encore+

European Network for Catalysing Open Resources in Education

OER Innovation Report: Drivers, Barriers, Challenges and Enablers

encore+

OER Innovation Report

Version 1.0 - November 2023

Drivers, Barriers, Challenges and Enablers

encore+

European Network for Catalysing Open Resources in Education

Coordinator of this work:
The Open University, UK

Participants:
The Open University, UK

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Table of contents

Co-funded by the
Erasmus+ Programme
of the European Union

Executive Summary

This report focuses on improved understanding of stakeholders for whom innovation with and through open educational resources (OER) is relevant, and uses desk research to provide an analysis of the opportunities presented by OER to a range of stakeholders, including educational institutions, faculty, learning designers, educational technology providers, industry and services. Open Educational Resources (OER) are teaching, learning and research materials in any medium – digital or otherwise – that are in the public domain and/or released under an open licence that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. They are free at the point of use and 'free' in the sense that they provide users with greater freedoms in how resources are shared, used, customised and iterated. Compatible definitions of OER are provided by UNESCO, Hewlett Foundation and OER Commons.

This report is a deliverable for the ENCORE+ project under the work package 'Supporting Innovation in the European OER Ecosystem' (D6.1). This work package analyses the conditions under which OER leads to (or supports) innovation in business and higher education contexts. Innovating is a key part of how OERs are used, as resources are typically adapted or transformed for use in a new context. Siloed forms of OER reuse - often limited to a single classroom - can make it harder for others to take advantage of the effective practice of others, limiting the spread of innovation. Routes to understand OER innovation for different stakeholders are needed, and can be provided through an improved understanding of the drivers and enablers of innovation as well as the challenges faced. This report thus develops an understanding of the key features of OER innovation and acts as a foundation for evaluating instances of innovation (D6.4).

Table 1 summarises the clusters of drivers, barriers and enablers as they relate to the key focus areas of the study. These are expanded upon in the body of the report below.

Co-funded by the
Erasmus+ Programme
of the European Union

Summary of Drivers, Barriers and Enablers for OER Innovation

	Drivers	Barriers	Enablers
Structural, Systemic & Contextual Factors	• Access & Equity Strategy • Reducing Costs • Knowledge & Learning • Responding to Crisis and Disruption	• Aligning Strategy for OER Adoption • Shaping Institutional Practice • Navigating Cultural and Global Realities • Implementing OER and Assessing Impact	• Community Engagement and Advocacy • OER Strategy • Support and Resources
Pedagogical Practice	• OER as Collaboration Catalyst • Institutional Culture • Pedagogical Enhancement • Improve Learning Outcomes	• Curriculum Integration • Educator Engagement • Implementation • Localisation	• Innovative Practice • Perspective Change • Pedagogical Support
Information, Awareness & Attitude	• Attitudinal Change • Awareness of OER/OEP	• Access • Encultured Practice • Low Awareness • Knowledge & Impact • Quality & Trust	• Stakeholder Engagement • Educator Mindset • Knowledge Base • Quality Feedback Mechanisms • Empowered Vision

Table 1. Summary of Drivers, Barriers and Enablers for OER Innovation

Co-funded by the Erasmus+ Programme of the European Union

	Drivers	Barriers	Enablers
Resourcing & Sustainability	• Funding Streams • Reducing Costs	• Funding • Resourcing • Sustainability	• Funding Models • Institutional Support • Capacity Building
Technology & Infrastructure	• Access to Technology • Compatibility/Interoperability	• Infrastructural • Sociotechnical • Technological	• Accessibility and Usability • Open Infrastructure/Ecosystem • Interoperability and Integration • Digitalisation & Emergent Technologies
Policy & Culture	• Policy • Institutional Alignment • Localization	• Policy Gap • Institutional Approach • Change Management	• National • Strategic • Alignment with Equity, Diversity and Inclusion

Table 1. Summary of Drivers, Barriers and Enablers for OER Innovation (cont.)

Co-funded by the Erasmus+ Programme of the European Union

Method

This study used a systematic review to identify relevant literature. The results of this initial search were then read collaboratively and qualitatively by the researchers before compiling results and impressions of the body of literature as a whole. A shared spreadsheet and document were used to organise the analysis. Five researchers were involved in reviewing an initial data set of 637 results. The first stage reduced this to 328 through a quality and relevance filtering process. The remaining results were reviewed in more detail with a focus on OER innovation and the related drivers, barriers, challenges and enablers.

Literature Search & Filtering

The SCOPUS abstract & citation database was used for the search. SCOPUS indexes almost 28,000 scientific journals; more than 290,000 books; and 11 million conference papers.

The initial search was for any combination of the terms “OER” and “innovation” and provided 238 results. The second search was for “OER” and “drivers” or “barriers” or “challenges” or “solutions”. This yielded 399 results. The total resources considered was therefore 637. 188 duplicates and false positives were removed.

Items published in 2015 and before were then excluded so as to focus on more recent publications which reflect the current maturity of OER implementation. There were 121 such resources. The remaining 328 publications formed the basis of the systematic review.

During the review process some items were filtered out for the following reasons:

- No empirical data
- Not sufficiently focused on OER
- Low quality

The following (76) were removed: 2 book chapters, 29 conference proceedings, 45 journal articles. With these removed, the final sample was 252. The final sample included the following: 1 book chapter, 53 conference proceedings, 198 journal articles. These resources can all be found in the references section. Some literature reviews were included where they provided secondary reporting on empirical data.

Co-funded by the
Erasmus+ Programme
of the European Union

The journal titles appearing most frequently in the dataset are *International Review of Research in Open and Distance/Distributed Learning* and the *Journal of Interactive Media in Education*, publications with an emphasis on open education. However, a range of other journals with diverse areas of focus are also represented. In some cases these are examples of OER practices being adopted and advocated within different subject areas across the arts and sciences. There are relatively few extant publications which take as their theme OER and innovation. It was also found that research papers on OER innovation mainly originate in North America and the Global South. Evidently, very little research on OER innovation originated in Europe over the time period considered by this study.

Review Process

The review was conducted by researchers from the Institute of Educational Technology at The Open University (UK) as part of the ENCORE+ project. Having several researchers was deemed preferable since it can act as a counterbalance to individual bias and interpretation. This also meant that publications in several languages could be considered. The researchers, who are all research active in the field of open education, were:

- Dr. Carina Bossu
- Dr. Robert Farrow (study lead)
- Dr. Francisco (Paco) Iniesto
- Dr. Rebecca (Beck) Pitt
- Prof. Martin Weller

Scoping and planning the study took place between September and December 2022, and the review of literature took place between December 2022 and February 2023.

Data extraction focused on identifying relevant information and extracting this into a shared document organised into drivers, barriers, challenges and enablers. This information was abstracted and recombined experimentally in various ways using different themes to cluster and make sense of the data before arriving on the presentation here. The process of combining and recombining the data was completed in August 2023.

Co-funded by the
Erasmus+ Programme
of the European Union

The recombined data was verified through peer review and some minor changes made to categorisation. Once categorised, the research team wrote brief commentaries to interpret and make sense of the clustering that was produced. These were peer-reviewed by the researchers. The draft report was also proof-read for sense and copyediting by members of the ENCORE+ project before publication.

Co-funded by the
Erasmus+ Programme
of the European Union

Limitations

This study has several limitations which relate to the generalisability of the findings.

1. *Selection*. The data set was chosen to be of a manageable size and scope according to the constraints of the project; it is possible that important texts were omitted because of the way that resources were selected from a specific time period, by using certain key phrases, or through excluding some scientific databases. This study is based in a particular dataset as described in the methods and does not refer to resources from outside this period.

2. *Ambiguity*. A higher-order finding of this study is that the term 'innovation' is used ambiguously in the research literature. This seems partly explained by the relative maturity of an OER implementation. For those audiences unused to the basic proposition of OER, the use of OER *is* the innovation. This applies even when the OER is being substituted for proprietary resources without using any affordances of open licences, such as remix, localisation or repurposing. The literature identified examples where OER is being introduced to a new audience as an innovation behaviour. The researchers differentiate this from an interest in OER as a driver of innovation and change within a particular context. This second sense reflects a more mature, experimental perspective on the potential of OER and is the focus for the study, but there is no obvious way to differentiate these two senses when searching scientific literature tagged with both 'OER' and 'innovation'. Similarly, the drivers, barriers and enablers associated with OER innovation are often presented in relation to adoption rather than OER enabled innovation behaviours per se, and it can be challenging to distinguish factors driving the adoption of OER from those supporting downstream innovation behaviours.

3. *Decontextualisation*. The vast majority of resources referred to in this study relate to a particular socioeconomic, cultural and historical context. In this study we attempt to derive from these a generalised understanding of the drivers, barriers, challenges and enablers of OER innovation. This process requires a degree of interpretation and reconstruction that others might not agree with, and some would dispute such an approach altogether. Our goal in this study is not to determine an empirical proof of lawlike relationships which describe OER and innovation, but to articulate a wider understanding of how these various factors could be understood to interrelate. The findings of the study are an abstraction and shorthand description of a range of possibilities that have been

identified by others and not a roadmap to a concrete state of innovation with or through OER. Rather, we trust that the value of this research is in the richness of its depiction of the complexity of factors affecting OER implementations.

4. *Positionality*. The results presented here should be understood as an interpretation of the data set. Other interpretations are possible (and may indeed be preferable). The drivers, barriers, challenges and enablers presented here represent the views and subjective perspectives of the researchers on a complex body of knowledge.

5. *Reduction*. More than 250 resources, many of them individually complex, have been summarised and thematically mapped in this study. It is inevitable that some nuance from the original works is lost in this process. The emphasis of this study is on wider systematic and structural features, meaning that descriptions of contextual relevance and importance are not foregrounded even when they might be essential to understanding a particular case.

Reporting Structure

Results of the study are presented below according to thematic groupings. In each section a table shows the identified drivers, barriers/challenges and enablers associated with the theme. The interplay of drivers, barriers, and enablers profoundly influences the successful implementation and evolution of Open Educational Resources (OER). Understanding these dynamics is paramount for educators and institutions striving to harness the transformative potential of OER for the benefit of both students and the broader educational community.

Drivers

By 'drivers' we refer to those factors which generate interest in innovative practice with OER. This impulse or source of inspiration has an influence on activity and is directed towards a particular set of interests. Drivers can be economic, political, cultural, ideological, institutional or personal. In many cases, OER is seen as an innovation route to achieving some other goal. In this sense, drivers are catalysts or motivators that stimulate innovation and adoption of OER in education. Some of the commonly cited drivers include cost reduction, improving access to education, and pedagogical improvement or experimentation. Stoffregen et al. (2016) suggest dividing barriers relating to open e-learning into contextual (resourcing, management, regulation, technological fit); social (national characteristics, ICT skills, digital divide); and technical (availability of resources, interoperability, privacy, security, usability). This categorisation is broadly incorporated into the reporting below.

Barriers/Challenges

Barriers are obstacles or challenges that impede the successful implementation and adoption of OER in educational contexts. Specifically in this study we focus on those factors which are reported to affect innovation behaviours such as those associated with the affordances of open licensing. However, much of the literature also treats any use of OER as an innovation and thus concentrates on barriers to adoption. This is not incorrect in that adoption and use are a precondition of further innovation, but arguably implies the need for a maturity model which more clearly delineates the changing nature of barriers to use of OER over time.

In the initial review of literature the terms "barriers" and "challenges" were treated separately. This proved not to be a meaningful distinction in the literature since they

are often used interchangeably. In the reporting below they are combined into one category.

Enablers

Enablers are factors or strategies that facilitate the successful integration and adoption of OER innovations in educational settings. Schuwer & Janssen (2018) note that barriers and enablers are often different formulations of the same observation or idea. We do not disagree with this insight and do not wish to overstress semantic differences. Our review of literature is upfront about such ambiguities. We make the distinction that drivers reflect originary or external motivations while enablers are a more direct response to a perceived challenge. Enablers reflect a degree of maturity in an OER implementation and are themselves often the reported results of innovation or experimentation. Many of the enablers identified originate from a change in institutional or business practice, the basis of which was the attempt to overcome or solve a problem limiting the use of OER. These kinds of factors often involve extending conversations into new stakeholder relationships; reformation of institutional or pedagogical practice; and developing enculturation around the use of OER.

Stakeholders

ENCORE+ embraces an understanding of the relevant stakeholders that is ecosystem wide, incorporating perspectives from education and business. The following table, which uses the UPIG categories, summarises a possible view of this ecosystem. UPIG (users, providers, influencers, governance) is a simple stakeholder model which can accommodate a wide range of types and use cases. The presentation here also describes differences of scale (macro, meso, micro). The ENCORE+ stakeholder map was validated through feedback from various groups of relevance at workshops, presentations and online events. (See the ENCORE+ website for more details.) This forms the basis for understanding how the findings can be applied to concrete groups - though of course not all factors are relevant to all parties.

	USERS			PROVIDERS	INFLUENCERS					GOVERNANCE
MACRO	MOOC Providers National/ International Education Providers National & International Training Providers Open Education Initiatives	Repositories	Publishers	Ed Tech Companies Infrastructure Providers Technology Providers	Funders International Development Agencies International Education Partnerships Lobbyists NGOs Philanthropy	Leaders	Broadcast Media	Policymakers	Management	Student Assessment and Testing Organizations Standardization Bodies Quality Assurance Agencies Ministries
MESO	Companies and Employers Continuous Education Industry and Corporate Sector Lifelong Learning Initiatives Training Providers			Collections Course Providers Galleries, Libraries, Archives, Museums Open Access Publishers Open Source Software Communities	Advocacy Groups Charities Education Associations Open Data and Open Science Communities Open Education Communities Professional Associations Professional Organizations Researchers & Scientists Student Organizations: Trade Unions and Labor Organizations		Social Media			Local Governments and Municipalities Evaluators Educational Authorities Copyright and Intellectual Property Experts
MICRO	Community-Based Organizations Educators Instructional Designers Learner Support Services Learners Workers			Content Creators Education Technology Startups Libraries Remixers	Accessibility and Inclusion Advocates Advocates of OER Education Consultants Institutional actors Learning Analytics Experts Parents and Guardians Private Foundations and Donors					Copyright/Data Officers Higher Educational Institution decision makers Student Governments

Table 2. ENCORE+ OER Stakeholder Model

Co-funded by the
Erasmus+ Programme
of the European Union

Results

Structural, Systemic & Contextual Factors

Drivers	Barriers / Challenges	Enablers
Access & Equity Strategy • **Accessibility** (Coughlan et al., 2016; Moreno, Caro & Cabedo, 2018; Navarrete & Lujan-Mora, 2016a; Sanchez-Gordon & Lujan-Mora, 2016) • **Effective patronage (**Abeywardena et al., 2018) • **Expand teacher education** (Buckler et al., 2021) • **Growing numbers of tertiary students worldwide** (Dix, 2016) • **Improve access to education** (Ben Brahaim, Khribi & Jemni, 2017); Bohrer et al., 2016; Bossu et al., 2016; Brahim et al., 2020; Blackmon, 2018; Blomgren, 2018; Hameed & El-Ameer, 2020; Henderson & Ostashewski, 2018; Herrera-Cubides et al., 2022; Kopp, Gröblinger & Zimmermann, 2017; Mays, 2020; Mazohl et al., 2018; Wong & Li, 2019) • **Lifelong learning (**Navarrete & Lujan-Mora, 2016b)	*Aligning Strategy for OER Adoption* • **Collaboration across borders** (Saay & Margaria, 2020) • **Continual improvement** (Bodily, Nyland & Wiley, 2017) • **Knowledge sharing** (Bohrer et al., 2016) • **OER strategy in relation to cost, quality, and access** (Abeywardena, 2017; Pande et al., 2019) • **Quality assurance** (Almazyad, 2019) • **Training educators and virtual mobility** (Jacqmot, Docq & Deville, 2020; Otto, 2019) *Shaping Institutional Practice* • **Developing institutional OER publishing workflows** (Santiago & Ray, 2020; Perez, 2017) • **Establishing generic OER policies** (Tisoglu, Kursun & Cagiltay, 2020) • **Harmonising OER initiatives** (Santos-Hermosa et al., 2020)	*Community Engagement and Advocacy* • **Campus-based OER advocacy** (Hassan et al., 2019) • **Discipline-specific OER workshops** (Santiago & Ray, 2020) • **Growing availability of OER** (Navarrete, Lujan-Mora & Peñafiel, 2016) • **Involving a wider range of stakeholders** (Morales & Baker, 2018; Ng, Ng & Liu, 2019; Reid & Maybee, 2021; Ren, 2019; Tlili et al., 2020) • **Non-profit/Higher Education collaboration** (Lin, 2019) • **OER as a boundary object** (Ritella et al., 2017) • **Synergies between interest groups and coordination** (Ponte, Lennox & Hurley, 2021) • **Volunteer communities** (DeVries, 2019)

Co-funded by the
Erasmus+ Programme
of the European Union

• **Meeting increased demand for non-formal learning** (Zhu & Kadirova, 2020) • **Social justice (**Bencheva & Kostadinov, 2019; Cox & Trotter, 2016; Henderson & Ostashewski, 2018; Jenkins et al., 2020) *Reducing Costs* • **Increasing costs of traditional educational materials** (Craig, 2020; Delgado et al., 2019) • **Reduce student costs** (Farrow, Pitt & Weller, 2020; Fischer, Ernst & Mason, 2017; Henderson & Ostashewski, 2018; Hilton, 2020; Hollister & Patton, 2021; Julien et al., 2018) *Knowledge & Learning* • **Contributing to the knowledge society** (Masterman, 2016; Pande et al., 2019) • **Increased access to knowledge** (Mengual-Andrés & Rico, 2018) • **Personal / cultural practice** (Rolfe, 2017) *Responding to Crisis & Disruption* • **Cost of living crisis** (McGreal et al., 2022)	• **Resistance to change in higher education** (Bonami, Nocenzi & Passarelli, 2020) • **Shifting from operational compliance to strategic engagement** (Cox & Trotter, 2016) *Navigating Cultural and Global Realities* • **Acknowledging cultural nuances** (Abeywardena et al., 2018; Bencheva & Kostadinov, 2019) • **Addressing differing OER terminology and approaches** (Bohrer et al., 2016; Baran & Al Zoubi, 2020) • **Managing diverse OER development levels across countries** (Alkhasawneh, 2020; Ayoub, Amin & Wani, 2020; Kosmas et al., 2021) *Implementing OER and Assessing Impact* • **Ensuring comprehensive OER coverage** (Dumbraveanu, 2021) • **Exploring the impact of OER on specific groups** (Jenkins et al., 2020) • **Finding suitable OER resources** (Mays, 2020) • **Incorporating contextual factors into OER research** (Kılıçkaya & Kic-Drgas, 2021) • **Integrating OER into curriculum**	*OER Strategy* • **Digital transformation and change readiness** (Bonami, Nocenzi & Passarelli, 2020) • **Increased interest in microcredentials** (McGreal et al., 2022) • **Institutional experimentation with digitalization and innovation** (Orr, Weller & Farrow, 2019) • **Integrating OER across different levels of education** (Abeywardena et al., 2018) • **Institutional vision** (Almazyad, 2019) • **Mainstreaming OER checklist** (Abeywardena, 2017) • **OER as a strategic approach** (Axe et al., 2020; Datt & Singh, 2022) *Support and Resources* • **Central role for academic library services** (Cooke, Rivera & Rokusek, 2022; de Jong, Munnik & Will, 2019; Ferguson, 2017; Kohout-Tailor & Sheaffer, 2020; Petrides, Goger & Jimes, 2016; Perez, 2017; Vogus, 2019; Zaid & Alabi, 2021) • **Centralising the role/contribution of instructional designers** (Ren, 2019) • **Institutional services and support** (Axe et al., 2020; Datt & Singh, 2022; Sheu

Co-funded by the Erasmus+ Programme of the European Union

• **Covid-19 pandemic disruption** (Gill et al., 2020; Rocha et al., 2021; Sánchez González et al., 2022)
  ○ **Increased demand for online education (**Markin, 2021; McGreal et al., 2022)
  ○ **Support for teachers during Covid** (Mays et al., 2021)
	seamlessly (Lin, 2019)
	• **Localising OER materials** (Ponte, Lennox & Hurley, 2021)
	• **Monitoring the learning process effectively** (Tlili et al., 2021)
	• **Providing necessary ancillary materials** (Ponte, Lennox & Hurley, 2021)
		& Shih, 2017; Tillinghast, 2020; Towey et al., 2017b; Wiley et al., 2016; Zhang & Li, 2017)
		• **OER Steering Committee** (Anderson, Kelly & Lynch, 2021)
		• **Readiness of campus personnel** (Anderson, Kelly & Lynch, 2021; Otto, 2019)
		• **Stimulation by internal grant-making** (Schuwer & Janssen, 2018; Thomas & Bernhardt, 2018)
		• **Streamlining the process of quality review** (Navarrete & Martinez-Mosquera, 2020)
		• **Support for educators in creating/using OER** (Henderson & Ostashewski, 2018)
		• **Tools for collaboration (multi-language)** (Nurhas et al., 2016)

Table 3. Summary of Drivers, Barriers and Enablers relating to Structural, Systemic & Contextual Factors

Commentary

Many of the conditions which act as drivers for innovation with OER are also drivers for the uptake of OER. At the structural or systemic level, OER can be seen as a strategic route to a range of goals. Improving access to education was the most commonly cited driver of OER innovation (Ben Brahaim, Khribi & Jemni, 201); Bohrer et al., 2016; Bossu et al., 2016; Brahim et al., 2020; Blackmon, 2018;

Co-funded by the Erasmus+ Programme of the European Union

Blomgren, 2018; Hameed & El-Ameer, 2020; Henderson & Ostashewski, 2018; Herrera-Cubides et al., 2022; Kopp, Gröblinger & Zimmermann, 2017; Mays, 2020; Mazohl et al., 2018; Wong & Li, 2019). We also see emergent variations or nuances within this broad goal, including improved accessibility, expansion of teacher education, or lifelong learning programmes. A related cluster of drivers relate to the reduction of student expenses against a background of increasing costs (Farrow, Pitt & Weller, 2020; Fischer, Ernst & Mason, 2017; Henderson & Ostashewski, 2018; Hilton, 2020; Hollister & Patton, 2021; Julien et al., 2018). Improving access was found to be an innovation driver both in relation to individual practice and the more abstract theme of equitable knowledge. The final cluster of drivers relate to the impact of the Covid19 pandemic (Gill et al., 2020; Rocha et al., 2021; Sánchez González et al., 2022) and a surge in demand for online education in general (Markin, 2021; McGreal et al., 2022; Mays et al., 2021).

We similarly observe barriers and challenges relevant to adoption of OER in the second column. A key theme that emerges from the challenges is the difficulties associated with coordination and harmonisation of efforts. Implementing change and strategizing around the delivery of OER can be complex. One focus area is in the difference between the imagined and realised forms of implementation, where complexities in adapting, localising and integrating OER become apparent. These features can be observed at a more strategic, cultural level but also in relation to very specific institutional implementations, where challenges can relate to concrete implementation and evaluation of OER.

Addressing these barriers can act as a motivator of innovative practice. In the enablers identified under this category we find a range of inspirations for engagement and advocacy, strategy, and support for OER. Community engagement often results from increasing the involvement of a wide range of stakeholders, seeking synergies between groups and coordinating efforts. One interesting concept here is the idea of OER as a 'boundary object' which facilitates or catalyses this kind of interaction. At the strategic level an important set of innovation enablers regards institutional vision and willingness to embrace change as essential. OER can in this way be seen as an integral part of innovating higher education or digitalisation strategy. The final cluster of enablers relate to specific forms of support offered to the teaching and learning process. The central role of library and other campus services are repeatedly cited as being central to this, often with some changes to the provision of such services (Cooke, Rivera & Rokusek, 2022; de Jong, Munnik & Will, 2019; Ferguson, 2017; Kohout-Tailor & Sheaffer, 2020; Petrides, Goger & Jimes, 2016; Perez, 2017; Vogus, 2019; Zaid & Alabi, 2021). We also see more stratified examples such as a focus on quality review (Navarrete & Martinez-Mosquera, 2020) or support with implementation by educators (Anderson, Kelly & Lynch, 2021; Henderson & Ostashewski, 2018).

Co-funded by the
Erasmus+ Programme
of the European Union

Pedagogical Practice

Drivers	Barriers / Challenges	Enablers
OER as Collaboration Catalyst • **Facilitating collaboration** (Axe et al., 2020; Baas et al., 2023; Baran & Al Zoubi, 2020; Bencheva & Kostadinov, 2019; Blomgren, 2018; Kruger & Hollister, 2021) *Institutional Culture* • **Facilitate institutional culture of pedagogical innovation, collaboration** (Coughlan et al., 2019; Otto, 2019; Senn et al., 2022; Smirani & Boulahia, 2022) *Pedagogical Enhancement* • **Facilitate elearning** (Bonami, Nocenzi & Passarelli, 2020) • **Improve learner confidence** (Alario-Hoyos et al., 2017) • **Improved pedagogy through co-creation** (Mazzucato & Kic-Drgas, 2021) • **Support problem-based learning** (Breathnach, Murphy & Margaria, 2021) *Improving Learning Outcomes*	*Curriculum Integration* • **Difficulty finding resources** (Henderson & Ostashewski, 2018; Oelfke et al., 2021; Todorinova & Wilkinson, 2020) • **Integrating OER into existing curriculum** (Daukšienė et al., 2020; Dreisiebner et al., 2021) • **Lack of appropriate resources** (Brandle, 2018) • **OER doesn't necessarily change the curriculum** (Daukšienė et al., 2020) • **OER limited to being supplementary** (Jung & Hong, 2016; Lin, 2019) • **OER selection can be challenging** (Reid & Maybee, 2021) • **Pedagogical concerns, learning design** (Burgos & Corbí, 2018; Oelfke et al., 2021; Truong, Denison & Stracke, 2021; Wong & Li, 2019) *Educator Engagement* • **Adjunct faculty (part-time, mandated textbooks)** (Cooke, Rivera & Rokusek, 2022) • **Digital access is not the preferred mode for some trainers** (McFaul & Fitzgerald, 2021)	*Innovative Practice* • **Accessible and interactive OER** Liu & Johnson (2020) • **Adaptive learning** Tlili et al. (2021) • **Design for and support the 'open' aspect in teaching/pedagogy** Lin (2019) **Design OER for reuse** (Zhang et al., 2021) • **Emphasis on complex problem solving, critical thinking, creativity, and collaboration** (Axe et al., 2020) • **Gamification** (A Quaffas et al., 2020) • **Innovative assessments** (Chan et al., 2021) • **Learners as co-creators of OER** (Andone et al., 2020) • **Non disposable assignments** (Seraphin et al., 2019; Werth & Williams, 2021b) • **Open pedagogy** (Seraphin et al., 2019; Tillinghast, Fialkowski & Draper, 2020; Vera et al., 2022; Werth & Williams, 2021a; Werth & Williams, 2021b) • **Participatory pedagogy** (Axe et al., 2020) • **Personalisation of OER/MOOC** (Hajri, Bourda & Popineau, 2017; Kaabi et al., 2020) • **Reflective curation** (Deshmukh & Sahasrabudhe, 2020)

Co-funded by the Erasmus+ Programme of the European Union

• **Improve student performance** (Bodily, Nyland & Wiley, 2017; Nagashima & Hrach, 2021) • **Improve success of TVET learners** (Mazohl, Ossiannilsson & Makl, 2018) • **Improve student learning** (Blackmon, 2018; Brandle, 2018; Kwak, 2017; Schuwer & Janssen, 2018) • **Inadequacy of proprietary textbooks** Finlayson (2020)	• **Educator engagement** (Hollister & Patton, 2021; Hood & Littlejohn, 2017) • **Educators slow and/or reluctant to adapt to online learning** (Jacqmot, Docq & Deville, 2020) • **Educators expected to perform roles traditionally fulfilled by publishers** (Wang & Wang, 2017) • **Lack of innovative teaching strategies** (Tlili et al., 2021) • **Lack of skills to develop OER** (Kimball et al., 2022a; Muganda, Samzugi & Mallinson, 2016) • **Learner anxiety around using OER** (Axe et al., 2020) • **Open sharing is not common practice** (Schuwer & Janssen, 2018) *Implementation* • **Gap between theory and practice** (Schuwer & Janssen, 2018; Nkuyubwatsi, 2018; Villar-Onrubia, 2022) • **MOOC dropout rates (**Kaabi et al., 2020) • **Patterns of engagement with OER are not uniform** (Sunar, 2020; Tlili et al., 2020; Zaatri et al., 2020) *Localisation*	• **Student co-creation with interdisciplinary teams** (Breathnach, Murphy & Margaria, 2021) • **Virtual OER/OEP laboratories** (El Kharki et al., 2021) • **Visualisation that can draw on OER and expand teaching** (Burgos & Corbí, 2018) *Perspective Change* • **A 'produsage' paradigm for creating, sharing and repurposing OER** (MacKinnon & Pasfield-Neofitou, 2016) • **Active OER adopters re-appropriate (rather than just use) existing OER** (Pulker & Kukulska-Hulme, 2020) • **Constructivist pedagogy** (Karunanayaka et al., 2016; Senn et al., 2022) • **Engagement changes educator practice** Hood & Littlejohn (2017) • **Integrate OER into teaching** (Rivera & Chotto, 2017) • **OER being used in practice (not just theory)** (Arnett, 2018) • **Professional development / reflective practice** (Finlayson, 2020; Risquez et al., 2020; Senn et al., 2022; Tillinghast, 2020) *Pedagogical Support* • **Blended approach to repository use**

Co-funded by the Erasmus+ Programme of the European Union

	• **Accounting for regional differences** (Jung & Hong, 2016) • **Language barriers** (Abeywardena et al., 2018; Baas et al., 2022; Cinganotto & Cuccurullo, 2016; Datt & Singh, 2022; Dreisiebner et al. 2021; Georgiadou & Kolaxizis, 2019; Kosmas et al. 2021; Kwak, 2017; Maharaj, Upadhyay & Trivadi, 2021; Mishra et al, 2022; Navarrete & Martinez-Mosquera, 2020; Olivier, 2018; Pounds & Bostock, 2019; Zhu & Kadirova, 2020) • **Localising OER** (Wolfenden & Adinolfi, 2019) • **Paternalism (Global North)** (King, Pegrum & Forsey, 2019) • **Using OER outside of the original contex**t (Jacqmot, Docq & Deville, 2020; Sunar, 2020)	(Risquez et al., 2020) • **Effective online learning design** (Andone & Vaisu, 2016) • **Flexibility in delivery** (Andone, Vaisu & Ternauciuc, 2017; Jacqmot, Docq & Deville, 2020; Ng, Ng & Liu, 2019) • **Pedagogical support** (Schuwer & Janssen, 2018) • **Personalised learning pathways for diverse learners** (A Quaffas et al., 2020) • **Provision of OER/MOOC in non-English languages** (King, Pegrum & Forsey, 2019) • **Recommending appropriate resources to learners** (Brahim et al. 2020) • **Regular review of course content & delivery** (Cozart, Horan & Frome, 2021) • **Scaffolding of pedagogical activity by educators** (Axe et al., 2020; de Jong, Munnik & Will, 2019) • **Social interactions** (Sandanayake; 2019)

Table 4. Summary of Drivers, Barriers and Enablers relating to Pedagogical Practice

Commentary

Pedagogical practice and how educators and learners find, utilise, teach and learn with OER is a key aspect of OER innovation. Drivers include supporting and facilitating collaboration as well as the role of OER in supporting wider institutional change. OER can also enhance pedagogical approaches through facilitating elearning, improving confidence, support problem-based learning and encourage co-creation. Further pedagogical drivers for OER use include improvements to student performance and learning outcomes, particularly

Co-funded by the
Erasmus+ Programme
of the European Union

for certain groups of students). The role that OER development or reuse can have in providing specific, localised materials for classes, where no suitable resources currently exist (see Finlayson (2020) on developing a "World Regional Geography" open textbook, for example) is also an important driver for OER innovation.

There are a variety of barriers and challenges reported by the literature with regard to using OER. Although a driver for OER use can be a lack of suitable existing proprietary resources, a variety of challenges can be faced by users who chose to utilise OER and integrate it into, or use it to replace, existing resources. Todorinova & Wilkinson (2020) in their survey of educators who participated in one institution's programme to make use of reduced cost materials and openly licensed content, reported "major deterrents" included "…the lack of a comprehensive catalogue of OER, the difficulty of finding OER that meets a specific need, the lack of resources in their specific subject area…" The visibility and ease of finding materials, and especially that of identifying appropriate resources can hinder reuse.

If suitable resources are identified, language barriers were the most frequently mentioned challenge when localising OER (Abeywardena et al. (2018); Baas et al. (2022); Cinganotto & Cuccurullo (2016); Datt & Singh (2022); Dreisiebner et al. (2021); Georgiadou & Kolaxizis (2019); Kosmas et al. (2021) Kwak (2017; Maharaj, Upadhyay & Trivadi (2021); Mishra et al. (2022); Navarrete & Martinez-Mosquera (2020); Olivier (2018); Pounds & Bostock (2019) and Zhu & Kadirova (2020)). The dominance of English language OER and consequently Global North discourses and approaches can also hinder OER innovation. Language barriers make finding suitable OER more challenging and can also result in additional costs for translation. More broadly, if suitable resources are identified, possibilities for reuse can be limited by the pedagogical approach or learning design of the OER concerned (see Burgos & Corbí, 2018; Oelfke et al., 2021; Truong, Denison & Stracke, 2021 and Wong & Li, 2019). Consequently, blending existing resources with OER can be a challenge.

Incentivising and supporting educators is a key enabler to OER innovation. A range of challenges and barriers were reported in the literature (e.g. lack of skills, teaching strategies and unfamiliarity with open sharing) and training could be used to address some of these (e.g. Finlayson, 2020; Risquez et al., 2020; Senn et al., 2022 and Tillinghast, 2020)). Ongoing institutional support for educator experimentation with innovative and different pedagogical approaches as well as encouraging student co-creation could also enable

Co-funded by the
Erasmus+ Programme
of the European Union

OER innovation and address identified barriers and challenges. Ensuring that all faculty are engaged in the process of OER innovation is also important as some educators (e.g. those who work part-time) may currently have limited opportunities to engage (e.g. Cooke, Rivera & Rokuse, 2022).

Co-funded by the
Erasmus+ Programme
of the European Union

Information, Awareness & Attitude

Drivers	Barriers / Challenges	Enablers
Attitudinal Change • **Change in mindset regarding open & OER** (Abeywardena, 2017; Baas, Admiraal & van den Berg, 2019; Baran & Al Zoubi, 2020; Chotto & Rivera, 2017; Christoforidou & Gerogiadou, 2022; Kopp, Gröblinger & Zimmermann, 2017; Kumar & Singh, 2019; Kwak, 2017) *Awareness of OER/OEP* • **Learning from the shared examples of others** (Ponte, Lennox & Hurley, 2021) • **Growing awareness of OER** (Dell, 2021; Wiche & Ogunbodede, 2021) • **Growing awareness of open pedagogy** (Shemy & Al-Habsi, 2021)	*Access* • **Addressing student concerns** (Jaggars, Folk & Mullins, 2018) • **Disregard of users with disabilities (**Brahim et al., 2020; Ben Brahaim, Khribi & Jemni, 2018) • **Lack of accessibility studies** Moreno, Caro & Cabedo (2018) *Encultured Practice* • **Changing the narrative around professional development** (Buckler et al., 2021; Werth & Williams, 2021a; Leufer et al., 2019) • **Difficulty establishing the suitability of OER for specific use** (Jung, Sasaki & Latchem, 2016) • **Difficulty in sourcing high-quality images with correct attribution** (Perez, 2017) • **Educator resistance** (Henderson & Ostashewski, 2018) • **Encouraging educator uptake** (Hollister & Patton, 2021) • **Lack of educator understanding** (Henderson & Ostashewski, 2018; Tlili	*Stakeholder Engagement* • **Cultural readiness** (Anderson, Kelly & Lynch, 2021; Truong, Denison & Stracke, 2021) • **"Diversity of experience"** (Jiménez-Castañeda et al., 2019) • **Engage stakeholders** (Anderson, Kelly & Lynch, 2021) • **Instructor willingness to embrace OER** (Karipi, Mawela & Van-Wyk, 2022) • **Profile/visibility of OER** (Islim & Caglitay, 2016; Judith & Bull, 2016) • **Promote OER-based learning among undergraduates** (Sandanayake, 2019) • **Raise awareness through outreach (conferences, workshops)** (Farrow, Pitt & Weller, 2020; Zaid & Alabi, 2021) • **Using OER in teaching leads to conversations about copyright** (Kohout-Tailor & Sheaffer, 2020; Lin, 2019) *Educator Mindset* • **Enculturing the publication of educational materials as OER** Alkhasawneh (2020)

Co-funded by the Erasmus+ Programme of the European Union

	et al., 2020) • **Low prestige of OER in countries where the concept is new** (Dumbraveanu, 2021) • **OER is not common practice** (Schuwer & Janssen, 2018) • **Personal barriers** (Tang & Bao, 2021) • **Some educational cultures are 'closed' by tradition** (Shemy & Al-Habsi, 2021) *Low Awareness* • **Lack of understanding about open licences** (Hassan et al., 2019; Luo et al., 2020; Tisoglu, Kursun & Cagiltay, 2020; Wright et al., 2016) • **Lack of a comprehensive catalogue of OER** (Todorinova & Wilkinson, 2020) • **Lack of awareness of OER** (Buckler et al., 2021; Datt & Singh, 2022; Farrow, Pitt & Weller, 2020; Islim & Cagiltay, 2016; Mays, 2020; Muganda, Samzugi & Mallinson, 2016; Otto, 2019; Pérez-Paredes et al., 2018; Pounds & Bostock, 2019; Senn et al., 2022; Zaid & Alabi, 2021) • **Lack of awareness of OER policies** (Marín et al., 2022) • **Low awareness of OER among learners** (Georgiadou & Kolaxizis, 2019; Hassan et al., 2019)	• **Emotional regulation** (Zhang, 2020) • **Empathic approaches to implementation** (Axe et al., 2020) • **Make the innovative features of open sharing and reuse clear to educators** (Schuwer & Janssen, 2018) • **Popularity/awareness of tools are drivers of uptake** (Schön, Ebner & Hornung-Prähauser, 2017) • **Support for copyright issues** (Nagashima & Hrach, 2021; Otto, 2019; Schuwer & Janssen, 2018) *Knowledge Base* • **Growing body of research on impact of OER** (Jenkins et al., 2020) • **OER tools should emphasise transparency** (Schön, Ebner & Hornung-Prähauser, 2017; Sunar, 2020; Tammaro et al., 2017; Vollman, 2021) • **Proof of efficacy** (Hilton, 2020) • **Share data about educational systems** (Saay & Margaria, 2020) • **Sharing localised examples of good practice** (Jemni & Khribi, 2016) • **Use of tools such as LitMaps to track and build a picture of OER research and the relation between publications** (Kaur et al., 2022)

Co-funded by the
Erasmus+ Programme
of the European Union

	• **Low awareness of OER in specific regions** (Karipi, Mawela & Van-Wyk, 2022; Kinyua, 2021) *Knowledge & Impact* • **'Dark' reuse of OER** (Arnett, 2018) • **Demonstrating the efficacy of OER** (Hilton, 2020) • **Lack of accessibility studies** (Moreno, Caro & Cabedo, 2018) • **Lack of research reflecting specific regions or countries** (Julien et al., 2018) • **Most research focuses on adoption, not innovation** (Luo et al., 2020) • **Need for more research into student perceptions and experiences** (Lin, 2019) • **Understanding the impact of OER intervention(s)** (Jenkins et al., 2020) *Quality & Trust* • **Differing perceptions of OER** (Lin, 2019) • **Improving recognition of open textbooks** (Brandle, 2022; Kruger & Hollister, 2021) • **Low quality of domain specific OER**	*Quality Feedback Mechanisms* • **Community-driven OER taxonomy** (Tovar, Chan & Reisman, 2017) • **Contextual specificity** (Oelfke et al., 2021; Villar-Onrubia, 2022; Wijayati et al., 2022; Wolfenden & Adinolfi, 2019; Zhu & Kadirova, 2020) • **Quality reviews for OER** (Fischer, Ernst & Mason, 2017) • **Reusability aligned with learning analytics** (Bodily, Nyland & Wiley, 2017) • **Scoring OER quality in repositories** (Gordillo, López-Fernández & Verbert, 2020) • **Student feedback** (Cooney, 2017) *Empowered Vision* • **Acceptance from staff and administration that refinement happens** Kimball et al. (2022a) • **Desire to experiment with pedagogy** (Masterman, 2016) • **Emphasis on autonomy and user needs** (Petrich, 2020) • **Increased "open thinking" in learners as a result of OEP/OER** (Jung & Lee, 2022) • **Institutional mission** (Masterman, 2016)

Co-funded by the Erasmus+ Programme of the European Union

	(Pounds & Bostock, 2019) • **Low acceptance/trust of OER** (Pande, 2019) • **Perception that OER are lower in quality** (Julien et al., 2018) • **Quality concerns** (Brandle, 2018; Navarrete & Martinez-Mosquera, 2020; Ponte, Lennox & Hurley, 2021)	• **Instructor willingness to embrace OER** (Karipi, Mawela & Van-Wyk, 2022) • **Sector-specific OER competence frameworks** (Voß et al., 2018) • **Shared vision/philosophy** (Petruccoal & Ferranti, 2020) • **Student empowerment** (Mazzucato & Kic-Drgas, 2021)

Table 5. Summary of Drivers, Barriers and Enablers relating to Information, Awareness & Attitude

Commentary

Relatively few drivers were identified in the category of information, awareness and attitudinal factors. This may reflect the notion that such aspects are less likely to be considered drivers in their own right. The clear trend was for drivers relating to developing mindsets and opinions around OER and OEP which then drives behaviour in these areas (Abeywardena, 2017; Baas, Admiraal & van den Berg, 2019; Baran & Al Zoubi, 2020; Chotto & Rivera, 2017; Christoforidou & Gerogiadou, 2022; Kopp, Gröblinger & Zimmermann, 2017; Kumar & Singh, 2019; Kwak, 2017). These papers tended to reflect growing interest in open approaches and innovations. These interests can be in specific areas such as open pedagogy (e.g. Shemy & Al-Habsi, 2021) or OEP (e.g. Dell, 2021; Wiche & Ogunbodede, 2021) which then drives a wider interest in innovation.

Much more pronounced are the range of barriers associated with these themes, and the general concept here seems to be that lack of information and awareness of open leads to a range of perceptions or misunderstandings that can inhibit innovative practice. A general lack of awareness of OER was commonly cited as a barrier (e.g. Buckler et al., 2021; Datt & Singh, 2022; Farrow, Pitt & Weller, 2020; Islim & Cagiltay, 2016; Mays, 2020; Muganda, Samzugi & Mallinson, 2016; Otto, 2019; Pérez-Paredes et al., 2018; Pounds & Bostock, 2019; Senn et al., 2022; Zaid & Alabi, 2021). Even when there is some awareness of open, there can be a lack of familiarity with specific areas such as open licences (Hassan et al., 2019; Luo et al., 2020; Tisoglu, Kursun & Cagiltay, 2020; Wright et al., 2016) or policy (Marín et al., 2022). This lack of information seems to form the basis of other, related clusters. For instance, we identify a range of barriers relating to the intransigence of existing, encultured open practice in areas such as professional development (Buckler et al.,

2021; Werth & Williams, 2021a; Leufer et al., 2019) and the association of low prestige (Dumbraveanu, 2021). There are two other (related) clusters which seem to relate to these issues. Firstly, shortcomings in the knowledge base itself. These can be in specific research areas such as accessibility (Moreno, Caro & Cabedo, 2018), student experience (Lin, 2019) or more structural aspects such as the 'dark' nature of OER reuse (Arnett, 2018). Low awareness and a perceived lack of evidence gives rise to the second barrier cluster of quality (Brandle, 2018; Navarrete & Martinez-Mosquera, 2020; Ponte, Lennox & Hurley, 2021) and trust (Pande, 2019) concerns.

How can the shortfall of information and awareness be addressed? Here there is no shortage of suggestions. The first cluster of enablers relate to improved stakeholder engagement to raise awareness of OER through teaching activities ((Islim & Caglitay, 2016; Judith & Bull, 2016; Kohout-Tailor & Sheaffer, 2020; Lin, 2019) and dedicated outreach activities (Farrow, Pitt & Weller, 2020; Sandanayake, 2019; Zaid & Alabi, 2021). The second set of clustering relates to changing educator mindsets regarding the potential of OER. These tended to present diverse strategies aimed at a common goal, and ranged from practical guidance to the more aspirational. This readiness among educators is further supported by the third cluster which calls for an improved evidence base around OER. These enablers varied in their specificity but tended to emphasise open practice and transparency about how the knowledge base is formed to complement the open nature of implementation (n.b. Schön, Ebner & Hornung-Prähauser, 2017; Sunar, 2020; Tammaro et al., 2017; Vollman, 2021). A related aspect refers to the improvement of feedback mechanisms about OER implementation, often organised around providing information of greater local specificity and relevance (Oelfke et al., 2021; Villar-Onrubia, 2022; Wijayati et al., 2022; Wolfenden & Adinolfi, 2019; Zhu & Kadirova, 2020). The final cluster of enablers represent the beginnings of a paradigm shift in awareness by reflecting an enduring change in the vision and expectations of educators. Again, these represent diverse possibilities but often appeal to the principles of greater autonomy and empowerment of local actors.

Co-funded by the
Erasmus+ Programme
of the European Union

Resourcing & Sustainability

Drivers	Barriers / Challenges	Enablers
Funding Streams • **National funding of OER initiatives** (Bossu et al., 2016; Julien et al., 2018) *Cost Reduction* • **Reducing costs** (Blomgren, 2018; Brandle, 2022; Pitt et al., 2020; Ren, 2019; Stanberry, 2022; Sweet & Clarage, 2020; Thomas & Bernhardt, 2018; Todorinova & Wilkinson, 2020) • **Reuse of resources** (Hood & Littlejohn, 2017; Kosmas et al., 2021)	*Funding* • **High capital startup costs** (Dutta, 2016) • **OER production dependence on institutional funding** (Santos-Hermosa, Ferran-Ferrer & Abadal, 2017) *Resourcing* • **Economic constraints** (Truong, Denison & Stracke, 2021) • **Insufficient time for reflective practice** (Masterman, 2016) • **Non-obvious costs associated with OER** (Pande, 2018; Wiley et al., 2016) • **Time constraints** (Abeywardena et al., 2018; Ayoub, Amin & Wani, 2020; Datt & Singh, 2022; Ferguson, 2017) • **Time/quality pressures for OER creation** (Nagashima & Hrach, 2021; Pande, 2018) • **Training in IT** (Kinyua, 2021)	*Funding Models* • **Financial incentives for OER adoption** (Smirani & Boulahia, 2022; Zaid & Alabi (2021) • **Grants/awards** (Kimball et al., 2022a) • **State support** (Anderson, Kelly & Lynch 2021; Katz, 2019) • **Stipend programme to encourage adoption** (Katz, 2019; Hollister & Patton, 2021) *Institutional Support* • **Increased support for school children** (Mengual-Andrés & Rico, 2018) • **Organise adequate support for ICT, legal and educational aspects** (Otto, 2019; Schuwer & Janssen, 2018) • **Support for localisation** (Judith & Bull, 2016) • **Supports can be organised around the OER life cycle** (Senn et al., 2022) • **Virtual support structures** (Sungkur & Santally, 2019)

Co-funded by the
Erasmus+ Programme
of the European Union

	Sustainability • **Conflict with profit motive** (Otto, 2019) • **Openness can add to educator burden** (Jacqmot, Docq & Deville, 2020) • **Unsustainable funding models** (Coughlan et al., 2019; Katz (2019))	*Capacity Building* • **OER creation (book) sprints** (Zapata, 2020 • **OER 'Incubators'** (socio-technical system for development, 4-8 week sprints) (Ryder et al., 2020) • **Reach out to OER community for advice and support** (Finlayson, 2020) • **Supporting OER projects beyond project duration** (Jemni & Khribi, 2016) • **Training in digital education** (Keshavarz & Ghoniem, 2021)

Table 6. Summary of Drivers, Barriers and Enablers relating to Resourcing & Sustainability

Commentary

Resourcing and sustainability of OER have been topics of considerable interest for as long as OER have been around, and emerge as key to supporting innovation. Making the case for OER project funding can take many forms, and finding models to sustain OER creation and adoption beyond initial funding has proven problematic. The Drivers of resourcing can be found through national directives, for instance Bossu et al (2016) focus on an Australian national roadmap for OER adoption. A more local, and identifiable driver can be the desire to reduce costs, particularly for students, which is part of the motivation for initiatives such as the Z degree. Like many researchers, Blomgren (2018) identifies cost saving as one benefit amongst many. Perhaps a less common driver for resourcing is the benefit for educators in engaging with reuse. Hood & Littlejohn (2017) state that "adult educators learn from and through their engagement with OER in the contexts of their work".

Some of the barriers to funding have been well documented. These include startup costs to get an OER initiative underway, and a reliance on institutional funding. Resourcing can be impacted by economic constraints, usually as one of many as Truong, Denison & Stracke (2021) report in the Vietnamese context. Many resourcing barriers relate to factors around OER adoption, which are not always

Co-funded by the Erasmus+ Programme of the European Union

obvious. For instance, Wiley et al. (2016) identify locating OER, managing open licence compatibility and attribution requirements, effectively integrating OER into teaching and learning practices and integrating OER into campus technologies like learning management systems all as additional resourcing implications. Lack of relevant IT skills, or time to reflect upon educational practice can also impact upon OER adoption. Nagashima & Hrach (2021) identify " the lack of time to locate, customise, and create teaching materials with OER" as a resourcing issue. Teachers are generally time-poor and although OER adoption may save time in the long-term, in the short term there is often a resourcing issue. This is seen with the long-term sustainability when the initial project funding may have been used, and OER becomes business as usual. This can be particularly problematic for issues such as accessibility, as Coughlan et al (2019) highlight "forms of human support that provide responsiveness to accessibility issues in formal study are rarely provided for in open learning".

Enablers for resourcing and sustainability inevitability start with funding. This can be in the form of financial incentives or stipends for faculty to adopt OERS, grants for OER creation or state wide initiatives to adopt and curate OER. These and other approaches can form part of institutional support, which Senn et al (2022) aligned with each phase of the OER life cycle, of Search, Evaluation, Adaptation, Use, and Share. A strong theme in enablers was that of capacity building, which can take the form of a common infrastructure to allow easy sharing of resources, structured approaches to OER creation such as book sprints, or community enhanced models such as incubators. The long term sustainability of any OER approach will inevitably rely on sufficient capacity building, and so this is an element that needs to be considered from the outset. Resourcing and sustainability are key issues for successful OER implementation and provide a foundation for innovation. The analysis above combines what might be termed 'hard' factors, such as financial incentives and funding streams with 'soft' factors such as community building and educator reflection. Getting the balance of these factors correct is key to the long term sustainability of any OER project.

Co-funded by the
Erasmus+ Programme
of the European Union

Technology & Infrastructure

Drivers	Barriers / Challenges	Enablers
Access to Technology • **Internet access** (Dutta, 2016; Kinyua, 2021) • **Growing access to smart technologies (including in the developing world)** (Dutta, 2016; Stefanovic & Milosevic, 2016) *Compatibility/Interoperability* • **Formats used across platforms and devices** (Abdulameer & Abdullah, 2020; Blackmon, 2018; Choudhury, 2018; Kopp, Gröblinger & Zimmermann, 2017) • **Convergence of simpler ways to share learning resources** (Dix, Malizia & Gabrielli, 2016)	*Infrastructural* • **Inadequate technological infrastructure** (Abeywardena, 2017; Abeywardena et al., 2018; Alkhasawneh, 2020; Datt & Singh, 2022; MacKinnon & Pasfield-Neofitou, 2016; Venegas-Muggli & Westermann, 2019; Wiche & Ogunbodede, 2021; Wong & Li, 2019) • **Lack of affordable technology and energy** (Kinyua, 2021) • **Lack of internet access** (Afolabi, 2017; Datt & Singh, 2022; Mays et al., 2021; Singh et al., 2021; Wiche & Ogunbodede, 2021) • **Lack of mobile and internet coverage** (Mays, 2020) • **Platformisation** (Jacqmot, Docq & Deville, 2020) • **Technological readiness is not distributed evenly** (Jemni & Khribi, 2016) *Sociotechnical* • **Accessibility** (Abdulameer & Abdullah; 2020; Navarrete & Lujan-Mora, 2016b;	*Accessibility and Usability* • **Accessible repositories** (Hajri, Bourda & Popineau, 2018; Iniesto et al., 2021; Perifanou & Economides, 2022b) • **Ease of use (good searching, classification, and download functions)** (Chan et al., 2020; Pounds & Bostock, 2019) • **Effective metadata** (Hajri, Bourda & Popineau, 2017; Hajri, Bourda & Popineau, 2018; Judith & Bull, 2016; Mosharraf & Taghiyareh, 2020) • **Usability and accessibility of OER tools** (Schön, Ebner & Hornung-Prähauser, 2017; Sunar, 2020; Tammaro et al., 2017; Vollman, 2021) *Open Infrastructure/Ecosystem* • **Centralized OER repositories** (Schuwer & Janssen, 2018) • **Complex technological frameworks for OER with systems for quality, feedback, motivation, usability, and reusability** (Abdulameer & Abdullah, 2020; Anderson, Kelly & Lynch, 2021; de Jong, Munnik & Will, 2019)

Co-funded by the Erasmus+ Programme of the European Union

	Peláez & Yunga, 2016; Tlili et al., 2020) • **Institutional repositories can become silos** (Perifanou & Economides, 2022a; Piedra et al., 2016; Risquez et al., 2020) • **Lack of technological support** (Alkhasawneh, 2020) • **OER repositories not being user-friendly** (Guzmán-Arias, Solís-Céspedes & Francesa-Alfaro, 2019; Otto et al., 2021a) • **Paywalls and mandatory account creation** (Chan et al., 2020; Kinyua, 2021) • **Poor implementation of OER in LMS** (Horn, Anderson & Pierick, 2018) • **Promoting equal/uniform engagement** (Arnett, 2018) • **Supporting reuse of OER is not considered by creators** (Kinyua, 2021) • **Technical challenges** (Breathnach, Murphy & Margaria, 2021; Datt & Singh, 2022; Truong, Denison & Stracke, 2021) *Technological* • **Discoverability** (Cortinovis et al., 2019; Iniesto et al., 2021; Perifanou & Economides, 2022a)	• **More open OER repositories lead to better educational outcomes and more reuse** (Santos-Hermosa, Ferran-Ferrer & Abadal, 2017) • **Web 2.0 ecosystems** (Da Lima-Lopes & Biazi, 2021) *Interoperability and Integration* • **Interoperability of resources** (Brandle, 2018) • **LMS/OER integration** (Guzmán-Arias, Solís-Céspedes & Francesa-Alfaro, 2019; Sabitha et al., 2016; Villar-Onrubia, 2022) • **Linked data integration** (Herrera-Cubides et al., 2022) • **Linked Open Data** (Cortinovis et al., 2019; Mosharraf & Taghiyareh, 2016; Piedra et al., 2016) *Digitalisation & Emergent Technologies* • **OER software architecture** (Stefanovic & Milosevic, 2016) • **Blockchain for OER tracking, attribution, sustainability** (Marjit & Kumar, 2020) • **Use of digital devices in OER** (Mazohl, Ossiannilsson & Makl, 2018) • **Use of emergent technologies for OER challenges** (Tlili et al., 2021)

Co-funded by the Erasmus+ Programme of the European Union

	• **Inadequate or non-systematic metadata** (De Deus & Barbosa, 2022) • **Inadequate technological skills** (Afolabi, 2017; Axe et al., 2020; Zhu & Kadirova, 2020) • **Interoperability issues** (Herrera-Cubides et al., 2022) • **Metadata challenges** (Abdulameer & Abdullah, 2020) • **OER repositories can be slow with inaccurate metadata** (Perifanou & Economides, 2022c) • **Publishing platforms that don't accommodate OER** (Essmiller & Asino, 2021)	

Table 7. Summary of Drivers, Barriers and Enablers relating to Technology & Infrastructure

Commentary

Technology and infrastructure are driven by two key areas, first the “access to technology” which is determined by having access to the internet as what can be considered a bottleneck (Kinyua, 2021) and those sets of new smart technologies that are appearing and that might require skills (Dutta, 2016). Second “compatibility and interoperability” which can be complex across platforms and formats that have been created with different purposes and can mean a problem of incompatibility because of a lack of common standards (Choudhury, 2018) but also an opportunity to find simpler ways to share learning resources (Dix, Malizia & Gabrielli, 2016).

Co-funded by the
Erasmus+ Programme
of the European Union

Some of the main barriers identified include those which are infrastructural such as an inadequate technological infrastructure (Alkhasawneh, 2020) a lack of affordable technology and energy (Kinyua, 2021) or mobile and internet coverage (Mays, 2020). Other barriers have socio technical characteristics and implications such as lack of accessibility for those users with special needs (Abdulameer & Abdullah; 2020), OER repositories not being user-friendly (Guzmán-Arias, Solís-Céspedes & Francesa-Alfaro, 2019) or directly not supporting the reuse of OER (Kinyua, 2021). A third set of barriers is technological, which among many can include problems of discoverability of OERs (Perifanou & Economides, 2022a) inadequate technological skills (Zhu & Kadirova, 2020) and interoperability issues (Herrera-Cubides et al., 2022), meaning that a lot of work cannot be even found by external bodies or reused due to the bad application of metadata and standards when designing such technologies or infrastructures.

In terms of enablers for technology and infrastructure, some of them were identified as barriers such as providing better accessibility and usability to users with special needs and adapting accessible repositories when applied in the design stages (Hajri, Bourda & Popineau, 2018). That aspect affects the OERs usually included in those repositories (Sunar, 2020). The use of an open ecosystem is an enabler in OER repositories that are centralised (Schuwer & Janssen, 2018) or systems which take care to include several added values such as quality, feedback or reusability control (Anderson, Kelly & Lynch, 2021). Interoperability and integration are both important aspects to enable technology, and linked data (Cortinovis et al., 2019) should be placed to better integrate LMS, repositories (Sabitha et al., 2016) and educational resources (Brandle, 2018). Finally, the digitalisation and emergent technologies to support as enablers should include the use of digital devices in OER (Mazohl, Ossiannilsson & Makl, 2018) and emergent technologies for OER challenges (Tlili et al., 2021).

Technology and infrastructure are key for having fair and universal access to repositories in particular and OER in general, potentiating the design of systems which include standards for metadata allows discoverability and reusability. Those two aspects can allow the inclusion of innovative technologies and different types of devices which should take into account usability and accessibility for those with special needs.

Co-funded by the
Erasmus+ Programme
of the European Union

Policy & Culture

Drivers	Barriers / Challenges	Enablers
Policy • **Institutional policies regarding the use of OER and/or open licences** (Abeywardena, 2017; Baas et al., 2023; Chotto & Rivera, 2017; Kumar, Baishya & Deka, 2021; Kwak, 2017; Pande, 2019; Risquez et al., 2020; Rolfe, 2017; Tlili et al., 2020) • **Policies incentivising OER activity** (Abeywardena, 2017; Anderson, Kelly & Lynch, 2021; Baas et al., 2022b; Baas, Admiraal & van den Berg, 2019; Baran & Al Zoubi, 2020; Christoforidou & Gerogiadou, 2022; Kwak, 2017) • **Strategic approaches to knowledge production and dissemination** (Ramirez-Montoya, 2020) *Institutional Alignment* • **OER are aligned to assessments** (Abdulameer & Abdullah, 2020; Ayoub, Amin & Wani, 2020; Baas et al., 2022; Baran & Al Zoubi, 2020)	*Policy Gap* • **Lack of sustainable OER development policies** (Yang & Kinshuk, 2016) • **Legal or legislative limitations** (Truong, Denison & Stracke, 2021; Wright et al., 2016) • **Policy does not necessarily lead to the adoption of OER** (Schuwer & Janssen, 2018) • **Policy gap** (Bossu et al., 2016) *Institutional Approach* • **Academic competition between institutions and educators** (Pounds & Bostock, 2019) • **Institutional conservatism** (Cooke, Rivera & Rokusek, 2022; Coughlan et al., 2019) • **Institutional culture** (Masterman, 2016) • **Institutional strategies are diverse** (Orr, Weller & Farrow, 2019) • **Institutional support for proprietary resources** (Coughlan et al., 2019) • **Lack of academic recognition for OER development** (Afolabi, 2017; Kumar, Baishya & Deka, 2021)	*National* • **National strategy** (Bossu et al., 2016; Karipi, Mawela & Van-Wyk, 2022) *Strategic* • **Connect policy to wider educational innovations** such as transition to blended learning or enhancing customization of education for individual learners (Schuwer & Janssen, 2018) • **Promotion by professional bodies** (Brandle, 2022) *Alignment with EDI* • **Decolonizing curriculum** (Mays, 2020) • **OER as a way to fulfil DEI strategy** (Stanberry, 2022)

Co-funded by the
Erasmus+ Programme
of the European Union

• **OER are aligned to courses** (Abdulameer & Abdullah, 2020; Ayoub, Amin & Wani, 2020; Luo et al., 2020) • **OER are aligned to learning outcomes** (Abeywardena, 2017; Baas et al., 2022) *Localization* • **Accounting for regional differences** (Jung & Hong, 2016) • **Contextualization** (Karunanayaka et al., 2016) • **Provide OER in local language(s)** (Abeywardena et al., 2018; Cinganotto & Cuccurullo, 2016; Kosmas et al., 2021; Kwak, 2017)	• **Lack of institutional support** (Alkhasawneh, 2020; Kimball et al., 2022a) • **Student voices unheard** (Bossu et al., 2016) *Change Management* • **Communication issues** (Towey et al., 2017a) • **Consistency of approach** (Jiménez-Castañeda et al., 2019) • **Difficulty of organising efforts** (Breathnach, Murphy & Margaria; 2021) • **Lack of awareness of the benefits of OER among stakeholders** (Schuwer & Janssen, 2018) • **OER use imposed from above** (Cox & Trotter, 2016) • **Paradigm shift requires holistic approach** (Bonami, Nocenzi & Passarelli, 2020) • **Prioritising change** (Ponte, Lennox & Hurley, 2021)	

Table 8. Summary of Drivers, Barriers and Enablers relating to Policy & Culture

Co-funded by the
Erasmus+ Programme
of the European Union

Commentary

Educational policies can encourage the development and adoption of OER that reflect diverse perspectives and cultures, promoting inclusivity and customization of education for all learners. Schuwer & Janssen (2018) suggest that policy can play a crucial role in facilitating the transition to blended learning and enhancing the customization of education for individual learners. Policies can set guidelines and provide incentives for institutions to incorporate Open Educational Resources (OER) and technology-driven approaches into their teaching methods, which align with the goals of blended learning and customization. Hence we observe that policy is used as a key driver of OER activity in a range of studies, clearly showing that top-down policy directives are an important motivation. The two most common forms are policies which mandate either open licences for institutional work or incentivise OER activity directly in some way. Both these approaches support an environment conducive to innovation in practice. In the second cluster of drivers we see more granularity in what this means for institutions: incorporating OER directly into key activities such as course delivery and assessment. The final cluster of drivers concerns the attempt to benefit from existing OER in new contexts through contextualization and (particularly language) localization.

While drivers in this area are largely similar across contexts, there is more variety in the barriers found. This is perhaps to be expected, since localisation challenges are diverse. The first cluster here pertains to a structural shortfall between the ambition of policy and what is delivered or supported in practice. We see greater variety in the remaining two clusters. Institutional approaches - which can be understood as closely related to the 'policy gap' - are sometimes limited by their ability to adjust to a new paradigm or the inconsistency of attempts to adopt open practice. This can result from various forms of institutional conservatism (Bossu et al., 2016; Cooke, Rivera & Rokusek, 2022; Coughlan et al., 2019; Pounds & Bostock, 2019) or a lack of institutional support or recognition (Afolabi, 2017; Kimball et al., 2022a; Kumar, Baishya & Deka, 2021). The final cluster of barriers regard the difficulties associated with managing change, including communicating and managing expectations of change (Ponte, Lennox & Hurley, 2021; Schuwer & Janssen, 2018; Towey et al., 2017a) and ensuring that strategies are 'joined-up' and holistic rather than piecemeal (e.g. Bonami, Nocenzi & Passarelli, 2020; Cox & Trotter, 2016).

Relatively few enablers were identified compared with other categories in this study and tended towards different forms of re-strategization. Bossu et al. (2016) and Karipi, Mawela & Van-Wyk (2022) emphasise the role of national strategies in shaping education. OER policies can be integrated into broader national strategies for education, supporting the transition to blended learning and enhancing customization. These strategies often set the direction for educational innovation and can promote the use of OER to

Co-funded by the
Erasmus+ Programme
of the European Union

achieve these goals. Mays (2020) highlights the importance of decolonizing curriculum, which can be driven by policy changes. Stanberry (2022) similarly underscores that OER can be a means to fulfil Diversity, Equity, and Inclusion (DEI/EDI) strategies. Brandle (2022) discusses the promotion of OER by professional bodies as another route to improving culture around OER.

Co-funded by the
Erasmus+ Programme
of the European Union

References

A Qaffas, A,, Kaabi, K., Shadiev, R. & Essalmi F. (2020). Towards an optimal personalization strategy in MOOCs. *Smart Learning Environments*, 7(1). https://doi.org/10.1186/s40561-020-0117-y

Abdulameer M H and Abdullah M Z;. (2020). Recent Techniques of Open Educational Resources. In: *2019 Imam Al-Kadhum International Conference for Modern Applications of Information and Communication Technology, MAICT 2019*. Institute of Physics Publishing. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85086408886&doi=10.1088%2f1742-6596%2f1530%2f1%2f012031&partnerID=40&md5=8e0a369fabae756854f6f2bbca077f16.

Abeywardena I S. (2017). An empirical framework for mainstreaming OER in an academic institution. *Asian Association of Open Universities Journal,* 12(2), pp.230-242. https://doi.org/10.1108/AAOUJ-11-2017-0036

Abeywardena, I., Karunanayaka, S., Nkwenti, M. & Tladi, L. (2018). A Collaborative Approach to OER Policy and Guidelines Development in the Commonwealth: The Case of Botswana, Cameroon, and Sri Lanka. *International Review of Research in Open and Distributed Learning*, 19(2). https://doi.org/10.19173/irrodl.v19i2.3415

Afolabi, F. (2017). First Year Learning Experiences of University Undergraduates in the Use of Open Educational Resources in Online Learning. *The International Review of Research in Open and Distributed Learning*, *18*(7). https://doi.org/10.19173/irrodl.v18i7.3167

Alario-Hoyos, C., Estévez-Ayres, I., Pérez-Sanagustín, M., Delgado Kloos, C., & Fernández-Panadero, C. (2017). Understanding Learners' Motivation and Learning Strategies in MOOCs. *The International Review of Research in Open and Distributed Learning*, *18*(3). https://doi.org/10.19173/irrodl.v18i3.2996

Alkhasawneh S. (2020). Perception of academic staff toward barriers, incentives, and benefits of the open educational resources (OER) network (SHMS) at Saudi Universities. *Italian Journal of Sociology of Education*, 12(1), pp.211-225. https://ijse.padovauniversitypress.it/2020/1/12

Almazyad, R. (2019). Enhancing the Quality and Reliability of OER Content. In: *Eighth International Conference on Educational Innovation through Technology (EITT)*. Institute of

Electrical and Electronics Engineers Inc. MS, USA. pp. 35-38. https://doi.org/10.1109/EITT.2019.00016

Anderson, T. R., Kelly, S. M., & Lynch, K. (2021). Z-Degrees: Four Colleges in 12 Months. *Journal of Higher Education Theory and Practice*, 21(5), 131-142. https://doi.org/10.33423/jhetp.v21i5.4275

Andone, D., Vasiu, R. (2016). MOOCs in Higher Education—Flipped Classroom or a New Smart Learning Model?. In: Li, Y., et al. *State-of-the-Art and Future Directions of Smart Learning*. Lecture Notes in Educational Technology. Springer, Singapore. https://doi.org/10.1007/978-981-287-868-7_37

Andone, D., Mihaescu, V., Vert, S., Ternauciuc, A. & Vasiu, R. (2020). Students as OERs (Open Educational Resources) co-creators. In: *IEEE 20th International Conference on Advanced Learning Technologies (ICALT)*, Tartu, Estonia, 2020, pp. 34-38. https://doi.org/10.1109/ICALT49669.2020.00017

Arnett, E. J. (2018). If You Build It, Will They Come?: Research into Students' Use of an Open Educational Resource in Technical Communication. In: *IEEE International Professional Communication Conference (ProComm)*, Toronto, ON, Canada, 2018, pp. 207-21. https://doi.org/10.1109/ProComm.2018.00048

Axe, J., Childs, E., DeVries, I., & Webster, K. (2020). Student experiences of Open Educational Practices: a systematic literature review. *Journal of E-Learning and Knowledge Society*, 16(4), 67-75. https://doi.org/10.20368/1971-8829/1135340

Ayoub, A., Amin, R. and Wani, Z.A. (2020). Contribution of developed countries towards MOOCs: an exploration and assessment from a representative platform Coursera. *Asian Association of Open Universities Journal,* Vol. 15 No. 2, pp. 251-262. https://doi.org/10.1108/AAOUJ-03-2020-0016

Baas, M., Admiraal, W., and van den Berg, E. (2019). Teachers' adoption of open educational resources in higher education. *Journal of Interactive Media in Education,* 2019(1). https://doi.org/10.5334/jime.510

Baas, M., van der Rijst, R., Huizinga, T., van den Berg, E. and Admiraal, W. (2022). Would you use them? A qualitative study on teachers' assessments of open educational resources in higher education. *Internet and Higher Education*, 54. https://doi.org/10.1016/j.iheduc.2022.100857

Baas, M., Schuwer, R., van den Berg, E., Huizinga, T., van der Rijst, R. and Admiraal W. (2023). The role of brokers in cultivating an inter-institutional community around open educational resources in higher education. *Higher Education* 85, 999–1019. https://doi.org/10.1007/s10734-022-00876-y

Baran, E., & AlZoubi, D. (2020) Affordances, challenges, and impact of open pedagogy: examining students' voices. *Distance Education*, 41(2), 230-244, https://doi.org/10.1080/01587919.2020.1757409

Brahim, H.B., Khribi, M.K. and Jemni, M. (2017). Towards accessible open educational resources: Overview and challenges. In *Proceedings of the 6th International Conference on Information and Communication Technology and Accessibility (ICTA)*, Muscat, Oman, 19–21 December 2017. https://ieeexplore.ieee.org/document/8336068

Bencheva, N. & Kostadinov, N. (2019). Through STEM education and OER to attract the girls in ICT career. In: *29th Annual Conference of the European Association for Education in Electrical and Information Engineering, EAEEIE 2019*. Institute of Electrical and Electronics Engineers Inc. http://dx.doi.org/10.1109/EAEEIE46886.2019.9000472

Blackmon, S. (2018). MOOC makers: Professors' experiences with developing and delivering MOOCs. *International Review of Research in Open and Distributed Learning,* 19(4), 76–91. https://doi.org/10.19173/irrodl.v19i4.3718

Blomgren, C. (2018). OER Awareness and Use: The Affinity Between Higher Education and K-12. *The International Review of Research in Open and Distributed Learning,* 19(2). https://doi.org/10.19173/irrodl.v19i2.3431

Bodily, R., Nyland, R., & Wiley, D. (2017). The RISE Framework: Using Learning Analytics to Automatically Identify Open Educational Resources for Continuous Improvement. *The International Review of Research in Open and Distributed Learning*, 18(2). https://doi.org/10.19173/irrodl.v18i2.2952

Bohrer Junior, E., Nakayma, M., Silveira, R. & Teodoroski, R. (2016). Initiatives and experiences in open educational resources (OER) in higher education: A reflective roadmap. In: *18th International Symposium on Computers in Education, SIIE 2016*. Institute of Electrical and Electronics Engineers Inc. http://dx.doi.org/10.1109/SIIE.2016.7751863

Bonami, B., Nocenzi, M., & Passarelli, B. (2020). Qualitative Analysis of Digital Technology Research and Practice in the Field of Social and Human Sciences. *Journal of E-Learning and Knowledge Society*, 16(3), 50-59. https://doi.org/10.20368/1971-8829/1135241

Bossu, C., Ward, L., Wills, S., Alexander, S., Sadler, D., Kandlbinder, P., Brown, N., Chelliah, J., Klapdor, K., & Uys, U. (2016). A national strategy to promote Open Educational Practices in higher education in Australia. In: *33rd International Conference of Innovation, Practice and Research in the Use of Educational Technologies in Tertiary Education*. Australasian Society for Computers in Learning in Tertiary Education. http://ecite.utas.edu.au/112975

Brahim, H. B., Khribi, M .K., Jemni, M., Tlili, A. (2020). Promoting Inclusive Open Education: A Holistic Approach Towards a Novel Accessible OER Recommender System. In: Miesenberger, K., Manduchi, R., Covarrubias Rodriguez, M., Peňáz, P. (eds) *Computers Helping People with Special Needs. ICCHP 2020*. Lecture Notes in Computer Science(), vol 12377. Springer, Cham. https://doi.org/10.1007/978-3-030-58805-2_20

Brandle S M. (2018). Opening up to OERs: Electronic Original Sourcebook Versus Traditional Textbook in the Introduction to American Government Course, Journal of Political Science Education, 14:4, 535-554. https://doi.org/10.1080/15512169.2017.1420482

Brandle S M. (2022). The Book Costs How Much??? Textbook Cost & OER Awareness in Political Science, Journal of Political Science Education, 18:4, 555-569. https://doi.org/10.1080/15512169.2022.2104164

Breathnach, C., Murphy, R. & Margaria, T. (2021). Transcribathons as Practice-Based Learning for Historians and Computer Scientists. In: *2021 IEEE 45th Annual Computers, Software, and Applications Conference (COMPSAC)*, Madrid, Spain, 2021, pp. 1131-1136, https://doi.org/10.1109/COMPSAC51774.2021.00155

Buckler, A., Stutchbury, K., Kasule, G., Cullen, J., & Kaije, D. (2021). What Prevents Teacher Educators from Accessing Professional Development OER? Storytelling and Professional Identity in Ugandan Teacher Colleges. *Journal of Learning for Development,* 8(1), 10–26. https://doi.org/10.56059/jl4d.v8i1.493

Burgos, D. & Corbí, A. (2018). Transgenic learning for STEAM subjects and virtual containers for OER, *Distance Education*, 39:1, 4-18. https://doi.org/10.1080/01587919.2018.1429894

Chan, H. C. B., Ho, Y. H., Tovar, E. & Reisman, S. (2020). Enhancing the Learning of Computing/IT Students with Open Educational Resources. In: *2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC)*, Madrid, Spain, 2020, pp. 113-122. https://doi.org/10.1109/COMPSAC48688.2020.00024

Chan, H. C. B., Kemp, I. M., Leung, W. C. L., Tovar, E., & Reisman, S. (2021). Enhancing student learning through an open educational resource competition. In W. K. Chan, B. Claycomb, H. Takakura, J-J. Yang, Y. Teranishi, D. Towey, S. Segura, H. Shahriar, S. Reisman, & S. I. Ahamed (Eds.), *Proceedings - 2021 IEEE 45th Annual Computers, Software, and Applications Conference, COMPSAC 2021*, pp. 127-132. https://doi.org/10.1109/COMPSAC51774.2021.00029

Chotto, M. C., & Rivera, S. M. (2017, September). To what extent are faculty ready to participate in the OER movement?: The case of the Informatics School, UNA. In: *2017 XLIII Latin American Computer Conference (CLEI)* (pp. 1-8). IEEE. https://doi.org/10.1109/CLEI.2017.8226379

houdhury, B. R. (2018). Openness in Higher Education through Open and Distance Learning Environment,. *In: 2018 5th International Symposium on Emerging Trends and Technologies in Libraries and Information Services (ETTLIS)*, Noida, India, 2018, pp. 221-225. https://doi.org/10.1109/ETTLIS.2018.8485203

Christoforidou, A., & Georgiadou, E. (2021). Awareness and Use of OER by Higher Education Students and Educators within the Graphic Arts Discipline in Greece. *Education Sciences,* 12(1), 16. MDPI AG. Retrieved from http://dx.doi.org/10.3390/educsci12010016

Cinganotto, L. & Cuccurullo, D. (2016). Open educational resources, ICT and virtual communities for content and language integrated learning. *Teaching English with Technology*, 16(4), pp.3-11. https://files.eric.ed.gov/fulltext/EJ1135659.pdf

Colson, R., Scott E., & Donaldson, R. (2017). Supporting Librarians in Making the Business Case for OER. *Reference Librarian,* 58(4), pp.278-287. https://doi.org/10.1080/02763877.2017.1377665

Cooke, R., Rivera, K. & Rokusek, S. (2022). Connecting adjuncts to the library: Hosting online sessions to increase awareness of OER, E-books, and other library resources. *Journal of Academic Librarianship,* 48(5). https://doi.org/10.1016/j.acalib.2022.102571

Cooney, C. (2017). What Impacts do OER Have on Students? Students Share Their Experiences with a Health Psychology OER at New York City College of Technology. *International Review of Research in Open and Distributed Learning,* 18(4), 155–178. https://doi.org/10.19173/irrodl.v18i4.3111

Cortinovis, R., Mikroyannidis, A., Domingue, J., Mulholland, P. & Farrow, R. (2019). Supporting the discoverability of open educational resources. *Education and Information Technologies*, 24(5), pp.3129-3161. https://doi.org/10.1007/s10639-019-09921-3

Coughlan, T., Rodriguez-Ascaso, A., Iniesto, F. & Jelfs, A;. (2016). OLA! a scenario-based approach to enhance open learning through accessibility. In: *Computers Helping People with Special Needs: Proceedings of the 15th ICCHP conference*, Lecture Notes in Computer Science, Springer, pp. 445–452. https://oro.open.ac.uk/46036/1/OLA%20ICCHP%2016.pdf

Coughlan, T., Pitt, R. & Farrow, R. (2019). Forms of innovation inspired by open educational resources: a post-project analysis. *Open Learning: The Journal of Open and Distance Learning* 34:2, 156-175. https://doi.org/10.1080/02680513.2018.1552579

Cox, G. & Trotter, H. (2016). Institutional Culture and OER Policy: How Structure, Culture, and Agency Mediate OER Policy Potential in South African Universities. *International Review of Research in Open and Distributed Learning*, 17(5), 147–164. https://doi.org/10.19173/irrodl.v17i5.2523

Cozart, D., Horan, E. M., & Frome, G. . (2021). Rethinking the Traditional Textbook: A Case for Open Educational Resources (OER) and No-Cost Learning Materials. *Teaching and Learning Inquiry*, 9(2). https://doi.org/10.20343/teachlearninqu.9.2.13

Craig, C. D. (2020). 2020 pandemic: Resilient Canadian higher education institutions will integrate OER. In: N. Callaos, B. Muirhead, L. Robertson, B. Sanchez, & M. Savoie (Eds.), *14th International Multi-Conference on Society, Cybernetics and Informatics (IMSCI 2020)* pp. 149-153. International Institute of Informatics and Systemics. https://www.proceedings.com/content/056/056306webtoc.pdf

Darwish H. (2019). Open educational resources (OER) Edupreneurship business models for different stakeholders. *Education and Information Technologies,* 24(6), pp.3855-3886. https://doi.org/10.1007/s10639-019-09962-8

Datt, G. & Singh, G. (2022). Acceptance and Barriers of Open Educational Resources in the Context to Indian Higher Education. *Canadian Journal of Learning and Technology,* 47. http://dx.doi.org/10.21432/cjlt28028

Daukšienė, E., Trepulė, E., Volungevičienė. A., Šadauskas, M. & Ehlers, U. (2020). How to become an open educator?. *Journal of E-Learning and Knowledge Society,* 16(2), pp.51-60. https://doi.org/10.20368/1971-8829/1135182

De Deus, W. S. & Barbosa, E. F. (2022). A Systematic Mapping of the Classification of Open Educational Resources for Computer Science Education in Digital Sources. *IEEE Transactions on Education*, 65(3), pp.450-460. https://doi.org/10.1109/TE.2021.3128019

de Jong, M., Munnik, M., & Will, N. (2019). Innovation opportunities for academic libraries to support teaching through open education: A case study at TU Delft, the Netherlands. *New Review of Academic Librarianship*, 25(2-4), 392-407. https://doi.org/10.1080/13614533.2019.1621185

Delgado, H., Delgado, M., & Hilton III, J. (2019). On the Efficacy of Open Educational Resources: Parametric and Nonparametric Analyses of a University Calculus Class. *The International Review of Research in Open and Distributed Learning*, 20(1). https://doi.org/10.19173/irrodl.v20i1.3892

Dell, D. (2021). Resonance and Current Relevance of IRRODL Highly-Cited Articles: An Integrative Retrospective. *The International Review of Research in Open and Distributed Learning,* 22(1), 243–258. https://doi.org/10.19173/irrodl.v22i1.5315

Deshmukh A., and Sahasrabudhe S., (2020). Curating an OER Course by Applying the Learner-Centric MOOC Model. In*: 9th International Workshop on ICT Trends in Emerging Economies (WICTTEE)*. Asia Pacific Society for Computers in Education. (Nov, 2020). https://apsce.net/icce/icce2020/proceedings/W1-13/W7/ICCE2020-Proceedings-Vol2-W7_9.pdf

DeVries, I. J. (2015). Community volunteers in collaborative OER development. In: *32nd Annual Conference of the Australasian Society for Computers in Learning and Tertiary Education*. Australasian Society for Computers in Learning in Tertiary Education

(ASCILITE), pp.77-88.
http://www.2015conference.ascilite.org/wp-content/uploads/2015/11/ascilite-2015-proceedings.pdf

Dix, A. (2016). Challenge and Potential of Fine Grain, Cross-Institutional Learning Data. In: *L@S: Third Annual ACM Conference on Learning at Scale*, ACM, pp. 261–264. https://doi.org/10.1145/2876034.2893429

Dix, A., Malizia, A., & Gabrielli, S. (2016). HCI and the Educational Technology Revolution. In: *Proceedings of the International Working Conference on Advanced Visual Interfaces (AVI 2016)* pp. 368-371. Association for Computing Machinery . https://doi.org/10.1145/2909132.2927472

Dreisiebner, S., Polzer, A. K., Robinson, L., Libbrecht, P., Bote-Vericad, J-J., Urbano, C., Mandl, T., Vilar, P., Zumer, M., Juric, M., et al (2021). Facilitation of information literacy through a multilingual MOOC considering cultural aspects. *Journal of Documentation*, 77(3), pp. 777-797. https://doi.org/10.1108/JD-06-2020-0099

Dumbrăveanu, R. (2021). Challenges in the current distance education paradigm. In: *eLearning and Software for Education Conference: eLSE 2020*, Ed. 17, 22-23 aprilie 2021, București. București, România: National Defence University - Carol I Printing House, 2021, Ediția 17, Vol.1, pp. 433-443. ISSN 2066 - 026X. https://doi.org/10.12753/2066-026X-21-197

Dutta, I. (2016). Open Educational Resources (OER): Opportunities and challenges for Indian higher education. *Turkish Online Journal of Distance Education*, 17(2). https://dergipark.org.tr/en/download/article-file/222610

Edelsbrunner, S., Steiner, K., Schön, S., Ebner, M., & Leitner, P. (2022). Promoting Digital Skills for Austrian Employees through a MOOC: Results and Lessons Learned from Design and Implementation. *Education Sciences*, 12(2), 89. MDPI AG. http://dx.doi.org/10.3390/educsci12020089

El Kharki, K., Berrada, K., Bensamka, F., Burgos, D. (2021). The Adoption of Open Educational Practices to Support Practical Work at Moroccan Universities. In: Burgos, D., Olivier, J. (eds) *Radical Solutions for Education in Africa. Lecture Notes in Educational Technology*. Springer, Singapore. https://doi.org/10.1007/978-981-16-4099-5_12

Essmiller, K., & Asino, T. (2021). Will Academic Library Publishing Break OER? A Diffusion of Innovations Study. *Journal of Interactive Media in Education*, 2021(1). https://doi.org/10.5334/jime.673

Farrow, R., Pitt, R., & Weller M. (2020). Open Textbooks as an innovation route for open science pedagogy. *Education for Information*, 36(3), pp.227-245. https://doi.org/10.3233/EFI-190260

Ferguson, C. L. (2017). Open Educational Resources and Institutional Repositories. *Serials Review*, 43(1), pp.34-38. https://doi.org/10.1080/00987913.2016.1274219

Finlayson, C. (2020). Writing and Implementing an Open Textbook in World Regional Geography: A Case Study. *The International Review of Research in Open and Distributed Learning,* 21(4), 245–254. https://doi.org/10.19173/irrodl.v21i4.4756

Fischer, L., Ernst, D., & Mason, S. L. (2017). Rating the Quality of Open Textbooks: How Reviewer and Text Characteristics Predict Ratings. *The International Review of Research in Open and Distributed Learning*, 18(4). https://doi.org/10.19173/irrodl.v18i4.2985

Georgiadou, E., & Kolaxizis, I. (2019). Film Students' Attitude toward Open Educational Resources (OERs) for Film Studies in Greece. *Education Sciences,* 9(3), 195. MDPI AG. Retrieved from http://dx.doi.org/10.3390/educsci9030195

Gill, A., Irwin, D. S., Ng, R. Y. K., Towey, D., Wang, T., & Zhang, Y. (2020). The future of teaching post-COVID-19: Microlearning in product design education. In H. Mitsuhara, Y. Goda, Y. Ohashi, M. M. T. Rodrigo, J. Shen, N. Venkatarayalu, G. Wong, M. Yamada, & L. Chi-Un Lei (Eds.), *Proceedings of 2020 IEEE International Conference on Teaching, Assessment, and Learning for Engineering, TALE 2020* (pp. 780-785). Article 9368322 (Proceedings of 2020 IEEE International Conference on Teaching, Assessment, and Learning for Engineering, TALE 2020). Institute of Electrical and Electronics Engineers Inc.. https://doi.org/10.1109/TALE48869.2020.9368322

Goodier, S. (2017). Tracking the Money for Open Educational Resources in South African basic Education: What We Don't Know. *The International Review of Research in Open and Distributed Learning,* 18(4). https://doi.org/10.19173/irrodl.v18i4.2990

Gordillo, A., López-Fernández, D., & Verbert, K. (2020). Examining the Usefulness of Quality Scores for Generating Learning Object Recommendations in Repositories of

Open Educational Resources. *Applied Sciences*, 10(13), 4638. MDPI AG. http://dx.doi.org/10.3390/app10134638

Guzmán-Arias, L.C., Solís-Céspedes, J., & Francesa-Alfaro, A. (2019). Exploring Mobile UX/UI for an OER Repository Search Engine Integrated to an LMS. In: *2019 XIV Latin American Conference on Learning Technologies (LACLO)*, 55-62. https://doi.org/10.1109/LACLO49268.2019.00020

Hajri, H., Bourda, Y., & Popineau, F. (2017). MORS: A system for recommending OERs in a MOOC. In M. Chang, N-S Chen, Kinshuk, D. G. Sampson, & R. Vasiu (Eds.), *IEEE 17th International Conference on Advanced Learning Technologies (ICALT)* (pp. 50-52). https://doi.org/10.1109/ICALT.2017.89

Hajri, H., Bourda, Y., & Popineau, F. (2018). A system to recommend open educational resources during an online course. In B. McLaren, R. Reilly, S. Zvacek, & J. Uhomoibhi (Eds.), *Proceedings of the 10th International Conference on Computer Supported Education (CDSEU 2018)* Vol. 1 (pp 99-109). https://pdfs.semanticscholar.org/24d8/1a0d8874bfb075b90afff58ff4e247ddea85.pdf

Hameed, M. R. & El-Ameer, A.S. (2020). The design and implementation of open educational resource platform for IIPS. In: *3rd International Conference on Engineering Technology and its Applications, IICETA 2020*. Institute of Electrical and Electronics Engineers Inc., pp.169-174. https://doi.org/10.1109/IICETA50496.2020.9318974

Hassan, Q. K., Rahaman, K. R., Sumon, K. Z., & Dewan, A. (2019). Lessons Learned from the Development of Open Educational Resources at Post-Secondary Level in the Field of Environmental Modelling: An Exploratory Study. *Education Sciences*, 9(2), 103. MDPI AG. http://dx.doi.org/10.3390/educsci9020103

Henderson, S., & Ostashewski, N. (2018). Barriers, incentives, and benefits of the open educational resources (OER) movement: An exploration into instructor perspectives. *First Monday*, 23(12). https://doi.org/10.5210/fm.v23i12.9172

Herrera-Cubides, J. F., Gaona-García, P. A., Montenegro-Marín, C. E., & Sánchez-Alonso, S. (2022). Improving OER descriptions to enhance their availability, reuse, and enrichment. *Education and Information Technologies,* 27(2), 1811–1839. https://doi.org/10.1007/s10639-021-10641-w.

Hilton, J. (2020). Open educational resources, student efficacy, and user perceptions: a synthesis of research published between 2015 and 2018. *Educational Technology Research and Development,* 68, 853–876. https://doi.org/10.1007/s11423-019-09700-4

Hollister, C.V & Patton, J. (2021). Faculty perceptions of an OER stipend program. *New Review of Academic Librarianship*, 27. https://www.tandfonline.com/doi/full/10.1080/13614533.2021.2000452

Hood, N. & Littlejohn, A. (2017). Knowledge typologies for professional learning: educators' (re)generation of knowledge when learning open educational practice. Educational Technology Research and Development, 65(6), pp.1583-1604. https://doi.org/10.1007/s11423-017-9536-z

Horn, E.A., Anderson, R. and Pierick, K. (2018). Open educational resources (OERs) in self-directed competency-based education *Information Discovery and Delivery*, Vol. 46 No. 4, pp. 197-203. https://doi.org/10.1108/IDD-02-2018-0005

Iniesto, F., Tabuenca, B., Rodrigo, C., & Tovar, E. (2021). Challenges to Achieving a More Inclusive and Sustainable Open Education. *Journal of Interactive Media in Education,* 2021(1), 28. https://doi.org/10.5334/jime.679

Islim, O. F. & Cagiltay, K. (2016). The Impact of OER on Instructional Effectiveness: A Case Study. *Eurasia Journal of Mathematics, Science and Technology Education*, 12(3), 559-567. https://doi.org/10.12973/iser.2016.2003a

Jacqmot, C.; Docq, F. and Deville, Y. (2020). A Framework to Understand, Analyse and Describe Online and Open Education in Higher Education.In Proceedings of the 12th International Conference on Computer Supported Education - Volume 1: CSEDU, ISBN 978-989-758-417-6, pages 458-465. https://hdl.handle.net/20.500.12279/783

Jaggars, S. S., Folk, A. L. & Mullins, D. (2018). Understanding students' satisfaction with OERs as course materials. *Performance Measurement and Metrics*, Vol. 19 No. 1, pp. 66-74. https://doi.org/10.1108/PMM-12-2017-0059

Jemni, M., & Khribi, M. K. (2017). Toward empowering open and online education in the Arab world through OER and MOOCs. In *Open education: from OERs to MOOCs* (pp. 73-100). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-52925-6_4

Jenkins, J. J., Sánchez, L. A., Schraedley, M. A. K., Hannans, J., Navick, N., & Young, J. (2020). Textbook Broke: Textbook Affordability as a Social Justice Issue. *Journal of Interactive Media in Education*, 2020(1), 3. https://doi.org/10.5334/jime.549

Jiménez-Castañeda, R., Castro-Gil, M., Jiménez-Ferrer, G., Suger-Bedorin, D., Socarras-Merida, L., Quiroga-Salomon, G., & Guzman-Quaharre, C. (2019, April). Standardization Guide to Develop Collaborative Massive Open Courses for Engineering Teaching in DIEGO Project. In 2019 IEEE Global Engineering Education Conference (EDUCON) (pp. 847-852). IEEE. https://doi.org/10.1109/EDUCON.2019.8725069

Johnston, E., Burleigh, C., Rasmusson, X., Turner, P., Valentine, D., & Bailey, L. (2021). Multimedia Open Educational Resource Materials for Teaching-Online Diversity and Leadership: Aligning Bloom's Taxonomy and Studio Habits of Mind. *Higher Learning Research Communications*, 11 (2). https://doi.org/10.18870/hlrc.v11i2.1234 .

Judith, K. & Bull, D. (2016). Assessing the potential for openness: A framework for examining course-level OER implementation in higher education. *Education Policy Analysis Archives,* 24(42). http://dx.doi.org/10.14507/epaa.24.1931

Julien, B.L., Lexis, L., Salisbury, F., Russell, K., & Loch, B. (2018). Human Physiology Students' Perceptions of etextbooks: Towards Open Access as an Alternative to Traditional Textbooks. *International Journal of Innovation in Science and Mathematics Education*, 26. https://openjournals.library.sydney.edu.au/index.php/CAL/article/view/12650

Jung, I. & Lee, J. (2022). Open thinking as a learning outcome of open education: scale development and validation. *Distance Education,* 43(1), pp.119-138. https://doi.org/10.1080/01587919.2021.2020620

Jung, I., Sasaki, T. & Latchem, C. (2016). A framework for assessing fitness for purpose in open educational resources. *International Journal of Educational Technology in Higher Education,* 13(3). https://doi.org/10.1186/s41239-016-0002-5

Kaabi, K., Essalmi, F., Jemni, M. & Qaffas, A. A. (2020). Personalization of MOOCs for increasing the retention rate of learners. In: *2020 International Multi-Conference on: "Organization of Knowledge and Advanced Technologies" (OCTA)*, Tunis, Tunisia, 2020, pp. 1-5. https://doi.org/10.1109/OCTA49274.2020.9151847

Karipi, E., Mawela, A. S., & Van-Wyk, M. M. (2022). Exploring faculty members' views on the use of open education resources: A case of the Namibian open distance learning institutions. *International Journal of Educational Methodology*, 8(1), 107-116. https://doi.org/10.12973/ijem.8.1.107

Karunanayaka, S.P., Rajendra, J.C.N., Ratnayake, H.U.W. and Naidu, S. (2016), Peer-facilitated discussions to enhance OER-based e-learning. *Asian Association of Open Universities Journal*, Vol. 11 No. 1, pp. 90-104. https://doi.org/10.1108/AAOUJ-07-2016-0022

Katz, S. (2019). Leveraging Library Expertise in Support of Institutional Goals: A Case Study of an Open Educational Resources Initiative. *New Review of Academic Librarianship,* 25(2-4), pp.381-391. https://doi.org/10.1080/13614533.2019.1630655

Kaur, A., Gulati, S., Sharma, R., Sinhababu, A. & Chakravarty, R. (2022). Visual citation navigation of open education resources using Litmaps. Library Hi Tech News, 39(5), pp.7-11.https://doi.org/10.1108/LHTN-01-2022-0012

Keshavarz, M., & Ghoneim, A. (2021). Preparing Educators to Teach in a Digital Age. *The International Review of Research in Open and Distributed Learning,* 22(1), 221–242. https://doi.org/10.19173/irrodl.v22i1.4910

Kimball, R., Halling, D., Neville, B. & Herbert, B. (2022a). Motivations and barriers in the adoption of OERs: The role of subject librarians. *Journal of Academic Librarianship,* 48(4), https://doi.org/10.1016/j.acalib.2022.102542

Kimball, R., Halling, D., Neville, B. & Herbert, B. (2022b). OASES: The role of subject librarians in an effective campus OER program. *Journal of Academic Librarianship*, 48(3), https://doi.org/10.1016/j.acalib.2022.102518

King, M., Pegrum, M., & Forsey, M. (2018). MOOCs and OER in the Global South: Problems and Potential. *The International Review of Research in Open and Distributed Learning*, 19(5). https://doi.org/10.19173/irrodl.v19i5.3742

Kinyua, A.H. (2019). When the Trainer is Untrained: Stakeholder Incapacitation in Implementation and Utilisation of Open Educational Resources in Kenya. Journal of Learning for Development, 8(1), pp.171-181. https://doi.org/10.56059/jl4d.v8i1.396

Kılıçkaya, F. & Kic-Drgas, J. (2021). Issues of context and design in OER (open educational resources). Educational Technology Research and Development, 69(1), pp.401-405. https://doi.org/10.1007/s11423-020-09852-8

Kohout-Tailor, J., & Sheaffer, K. E. (2020). Using open educational resources to empower student creators. Journal of Electronic Resources Librarianship, 32(1), pp.11-18. https://doi.org/10.1080/1941126X.2020.1709728

Kopp, M., Gröblinger, O., Zimmermann, C. (2017). Increasing Educational Value: The Transformation of MOOCs into Open Educational Resources. In: Delgado Kloos, C., Jermann, P., Pérez-Sanagustín, M., Seaton, D., White, S. (eds) *Digital Education: Out to the World and Back to the Campus. EMOOCs 2017.* Lecture Notes in Computer Science, vol 10254. Springer, Cham. https://doi.org/10.1007/978-3-319-59044-8_27

Kosmas, P., Parmaxi, A., Perifanou, M. & Economides, A.A. (2021). Open Educational Resources for Language Education: Towards the Development of an e-Toolkit. In: Zaphiris, P., Ioannou, A. (eds) *Learning and Collaboration Technologies: New Challenges and Learning Experiences. HCII 2021*. Lecture Notes in Computer Science, vol 12784. Springer, Cham. https://doi.org/10.1007/978-3-030-77889-7_5

Kruger J. S. & Hollister, C. (2021). Engaging undergraduate public health students through a textbook creation project. *Pedagogy in Health Promotion*, 7(3), 226–234. https://doi.org/10.1177/2373379920962416

Kumar, A. & Singh, M. (2019). Exploring the Use and Practice of Open Educational Resources (OERs) in Social Science Discipline with Special Reference to University of Delhi, Delhi. *Library Philosophy and Practice (e-Journal)*, 1–21 https://digitalcommons.unl.edu/libphilprac/2664/

Kumar, A., Baishya, D. & Deka, M. (2021). Open Educational Resources (OER) Issues and Problems Experienced by Social Scientists of Select Higher Educational Institutions in India. *Library Philosophy and Practice (e-journal)*, 5625: 1-20 https://digitalcommons.unl.edu/libphilprac/5625

Kwak, S. (2017). How Korean Language Arts Teachers Adopt and Adapt Open Educational Resources: A Study of Teachers' and Students' Perspectives. *The International Review of Research in Open and Distributed Learning*, 18(4). https://doi.org/10.19173/irrodl.v18i4.2977

Leufer, N., Prediger, S., Mahns, P. & Kortenkamp, U. (2019). Facilitators' adaptation practices of curriculum material resources for professional development courses. *International Journal of STEM Education*, 6(24), https://doi.org/10.1186/s40594-019-0177-0

Lin, H. (2019). Teaching and Learning Without a Textbook: Undergraduate Student Perceptions of Open Educational Resources. *The International Review of Research in Open and Distributed Learning*, 20(3). https://doi.org/10.19173/irrodl.v20i4.4224

Liu, J. C., & Johnson, E. (2020). Instructional development of media-based science OER. *TechTrends*, 64 (3), 439-450. https://doi.org/10.1007/s11528-020-00481-9

Luo, T., Hostetler, K., Freeman, C., & Stefaniak, J. (2020). The power of open: Benefits, barriers, and strategies for integration of open educational resources. *Open Learning,* 35(2), 140-158. https://doi.org/10.1080/02680513.2019.1677222

MacKinnon, T. & Pasfield-Neofitou, S. (2016). OER "produsage" as a model to support language teaching and learning. *Education Policy Analysis Archives*, 24(40). http://dx.doi.org/10.14507/epaa.24.1825

Maharaj, N. G., Upadhyay, A. U. & Trivadi, M. J. (2021). SWOT Analysis of the Role of Open Educational Resources in Future Education with Special Reference to Open University Library and Librarian. *Library Philosophy and Practice (e-journal)*, 6197. https://digitalcommons.unl.edu/libphilprac/6197

Marín, V.I., Zawacki-Richter, O., Aydin, C.H. et al. Faculty perceptions, awareness and use of open educational resources for teaching and learning in higher education: a cross-comparative analysis. *RPTEL* 17, 11 (2022). https://doi.org/10.1186/s41039-022-00185-z

Marjit, U. & Kumar, P. (2020). Towards a Decentralized and Distributed Framework for Open Educational Resources based on IPFS and Blockchain. In: *2020 International Conference on Computer Science Engineering and Applications (ICCSEA), 2020*. International Conference on Computer Science Engineering and Applications (ICCSEA). https://doi.org/10.1109/ICCSEA49143.2020.9132841

Markin, P. B. (2021). Open educational resources in the context of open access. In: Challenges, Opportunities and Prospects of University Libraries in the Global Scenario of Uncertainty. *University Library at a New Stage of Social Communications Development. Conference Proceedings*, (6), 76–82. https://doi.org/10.15802/unilib/2021_249625

Masterman, E. (2016). Bringing open educational practice to a research-intensive university: Prospects and challenges. *Electronic Journal of e-Learning*, 14(1), 31–42. https://ora.ox.ac.uk/objects/uuid:19c7575d-916f-48a5-9474-050bf92b02bc

Mays, T. (2020). Open Educational Resources in South Africa. In: Huang, R., Liu, D., Tlili, A., Gao, Y., Koper, R. (eds) Current State of Open Educational Resources in the "Belt and Road" Countries. *Lecture Notes in Educational Technology*. Springer, Singapore. https://doi.org/10.1007/978-981-15-3040-1_11

Mays, T. J., Ogange, B., Naidu, S., & Perris, K. (2021). Supporting Teachers Moving Online, Using a MOOC, During the COVID-19 Pandemic . *Journal of Learning for Development*, 8(1), 27–41. https://doi.org/10.56059/jl4d.v8i1.497

Mazohl, P., Ossiannilsson, E. & Makl, H. (2018). Technical Innovation in Blended Learning – Concepts for the Creation of High Quality Continuous Vocational Education Courses using Multiple Devices. In: *Proceedings of the 10th International Conference on Computer Supported Education - Volume 1:* BLQE; ISBN 978-989-758-291-2; ISSN 2184-5026, SciTePress, pages 548-554. http://dx.doi.org/10.5220/0006817405480554

Mazzucato A and Kic-Drgas J . (2021). Develop OERs for technology enhanced learning. In: *2nd Workshop on Technology Enhanced Learning Environments for Blended Education - The Italian E-Learning Conference, teleXbe 2021*.https://ceur-ws.org/Vol-3025/paper9.pdf

McFaul, H., & FitzGerald, E. (2021). Supporting Access to Justice Through Volunteer Training: An Evaluation of an Open Educational Resource. *Journal of Interactive Media in Education, 2021*(1) https://doi.org/10.5334/jime.630

McGreal, R., Mackintosh, W., Cox, G., & Olcott, Jr., D. (2022). Bridging the Gap: Micro-credentials for Development: UNESCO Chairs Policy Brief Form - Under the III World Higher Education Conference (WHEC 2021) Type: Collective X . *The International Review of Research in Open and Distributed Learning,* 23(3), 288–302. https://doi.org/10.19173/irrodl.v23i3.6696

Mengual-Andrés, S., & Payá-Rico, A. (2018). Open Educational Resources' impact and outcomes: The essence of OpenKnowledge and its social contribution. *Education Policy Analysis Archives*, 26, 119. https://doi.org/10.14507/epaa.26.3667

Mishra, M., Dash, M. K., Sudarsan, D., Santos, C. A..G., Mishra, S. K., Kar, D., Bhat, I. A., Panda, B. K., Sethy, M. & Silva, R. M. D. (2022). Assessment of trend and current pattern of open educational resources: A bibliometric analysis. *Journal of Academic Librarianship*, 48(3), pp.. https://doi.org/10.1016/j.acalib.2022.102520

Morales, R., & Baker, A. (2018). Secondary Students' Perceptions of Open Science Textbooks. *Journal of Interactive Media in Education*, 2018(1), https://doi.org/10.5334/jime.455

Moreno, N., Caro, E., & Cabedo, R. (2018). Systematic Review: OER and Disability. In: *5th International Congress on Information Science and Technology, CiSt 2018*. Institute of Electrical and Electronics Engineers Inc., pp.428-431. https://ieeexplore.ieee.org/document/8596659

Mosharraf, M, & Taghiyareh, F. (2016). Federated search engine for open educational linked data. *Bulletin of the Technical Committee on Learning Technology*, 18(4), pp.6-9. https://tc.computer.org/tclt/wp-content/uploads/sites/5/2017/04/Mosharraf.pdf

Mosharraf, M, & Taghiyareh, F. (2020). Automatic Syllabus-Oriented Remixing of Open Educational Resources Using Agent-Based Modeling. *IEEE Transactions on Learning Technologies,* vol. 13, no. 2, pp. 297-311, 1 April-June 2020. https://doi.org/10.1109/TLT.2019.2937084

Muganda, C. K., Samzugi, A. S., & Mallinson, B. J. (2016). Analytical Insights on the Position, Challenges, and Potential for Promoting OER in ODeL Institutions in Africa. *The International Review of Research in Open and Distributed Learning*, 17(4). https://doi.org/10.19173/irrodl.v17i4.2465

Nagashima, T., & Hrach, S. (2021). Motivating Factors among University Faculty for Adopting Open Educational Resources: Incentives Matter. *Journal of Interactive Media in Education,* 2021(1). https://doi.org/10.5334/jime.678

Naithani, K., Jones, M. & Grayson, K. L. (2022). Building communities of teaching practice and data-driven open education resources with NEON faculty mentoring networks. *Ecosphere*, 13(8), pp.. https://doi.org/10.1002/ecs2.4210

Nascimbeni, F., Burgos, D. & Tlili, A. (2019). Fostering Teachers-Led Open Education in Universities: Recommendations Emerging from Research. In: *7th International Conference*

on ICT and Accessibility, ICTA 2019. Institute of Electrical and Electronics Engineers Inc. http://dx.doi.org/10.1109/ICTA49490.2019.9144977

Navarrete, R. & Luján-Mora, S. (2016). OER-based learning and people with disabilities. In: *International Conference on Interactive Collaborative and Blended Learning (ICBL),* Mexico City, Mexico., pp. 25-34. http://dx.doi.org/10.1109/ICBL.2015.7387646

Navarrete R. and Luján-Mora S. (2016). OER-based Lifelong Learning for Older People . In: *Proceedings of the 8th International Conference on Computer Supported Education - Volume 2*. CSEDU, ISBN 978-989-758-179-3, pages 388-393. https://doi.org/10.5220/0005792503880393

Navarrete, R. and Martinez-Mosquera, D. (2020). Overcoming Barriers for OER Adoption in Higher Education Application to Computer Science Curricula. In: *Proceedings of the 12th International Conference on Computer Supported Education - Volume 1*. CSEDU. ISBN 978-989-758-417-6; ISSN 2184-5026, SciTePress, pages 559-566 http://dx.doi.org/10.5220/0009471205590566

Ng, R.Yk., Ng, KK., Liu, B. (2019). An Empirical Study on the Usefulness, Effectiveness and Practicability of Vocational and Professional Education and Training's (VPET) Open Educational Resources (OER) in the Hotel Industry. In: Cheung, S., Lee, LK., Simonova, I., Kozel, T., Kwok, LF. (eds) *Blended Learning: Educational Innovation for Personalized Learning. ICBL 2019*. Lecture Notes in Computer Science, vol 11546. Springer, Cham. https://doi.org/10.1007/978-3-030-21562-0_22

Nkuyubwatsi, B. (2018). Revisiting the Reusability and Openness of Resources in the Massachusetts Institute of Technology Open Courseware. *Journal of Interactive Media in Education*, 2018(1) https://doi.org/10.5334/jime.447

Nurhas, I., Pawlowski, J.M., Jansen, M., Stoffregen, J. (2016). OERauthors: Requirements for Collaborative OER Authoring Tools in Global Settings. In: Verbert, K., Sharples, M., Klobučar, T. (eds) *Adaptive and Adaptable Learning. EC-TEL 2016*. Lecture Notes in Computer Science, vol 9891. Springer, Cham. https://doi.org/10.1007/978-3-319-45153-4_43

Oelfke, A. L., Sadowski, J. A., Mathwig Ramseier, C., Iremonger, C., Volkert, K., Dykman, E., Kuhl, L. & Baumann, A. (2021). Using Open Educational Resources at Viterbo University: Faculty and Student Feedback. *The International Review of Research in Open and Distributed Learning*, 22(1), 78–90. https://doi.org/10.19173/irrodl.v22i1.4970

Okada, A., & Sherborne, T. (2018). Equipping the Next Generation for Responsible Research and Innovation with Open Educational Resources, Open Courses, Open Communities and Open Schooling: An Impact Case Study in Brazil. *Journal of Interactive Media in Education*, 2018(1) https://doi.org/10.5334/jime.482

Olivier, J. A.K. (2018). The state of online open educational resources in Afrikaans: Afrikaans teaching as a case study. *Tydskr. geesteswet*. [online]. 2018, vol.58, n.4-2, pp.905-924. ISSN 2224-7912. http://dx.doi.org/10.17159/2224-7912/2018/v58n4-2a3.

Orr, D., Weller, M. and Farrow, R. (2019). How is Digitalisation Affecting the Flexibility and Openness of Higher Education Provision? Results of a Global Survey Using a New Conceptual Model. *Journal of Interactive Media in Education*, 2019 (1) http://doi.org/10.5334/jime.523

Otto, D. (2019). Adoption and Diffusion of Open Educational Resources (OER) in Education: A Meta-Analysis of 25 OER-Projects. *The International Review of Research in Open and Distributed Learning*, 20(5), 122–140. https://doi.org/10.19173/irrodl.v20i5.4472

Otto, D., Schroeder, N., Diekmann, D., & Sander, P. (2021a). Trends and Gaps in Empirical Research on Open Educational Resources (OER): A Systematic Mapping of the Literature from 2015 to 2019. *Contemporary Educational Technology,* 13(4), ep325. https://doi.org/10.30935/cedtech/11145

Otto, D., Schröder, N., Diekmann, D. & Sander, P. (2021b). Offen gemacht: Der Stand der internationalen evidenzbasierten Forschung zu Open Educational Resources (OER). *Zeitschrift fur Erziehungswissenschaft*, 24, 1061–1085 (2021). https://doi.org/10.1007/s11618-021-01043-2

Pande, J. (2018). Opportunities and challenges in the adoption of open educational resources for course development: a case study of Uttarakhand Open University. *International Journal of Information Technology*. 10 (3). http://dx.doi.org/10.1007/s41870-018-0126-z

Pande J. (2019). Open educational practices at Uttarakhand Open University: from policies to implementation. *International Journal of Information Technology* (Singapore), 11(3), pp.445-452. https://doi.org/10.1007/s41870-018-0208-y

Pande, J., Singh, A., Intaratat, K. & Mythali, G. (2019). Sharing, Adaptation and Organization of Open Educational Resources: Exploring the Teachers' Attitude of Sukhothai Thamathirat Open University, Thailand. *International Journal of Engineering and Advanced Technology*, 9(1). http://dx.doi.org/10.35940/ijeat.A1016.109119

Peláez A E.R and Yunga J C.M;. (2016). Características inherentespara OER's accesibles. *Opción*, 32(Special Issue 8), pp.674-688. https://produccioncientificaluz.org/index.php/opcion/article/view/21559

Perez, J. E. (2017). Images and the Open Educational Resources (OER) Movement. *Reference Librarian,* 58(4), pp.229-237. https://doi.org/10.1080/02763877.2017.1346495

Pérez-Paredes, Pascual & Ordoñana Guillamón, Carlos & Aguado, Pilar. (2018). Language teachers' perceptions on the use of OER language processing technologies in MALL. *Computer Assisted Language Learning*, 31(5-6), pp.522-545. http://dx.doi.org/10.17863/CAM.21321

Perifanou, M., Economides, A.A. (2022a). Discoverability of OER: The Case of Language OER. In: Mealha, Ó., Dascalu, M., Di Mascio, T. (eds) Ludic, Co-design and Tools *Supporting Smart Learning Ecosystems and Smart Education. Smart Innovation, Systems and Technologies*, vol 249. Springer, Singapore. https://doi.org/10.1007/978-981-16-3930-2_5

Perifanou, M. & Economides, A.A. (2022b). Analyzing repositories of OER using web analytics and accessibility tools. *Universal Access in the Information Society.* https://doi.org/10.1007/s10209-022-00907-6

Perifanou, M. & Economides, A.A. (2022c). Measuring quality, popularity, demand and usage of Repositories of Open Educational Resources (ROER): a study on Thirteen popular ROER. *Open Learning: The Journal of Open, Distance and e-Learning.* https://doi.org/10.1080/02680513.2022.2033114

Petrich, M. (2020). Building an OER program based on stakeholder feedback. *Reference Services Review*, Vol. 48 No. 3, pp. 489-501. https://doi.org/10.1108/RSR-03-2020-0013

Petrides, L., Goger, L., & Jimes, C. (2016). The role of "open" in strategic library planning. *Education Policy Analysis Archives*, 24, 36. https://doi.org/10.14507/epaa.24.2478

Petrucco, C. & Ferranti, C. (2020). Wikipedia as OER: the "Learning with Wikipedia" project. Vol. 16 (4). pp. 38-45. .http://dx.doi.org/10.20368/1971-8829/1135322

Piedra, N., Chicaiza, J., Atenas, J., Lopez-Vargas, J., Tovar, E. (2017). Using Linked Data to Blended Educational Materials With OER—A General Context of Synergy: Linked Data for Describe, Discovery and Retrieve OER and Human Beings Knowledge to Provide Context. In: Jemni, M., Kinshuk, Khribi, M. (eds) *Open Education: from OERs to MOOCs*. Lecture Notes in Educational Technology. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-52925-6_15

Pitt, R., Jordan, K., de los Arcos, B., Farrow, R. & Weller, M. (2020) Supporting open educational practices through open textbooks. *Distance Education*, 41(2), 303-318. https://doi.org/10.1080/01587919.2020.1757411

Ponte, F., Lennox, A., & Hurley, J. (2021). The evolution of the open textbook initiative. *Journal of the Australian Library and Information Association*, 70(2), 194–212. https://doi.org/10.1080/24750158.2021.1883819

Pounds, A., Bostock, J. Open educational resources (OER) in higher education courses in aquaculture and fisheries: opportunities, barriers, and future perspectives. *Aquaculture International* 27, 695–710 (2019). https://doi.org/10.1007/s10499-019-00355-9

Prince Machado, M.S., Tenorio Sepúlveda, G.C. & Ramirez Montoya, M.S. Educational innovation and digital competencies: the case of OER in a private Venezuelan university. International Journal of Educational Technology in Higher Education, 13(10). https://doi.org/10.1186/s41239-016-0006-1

Pulker, H. & Kukulska-Hulme, A . (2020). Openness reexamined: teachers' practices with open educational resources in online language teaching. *Distance Education*, 41(2), pp.216-229. https://doi.org/10.1080/01587919.2020.1757412

Ramirez-Montoya, MS. (2020). MOOCs and OER: Developments and Contributions for Open Education and Open Science. In: Burgos, D. (eds) *Radical Solutions and Open Science*. Lecture Notes in Educational Technology. Springer, Singapore. https://doi.org/10.1007/978-981-15-4276-3_10

Reid, P. & Maybee, C . (2021). Textbooks and Course Materials: A Holistic 5-Step Selection Process, College Teaching, 70:4, 518-529. https://doi.org/10.1080/87567555.2021.1987182

Ren, X. (2019). The undefined figure: Instructional designers in the open educational resource (OER) movement in higher education. *Education and Information Technologies*, 24, 3483-3500. https://doi.org/10.1007/s10639-019-09940-0

Risquez, A., McAvinia, C., Desmond, Y., Bruen, C., Ryan, D., & Coughlan, A. (2020). Towards a Devolved Model of Management of OER? The Case of the Irish Higher Education Sector. *The International Review of Research in Open and Distributed Learning*, 21(1), 100–112. https://doi.org/10.19173/irrodl.v20i5.4545

Ritella, G., Montanari, M., Spila, A., Lariccia, S. and Cesareni, D. (2017). Using OERs at the border between formal education and professional development. In: *9th International Conference on Computer Supported Education, CSEDU 2017.* SciTePress, pp.525-530. https://iris.uniroma1.it/handle/11573/1640392

Chotto, M. C., & Rivera, S. M. (2017, September). To what extent are faculty ready to participate in the OER movement?: The case of the Informatics School, UNA. In: *2017 XLIII Latin American Computer Conference (CLEI)* (pp. 1-8). IEEE. https://doi.org/10.1109/CLEI.2017.8226379

Rocha, J., Pessoa, P., Gomes, J.A., Sá-Pinto, X., Lopes, B. (2021). BiblioLab Project: Teachers, Parents and Students' Perspectives About the Usability and Usefulness of an Educational Distance Learning Platform. In: Reis, A., Barroso, J., Lopes, J.B., Mikropoulos, T., Fan, CW. (eds) *Technology and Innovation in Learning, Teaching and Education. TECH-EDU 2020. Communications in Computer and Information Science*, vol 1384. Springer, Cham. https://doi.org/10.1007/978-3-030-73988-1_7

Rolfe, V. (2017). Striving Toward Openness: But What Do We Really Mean?. *The International Review of Research in Open and Distributed Learning*, 18(7). https://doi.org/10.19173/irrodl.v18i7.3207

Rolfe, V., & Pitt, B. (2018). Open textbooks – an untapped opportunity for universities, colleges and schools. Insights: The UKSG Journal, 31(30). https://doi.org/10.1629/uksg.427

Ryder, E. F., Morgan, W. R., Sierk, M., Donovan, S. S., Robertson, S. D., Orndorf, H. C., Rosenwald, A. G., Triplett, E. W., Dinsdale, E., Pauley, M. A., & Tapprich, W. E. (2020). Incubators: Building community networks and developing open educational resources to integrate bioinformatics into life science education. *Biochemistry and molecular*

biology education : a bimonthly publication of the International Union of Biochemistry and Molecular Biology, 48(4), 381–390. https://doi.org/10.1002/bmb.21387

Saay, S. & Margaria, T . (2020). Model-Driven-Design of NREn Bridging Application: Case Study AfgREN. In: *2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC)*, Madrid, Spain, 2020, pp. 1522-1527. https://doi.org/10.1109/COMPSAC48688.2020.00-39

Sánchez González, M., Miró Amarante, ML, Ruiz Rey, FJ and Cebrián de la Serna, M. (2022). Evaluation of online teacher training programs on innovation and digital skills during Covid-19: #webinarsUNIA. *RIED-Revista Iberoamericana de Educación a Distancia (The Ibero-American Journal of Digital Education)*, 25 (1), 121-140. https://hdl.handle.net/11162/233087

Sanchez-Gordon, S. & Luján-Mora, S. (2015). An ecosystem for corporate training with accessible MOOCs and OERs. In: *2015 IEEE 3rd International Conference on MOOCs, Innovation and Technology in Education (MITE),* Amritsar, India, pp. 123-128 https://doi.org/10.1109/MITE.2015.7375301

Sandanayake, T.C. (2019). Promoting open educational resources-based blended learning. *International Journal of Educational Technology in Higher Education*, 16, 3.. https://doi.org/10.1186/s41239-019-0133-6

Santiago, A. and Ray, L. (2020). Navigating support models for OER publishing: case studies from the University of Houston and the University of Washington. *Reference Services Review*, Vol. 48 No. 3, pp. 397-413. https://doi.org/10.1108/RSR-03-2020-0019

Santos-Hermosa, G., Estupinyà, E., Nonó-Rius, B., París-Folch, L., & Prats-Prat, J. (2020). Open educational resources (OER) in the Spanish universities. *Profesional de La Informacion,* 29(6), 1–19. https://doi.org/10.3145/epi.2020.nov.37

Santos-Hermosa, G., Ferran-Ferrer, N., & Abadal, E. (2017). Repositories of Open Educational Resources: An Assessment of Reuse and Educational Aspects. The International Review of Research in Open and Distributed Learning, 18(5). https://doi.org/10.19173/irrodl.v18i5.3063

Schön, S., Ebner, M., & Hornung-Prähauser, V. (2017). Digital social innovation within education: Five insights on the role of digital tools in the field of Open Educational

Resources (OER) projects. In R. V. Nata (Ed.), *Progress in Education* (Vol. 49, pp. 167-188). Nova Science Publishers.

Schuwer, R., & Janssen, B. (2018). Adoption of Sharing and Reuse of Open Resources by Educators in Higher Education Institutions in the Netherlands: A Qualitative Research of Practices, Motives, and Conditions. *The International Review of Research in Open and Distributed Learning,* 19(3). https://doi.org/10.19173/irrodl.v19i3.3390

Senn, L. G., Heim, A. B., Vinson, E. & Smith, M, K. (2022). How do undergraduate biology instructors engage with the open educational resource life cycle? *Frontiers in Education,* 7. https://doi.org/10.3389/feduc.2022.835764

Seraphin, S. B., Grizzell, J. A., Kerr-German, A., Perkins, M. A., Grzanka, P. R., & Hardin, E. E. (2019). A conceptual framework for non-disposable assignments: Inspiring implementation, innovation, and research. *Psychology Learning & Teaching*, 18(1), 84–97. https://doi.org/10.1177/1475725718811711

Shemy, N. & Al-Habsi, M . (2021). The effect of a training program based on open educational resources on the teachers online professional development and their attitudes towards it of AL-Dakhliya governorate in sultanate of Oman. *Journal of E-Learning and Knowledge Society,* 17(1), pp.18-28. https://doi.org/10.20368/1971-8829/1135283

Sheu, F.-R., & Shih, M. (2017). Evaluating NTU's OpenCourseWare Project with Google Analytics: User Characteristics, Course Preferences, and Usage Patterns. *The International Review of Research in Open and Distributed Learning*, 18(4). https://doi.org/10.19173/irrodl.v18i4.3025

Singh, M,, Adebayo, S. O., Saini, M. & Singh, J. (2021). Indian government E-learning initiatives in response to COVID-19 crisis: A case study on online learning in Indian higher education system. Education and Information Technologies, 26, 7569–7607. https://doi.org/10.1007/s10639-021-10585-1

Smirani, L. & Boulahia, J. (2022). Using the Unified Theory of Acceptance and Use of Technology to Investigate the Adoption of Open Educational Resources by Faculty Members. *International Journal of Information Technology (Singapore)*, 14, 3201–3211 (2022). https://doi.org/10.1007/s41870-022-00918-9

Smith, B. & Lee, L. (2017). Librarians and OER: Cultivating a community of practice to be more effective advocates. *Journal of Library and Information Services in Distance Learning* 11(1/2):106–122. https://doi.org/10.1080/1533290X.2016.1226592

Stanberry, K. (2022). OER textbooks: A helpful tool for DEI initiatives in higher education. *Journal of Higher Education Theory and Practice*, 22(8), 33-36. https://doi.org/10.33423/jhetp.v22i8.5313

Stefanović, N., Milošević, D. (2016). Innovative OER model for Technology Enhanced Academic and Entrepreneurial Learning. In: Jemni, M, Kinshuk, Koutheair Khribi (Eds.) *Open Education: from OERs to MOOCs*. Springer - Verlag, *Lecture Notes in Educational Technology*, ISBN 978-3-662-52923-2, e-ISBN: 978-3-662-52925-6. http://www.springer.com/gp/book/9783662529232

Stoffregen, J. D., Pawlowski, J. M., Ras, E., Tobias, E., Šćepanović, S., Fitzpatrick, D., Mehigan, T., Steffens, P., Przygoda, C., Schilling, P., Friedrich, H. & Moebs, S. (2016). Barriers to open e-learning in public administrations: A comparative case study of the European countries Luxembourg, Germany, Montenegro and Ireland. *Technological Forecasting and Social Change,* 111, pp.198-208. http://dx.doi.org/10.1016/j.techfore.2016.06.030

Sunar, A. Novak, E. & Mladenić, D. (2020). Users' Learning Pathways on Cross-site Open Educational Resources. In: *Proceedings of the 12th International Conference on Computer Supported Education - Volume 2: CSEDU*; ISBN 978-989-758-417-6; ISSN 2184-5026, SciTePress, 84-95. http://dx.doi.org/10.5220/0009391600840095

Sungkur, R.K. & Santally, M.I. (2019). Knowledge Sharing for Capacity Building in Open and Distance Learning (ODL): Reflections from the African Experience. Journal of the Knowledge Economy, 10, 380–396. https://doi.org/10.1007/s13132-017-0459-z

Sweet, C. and Clarage, E.C. (2020). Library consortia contributing to college affordability: collection and OER initiatives in the Consortium of Academic and Research Libraries in Illinois. *Reference Services Review*, Vol. 48 No. 3, pp. 433-445. https://doi.org/10.1108/RSR-03-2020-0014

Tammaro, A.M., Ciancio, L., De Rosa, R., Pantò, E., Nascimbeni, F. (2017). Digital Libraries in Open Education: The Italy Case. In: Grana, C., Baraldi, L. (eds) *Digital Libraries and Archives. IRCDL 2017. Communications in Computer and Information Science,* vol 733. Springer, Cham. https://doi.org/10.1007/978-3-319-68130-6_3

Tang, H. & Bao, Y . (2021). Latent class analysis of K-12 teachers' barriers to implementing OER. *Distance Education*, 42(4), pp.582-598. https://doi.org/10.1080/01587919.2021.1986371

Tavakoli, M., Hakimov, S., Ewerth, R. & Kismihok, G. (2020). A recommender system for open educational videos based on skill requirements. In: *2020 IEEE 20th International Conference on Advanced Learning Technologies (ICALT)*, Tartu, Estonia, 2020, pp. 1-5. https://doi.org/10.1109/ICALT49669.2020.00008

Thomas, W. J. & Bernhardt, B. R. (2018). Helping Keep the Costs of Textbooks for Students Down: Two Approaches. *Technical Services Quarterly*, 35(3), pp.257-268. https://doi.org/10.1080/07317131.2018.1456844

Tillinghast, B., Fialkowski, M. K. & Draper, J. (2020). Exploring Aspects of Open Educational Resources Through OER-Enabled Pedagogy. *Frontiers in Education*, 5, pp.. https://doi.org/10.3389/feduc.2020.00076

Tillinghast, B. (2020). Developing an Open Educational Resource and Exploring OER-Enabled Pedagogy in Higher Education. *IAFOR Journal of Education: Technology in Education*, 8(2). https://doi.org/10.22492/ije.8.2.09

Tisoglu, S., Kursun, E., & Cagiltay, K. (2020). Open educational resources in Turkey. In R. Huang, D. Liu, A. Tlili, Y. Gao, & R. Koper (Eds.), *Current state of open educational resources in the "belt and road" countries* (pp. 213–235). Lecture Notes in Educational Technology. Springer, Singapore. https://doi.org/10.1007/978-981-15-3040-1_12

Tlili, A., Jemni, M., Khribi, M.K, Huang, R., Chang, T. W. & Liu, D. (2020). Current state of open educational resources in the Arab region: an investigation in 22 countries. *Smart Learning Environments* 7, 11. https://doi.org/10.1186/s40561-020-00120-z

Tlili A, Jemni M and Khribi M K; ;. (2020). Current state of open educational resources in the Arab region: an investigation in 22 countries. Smart Learning Environments, 7(1), pp..

Tlili, A., Zhang, J., Papamitsiou, Z., Manske, S., Huang, R. K. & Hoppe, H. U. (2021). Towards utilising emerging technologies to address the challenges of using Open Educational Resources: a vision of the future. *Educational Technology Research and Development*, 69, 515–532. https://doi.org/10.1007/s11423-021-09993-4

Todorinova, L., & Wilkinson, Z. T. (2020). Incentivizing faculty for open educational resources (OER) adoption and open textbook authoring. *Journal of academic librarianship,* 46(6), 102220. 10.1016/j.acalib.2020.102220

Tovar, E., Piedra, N., López, J., Chizaiza, J. (2016). Open Education Practices as Answer to New Demands of Training in Entrepreneurship Competences: The Role of Recommender Systems. In: Zvacek, S., Restivo, M., Uhomoibhi, J., Helfert, M. (eds) *Computer Supported Education. CSEDU 2015*. Communications in Computer and Information Science, vol 583. Springer, Cham. https://doi.org/10.1007/978-3-319-29585-5_1

Tovar E, Piedra N and López J ; Chizaiza J ;. (2016). Open education practices as answer to new demands of training in entrepreneurship competences: The role of recommender systems. 7th International Conference on Computer Supported Education and CSEDU 2015, 583, pp.3-18.

Towey, D., & Zhao, K. (2017). Developing an automated coding tutorial OER. In: *Proceedings of 2017 IEEE International Conference on Teaching, Assessment and Learning for Engineering, TALE 2017* (pp. 233-238). (Proceedings of 2017 IEEE International Conference on Teaching, Assessment and Learning for Engineering, TALE 2017; Vol. 2018-January). Institute of Electrical and Electronics Engineers Inc.. https://doi.org/10.1109/TALE.2017.8252339

Towey D and Zhao K . (2017). Developing an automated coding tutorial OER. In: 2017 IEEE International Conference on Teaching, Assessment and Learning for Engineering, TALE 2017. : Institute of Electrical and Electronics Engineers Inc., pp.233-238. Available at: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85047271175&doi=10.1109%2fTALE.2017.8252339&partnerID=40&md5=34d0734a6f767607cfd3ab49ad845b59.

Towey, D., Foster, D., Gilardi, F., Martin, P., White, A. Jiang, Y., Pan, Y. & Qu, Y. (2017). Developing an Open Educational Resource: Reflections on a Student-Staff Collaboration. In: *2017 IEEE 41st Annual Computer Software and Applications Conference (COMPSAC),* Turin, Italy, pp. 707-711. https://doi.org/10.1109/COMPSAC.2017.281

Towey, D., Foster, D., Gilardi, F., Martin, P., White, A., Jiang, Y., Pan, Y., & Qu, Y. (2017). Students as partners in a multi-media note-taking app development: Best practices. In: *Proceedings - 2017 IEEE/ACM 39th International Conference on Software Engineering Companion, ICSE-C 2017* (pp. 334-335). Article 7965349 (Proceedings - 2017 IEEE/ACM

39th International Conference on Software Engineering Companion, ICSE-C 2017). Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/ICSE-C.2017.58

Truong, V., Denison , T., & Stracke, C. M. (2021). Developing Institutional Open Educational Resource Repositories in Vietnam: Opportunities and Challenges. *The International Review of Research in Open and Distributed Learning*, 22(4), 109–124. https://doi.org/10.19173/irrodl.v23i1.5582

Venegas Muggli, J. I., & Westermann, W. (2019). Effectiveness of OER Use in First-Year Higher Education Students' Mathematical Course Performance: A Case Study . *The International Review of Research in Open and Distributed Learning*, 20(2). https://doi.org/10.19173/irrodl.v20i2.3521

Venegas-Muggli J I and Westermann W. (2019). Effectiveness of OER use in first-year higher education students' mathematical course performance: A case study. International Review of Research in Open and Distance Learning, 20(2), pp.204-222.

Sánchez Vera, F., Tellez Infantes, A., Martínez Guirao, J. E., & Antón Hurtado, F. (2021). Development of the Pre-Professional Identity of Vocational Students during Their Training through a Program Based on OER-Enabled Pedagogy and an Online Community of Practice. *Sustainability*, 14(1), 356. MDPI AG. http://dx.doi.org/10.3390/su14010356

Villar-Onrubia, D. (2022). "They Have to Combine the Future of the University and Their Own Future": OpenCourseWare (OCW) Authoring as an Academic Practice in Spain. *The International Review of Research in Open and Distributed Learning*, 23(2), 63–85. https://doi.org/10.19173/irrodl.v23i2.5765

Vogus, B. (2019). Open Educational Resources (OER) and Textbooks: Opportunities for Academic Libraries. *Public Services Quarterly*, 15:3, 242-247. https://doi.org/10.1080/15228959.2019.1629858

Vollman, B. K. (2021). Access, use and perceptions of open (free) and traditional textbooks: an exploratory comparative analysis of community college criminal justice courses. *Open Learning: The Journal of Open, Distance and e-Learning*, 38:3, 260-280. https://doi.org/10.1080/02680513.2021.1874330

Voß, F., De Fries, T., Möbs, S., Pawlowski, J.M., Raffl, C., Stoffregen, J. (2018). A Competence Framework for Open Educational Resources: The Case of the Public Sector.

In: Uden, L., Liberona, D., Ristvej, J. (eds) *Learning Technology for Education Challenges. LTEC 2018*. Communications in Computer and Information Science, vol 870. Springer, Cham. https://doi.org/10.1007/978-3-319-95522-3_8

Vujicic, T., Scepanovic, S. & Jovanovic, J. (2016). Requirements elicitation in culturally and technologically diverse settings. In: *2016 5th Mediterranean Conference on Embedded Computing (MECO), Bar, Montenegro*, pp. 464-467. https://doi.org/10.1109/MECO.2016.7525693 .

Wang, S. & Wang, H. (2017). Adoption of open educational resources (OER) textbook for an introductory information systems course. *Open Learning: The Journal of Open, Distance and e-Learning*, 32:3, 224-235. https://doi.org/10.1080/02680513.2017.1354762

Werth, E. & Williams, K. (2021a). Learning to be open: instructor growth through open pedagogy, *Open Learning: The Journal of Open, Distance and e-Learning*. https://doi.org/10.1080/02680513.2021.1970520

Werth, E., & Williams, K. (2021b). What Motivates Students About Open Pedagogy? Motivational Regulation Through the Lens of Self-Determination Theory. The International Review of Research in Open and Distributed Learning, 22(3), 34–54. https://doi.org/10.19173/irrodl.v22i3.5373

Werth E and Williams K . (2021). Learning to be open: instructor growth through open pedagogy. Open Learning, , pp..

Werth E and Williams K . (2021). What Motivates Students About Open Pedagogy? Motivational Regulation Through the Lens of SelfDetermination Theory. International Review of Research in Open and Distance Learning, 22(3), pp.34-54.

Whitehill, J., Aguerrebere, C., & Hylak, B. (2019). Do Learners Know What's Good for Them? Crowdsourcing Subjective Ratings of OERs to Predict Learning Gains. In: *12th International Conference on Educational Data Mining, EDM 2019*. International Educational Data Mining Society, pp.462-467. https://eric.ed.gov/?id=ED599196

Whitehill J, Aguerrebere C and Hylak B ;. (2019). Do learners know what's good for them? Crowdsourcing subjective ratings of OERs to predict learning gains.Available at: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85078590678&partnerID=40&md5=c956c99772b564bb8f09850f0decd2f5.

Ibrahim, S. S., Zaid, N. A. M., Zoolkefli, Z., Musa, A. H., & Baharuddin, F. N. (2021). Awareness and Acceptance toward the Role of Open Education Resources (OER) in Teaching and Learning Aftermath COVID-19 Pandemic: PLS-SEM Approach. *International Journal of Academic Research in Progressive Education and Development*, 10(3), 1095–1106. http://dx.doi.org/10.6007/IJARPED/v10-i3/11482

Wijayati P H, Kharis M and Hidayat E ; Ardiyani D K; Ebner M ; Schön S ;. (2022). Teaching German as a Foreign Language with Open Educational Resources (OER) Implementation in and Experiences from an Indonesian University. International Journal of Emerging Technologies in Learning, 17(4), pp.225-238.

Wijayati P H, Kharis M and Hidayat E ; Ardiyani D K; Ebner M ; Schön S ;. (2022). Teaching German as a Foreign Language with Open Educational Resources (OER) Implementation in and Experiences from an Indonesian University. International Journal of Emerging Technologies in Learning, 17(4), pp.225-238.

Wiley, D., Williams, L., DeMarte, D., & Hilton, J. (2016). The Tidewater Z-Degree and the INTRO Model for Sustaining OER Adoption. *Education Policy Analysis Archives*, 24, 41. https://doi.org/10.14507/epaa.24.1828

Wolfenden, F., & Adinolfi, L. (2019). An exploration of agency in the localisation of open educational resources for teacher development. *Learning, Media and Technology*, 44(3), 327–344. https://doi.org/10.1080/17439884.2019.1628046 .
Wong, B. T. M., & Li, K. C. (2019). Using open educational resources for teaching in higher education: A review of case studies. In *Proceedings - 2019 International Symposium on Educational Technology, ISET 2019* (pp. 186–190). IEEE. https://doi.org/10.1109/ISET.2019.00046

Wright, R., Padgett, L., Whitehead, D., & Bossu, C. (2016). Open Education Licensing – making online education really work. In: *ASCILITE 2016 Conference Proceedings, 28-30 Nov 2016, Adelaide, Australia*, Australasian Society for Computers in Learning in Tertiary Education, pp. 675–676. https://hdl.handle.net/102.100.100/509424

Yang, J., Kinshuk (2017). Survey and Reflection of Open Education Policies. In: Jemni, M., Kinshuk, Khribi, M. (eds) *Open Education: from OERs to MOOCs*. Lecture Notes in Educational Technology. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-52925-6_2

Zaatri, I., Margoum, S., Bendaoud, R., El Malti, I.L., Burgos, D., Berrada, K. (2020). Open Educational Resources in Morocco. In: Huang, R., Liu, D., Tlili, A., Gao, Y., Koper, R. (eds) *Current State of Open Educational Resources in the "Belt and Road" Countries*. Lecture Notes in Educational Technology. Springer, Singapore. https://doi.org/10.1007/978-981-15-3040-1_7

Zaid, Y. A. & Alabi, A. O. (2021). Sustaining Open Educational Resources (OER) initiatives in Nigerian Universities, *Open Learning: The Journal of Open, Distance and e-Learning*, 36:2, 181-197. https://doi.org/10.1080/02680513.2020.1713738

Zapata, G. (2020). Sprinting to the Finish Line: The Benefits and Challenges of Book Sprints in OER Faculty-Graduate Student Collaborations. *International Review of Research in Open and Distributed Learning*, 21(2), 1–17. https://doi.org/10.19173/irrodl.v21i2.4607

Zhang, M. & Li, Y. (2017). Teaching Experience on Faculty Members' Perceptions about the Attributes of Open Educational Resources (OER). International Journal of Emerging Technologies in Learning (iJET), 12(4), 191-199. *International Journal of Emerging Technology in Learning*. https://www.learntechlib.org/p/180127/.

Zhang, X. (2020). Revisiting Textbook Adaption Through Open Educational Resources: An Inquiry into Students' Emotions. *International Review of Research in Open and Distributed Learning*, 21(3), 197–210. https://doi.org/10.19173/irrodl.v21i3.4775

Zhang, X., Tlili, A., Shubeck, K. et al. Teachers' adoption of an open and interactive e-book for teaching K-12 students Artificial Intelligence: a mixed methods inquiry. *Smart Learning Environments*. 8, 34 (2021). https://doi.org/10.1186/s40561-021-00176-5 .

Zhu, M. & Kadirova, D. (2020). Self-directed learners' perceptions and experiences of learning computer science through MIT open courseware. *Open Learning: The Journal of Open, Distance and e-Learning*, 37:4, 370-385. https://doi.org/10.1080/02680513.2020.1781606

Further Information

Website

For further and updated information about this project please see:
www.encoreproject.eu

Contacts

Report coordinator
Robert Farrow, The Open University (UK)

Project Coordinator
Juliane Granly, ICDE
granly@icde.org

Contact us
info@encoreproject.eu

This project has been funded with support from the European Commission. This publication reflects the views only of the authors, and