for the lecturers and one for the students participating in the creation of OERs. Further research will be needed to look at these aspects in detail.

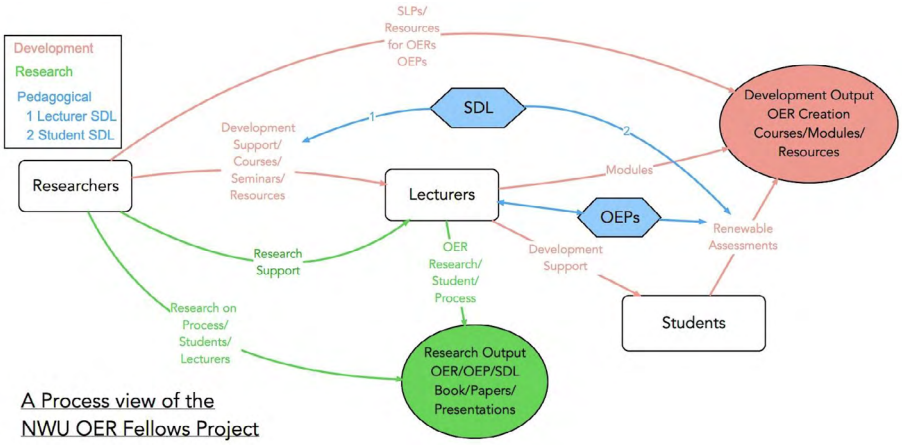

Figure 2. A process view of the OER Fellows project indicating the flow and highlighting important agents and aspects.

5. Findings and discussion

From the inductive analysis of the qualitative responses the participants emphasised the value of the following aspects:

- Fostering of independent work in creating or adapting OERs.
- Having peer interactions during the process.
- The online workshops were experienced as being highly relevant and useful and they especially appreciated the fact that they could learn from a diverse group of international OER experts.
- The introduction to OERs lead to the implementation of OEPs.
- Such OEPs supported student agency and allowed for greater student class involvement in some cases.
- Localisation of OER content was an important aspect which linked to the importance of translations of OERs in this context.
- Cost savings was also a significant issue for the participants.
- The financial incentive was also appreciated.

It is significant to note that the projects had varying degrees of success and completion rates. Generally, group projects were very successful while individual projects did not often get off the ground. Of the eleven projects mentioned above, as of June 2022, only eight have content that has been published or will be published soon. At this point, two projects have been discontinued.

Overall, participants were positive about the fellowship. However, based on their feedback and the evaluation of the entire process, several recommendations can be made for future similar initiatives.

6. Recommendations

In this section, a number of recommendations are presented in terms of effectively running an OER fellowship. However, it is essential to note that each context and cohort would have different needs, and not all of these issues might be relevant in all contexts.

From an institutional perspective, an initiative like an OER fellowship has the potential to not only raise awareness and change perceptions but also inform classroom practices. In this context, the use of incentives for the use of OERs and OEPs motivated lecturers to infuse openness in their classrooms.

In terms of preparation, it would be sensible for facilitators to have backing from policy and wider university management, as well as line managers of fellows in place prior to commencing with such a fellowship. Furthermore, it would be necessary to screen potential fellows first in order to determine the needs of participants.

The value of projects being done in a group and collaboration within and across groups is highly relevant. Participants indicated that they would have preferred having even more cross-disciplinary interaction within the process.

Adding a research component was also perceived positively; however, sufficient scaffolding should be provided for participants who do not have extensive experience in educational research.

7. Conclusion

This paper explored how an open education fellowship can be optimized to promote open education at a South African university. The discussed OER Fellowship shows that with adequate support and structure, such an initiative can be replicated to promote openness and OEPs in other educational institutions.

In terms of limitations, this study focused on feedback towards the end of the process, and more in-depth and even longitudinal data could enhance our understanding of the process. Additionally, it might be interesting to explore the perceptions of students involved in the initiative.

Finally, it is recommended that future studies build on these findings and recommendations and explore aspects such as the role of lecturer and student agency and localization in other contexts.

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MOOC on Inclusive education for Children with Disabilities:

Professional Development of Teachers

Sneh Bansal

Principal, Chandigarh College of Education,

Punjab, India Princeton NJ 08544, USA

Abstract. The Sustainable Development Goals (SDGs) call for "ensuring inclusive and quality education for all and promoting lifelong learning" (Goal 4). The SDG targets aim to provide access to education for all children, with a focus on vocational training including persons with disabilities. However, persons with disabilities remain neglected and excluded from mainstream education worldwide, leading to a huge gap in learning outcomes. Providing meaningful and quality learning experiences for children with disabilities can increase the likelihood of completing their education and living an independent life. To address this issue, a MOOC was developed using open education resources to train professionals, teachers, and adults in inclusive education. This article discusses the design and course structure of the MOOC, including the participation and involvement levels of the participants in the exercises, as well as their perceptions of the course's value and professional takeaways. The article will be helpful for administrators, academicians, and stakeholders who are planning and designing professional development programs in innovative and engaging ways for lifelong learning.

Keywords: Inclusive education, Children with special needs, MOOC, Open educational resources, Professional development, teachers

1. Introduction

Worldwide, emphasis has been given to the inclusive model of teaching children with diverse needs in regular schools during the last three decades, and several legislations and policies have been made to make it happen in real sense. India, being a signatory to UNCRPD, 2008, was obliged to align its laws and policies with the International convention. In India, RPWD act 2016 gave statutory backing to inclusive education (Rao et al., 2020). According to the 2011 Census of India, only 61% of children with disabilities aged between 5 and 19 were attending an educational institution, and 27% of them never attended any educational institution, as opposed to the overall figure of 17% (Inclusive Education in India 2020). Legislations and policies on inclusive education ensured physical access to education for children with disabilities; however, their involvement and participation in schools are lacking. It is a well-documented fact that children with disabilities benefit more in a regular school environment by interacting with the diversity in the classroom. Worldwide, including India, the teacher registration bodies have made it mandatory for all teachers to complete a subject in special or inclusive education or made outcomes related to inclusion mandatory in teacher preparation programs. The requirement is based on the premise that without such training, teachers will not be able to meet the needs of diverse student populations in their classrooms (Sharma et al., 2011). The recent New Education Policy (2020) asserted that children with disabilities will have opportunities for equal participation across the educational system. A major victory is the recognition of the Rights of Persons with Disabilities Act (RPWD), 2016, and its provisions for inclusive education, defined as a system of education where students with and without disabilities learn together. NEP (2020) is in consonance with and fully endorses the recommendations of the Rights of People with Disabilities Act, 2016. The recommendation of NITI Aayog (2016) to improve the potential abilities of children with disabilities through inclusive education, and NEP (2020), has emphasized the need to train special educators and teachers in the relevant skills and understanding of the special requirements of children with special needs in regular setups, encouraging schools to be more inclusive in character.

In spite of these proactive steps, India continues to face challenges in providing equitable education to children with disabilities, mainly due to a lack of training on the part of teachers. Teachers have expressed a lack of practical training and an emphasis on theoretical aspects, leading to a lack of skill in handling children with disabilities (Sharma, Forlin & Loreman, 2008; Mishra, et al., 2018). Researchers have highlighted the lack of training among teachers, which is evident from their unfavorable attitude towards teaching students with disabilities in inclusive settings (Bansal, 2018; Bindal & Sharma, 2010; Sharma & Desai, 2002; Swaroop, 2001; Singal, 2006). School teachers have also reported that the practical component is not emphasized enough in pre-service training programs (Bansal, 2016).

In India, approximately 76% of teachers have not received any special training, and about 43% of those lacking training reported that they were not able to teach children with disabilities according to their needs. Nearly 65% of teachers also reported that they required in-service training to meet the needs of children with special needs in an inclusive setting (Kaur & Bansal, 2019). Regular school teachers should be more sensitive and aware of the educational needs of children with disabilities, including their levels of learning and motivation. They should be equipped with skills related to planning and delivering lessons based on the universal design of learning, curriculum adaptation and modification, and alternative means of assessment. Specifically, they should also understand the importance of collaborating with special educators to implement individual educational programs effectively. They should know how to teach content in a different way using differential instruction by modifying content. Philpott et al. (2011) recommended strategies such as peer tutoring, cooperative learning, mastery learning, and applied behavior analysis to teach children with disabilities in the classroom and improve their learning performance. There is a need to upskill teacher educators and school teachers to offer an appropriate curriculum and employ suitable pedagogies to prepare teachers for inclusion (Sharma et al., 2013). UNICEF, 2016 stated that "around 40% of children with disabilities are out of school at the primary level and 55% at the lower secondary level in low and low-middle income countries." A substantial number of studies also concluded that

teachers are not equipped to teach children with disabilities in regular schools.

Taking into account the existing literature and the need to bridge the knowledge gap among teachers regarding inclusive education, a Massive Open Online Course (MOOC) on "Inclusive Education for Children with Disabilities" was developed as part of the OE4BW project for UNESCO Slovenia. This MOOC provides comprehensive learning materials and assessments to help learners understand how inclusive education, including curriculum adaptation and modification for children with disabilities, can be implemented in a regular school setting. The learning materials are accompanied by interactive videos, self-reflective exercises, and checklists with classroom formats that can be used to facilitate maximum learning for children with disabilities in the classroom.

The article covered the learning experiences of the participants enrolled in the MOOC from India and how it helped in their understanding of the education of children with special needs in a regular setup. Broadly, the present article answers the following questions:

1. What was the design and course structure of the MOOC?
2. What was the participation and involvement level of the participants in the exercises?
3. What were the participants' perceptions of the course values and their professional takeaways?

2. Course Development

The course was developed on the open learning platform under 'Open Education for a Better World: OE4BW' online mentoring program that supports the development and implementation of OERs according to the UN sustainable development goals (SDGs). In the context of OE4BW programs, the value of an MOOC, in particular, was its potential to reach teachers worldwide. The course team was formed with one developer, one mentor, and one hub coordinator. The developer (the author of this paper) acted as the lead instructor. With one hub coordinator along with developer and mentor, online meetings were con-

ducted to discuss the overall planning and scheduling of the project development and hosting. The hub coordinator and the mentor were experts and experienced in MOOC development. The project mentor guided and supported the developer to plan the MOOC, including a pre-survey form, learning activities, reading materials, PowerPoint presentations, videos, assessments, and a feedback form. The team used the Microsoft platform to share the course material. The overall outlay of the MOOC course, along with the timeline, was prepared by the developer. The introductory video of the MOOC was also created by the developer, covering the background and learning outcomes of the course. The course entry form was created on the Google form and uploaded on the open learning platform to gauge the understanding of the participants in inclusive education. The participants were teachers and special educators from different parts of India. The course was licensed under Creative Commons Attribution-ShareAlike 4.0 International License. The three modules, along with the pre-survey form in the beginning and the feedback form after they completed the course, were designed by the developer (given in Table 1) and were submitted with the mentor on the Microsoft platform for the final review and approval. The course material was modified based on the feedback given by the mentor. After that, with the support of the mentor, the materials developed were uploaded on the open learning platform. The announcement with the link of the course: https://www.openlearning.com/courses/inclusive-education-for-children-with-disabilities, and the poster of the course along with details, were uploaded on the OE4BW platform to encourage the participants to join the MOOC. After an open call, a total of 319 teachers were enrolled from various geographical regions of India. Finally, 115 teachers completed the course successfully and received course completion certificates (36%) since they were active participants and they effectively responded to the obligatory assignments. Jeffrey (2014) found that, on average, among survey respondents, 22 percent of students who intended to complete a course earned a certificate, compared with 6 percent of students who intended to browse a course. Nevertheless, the survey conducted by Haggard (2013) concluded that non-completion of the course does not indicate that the non-completers are not satisfied with the course.

It was a self-paced course which facilitated the learners in practicing and reflecting on the practices adopted by them in their classroom to accommodate children with disabilities in an inclusive set up.

Table 1. Description of the Modules with topics and learning objectives

Modules	Topic	Learning Objectives
Module 1	**Concept of Inclusive Education**	*•The concept of inclusive education,* *•Need for Inclusive education,* *•The major milestone of inclusive education at the International and National (India) level, Rights of Persons with disabilities act, 2016 for the education of children with disabilities in India.* *•Parameters of Inclusive Education*
Module 2	**Inclusive Classrooms**	*•The meaning and principles of the Universal design of learning,* *•Strategies, and techniques to teach the children with diverse needs in inclusive classrooms,* *•Accommodations given by education boards for children with disabilities.*
Module 3	**Creating Collaborative culture**	*•The role of various professionals and collaborations for inclusive education* *•Comprehensive school reform and inclusive school programme.*

3. Results of the Pre- survey form

Table 2. Responses of the participants on the pre-survey form on the perception and awareness of Inclusive education for children with disabilities (n=100)

S.No.	Statement	Responses		
1.	Which of the following statements best describe your definition of inclusion?	*67.3%* *Placing every child in regular classroom with adjustments and changes*	*12.2%* *placing every child in ordinary school and special classes been conducted for children with disabilities*	*20.4%* *placing mild disabled children in ordinary classrooms and children with moderate and severe in special education programmes*

S.No.	Statement	Responses		
2.	Developing an inclusive school requires	*9.2%* *lots of infrastructural changes*	*33.7%* *appointment of special educators and additional manpower*	*57.1%* *change in the belief system*
3.	Inclusive schools	*63.9%* *requires increased funding*	*35.1%* *saves money*	*1%* *Is expensive*
4.	Which of the following groups do you perceive shall be more supportive towards inclusive schools?	*44.9%* *Special educators*	*25.5%* *Parents of children with disabilities*	*29.6%* *regular school teacher*
5.	I would describe my training related to inclusive education for children with disabilities as	*37.8%* *Excellent*	*49%* *Adequate*	*13.3%* *Inadequate*
6.	Do you have any experience of teaching children with disabilities?	*60.2%* *Yes*	*39.8%* *No*	-
7.	I believe inclusion can be successful	*21.4%* *Partially*	*78.6%* *Fully*	*Impossible*
8.	Do you think changes in the education system for children with disabilities can help to change the nation in terms of inclusion and equity?	*94.9%* *Yes*	*1%* *No*	*4.1%* *Maybe*

From the pre-survey, it was concluded that the majority of the participants believed that inclusion means placing every child in a regular classroom with adjustments and changes (67.3%). They also believed that inclusion requires a change in the belief system (57.1%) and that inclusive schools require increased funding (63.9%). Most participants thought that special educators should be more supportive (44.9%). The majority of participants believed that adequate training related to inclusive education for children with disabilities (49%) and having experience teaching children with disabilities (60.2%) are necessary for successful inclusion. They also believed that inclusion can be fully successful (78.6%) and that changes in the education system for children with disabilities can help to change the nation in terms of inclusion and equity (94.9%).

4. Design and course structure of the MOOC

4.1. Teaching Learning activities of the course

This MOOC pedagogy is a combination of curated open educational resources with the experience of the developer in the field of inclusive education. The learning activities involved reading materials, videos, presentations, further reading reference links, discussions, sharing experiences and ideas, practical in-hand experiences through case studies, and formats that helped them to reflect on their own teaching and school practices.

Module 1 covered the reading material on inclusive education, covering the meaning and definition of inclusive education, differences in the various terms related to the placement of children with disabilities in education, initiatives taken for the education of children with disabilities at the national and international level, provisions given in the RPWD Act (2016) for the education of children with disabilities, and categories of disabilities and parameters of an inclusive environment in schools. A video covering the aspects of inclusive education in schools was created. To understand the concept of inclusive education, activities on 'Understanding Inclusion,' 'Understanding Challenges in Schools,' and 'Self-evaluation Scale of Inclusion' were designed. These activities enabled the participants to share their ideas and experiences and comment on each other's responses. Through these activities, participants were able to share and connect with each other, create professional connections, and reflect on inclusive practices.

Module 2 discussed "Inclusive classrooms," covering how to create an inclusive class by applying the universal design of learning with inclusive teaching strategies and techniques, and adaptive assessments. The module provided reading materials, videos, and additional material links, along with supplementary materials such as lesson plan formats using UDL principles and visual prompts for inclusive practices in schools. Activities included "Understanding the learners in the classroom," "Types of accommodations," and "Designing inclusive lesson plans," which focused on contextualized practice and collaborative learning.

Module 3 was about creating a collaborative culture. In inclusive education, collaboration is essential, as it helps create a learning environment for children with disabilities in inclusive schools through everyone's involvement, participation, and contributions for successful inclusion. The module covered material on the role of various professionals and collaborations for inclusive education, comprehensive school reform, and an inclusive school program. Curated reading material and presentations on collaboration and comprehensive school reform were included to help learners apply the collaborative model based on the whole school approach. Module three enabled participants to implement the comprehensive inclusive school model, and a systematic and collaborative activity on "Developing an inclusive school model" was included, in which participants, depending on the context and needs of their school, developed an inclusive school program (ISP) by collaborating with school professionals to support the education of children with disabilities in general classrooms. A format for developing an inclusive school program was provided as a reference for participants to gain hands-on experience.

4.2. Assessment

In this MOOC, the focus was on self-reflection of the practices embodied in the teaching-learning process by the participants, along with the use of automated assessment methods such as quizzes. For qualitative descriptions and contextualized practice, a sequence of activities linked with the different modules was used, and peer assessment was also employed. The ideas and discussions generated by the peers related to the practices shared by the participants supported richer forms of collaborative learning. Reviewing and reflecting on the experiences and practices shared by their peers provided an opportunity for the participants to use these experiences in their own teaching-learning process and support them in making their schools more inclusive

4.3. Participation and involvement level of the participants on the exercises

The MOOC focused on equipping the participants with inclusive practices in their schools to address the needs of children with disabilities. The completion rate of this course (36%) was found to be higher than the average rate (7.6%) across xMOOCs (Jordan, 2015). In total, 319 teachers from different parts of India registered for the course, and they produced 1,170 comments on all the activities. The participants shared their reflections on each activity and provided feedback.

4.4. Participant's perception of the course values and their professional takeaways

The course was designed for pre-service and in-service teachers and educators. The value of the course, overall experience, and perceived improvement in the understanding of inclusive education by the participants were measured through a post-course survey link posted on the open learning platform. Additionally, the participants gave their comments on the discussion forum related to their improvement and understanding of inclusive education for children with disabilities in schools. The participants expressed that the course was informative, relevant, had well-explained videos, content, format of IEP, case study, lesson planning, was easily accessible and understandable, and clearly explained. They appreciated learning about inclusive education and how to help students with different disabilities, challenging quizzes, interesting subject matter, imparted knowledge about teaching strategies, like learning by doing methodology, elaborative and effective material, objective-based assessment, and developed as per the needs of the current educational setup with illustrations. The responses were good evidence that broadly the course received the resounding appreciation of the respondents. The participants also valued and expressed their appreciation and understanding of inclusive education in the discussion forum after completing the course, which was evident in the screenshot of the discussion forum.

5. Concluding Discussion

The literature review clearly indicates that teachers are not equipped to teach children with disabilities in regular schools. Hence, the author felt the need to develop OERs that support professionals and teachers in developing knowledge and skills to accommodate children with disabilities in regular school setups. According to a study conducted by Bansal (2022), the number of special educators in India is very low, with one special educator being allotted to 7-8 schools in a cluster. In such cases, the holistic needs of children with disabilities are neglected, and the responsibility of general teachers is increased to a greater extent, requiring them to be trained and sensitive to the needs of children in their classrooms. The MOOC was designed with the intent to empower general teachers, parents, and the community at large to address diversity in classrooms. The experiences collected from the participants in the form of surveys and discussion forms and their level of engagement in all activities showed that the intended learning outcomes of this MOOC were achieved. The comments shared by the participants in the forums were encouraging for the prospect of using OERs to promote the building of community knowledge among teachers about using distinct pedagogies designed to meet the needs of all children in their classes irrespective of diversity.

While a typical MOOC programme generally covers video, reading material, quiz, discussion forums, and further reading material, this particular MOOC covered not only expanded learning material, but also focused on self-reflection with a wider range of activities covering each module, enabling participants to develop a positive attitude while working in a collaborative environment. Each module was designed in the form of a sequence of resources and activities linked with the video, supporting the participants in independent but guided learning activities to ensure that they would be able to apply their understanding in their regular classrooms. A wider learning experience on each component was focused on through discussions, case studies, and format plans to improve their understanding of catering to the needs of children with disabilities in their working practices.

The significant engagement of the participants demonstrated that an open online course establishes a clear contribution in solving the educa-

tional challenges that emerge in the professional development of teachers and updating their knowledge and skills compared to face-to-face programmes. The co-learning/collaborative model used in the development of this free and open MOOC can reach every corner of the world and make a contribution to achieving Sustainable Development Goal 4. The new and ever-emerging dynamic needs of the educational world are MOOCs that are free and open to use so that they can directly benefit the learning community and develop capacities among academicians to achieve an inclusive and equitable society by focusing on "Education for All."

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Forging Open Educational Practices and Practitioners:
The Perspective of Educators

Janaina de Almeida Sousa[1], Tel Amiel[2]
[1]Superior Tribunal de Justiça, Brasília, DF, Brazil
[2]Universidade de Brasília, Brasília, DF, Brazil

Abstract. The COVID-19 pandemic has elicited calls, once again, for substantial changes in how formal education operates and how educators perform their functions. The discourse around innovation and transformation of education took an even more critical tone during the pandemic, requiring educators and institutions to mobilize capabilities and acquire knowledge for a new mode of operation: 'remote' or 'emergency' teaching. Much of what is called for can be evidenced in Open Educational Practices (OEP), an emerging and still under-theorized concept that is a key component of Open Education and connected to the adoption of Open Educational Resources (OER). In this study, we conducted in-depth interviews with a group of seven educators who were part of a leadership course in OE to understand how they define OEP, what kinds of characteristics an open educator possesses, and what kind of practices open educators enact. We found that OEP is conceptualized as making use of - but not depending on - OER and that it is a practice associated with providing access to knowledge, enhancing dialogue and respect, and valuing the contributions of all subjects in the construction of knowledge. Empirical investigations of OEP can help us better conceptualize how OE is being enacted and provide further insight into how one can conduct professional development.

Keywords: Open Educational Practices; Basic Education; Teacher training.

1. Introduction

Technological changes and social transformations have encouraged educators to continuously experiment, change, and adapt their teaching methods, particularly through information and communication technologies (ICT). This encourages teaching professionals to acquire new knowledge, which is directly related to the constitution of their professional identities. Especially in the context of the COVID-19 pandemic, the growing and urgent need for the introduction of innovative teaching practices associated with new media has become evident.

Innovation is a process inherent in education, as the latter "finds itself engaged in an endless attempt to bridge the gap between the present and the future" (Inbar, 1996, p. 21). From an educational point of view, innovation is a complex concept, conceptualized as variation, restoration, or reform. It is associated with drastic changes and, at other times, portrayed as transformations of a lesser scope.

Innovations are engendered in the various dimensions of educational practice, pertinent to specific cultural and social contexts. The process of innovation in educational practice occurs in the culture in which the practices are conceived, a culture that takes shape from the relations of meaning established socially, inside and outside educational institutions, and that are translated into symbols and shared codes (Cuban, 2013; Chartier, 2002).

Chartier (2002) explains that the relationship with the social world and, consequently, the production of meanings can be understood from the articulation between: (1) *representations* – understood as categories of classification and delimitation in which reality is built, of a collective character; (2) *practices* – ways of acting and doing; and (3) *appropriations* – defined as institutionalized and objectified forms inscribed in practices, which mark the existence of a group. They are of an individual character and, therefore, produce different interpretations of *representations* and multiple ways of being.

The concept of school culture is related to the set of intentionalities and representations inherent to the educational activity and which delimit the actions developed by defining norms, curriculum, practices and behaviors (Julia, 2001) and, consequently, guide expectations, give

meaning to institutional activities and establish the link between action and results (Inbar, 1996).

Educational practices are essential tools for promoting change because they convey ideas, consolidate positions, and teach roles through daily actions. Inbar (ibid.) points out that their role is to mobilize and turn words into action. In this sense, practices become a space for resignification and appropriation, making it possible to change and reorganize culture through different uses of representations and the production of new meanings.

The primary means of introducing innovations through everyday practices consist of *tactics*, which involve manipulating situations that lead to modes of action different from those typically expected while acting within the context of *strategies*, understood as institutionally or socially established rules and controls (De Certeau, 1998).

The concept of educational innovation addressed in this study corresponds to Inbar's definition (2002), according to which innovation "is the reworking of familiar fields of action in new circumstances and the creation of new ways of perceiving and approaching problems" (ibid., p. 23). Cuban (2013) also notes the power of what he calls "incremental changes" or first-order changes, characterized by not engendering profound changes in the way the school is organized. Azanha (1995) suggests approaching educational outcomes as the results of practices in the learning environment, making them the central element for promoting effective change.

As such, innovating implies adapting practices and policies with the aim of improving activities and the organization of existing processes. From this perspective, the changes brought about seek to establish a link and balance between old and new ways of acting, ensuring the conservation of fundamental characteristics of the educational institution, as well as the introduction of innovations, a phenomenon called "dynamic conservatism" by Cuban (2013).

Open Educational Practices (OEP), defined by Cronin as "collaborative practices that include the creation, use, and reuse of OER, as well as pedagogical practices employing participatory technologies and social networks for interaction, peer-learning, knowledge creation, and empowerment of learners" (Cronin, 2017, p. 18), are associated with Open Education, an educational perspective that seeks to update the princi-

ples of progressive education within the context of digital culture (Furtado & Amiel, 2019). These practices represent innovations that can be introduced through daily activities and serve as a tool for transforming the culture of the learning environment.

The *TIC Educação study* (CETIC BR, 2010), a nationally representative survey conducted annually in Brazil, found that 78% of participating urban educators used new media to promote new teaching practices (69% in public schools and 88% in private schools). Among the main approaches mentioned were the use of games and apps in teaching activities, assessments, and the development of subject content. At least some of these pedagogical and didactic skills are aligned with OEP, which raises interesting questions about how OEP can be related to changes and innovations in education.

Therefore, this study aimed to understand the meanings of OEP for educators at the basic education level, focusing on the question: *How do educators conceptualize and enact Open Educational Practices?* The study focused on the perspective of Brazilian educators involved in a course on Open Education Leadership. Its specific objectives were to (1) identify the characteristics inherent to OEP, (2) identify elements of the identity of an open educator and understand their relation to OEP, and (3) identify the perspective on OEP presented by the participants of this study.

2. Forging an Open Educator

In the context of critical knowledge production and social justice, which is the frame for OEP, becoming an open educator involves a process of reconfiguration and repositioning that results from the relationship between practices, theories, and knowledge. According to Garcia, Hypolito, and Vieira (García, 2005) professional teaching identity refers to the set of representations conveyed by the discourse about the ways of being and acting of educators in the exercise of their functions. Therefore, it is necessary to understand the representations related to the actions of open educators to comprehend their interrelation with personal identity and what is required for teacher professional development from the perspective of Open Education.

The knowledge that is essential for teachers in educational practice is configured by a set of individual and collective experiences that are permeated by the social context, and changes according to the conditions of the environment and the interactions among individuals (Cuban, 2013; Tardif, 2014; Nóvoa, 2009). In terms of teacher training, this understanding presupposes a focus on the formative journey and how individuals construct their professional identity (Nóvoa, 200) highlighting the role of personal identities in this process.

Cronin (2017) and Tur et al. (2020) identify a strong relationship between engagement in OEP and the values, beliefs, and attitudes that form the educator's individual identity. According to Cronin, these values are constantly negotiated and occur mainly through practical experience, i.e., through knowledge of experience, as defined by Pimenta (Pimenta, 1999). Dauksienè et al. (2020) attribute the attitude and predisposition of each professional to change their teaching methods as crucial factors in becoming an open educator.

The constitution of the open educator's identity and the transformation of their practices are understood as protracted, challenging, and evolutionary processes of acquiring fundamental expertise based on the sharing of capabilities and experience, resulting in the transformation of individual and collective identities (Tur et al., 2020). During the transition process, it is common to have a prolonged experience of oscillation between old and new identities and practices (Karunanayaka and Naidu, 2020). Vidal (2009) emphasizes that the hybridization of practices represents the welcoming of innovations, allowing their incorporation into everyday ways of doing.

Knowledge about the process of transition of identities and practices is a relevant source of information for the formulation of training strategies for open educators, suggesting greater chances of success from incremental changes (Inbar, 1996) in practices, which can be gradually incorporated into the ways of acting of each educator. Additionally, they indicate that this process must be continuous, requiring the development of a support network throughout the transformation process.

Among the strategies that present themselves as relevant contributions to the professional development of open educators are the reflective action of teaching practice, the development of collaborative work

with peers, and the encouragement of professional autonomy in the learning environment. Reflective teaching practice, as advocated by Nóvoa (2009) and Hegarty (2015), consists of making the factors that promote and limit openness conscious, through continuous examination and revision of one's actions, in order to produce new knowledge and skills. In the context of the professional development of open educators, this strategy contributes to the intentional reorganization of actions, focusing on the constitution of an open learning environment, and, according to Pimenta (1999) is an emancipatory project that bets on teachers as creators of social practice and producers of knowledge.

The engagement in communities of practice, especially among educators of different levels of education, works as a personal learning network (Corous & Veletsianos, 2010) and provides a mixture of experiences, as well as the building of shared technical knowledge (Cuban, 2013), expanding individual and collective knowledge mobilized in action and enabling the consolidation of a culture of openness. On the other hand, the promotion of autonomy in the exercise of teaching allows putting into practice the ability to generate quick solutions supported by tacit and explicit knowledge, besides stimulating creativity (Inbar, 1996), providing more room for the incorporation of innovations.

3. Metodology

The research method involved a combination of semi-structured interviews (conducted online due to the COVID-19 pandemic) and document analysis. The choice of semi-structured interviews was justified by their potential to offer an open perspective on the object of study, as well as by the ease of data collection (Flick, 2009).

The interview questions were developed based on a thematic coding (ibid.) of a literature review, which resulted in three categories of interest with a total of nine open questions. The first category consisted of two questions related to the personal and professional characteristics and contexts of open educators. The second category comprised two questions about the participants' conceptions of open educational practices (OEP). The third category focused on open educator practices and aimed

to understand how participants dealt with issues and challenges in OEP. The interview instrument was semantically validated by three educators.

The main objective of the study was to elicit the participants' conceptions of OEP based on their subjective experiences. Seven teachers from different regions of Brazil who had completed the Open Education Leadership course participated voluntarily in the study. Five of the interviewees had experience in teaching at the elementary and high school levels, and two were employed in higher education and focused on pre-service teacher courses. The inclusion of the latter two aimed to obtain complementary data relevant to teacher training in the context of OEP (Table 1).

Table 1. Study participants.

Professional activity	State
Informatics teacher (basic education)	SP
Geography teacher (basic education)	SP
Informatics teacher (basic education)	SP
Portuguese teacher (basic education)	PA
Teacher (technical middle school)	MG
Teacher (Pre-service teacher training/ *Licenciatura*	GO
Teacher (Language and Literature/ Pedagogy	SP

The corpus of the documentary analysis (Bardin, 2011) consisted of four works that resulted from practices voluntarily shared by participants in the Open Education Leadership course. These materials were considered "open" by the educators in terms of their use and were created before their participation in the course.

3.1. Participants

OEP is part of Open Education, a field that is still limited to a small group of researchers, educators, and people interested in the subject (Amiel & Gonsales, 2018). Considering the objectives of the study, participants needed to have some knowledge of OEP. Thus, they were selected from those engaged in the Open Education Leadership course. It is a free online course for teachers, managers, and technicians in basic education,

promoted by the Open Education Initiative (IEA; aberta.org.br) with the support of UNESCO Brazil.

From 2020 to 2021, the course involved more than 60 education professionals from all over Brazil, distributed in two course offerings/groups. Conducted through synchronous and asynchronous meetings, the course had a workload of 60 hours, structured into six content modules, each with a practical activity. Topics included: OER and related skills (understanding, searching, using, creating, and sharing); choosing open licenses; authoring production and the use of repositories and platforms for sharing resources created by participants, remix, and digital culture and digital rights.

4. Results

The research corpus consisted of the reports resulting from the seven transcribed interviews, as well as the four products of open practices. The data was analyzed through codification and then categorization.

The results of the research were grouped into the three guiding categories of the study. Regarding the characteristics of OEP, the analysis points to OEP as practices that challenge traditional forms of teaching, with the predominance of a conception of practice based on willingness to dialogue, broad access to knowledge, and respect and appreciation of the contributions of students/subjects, making the educator's attitude and the kind of didactics employed relevant. It was noted that their perception is closely associated with an expansive perspective on OEP (Cronin & MacLaren, 2018). Here, OEP are supported by a set of diversified and participatory activities, with or without the support of new media, that aim to promote collaboration, sharing, and equilibrium in teaching-learning relationships, perceiving students as producers and co-authors of their own knowledge. The study identified that the open practices enacted by educators are supported by digital culture, especially through the deployment of open resources and tools to promote learning experiences. Furthermore, there is an understanding that OEP do not depend on the use of OER, and that the lack of knowledge or absence of OER that meet diverse educational objectives is a limiting factor in OEP.

In regard to the characteristics of the open educator, participants revealed that the development of OEP is intrinsically related to the educator's attitude. Among the reasons for adopting open practices, we have evidence, on the one hand, of individual interest and previous experiences with OER/Open Education, and, on the other hand, a need to revisit educational practices in the context of digital culture. Most of the participants indicated that their primary role is knowledge mediation, leading to a predominance of activity centered on the learner. A professional environment with broad sharing and collaboration in the development of experiences and projects was identified as a factor in inducing the sharing of ideas and practices among educators. This was corroborated by how the participants of this study indicated participating in communities of practice. As such, self-concept regarding their role as educators, and the culture of their professional environment, were factors that contributed to the engagement in OEP. Moreover, the analysis indicates that the change of practices towards OEP is enacted through having knowledge of open tools as well as changes in practice. Educators indicated a significant degree of skill with the use of new media and continually seek to improve on these skills. In terms of methods of teaching, the use of diversified strategies, promoting flexibility and collaboration in the construction of knowledge, was highlighted.

Finally, regarding practices by open educators, the analysis of the practices that were part of the corpus supports the representations espoused by participants regarding OEP. This indicates their understanding of OEP as flexible and collaborative educational practices that seek to create a learning environment that fosters freedom and autonomy for participants. Beyond providing access to knowledge, this implies generating opportunities for students, peers, and community members to contribute ideas and activities related to knowledge building and educational practices. The practices identified by the participants exposed everyday situations in diverse learning environments that combine elements such as open technologies, OER, collaboration, and open teaching, all of which contribute to the opening of practices (Huang et al., 2020). These practices vary according to teaching objectives and contexts, meaning that OEP is seen as a product of the quest for the diversification of teaching methods and strategies, with a predominance of

those that stimulate situations of collaboration and sharing. Several collaborative strategies were identified in the observed practices, including interaction only between students, between educators and students, educators and their peers, and even those involving the wider community.

From the point of view of the functions of teaching, a concept explored by Nascimbeni and Burgos (2016), flexibility and participation are made possible by didactic choices (using project-based and problem-based learning to promote collaboration, for example), the selection and use of tools, the choice of content, the flexibility of planning, and the methods of evaluation. In this context, the integration of new media, as well as the use, production, and dissemination of OER were frequently reported.

5. Discussion

The data suggest that in reflecting on OEP, participants present a strong association with an expansive approach to OEP (Cronin & MacLaren, 2018). Based on this analysis, we have come to define OEP as the combination of a set of educational activities guided by an ethical principle, strongly linked to the ideals of social justice, equity, and transparency. It is achieved through the multiple functions of teaching such as planning, instruction, evaluation, curriculum, activities, content, pedagogical practices, and resources. The main objective is to provide experiences that enable the generation of knowledge and learning through sharing and establishing a collaborative network, in which people from different relational levels contribute (peers, external network, students, and educators). This is done by benefiting from new media, but not necessarily promoting individual and collective goals.

Based on this synthesis, the study highlighted relevant areas for an initial framework for the development of OEP, composed of six dimensions:

1. Interpersonal Relations – should be guided by receptiveness and encouragement of the contribution of others (learners, peers, community) in various activities related to the teaching and learning process, contributing to the autonomy of learners.

2. Didactics – employing diversified approaches that promote the free exchange of ideas, as well as the production of knowledge in collaboration between students, educators, and the community.
3. Evaluation – adoption of diversified strategies, including, whenever possible, third-party perspectives and the perspectives of those being evaluated in regards to the products and results of their learning process.
4. Planning – activities are organized in flexible models that allow for the possibility of adapting and incorporating suggestions and ideas, both from the students and from people external to the learning environment.
5. Content – the creation, use, adaptation, and sharing of personal and collaborative works is valued and encouraged.
6. Resources and Tools – the integration of resources and tools that are easily accessible to learners is sought, promoting the use of new media whenever possible and appropriate, especially OER.
7. Reflecting on these dimensions allows for the identification of choices that are more conducive to open practices, facilitating the ongoing process of action and reflection, and consequently guiding possible changes in teaching practices.

6. Conclusion

This article aimed to contribute to the conceptualization of OEP, a concept that is both recent and evolving. Importantly, the findings presented here are based on the experiences and practices of educators with knowledge of the concept, reflecting on their own practices through the lens of OEP. These experiences are contextualized in the culture and reality of Brazil, a developing country in Latin America, focusing on practices carried out in the area of basic education. We believe that this broadens the sociocultural perspectives of the study of OEP, considering that most of the work done on the topic originates in European or North American countries and is focused on higher education. The study resulted in a comprehensive definition of OEP, based on and corroborating the expansive perspective that is prevalent in part of the literature

(Cronin, 2017). A framework resulted from this analysis, which can be an important resource to guide the future development of tools and guidelines for teacher reflection and professional development, particularly in a pandemic and post-pandemic scenario.

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BRIDGES

Removing Cost from the Equation:

A Framework for Assessing OER Programs Without Measuring Savings

Seth Vuletich[1], Patrick Farrell[1]

[1] Colorado School of Mines, Golden, Colorado 80401, USA

Abstract. Cost savings have become a prominent focus of programmatic Open Educational Resources (OER) assessment. While cost savings appear easy to understand, measure, and sell to stakeholders, they belie the breadth of benefits associated with OER and may be based on inaccurate assumptions. A comprehensive approach to assessment is needed to understand the full impact of OER, accurately represent the benefits of OER to stakeholders, and maintain program momentum and sustainability. Libraries and OER share much in common, perhaps most significantly, a foundational purpose of enabling access to information. Librarians are advocates of OER and frequently serve as program administrators. Libraries use evaluation to improve their offerings and sell the value of free goods and services to policymakers and stakeholders. As such, library assessment is well-suited to act as a guide for developing OER program assessment. This paper seeks to provide recommendations for an approach to OER program assessment based on existing OER and library assessment frameworks, with a de-emphasis on cost savings.

Keywords: research, evaluation of open educational resources, framework, assessment, cost savings

1. Introduction

Open Educational Resources (OER) program assessment ensures that efforts and expenditures on such programs are having the intended impacts. Open Education is transforming teaching by accelerating development and allowing for better customization of resources. In addition, OER promotes equitable access to quality educational materials by removing some of the financial burdens associated with higher education. As OER programs mature, redefining the focus of assessment to reflect transformative potential rather than immediate impact is essential for sustainable growth and development.

OER fit naturally within library missions, and so, many libraries facilitate OER programs. Given this relationship, rather than relying on novel techniques for OER, library assessment models might serve as a basis for OER program assessment. Selling the impact of free resources is challenging. How can you assess and then sell the value of something that is free? Library and OER assessment share this common challenge: stakeholder support depends on both a compelling value proposition and a clear narrative about the impacts of programs that do not directly generate revenue.

For OER, a frequent response to this assessment problem is to use cost savings to ascribe financial value to free resources and sell program costs to stakeholders. However, to fully understand the complex financial implications of changing to open course materials, program administrators would need to account for numerous variables such as students who do not purchase the text, textbook sharing, textbook rentals, resale after a course, library reserve copies, and any variety of other use cases that students deploy to reduce their costs. This granularity of assessment is beyond most program administrators' capacities.

The purpose of this paper is to analyze the current state of OER program assessment within the broader context of academic library assessment to develop a framework informed by more reliable and holistic metrics than cost savings alone. Our goal is to align assessment more closely with the mission of OER programs, specifically, providing equitable access to quality educational materials and encouraging open academic discourse.

Assessment functions, in part, as a communication tool by which departments and programs advance an argument in favor of funding, staffing, and institutional support. Cost savings can appear simple or objective in these contexts, but monetary value can sometimes serve as an imprecise proxy for measuring programs that include social impact in their stated goals. This paper reimagines OER assessment, incorporating qualitative and quantitative measures into a framework for OER program administrators.

2. Literature Review

Library assessment emerged in the 1970s as increasingly consumerist views of government and education started to play a greater role in policymaking (Appleton, 2017). The idea of value for money or return on investment came to have more influence on discussions around the costs associated with public services. Benefits associated with assessment are far broader than building support for programs. Assessment relies on data and scientific inquiry; therefore, it promises a set of standardized approaches to the measurement of services. Often drawing from models in private industry, library assessment tends to serve two primary purposes: to convince stakeholders to support a program and to improve the services offered (Crawford, 2006; Chowdhury, 2008). Chowdhury identifies three core attributes of library offerings in their conceptual framework: content, service, and users (Chowdhury, 2008). Assessing how well each of these attributes is served in a library can help to define the direction of library content development, programming, and user experience. Such purposes and attributes used in library assessment are extensible to other public service programs like OER. Additionally, holistic assessment derived from extant OER assessment tools may serve as a basis for a more sustainable framework.

The affordability of education has been the focus of OER development in several countries including the United States of America (UNESCO, 2019; Zaback, 2022). UNESCO's Guidelines on Development of Open Educational Resources Policies contain a section responding to the ubiquity of cost savings as a focus of OER programs, stating: "If

[reducing the costs to access education] is the focus of the policy, OER should be particularly implemented to reduce the costs of providing learning materials on a large scale" (UNESCO, 2019).

These guidelines do not specifically recommend using cost savings as a metric for assessment but provide recommendations on building programs around cost savings when that is a programmatic priority.

In alignment with these recommendations, OER program assessment frequently relies upon the Open Education Group's Cost, Outcomes, Usage, and Perceptions (COUP) framework. As the framework states, "the Cost strand of our work provides empirical evidence about the magnitude and direction of the financial impacts of OER adoption" (Open Education Group, 2022). Numerous studies of OER have been performed with specific focus on cost (Hilton et al., 2014; Wiley et al., 2012). Although cost is often emphasized, COUP provides more comprehensive metrics for assessment. For example, the framework recommends tracking changes in student outcomes like pass, fail, and withdrawal rates, as well as enrollment and graduation rates (Open Education Group, 2022). A comprehensive use of the framework may serve to provide a rounded assessment that cost-saving metrics alone cannot.

The literature reveals several reasons why cost metrics are prevalent in OER program assessment. Belikov and Bodily note that cost savings are easy to understand and incentivize (Belikov & Bodily, 2016). Hilton notes that cost savings are hard to argue with when other metrics, such as the achievement of learning outcomes, often only prove to be the same or sometimes better (Hilton, 2020). Zaback argues that measuring cost savings is necessary, as cost savings have been a driving factor in the development of OER, and such metrics provide a clear and concise method of communicating benefits to stakeholders (Zaback, 2022).

Multi-dimensional assessment of cost is also an element of several frameworks derived from Kaplan and Norton's "Balanced Scorecard" (Appleton, 2017). For example, customer service outputs can be calculated against inputs such as staffing and training. Kaplan and Norton acknowledge that the financial aspect of the scorecard has been criticized in industry by proponents of customer service and/or products-focused assessment (Kaplan & Norton, 1996). However, Kaplan and Norton counter such arguments by noting that financial aspects drive com-

mercial enterprises, so financial assessment is a necessary measure of success. Intended for business applications, the "Balanced Scorecard" argues for assessment targeting sustainability and long-term growth, which necessarily requires a continuous improvement approach to products and programs (ibid.).

In business contexts, financial assessment may be simple to calculate. However, in education, cost savings are not a uniform metric due to regional variations and students' individual situations, making cost savings unreliable. The United States Bureau of Economic Analysis reports regional Purchasing Power Parity (PPP) variance of approximately 22 percent across states and even greater variance when accounting for more granular local assessment (U.S. Bureau of Economic Analysis, 2022). Globally, there are orders of magnitude in variance of PPP between countries [13]. Given this disparity in purchasing power, OER will not result in uniform financial benefits for students. Indeed, the literature suggests that open access to resources provides greater benefit to students who do not have financial access to commercial course materials (Colvard et al., 2018; Grimaldi et al., 2019).

Beyond PPP considerations, methods for assessing cost savings are inconsistent. Zaback identifies several methods deployed to calculate cost savings in OER, noting that there are inconsistencies across programs and institutions (Zaback, 2022). The lack of consistency around any metric presents risk, especially when reporting across departments or institutions. Redman's analysis of data quality notes the maxim that "decisions are no better than the data on which they are based" (Redman, 1998). Additionally, as Jhangiani notes, the focus on cost savings risks creating an OER community singularly focused on replacing expensive resources to the detriment of realizing the full potential of OER (Jhangiani, 2017).

There are also concerns related to the commercialization of OER. David Wiley's motives have been called into question as a founder and Chief Education Officer of Lumen, a for-profit company that sells products to support OER and low-cost academic resources [18]. Wiley is also a notable proponent of OER and the COUP framework and, as such, is cited within this paper. Appleton has identified such potential conflicts of interest in library assessment: "The unfortunate factor about using

return on investment to demonstrate value, and particularly when it is pushed and promoted by commercial publishers, is that it seems to be almost entirely driven by economics, rather than impact and value on society for the greater good" [1]. While commercial entities are beyond the scope of this framework, the commercialization of OER poses a risk to program sustainability.

Alternative frameworks have been developed de-emphasizing the cost strand of the COUP framework. For example, the Resource Inspection Selection and Enhancement (RISE) framework proposes a continuous improvement approach in which qualitative measures such as use and usability are prioritized [19]. Additionally, research suggests that overall student experience, albeit harder to quantify, is positively impacted by the adoption of OER course materials. Weller et al. note, "The impact of OER on emotive aspects related to learning such as satisfaction, enthusiasm, and confidence could be of greater relevance than cost savings" [20]. Building assessment to gain a greater understanding of these benefits might improve program delivery and help sustain funding.

Beyond programmatic assessment of OER, individual OER must also be assessed to determine efficacy for a given course on a case-by-case basis. Most of the literature on this topic identifies quality of resources as the focal point for assessment [21, 22]. Additionally, the ability to modify and continuously improve resources may factor into the decision to use OER, as is demonstrated by the RISE framework [19]. The literature reveals disparate assessment of OER at the individual course and programmatic levels. Our research aims to provide a wide-ranging framework for OER assessment that addresses all levels of programmatic engagement.

Table 1 outlines the advantages and disadvantages of each relevant framework as well as potential areas of assessment that each source considers beyond cost savings.

Table 1. Metrics from the Literature

Framework	Advantages	Disadvantages	Potential Areas of OER Assessment (Beyond Cost)
Appleton	Comprehensive and holistic	Must be adapted to OER	• Benchmarking/Comparisons to other programs • Percent increase in consultations • Use and usage statistics
RISE	Focus on Continuous Improvement OER modification and Student Performance	Intended to automate identification of poorquality resources not to assess programs	• Continuous improvement • Student performance • Modification
COUP	Fairly comprehensive Outcomes, Usage, Perceptions are valuable assessment tools	Assessment tends to focus on cost Framework does not focus on products of OER programs	• Student Outcomes • Student retention • Modification • Perceptions • Awareness
UNESCO	Impetus for many OER pro- grams Identifies critical issues with OER	Not focused on assessment Does not provide metrics	• Capacity • Awareness • Cooperation/Sharing • Efficiency • Equitable access
Achieve	Very granular and detailed	Intended for individual resource selection	• Standards alignment • Equitable access

3. OER Assessment Framework

Effective assessment of OER programs can enhance sustainability, engage stakeholders, and improve the resulting products of such initiatives. Ineffective assessment, on the other hand, can undermine the strengths of these programs. Therefore, it is crucial to choose appropriate metrics that make sense for a given context. Not all the metrics explored in this framework need to be used in every case, but the full list of metrics provides options that may be relevant to local strategic goals.

Madsen and Hurst emphasize the importance of understanding a library's "assessment ecosystem," which refers to the modalities and overall culture of assessment at the program, disciplinary, and campus levels [24]. Similarly, many of the OER assessment frameworks reviewed in this paper rely on institution-level metrics, such as graduation and retention rates, to demonstrate the value of OER.

As a basis for our framework, we used Chowdhury's conceptual framework for library services. The three core attributes of their framework are content, service, and users [3]. These same attributes are applicable to OER programs and serve as logical points of assessment. We then mapped criteria from the previously discussed frameworks to Chowdhury's model to create a list of metrics for OER assessment. There are significant overlaps in Chowdhury's core attributes. For instance, we elected to include accessibility under the "content" attribute because it relates to the material contents. Accessibility also broadens the potential audience by employing inclusive design and thus crosses into the "users" attribute.

After mapping the criteria to Chowdhury's framework, each assessment tool was identified as internal (measures that program administrators can obtain through self-assessment) or external (measures that require data collection from external stakeholders). The type of measure was also identified as qualitative, quantitative, or mixed methods. The full framework is outlined in Table 2. There is no universal set of criteria for evaluation in all contexts but using a mix of internally and externally collected qualitative, quantitative, and mixed methods measures will provide a more complete and compelling narrative for program administrators.

3.1. Content

Evaluation of the content used and produced through OER programs is essential to understand the impact and value of these programs. If textbooks are replaced, the content must be of sufficient quality to meet the learning objectives of the course. Evaluating the originality of OER created may be useful to determine if limited programmatic resources are being expended in ways that maximize impact. Course-specific rubrics and assessment tools have been used by faculty to collect this kind of information (Bodily et al., 2017; Jung & Hong, 2016). Whether this same level of assessment could be consistently implemented at the program level will depend on the context.

Hilton's survey found that the quality and accessibility of ancillary materials, such as problem sets and presentation slides, can influence faculty adoption of OER (Hilton, 2020). Interoperability with Learning Management Systems also impacts the ease and efficiency of faculty adoptions. If faculty are more likely to sacrifice the extensibility of OER for the convenience of commercial products, this may be an area to target for assessment and continuous improvement. Belikov and Bodily's study of faculty perceptions found that the ability to edit and update course materials incentivizes adoption (Belikov & Bodily, 2016).

When it comes to course materials, conducting a thorough inquiry into the content can offer insights into where efforts and funding should be directed. In addition to accuracy and quality (best assessed in collaboration with faculty), determining whether content is optimized to perform well for instructors and students is a key criterion. Content performance across platforms and ecosystems is determined by how the resource is created and maintained. Emphasizing content design supports the value proposition of OER, which is that the quality of resources should be equal to or better than commercial alternatives. A framework that identifies where a resource could and should be developed further serves the dual purpose of demonstrating and realizing the benefits of open course materials.

Table 2. OER Assessment Framework

Frame	Assessment Category	Possible Indicators of Performance	Data Source	Methods
Content	Quality of usedOER materials	Originality of created OER	External	Mixed
		Alignment to standards	External	Mixed
		Types/quantity of modifications to adapted OER	External	Mixed
	Accessibility	Access for users with disabilities	External	Mixed
		Access in different languages	External	Mixed
		Access in different formats	External	Mixed
Service	Awareness	Quantity and percentage of courses using OER at the institution	External	Quantitative
		Student, faculty, and administrator knowledge of OER	External	Mixed
		Student, faculty, and administrator perceptions of OER	External	Mixed
	Instruction and out-reach	Quantity of workshops hosted, topics covered, and attendance num-bers	Internal	Quantitative
		OER consultations and questions asked	Internal	Mixed
		Programmatic offerings relative to peer institutions	Internal	Qualitative
	Capacity	Number of faculty actively engaged in OER	External	Quantitative
		Size of/representation on OER committee	Internal	Mixed
		Personnel trained to find and evaluate OER	Internal	Quantitative
		Departments represented	External	Mixed
Users	Student Outcomes	Pass/fail/withdraw rates	External	Quantitative
		Degree completion rates	External	Quantitative
		Student Learning Outcomes (SLOs)	External	Qualitative
		Student satisfaction with resource/course/institution	External	Qualitative
		Student use of course materials (OER vs. Commercial)	External	Mixed
	Usage	Section and course use of OER	External	Quantitative
		External adoptions/adaptions of original OER created through pro-gram	External	Quantitative
		Reviews/feedback for OER created through program	External	Qualitative
		Growth of OER courses relative to other courses	External	Quantitative

3.2. Service

Evaluating the service provided is necessary to understand how well the OER program and its administration meet the needs of users. The purpose of OER is to serve students better through improved quality, currency, and access. As the point of engagement with prospective users and stakeholders, the service is an area of assessment that can inform how best to increase programmatic participation. Additionally, it can help build sustainable models for OER by identifying where outreach efforts are best spent. If OER is poorly understood, then funding projects are unlikely to improve participation beyond stakeholders already invested in OER. Education and outreach can influence opinions on OER. Belikov and Bodily's study found that perceptions of quality, lack of awareness, and lack of support all serve as barriers to OER adoption and adaptation [9]. Efforts to educate potential instructors and students might serve to alter these perceptions.

To best understand if the services related to OER programs are sufficiently meeting the needs of stakeholders, data on the service offerings must be collected. Mixed methods studies of perceptions and programmatic participation might serve to inform future development and understand the level of campus engagement in OER. Service quality is almost entirely determined internally; these metrics rely on honest self-assessment and comparison benchmarking.

3.3. Users

User-centric programming serves to enhance user engagement and enthusiasm. Furthermore, OER provide added value to end-users. There is no value in switching resources if user needs are being met, and learning objectives are being achieved with existing resources. Student success metrics are easy to obtain, but they may not be particularly valid in the absence of a robust experimental design (e.g., pretest-posttest control group design). More comprehensive metrics, including satisfaction and attitudes toward learning, might help inform program administrators if needs are being met.

Studies around student and course outcomes do not always demonstrate drastic change between OER and commercial course materials. However, the literature suggests OER adoption serves to improve or have no negative impact on the achievement of learning outcomes [25]. Khanna and Basak found that when combining drop, withdrawal, and passing rates, students who used OER were about 6% more likely to complete the class with credit than their peers who did not use OER [25]. Hilton's survey of OER efficacy and perceptions studies found that student performance is not impacted negatively by the use of OER, and faculty and student satisfaction with OER are high [10]. Defining objectives with regards to user outcomes can help benchmark OER programs and sell their impacts.

4. Conclusions

Performance metrics serve as both a means for continuous improvement and a sales device. Monetary performance metrics make return on investment appear as a simple calculus for stakeholders. For this reason, many OER advocates use cost savings metrics to assess OER programs. Creating a culture shift in assessment methods for OER will pose a challenge, and gaining buy-in from stakeholders will require more narrative contextualization. Fortunately, even cost-centric models of assessment, like the COUP framework, encourage more inclusive data collection. The collection of nuanced data and abandonment of flawed data will result in better and more sustainable OER programs.

We hope this framework serves as an outline for viable and comprehensive assessment solutions, but we acknowledge that it is likely in need of refinement, revision, and customization for each program's contextual constraints. Moreover, reporting cost savings is often expected as a condition of receiving grant funding, so the impetus for more narrative and inclusive assessment may fall on institutional program administrators.

Cost savings are not inherently insignificant or unimportant variables in the assessment of OER programs or libraries, but they are difficult to measure with any accuracy. In times of scarcity or in organiza-

tions with scarcity mindsets, metrics such as cost have the appearance of simplicity and objectivity, even though they may be derived from incomplete data and flawed assumptions. Furthermore, a predominant focus on savings tells an incomplete story of the value and significance of OER and may serve as a poor motivator for broad buy-in.

The value of money is inconsistent across geographic boundaries and socioeconomic statuses. Savings may appear insignificant when compared to high tuition rates. Students' experiences are not uniform, so saving money may not factor into any realized benefit for many students. Furthermore, as OER initiatives are already resulting in complete educational programs free from textbook cost, these programs can no longer achieve savings. In such cases, the financial return on investment has vanished, and cost savings as a programmatic assessment tool will ultimately prove unsustainable. As a result, OER program support may diminish. More complete models of assessment will improve program sustainability.

Library experience with assessing goods and services in non-commercial contexts makes library assessment models particularly appropriate for assessing OER. Aligning OER assessment with broader institutional and departmental goals has long been the focus of library assessment. This same approach will help improve OER program assessment. Our framework can help OER administrators identify metrics and methods of assessment to build stronger programs and further sustainability.

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BRIDGES

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Proceedings book of the Online Learning Symposium BRIDGES (funded under the Erasmus+ project BRIDGES). The symposium focused on "Bridging Educational Emergency to Digital Pedagogies" and ran alongside the Open Education for a Better World (OE4BW) conference hosted by the University of Nova Gorica and the Jožef Stefan Institute. The symposium featured research and experience track papers covering various topics related to digital pedagogical practices. Keynote speakers delivered talks on a range of subjects, including the role of Open Education in emergencies such as COVID-19, best practices in open pedagogy, leadership and language issues in open education and inclusive knowledge societies, open source authoring tools for creating open educational resources, and the application of visual communication technologies in education. The track was led by BRIDGES consortium members and featured 21 research and experience papers presented across five sessions. The research and practitioner papers in this proceeding have been peer-reviewed and selected for publication by the scientific committee.

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