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RESEARCH PAPER

# An Introduction to Open Educational Resources and Their Implementation in Higher Education Worldwide

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ABSTRACT

The digitization of (higher) education has exposed copyright infringement issues, as the unauthorized use of copyrighted materials has become more visible. This article explores the importance of open educational resources (OER) in higher education, focusing on their development, how they are understood, and the opportunities they offer. OER are defined as learning materials released under open licenses, allowing no-cost access, reuse, adaptation, and redistribution. The article discusses the OER movement, its milestones, and its integration into educational practice. It also presents arguments for OER: they enable free access to education, improve teaching practice, diminish legal issues, and foster open science. In addition, it highlights criticisms, including resistance from traditional publishers and concerns about marketing influence. The article concludes by examining current OER implementation in higher education and its promise of innovation. While OER are increasingly adopted, proprietary resources still dominate. The article emphasizes the need for educators to use

open licenses meaningfully and innovatively and presents research on OER acceptance and usage. The monitoring of OER development in higher education is essential, but approaches may vary across countries.

## 1 Introduction: Increasing Digitization and the Internet Makes Copyright Infringement in (Higher) Education Visible

In the last two centuries, teachers have played a pivotal role in identifying and harnessing the most effective educational materials, tools, and techniques to engage and inspire their students. The daily work of teaching is a process of curating and integrating various resources to create rich learning experiences. The advent of digitization has brought to light the issue of copyright infringement in educational settings. For example, when a pdf document is shared via email or the learning management system or a presentation is published online, copyright issues become visible, and the rights owners, e.g., book publishers or photographers, increasingly assert their claims. Digitization makes more visible instances of copyrighted materials being used without proper authorization or attribution, potentially leading to legal repercussions and ethical dilemmas. At the same time, digitization has led to online resources being much more widely available and usable: it is easier to offer them, retrieve them, adapt them, and reuse them. This article discusses advantages of "open educational resources" (OER), i.e., materials that explicitly allow these forms of use, with a focus on the development of OER in higher education. The article is intended as an introduction to OER, and outlines the OER movement, describes current debates on and developments in OER in higher education, especially in Europe but also globally, and concludes with recommendations.

This article contributes to the topic of education in the digital world as OER have become more relevant through and with digitization. By analyzing the role of OER in improving accessibility, enhancing teaching practices, and reducing legal issues, the article offers insights into reimagining digital learning and teaching in the post-pandemic world, as well as addressing digital-era higher educational literacy.

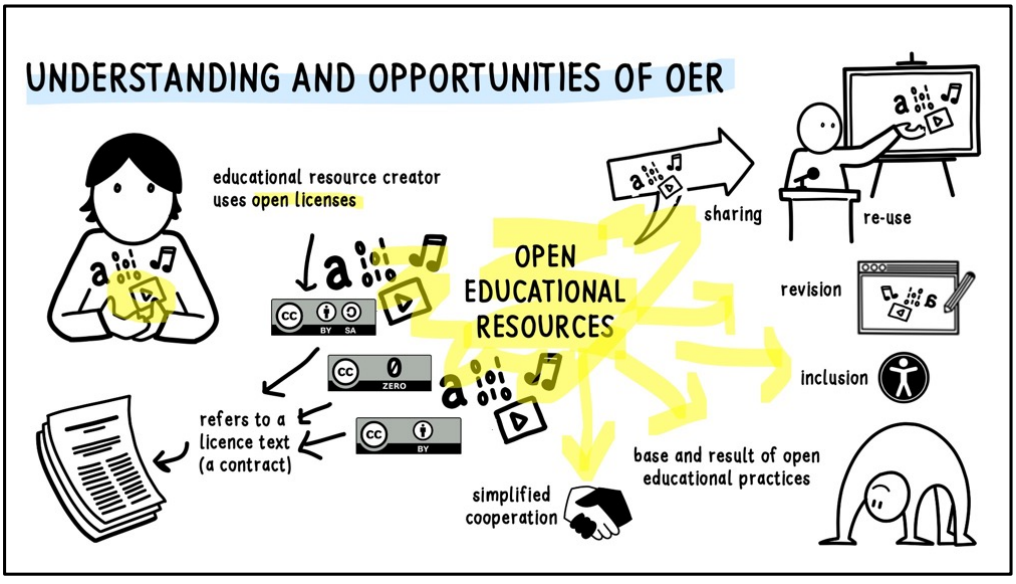
## 2 The Understanding of and Opportunities Offered by OER

Open educational resources are defined by UNESCO in the Recommendation on open educational resources (OER) as follows:

> Open Educational Resources (OER) are learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation, and redistribution by others. (UNESCO, 2019, I.1)

Therefore, "open," which should not be confused with "free," is related to the possibility of being able to access, re-use, modify, and re-publish materials, legally and at no cost. Such uses of educational materials in parts of the education sector is unproblematic in some countries, e.g., the "fair use" principle in the US (Copyright Act, 1976). However, there are enormous differences in the allowed uses of (educational) content between, for example, European countries (Nobre, 2017). Therefore, a clear contractual regulation is important, such as the legal texts of so-called "open licenses." In recent years, three contract variants of Creative Commons ("CC") licenses, the most used open licenses, for educational content have prevailed. They are abbreviated as CC BY (attribution required), CC BY-SA (attribution and same license required), and CC 0 ("public domain," without copyright protection). These licenses exist as several variants, but the latest variant (4.0) applies to jurisdictions worldwide. Therefore, OER are also connected to open-source software and open standards to ensure easy legal and technical adoption.

Figure 1: The understanding of and opportunities for use of Open Educational Resources




Open educational resources are not only about resources; they are often based on and inspire open practices in teaching/learning settings and are about what the use of openly licensed content can bring to the learning process. Thus, "open educational practices" are teaching approaches closely connected to the creation and use of OER (Conole & Ehlers, 2010), and "open" pedagogi-

cal and scholarly practices "are most likely to allow for learning experiences that are real, rich and relevant" (Geser, 2007, p. 17). Open educational practices comprise a range of practices that act to open aspects of education in particular ways (Havemann, 2020), such as open and transparent educational digital scholarship (Weller, 2014), sharing-based approaches (Cronin, 2017), inclusive pedagogies (Havemann, 2020), care-based teaching methods (Bali, Cronin, & Jhangiani, 2019), accessibility dynamics (Tlili et al., 2020), and socially sustainable innovative approaches (Nerantzi & Atenas, 2022).

"Open education" is even broader and includes all concepts, measures, and activities aiming to increase educational access, effectiveness, and equity through the fostering of participation and knowledge co-creation, especially by marginalized and traditionally underrepresented groups (Campbell, 2020). Therefore, open education encompasses not only OER and open educational practices, but also approaches such as open universities, which allow people to study without a traditional university entrance qualification via distance education, and Massive Open Online Courses, which open university teaching to literally everyone. Therefore, "openness" can mean and refer to a variety of aspects in the field of education.

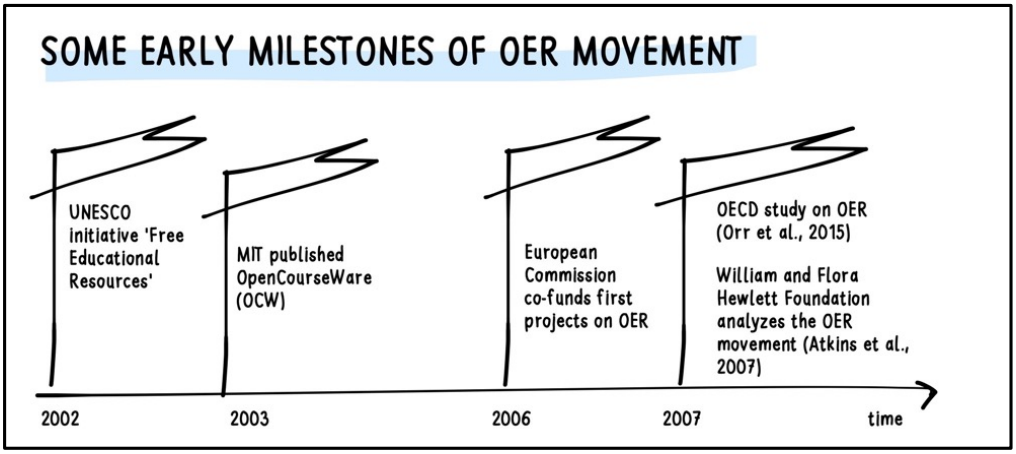
Especially in the context of universities and research, the term "open science" is yet another relevant concept, in which OER are seen as a part. Open science may be seen as an extension of the idea of "open access," which pursues the idea that scientific publications, especially those funded by public money, should be generally available to all (Persic et al., 2021). Since the first initiatives, for example the founding of arXiv in 1991 and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities in 2003, this understanding has expanded considerably. After initial resistance, scholarly publishers have also adapted their business models and have benefited in part from developments through the numerous funding programs (cf. Asai, 2020).

With this in mind, OER are first defined as educational that are legally available to be reused, modified and republished. Nevertheless, OER must always be seen as a conceptual part of the open educational practice, open education, and open science discussion. When OER publishers see "open" only as "cost-free," they are somehow missing important components such as knowledge co-creation and a general mindset open to sharing.

# 3 The Development of the OER Movement

The OER movement began at the end of the 20th century. Initially, the movement's main motive was to collect educational materials and make them accessible and freely available through the Internet. For example, this was the main objective of the German "Zentrale für Unterrichtsmedien im Internet" (ZUM.de) established in 1996 or the Wikieducator.org platform founded in 2006 in New Zealand. Several terms were used for freely usable educational materials at the time, for example "open educational content" and "free educational content." Later, copyright challenges came more to the fore, and with them the use of open licenses, initially mostly those within the context of open-source developments. Some of the early milestones of the world-wide OER movement, from the UNESCO initiative in 2002 to the OECD study on OER in 2007, are shown in Figure 2. The establishment and development of the Creative Commons licenses were also important for OER, as they fit educational content and usage better than the open-source software licenses used before.

Figure 2: Some early milestones of the Open Educational Resources (OER) movement. Illustration based on Santos-Hermosa and Atenas (2022)




Since around 2010, the term "open educational resources" has been applied comparatively uniformly, and OER projects and initiatives, of varying breadth and impact, are being implemented worldwide. For the global and European context, we want to highlight two moments from the OER movement in the last decade. First, the European Commission published a document in 2013 with the aim of "opening up education" and improving the teaching of digital skills in schools and universities (European Commission, 2013). The subsequent calls for research projects and national strategies in the EU increasingly referred to OER. UNESCO's (2019) OER Recommendation brought OER to the attention of global educational policymakers. To sum up, the open education movement brought OER to the agendas of several educational organizations and institutions. Nevertheless, the topic of OER has still not gained conceptual integration into educational practice and political strategies.

# 4 The OER Debate and Criticism

At first, the demand for OER seemed high, but there were various arguments and criticisms of the topic and resistance to OER from different stakeholders. The lines of argumentation currently prevailing depend on the respective national education system, the education sector and its financing, educational practice, and legal regulations.

### Free Qualitative Education for Everyone

The essential argument in favor of OER is that open licenses provide a legally secure framework for worldwide use of educational resources. It is thus possible that even structurally disadvantaged regions and individuals can, in principle, gain access to high-quality education. This is also addressed by the United Nations' Sustainable Development Goal 4 "Quality Education." In particular, this goal calls for free access to the education system for all population groups, especially those of school age. OER are seen as an essential measure in this regard (McGreal, 2017). Wherever traditional proprietorial textbooks must be paid for by learners and their families, the easier accessibility of OER is of particular interest (for example Hilton et al., 2014). OER also contribute to the solving of accessibility issues and, therefore, support inclusion.

### Better (Open) Teaching Practices

In recent years, many have been convinced of the possibilities of improving the quality of teaching with the help of OER. The use of OER allows academics and students to work with resources created by others that can be shared, widening the spectrum of resources and practices available to students and embedding transversal skills (including digital and data literacy, alongside critical thinking, research, teamwork, and global citizenship skills). Moreover, students can be empowered to be critical and collaborative citizens. Thus, within the contemporary post-pandemic context, educators have often found the open sharing of practices just as vital as the sharing of resources (Havemann & Roberts, 2021).

### Fewer Legal Issues, Especially in Digital Teaching

A more pragmatic argument for educational institutions to engage with OER is the avoidance of legal disputes. For example, if higher education institutions allow and encourage their teachers to produce OER, these materials can also be more effectively reused, at least in the central European legal area; this is an important argument (see Ebner et al., 2016).

### OER Competence as a Competitive Factor in Open Science

Because international organizations are currently promoting open science and the associated knowledge required for open licenses as a model for funded research projects, knowledge in dealing with this is important. The development of competencies in open licensing (or open access, OER, or open data) is thus pragmatically seen as a competitive advantage, even for people and institutions for whom philanthropic considerations are rather distant. There are also opposing positions and critical voices in the debate about OER, two of which are explained.

### The Need for New Business Models and Resistance from Traditional Textbook Publishers

Although there are many initiatives and good arguments for OER, textbooks and educational resources are still mostly produced proprietarily. OER also change the possibilities of availability and use, and thus, traditional business models are turned upside down (cf. Geser et al., 2019). Publishers are resisting such changes particularly for school textbooks. However, in the case of research publications, several publishers have changed their procedures and support open access or OER publications, so far largely through advance funding by the authors or their institutions.

### Gaining Influence with OER: New Imperialism and Marketing Influence Risk

OER are seen as a potential vehicle for widely sharing educational content. However, this principle is also perceived as a problem in some cases. For example, lobbying associations also create materials as OER, and these, like workbooks distributed free of charge, also easily find their way into the classroom because teachers obtain their teaching materials from the Internet. In a similar way, other countries or cultures are now beginning to perceive OER, especially from the US, as neo-imperialistic in nature. Both arguments do not speak against OER, but for the increased production of one's own OER that are desired, qualitatively valuable, and culturally appropriate (cf. Bates, 2016).

## 5 Current Forms of OER Implementation in Higher Education

OER in higher education have advanced from an early stage (Schaffert, 2010) to a phase in which they are more strategically embedded (Camilleri et al., 2014). However, the situation of the OER actors and institutional development presents a fragmented picture. The use of OER within higher education settings is increasingly common, even if they are still far from mainstream adop-

tion, with proprietary resources often being the norm. As shown by several studies (e.g., Nascimbeni et al., 2018), educators typically start exploring the use of OER with the aim of increasing accessibility by decreasing the cost of resources for students, but then discover the potential for pedagogical innovation associated with the use of open resources. This is typically related to knowledge co-creation by educators and learners, for example, through social annotation tools, as well as to other open educational practices, including open course design and open assessment (Cronin, 2017). International, national, and regional projects are increasingly addressing issues of OER in higher education, for example the European Network for Catalysing Open Resources in Education (ENCORE+) in Europe and research groups in South Africa (Ndebele, Masuku, & Mlambo, 2023).

The introduction of OER can empower different kinds of innovation along the whole process of education, as shown by the Handbook of Successful Teaching Practices by the OpenGame project (Garcia-Holgado et al., 2019). Open textbooks can be downloaded and printed for free, and students can annotate the textbook and develop their own revisions, for example, with the WikiToLearn.org platform. In addition, open licensed videos by other lecturers and experts can easily be integrated into a flipped or inverted classroom setting. Some students could even take on the role of OER developer, for example, in a hackathon for OER or apps for sustainable issues.

Many more innovations can be triggered by using OER (Coughlan et al., 2019), but for this to happen, educators need to be able to use open licenses in a meaningful and innovative pervasive way. Typically, OER training is used to spread these ideas. The first online tutorials on OER were published by Córcoles et al. (2007). Several open educational practices and OER competence frameworks are already published (Ehlers & Bounodo, 2020; Nascimbeni & Burgos, 2016; Organisation internationale de la Francophonie, 2016). Research on the current acceptance and usage of OER is a good start not only to verify their state, but also to highlight the importance of the new topic, as described for India (Padhi, 2018).

There are different approaches to assess and compare the OER situation in higher education institutions from different countries. Marín et al. (2020) studied the existence of OER policies and infrastructure in higher education in different countries. As recommended by UNESCO (2019), activities to monitor OER development, as well as OER in higher education, have increasingly been undertaken within the last few years. However, Neumann et al. (2022) have shown that similar higher education settings, such as those in Austria, Switzerland, and Germany, cannot be monitored using the same measures.

OER policies as documents or declarations at the national level are already available for some countries. For example, the Finnish national OER policy for higher education describes future objectives and activities as an executive plan (Open Science Coordination in Finland, 2022). In addition to such national OER policy documents, several institutions or networks in higher education have produced organizational OER strategy papers. In enabling sustainable open policies in the higher education sector, elements such as access to knowledge and information imposed by copyright reforms, which tend to benefit publishers over people, need to be considered (Atenas et al., 2019, 2020). OER policies should promote the publication of pedagogical resources, such as open textbooks or handbooks, following the open access licensing approach, or promote the use of open data as OER to develop data literacy (Atenas et al., 2015; Atenas, Havemann, & Timmermann, 2020). In addition, OER policies should promote the adoption of open-source software to produce, adapt, and store OER. Furthermore, OER policies in higher education need alignment. Open science initiatives as OER are considered key to fostering the development of scientific capacity as stated in the UNESCO Recommendation on Open Science (Santos-Hermosa & Atenas, 2022).

The new approach of an OER certificate to acknowledge the OER activities of higher education institutions is currently implemented in Austria. Based on the White paper, Concept of OER Certification at Austrian Universities (cf. Ebner, 2018), a certificate is currently granted to higher education institutions based on three criteria for “Certified OER higher education institutions”: the existence of an OER strategy document and offer of OER further education; an OER repository where staff can publish OER; and a certain number of staff members with training in OER (Schön et al., 2023).

The measurement of the impact of OER is important for higher education institutions already working in the field. Several approaches to OER impact analysis can be found (Ebner, Orr, & Schön, 2022). An Austrian university, Graz University of Technology (TU Graz), recently published its approach to OER impact assessment and ideas for evaluating the effects and impacts of their OER university (Ebner et al., 2022).

# 6 Outlook: Future Directions for OER Implementation in Higher Education

The implementation of OER in higher education has seen some progress, but opportunities and challenges still need addressing. Some potential future directions are discussed below.

### Advancing Pedagogical Innovation

Educators are discovering the pedagogical potential of OER, such as knowledge co-creation and open educational practices. Further research and exploration of pedagogical approaches that capitalize on OER can enhance active learning and collaboration.

### Strengthening International Collaboration

Initiatives and research groups are actively promoting OER adoption. The strengthening of international collaboration can facilitate knowledge exchange and accelerate progress through the sharing of best practices and experiences.

### Empowering Educators through OER Competence Development

Ongoing development of OER competence frameworks and provision of professional development opportunities can equip educators with the skills to effectively use open licenses and integrate OER into teaching practice.

### Monitoring and Evaluating OER Implementation

Research on acceptance, usage, and impact of OER provides insights into effective strategies. Standardized measurement frameworks can assess OER policies, infrastructure, and practices, aiding informed decision-making.

### Advocating for Open Policies and Practices

Open policies should promote the publication of resources, use of open data, and adoption of open-source software. Alignment between OER policies and broader open science initiatives is crucial for fostering scientific capacities. By pursuing these directions, higher education institutions can further enhance the implementation and impact of OER.

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