

ARTICLE

Teachers' Adoption of Open Educational Resources in Higher Education

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Open Educational Resources (OER) have the potential to change the domain of higher education; however, adoption is still limited. As teachers are the pivotal actors to adopt OER, more insights are needed on their practices with OER and need of support. This exploratory study uses the OER Adoption Pyramid as a framework to analyse adoption of OER within a Dutch University of Applied Sciences. A questionnaire (n = 143) and semi-structured interviews with teachers who had some experience with sharing or using OER (n = 11) offered insights into the current state of affairs on adoption and need of support. The results revealed that informal sharing of resources within teachers' personal networks happens frequently whereas the use of OER is more limited. If teachers use OER, they are mainly used 'as-is' or for a source of inspiration. Our findings indicate that the OER Adoption Pyramid does not properly describe the sequence of each layer within the context of this study. Availability must be lower in the pyramid as a prerequisite for teachers to explore their capacity and volition. Hence, the findings underline the need of support on subject-specific overviews of OER and the creation of national or institutional teacher communities. To improve our understanding, future research should focus on qualitative studies focusing on one case in which teachers engage with OER. This could lead to extensive insights on the factors and sequence of the OER Adoption Pyramid within different contexts.

Keywords: open educational resources; higher education; support; OER; teaching

1. Introduction

Open Educational Resources (OER) are teaching, learning and research materials that use open licensing to permit users to use them for educational purposes (Orr, Rimini and Van Damme, 2015). Users may retain, reuse, revise, remix and redistribute the resources, also known as the '5R characteristics' (Wiley, n.d.). These characteristics offer teachers pedagogical benefits to adapt the resources to their specific teaching needs (Belikov and Bodily, 2016). As OER are shared across the world, they offer teachers access to more and different pedagogical practices, which, in turn, can result in enhanced teaching practices (Rolfe, 2017). Other benefits refer to increased collaboration between fellow teachers across institutes (Chae and Jenkins, 2015), growth in critical reflection of teachers on their practices (Weller et al., 2015) and improved access to educational materials (Hennessy, Haßler and Hofmann, 2015; Hilton III et al., 2014).

OER could therefore have the potential to change teaching in higher education by providing access to a diverse collection of resources, information and practices. Teachers could make use of this diverse collection in four types of

practices (Armellini and Nie, 2013): (1) 'as-is' as a planned enhancement during curriculum design, (2) 'as-is' as a 'just-in-time' resource during course delivery, (3) adapted OER during curriculum design, and (4) adapted OER during course delivery. Nevertheless, despite the growing number of open resources accessible, the use of OER in higher education is low (Allen and Seaman, 2014; Schuwer and Janssen, 2016). However, this does not imply that reuse is not happening, as it might take place 'below the radar' (Glennie, Harley and Butcher, 2012). A recent study by Beaven (2018) showed that most practices are hidden and that adoption most often takes place in what Wiley (2009) has called 'dark reuse'. Teachers either find resources somewhere online, receive resources from their colleagues or already have resources in their personal collections. Consequently, it might appear that adoption does not take place, even though teachers might engage in OER practices more than they are aware of. Hence, it is essential to gain more insights into teachers' practices to examine the current state of affairs on adoption as well as to explore their need of support that could foster adoption.

1.1. Adoption of OER

Previous research identified different factors that influence OER adoption. Based on this, Cox and Trotter (2017) formulated the OER Adoption Pyramid (**Figure 1**) to underline the interdependencies of these factors in relation to

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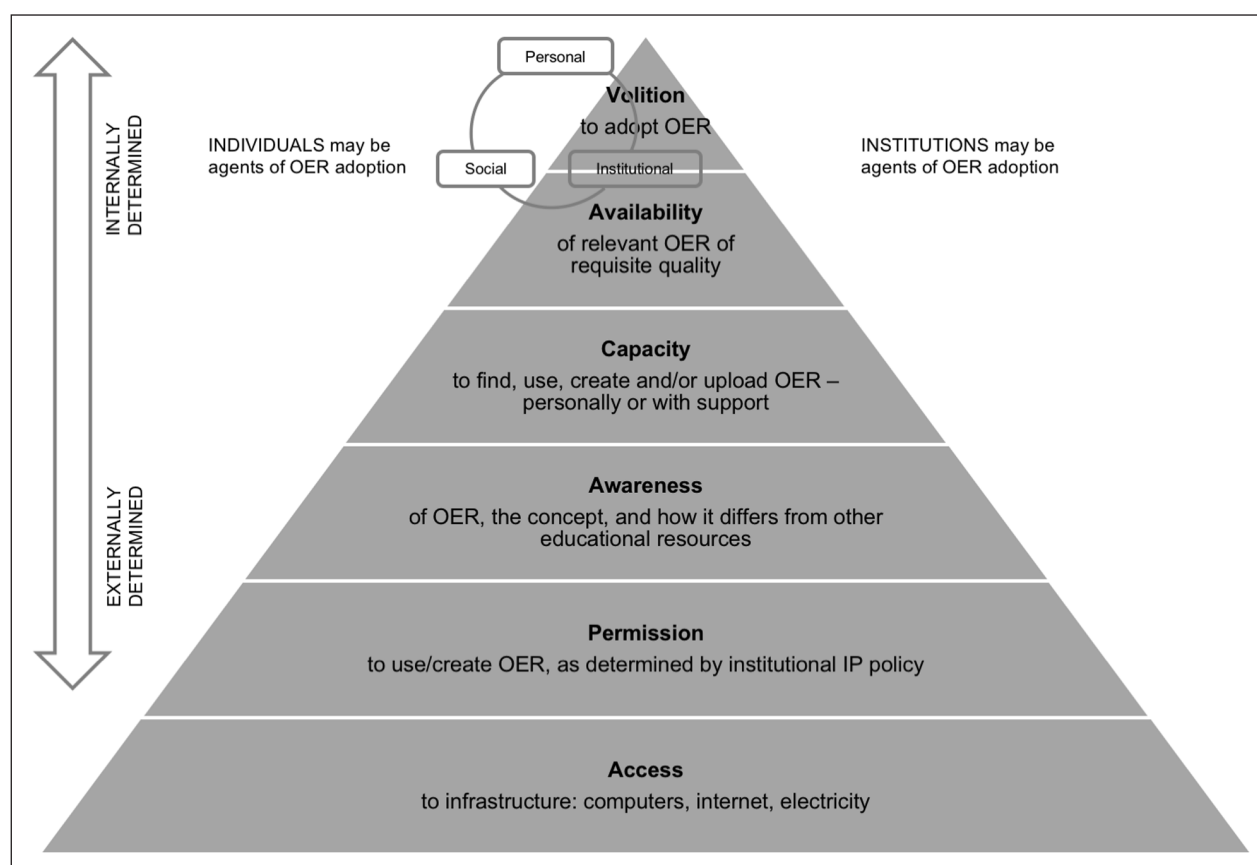


Figure 1: OER Adoption Pyramid (Cox and Trotter, 2017).

adoption. The pyramid shape implies that each layer must be accomplished before the next layer can be realised; the lower layers are remote factors (teachers have little control over them) whereas the upper layers are immediate factors (teachers have personal control over them).

This model denotes that six layers account for OER adoption: if the bottom layers are not provided for, then the upper layers will have less effect on OER engagement of teachers. First of all, teachers need *access* to infrastructure and hardware. A minimal level of information and communications technology (ICT) infrastructure is an important fundamental factor (de Oliveira Neto et al., 2017). The next prerequisite is the legal *permission* teachers need to either share teaching materials as OER or to use OER in curricula. Previous research by Cox (2013) showed that intellectual property (IP) policies of the institution determine whether teachers are allowed openly to share resources. Licences on the resources provide information on how teachers can use OER, but these require teachers' conceptual *awareness* of OER and how they differ from other digital resources. Yet several studies show that teachers' awareness of OER is low (Belikov and Bodily, 2016; Ozdemir and Bonk, 2017). If teachers are aware of OER, technical skills are needed in order to find, use, create and upload OER. Finding appropriate OER is an issue, as a lack in knowledge of IP rights and open licences negatively influences teachers' uptake (Schuwer and Janssen, 2018). In addition, as OER are often not as structured or as complete as commercial materials (Chae and Jenkins, 2015), teachers need to determine whether the resources

fit, or can be changed to fit, their specific context (Sloep, 2014). Even if teachers do possess these skills, volition is reliant on the actual *availability* of OER. This encompasses not only the number of available OER, but also the perceived relevance and quality of OER. Finally, *volition* is the key factor that determines OER adoption. As can be seen in **Figure 1**, three types of volition influence OER adoption: personal, social and institutional. Personal volition is, among others, induced from teaching style and cost convenience considerations but is also influenced by social volition (departmental and disciplinary norms) and institutional volition (support mechanisms and strategic commitments). Mtebe and Raisamo (2014) and Percy and Van Belle (2012) examined teachers' intention to adopt OER using personal as well as the social and institutional factors. Their results showed that personal volition was the main factor that influenced teachers' intention to adopt OER. Other, more qualitative studies show that social and institutional volition plays an important role as well. For example, Cox (2016) examined teachers' agency regarding OER contribution. Institutional structures were essential in facilitating teachers to spend time on OER, offering them support and creating a culture that permits academic freedom.

Although it is known what kind of factors could account for adoption as illustrated in **Figure 1**, empirical research is needed to examine whether this model is appropriate in other contexts (Cox and Trotter, 2017). In the Netherlands, national policies on OER as well as technical possibilities to share, use and find OER evolved over the years.

However, little is known about the extent of adoption and the kind of support that teachers need to foster OER adoption. As teachers are the pivotal actors to adopt OER (Allen and Seaman, 2014; Schuwer and Janssen, 2016), this study aims to gain understanding on teachers' awareness, capacity and availability of OER in relation to their current practices.

1.2. Research Questions

In 2015, the Dutch Ministry of Education published its Strategic Agenda for Higher Education (OCW, 2015). In this agenda, an ambition to increase OER adoption was announced. Institutes were explicitly called on to share and use resources from colleagues inside and outside their own institute. A national funding policy was initiated to stimulate the creation and use of OER. In 2017, a so-called four-year acceleration plan (VSNU, VH and SURF, 2017) was presented in which a total of 40 Research Universities and Universities of Applied Sciences will collaborate to achieve substantial gains of digitalisation in higher education. The plan is divided into eight acceleration zones, one of which concentrates on open and closed digital resources. The ambition of this zone is that by 2023 teachers and students can use an optimal mix of educational materials in teaching and learning.

To be able to fulfil this ambition, it is important to know what the current state of affairs is as well as how teachers perceive the value of OER in their curriculum. As adoption is influenced by the different factors as visualised in the OER Adoption Pyramid (Cox and Trotter, 2017), this model has been applied as a conceptual framework. The foundation of the Pyramid, access and permission, is already in place in the context of this study. Hence, the following research questions have been defined:

- 1) *To what extent are teachers aware of OER and how do they perceive their capacity and the availability of OER?*
- 2) *What is the current state of affairs regarding teachers' volition and adoption of OER?*

In addition, it is important to elicit the need of support of teachers for each individual layer. This will provide insights into what kind of activities and support are needed according to teachers in order to reach the ambition in 2023. Thus, the last research question is:

- 3) *What kind of support do teachers need to foster adoption of OER?*

2. Method

This study aimed to identify the current state of affairs and teachers' need for support to adopt OER. This exploratory study was based on teachers' self-reports. A mixed-method approach was adopted to answer the previously stated research questions. A questionnaire was sent out to examine the current state of affairs within the context of this study. Afterwards, interviews were conducted to explore teachers' current practices with OER and their need for support.

2.1. Context

This study was conducted in a large University of Applied Sciences (UAS) in the Netherlands. The institute has no policies, incentives or services on OER but aims to increase OER adoption in curricula according to the national policy. Approximately 1,200 teachers are employed across the 13 schools of the institute and around 27,000 students are served.

2.2. Participants and Data Collection

To gain an overview of the current situation of adoption, teachers were invited via a call on the intranet and in newsletters to participate in an online questionnaire in October and November 2017. A total of 143 fully completed questionnaires were returned. **Table 1** provides the general characteristics of the participants.

Subsequently, a purposeful sample of 11 teachers was interviewed in December 2017 and January 2018. Selection of participants was based on a two-stage process. First, the 45 teachers who gave permission to be contacted for an interview in the questionnaire were grouped into school level. Second, schools that had some experience with OER were selected. Within these four selected schools, teachers, who indicated they were familiar with OER and had either used or shared resources in the previous academic year, were invited to participate. These sample criteria were used to gain more insights into teachers' motives to use OER, their perspectives and practices with OER and support that could foster OER adoption. It was reasoned that these teachers could offer insights into these key elements of this study as opposed to teachers with no experience with OER.

Participation was voluntary and the purpose and nature of the study was explained before the interview. A total of 16 teachers within four different schools were invited to participate; 11 teachers responded to this invitation. **Table 2** provides an overview of these teachers' background; pseudonyms are used to ensure teachers'

Table 1: General characteristics of participants in questionnaire (n = 143).

Characteristics	Categories	Total (n/%)
Gender	Male	66 (46.2)
	Female	76 (53.1)
	Other	1 (0.7)
Age	<25 years	1 (0.7)
	26–35 years	32 (22.4)
	36–45 years	42 (29.4)
	46–55 years	40 (28.0)
	>55 years	28 (19.6)
Teaching experience	0–2 years	18 (12.6)
	3–5 years	39 (27.3)
	6–10 years	33 (23.1)
	>10 years	53 (37.1)

anonymity. The first author was the interviewer for all interviews, which were recorded and lasted between 35 and 60 minutes each, with an average duration of 43 minutes.

Before commencing the study, ethical clearance was obtained from ICLON Graduate School of Teaching of Leiden University. During data collection, several actions were undertaken to manage ethical issues. Data collected in the questionnaire were anonymous as teachers were invited indirectly, making it impossible to trace a response back to an individual. The interview data were collected after gaining consent. No demographic, institutional or personal data, which could lead to identification of teachers participating in this research study, are given.

2.3. Measures

2.3.1. Questionnaire

The questionnaire was designed by selecting items of previous research that fitted each layer of the OER Adoption Pyramid. Before administering the questionnaire, all items were discussed with two OER experts, three educational technologists and all members of the research team to optimise the instrument. Forward- and back-translations were conducted to ensure validity after translation of English items. This resulted in the final version of the questionnaire, which will be discussed in more detail in this section.

Table 2: Background of teachers participating in interviews.

Name	Gender	Age	Years of teaching
Chloe	Female	53	7
Matt	Male	44	13
Sebastian	Male	46	3
Sienna	Female	35	3
Ralph	Male	65	26
Reece	Male	53	11
Gary	Male	63	40
George	Male	35	3
Ethan	Male	40	4
Aaron	Male	46	3
Lily	Female	62	11

2.3.1.1. Awareness

Two items were used in which teachers were asked to self-report their level of awareness. First, based on a question of the Open Education Research Hub (Farrow et al., 2016), a picture of a Creative Commons logo was shown and teachers could answer with '*I have never seen it*', '*I have seen it but don't know what it means*' and '*I have seen it and know what it means*'. Second, based on a question of Allen and Seaman (2014), teachers were asked if they were familiar with OER with answer categories of '*No, I am not familiar with OER*', '*I have heard of OER*' and '*Yes, I am familiar with OER*'. Owing to the limitations of self-reporting questions, a definition and an example of OER were given in the subsequent section to ensure all teachers had a basic understanding of OER.

2.3.1.2. Capacity

Teachers' perceived capacity was measured by five items based on the self-efficacy scale to use technology of Admiraal et al. (2017). The items were adapted to fit the purpose of this study. All items used a five-point Likert scale ranging from totally disagree (1) to totally agree (5). Internal consistency of this scale (see **Table 3**) was moderate, as Cronbach's alpha had a value of 0.66.

2.3.1.3. Availability

In the questionnaire, four items based on Rolfe (2012) related to the availability of OER. Two items focused on finding relevant OER (e.g. '*It is difficult to find open educational resources of sufficient quality*') whereas the other two items focused on teachers' preferences about the origin of OER (e.g. '*I rather use open educational resources by an author or institution with a good reputation*').

2.3.1.4. Adoption

To gain insights into teachers' current practices, teachers who had either heard of OER or were familiar with OER were asked if they had used OER in the previous academic year (*Yes, No, I do not know*) and if they had shared self-developed materials with others (*Yes, No*). If a teacher had shared their materials, they were asked how the materials were shared in the previous academic year. Answer options included '*without any kind of rights*', '*with copyright for me*', '*with copyright for the institution*', '*with an open license*' and '*other*'. Multiple selections were possible. To gain insights into teachers' current (re)use practices, teachers were asked how often they had used certain digital learning resources in the previous academic year

Table 3: Items in capacity scale.

Capacity	I have sufficient expertise to assess the quality of Open Educational Resources
	It is quite easy to adapt Open Educational Resources so that it meets my requirements
	I wonder if I have enough skills to use Open Educational Resources effectively*
	I have sufficient knowledge to implement Open Educational Resources in my curriculum
	I think I can learn to use Open Educational Resources fairly quickly

* Negative formulated item that has been rescored.

ranging on a scale of never (1) to often (5). In addition, teachers were asked about the origin(s) for each resource they had used, with categories *publisher*, *self-developed*, *colleagues*, *Internet*, *openly licensed*, *company* and *other*. Multiple selections were possible.

2.3.2. Interviews

Teachers were interviewed with a semi-structured interview guide based on the recent study of Schuwer and Janssen (2018). Their interview guide was requested by the first author before the study was published. The questions in the interview guide were aimed at gaining more insights into teachers' 1) awareness of OER, 2) current behaviour, 3) volition and 4) need of support. **Table 4** shows examples of the initial questions for each theme in the interview guide. Follow-up questions were posed based on the answers of the teachers. After the final question of the interview guide, teachers had opportunities to express any additional thoughts.

2.4. Data Analyses

The data from the questionnaire were analysed with descriptive statistics to gain insights into teachers' awareness, perceived capacity and practices.

All interviews were summarised and sent to the participants for a member check (Merriam, 1988). Some teachers requested minor revisions. These revised summaries of the interview data were analysed in several cycles of thematic coding as suggested by Miles, Huberman and Saldaña (2014). In the first cycle of coding (a priori coding), the data were categorised into main codes and subcodes based on factors that derived from the theoretical framework, such as awareness, volition and sharing. In the second cycle of coding, codes and subcodes were added based on inductive coding. Once the main codes and subcodes had been defined and discussed in detail with the research team, the first author coded all data. In total, five main codes and 22 subcodes were identified. **Table 5** shows the main codes used in this study including a description of each code. After completing the coding for each interview in Atlas.ti, matrices were used to structure the data. All sub-codes were plotted against the main codes to gain understanding of underlying factors. The first research question focuses on the main codes *awareness* and *barriers*. Subcodes within these themes enabled more specific analysis of the data. For example, sub-codes within *barriers* were 'time', 'searching', 'capacity' and 'culture' among others. The main codes *volition* and *behaviour* were used to answer the

second research question. Within the theme *volition*, sub-codes elucidated underlying variables such as 'efficiency', 'supplementary' or 'quality'. To answer the last question, the code *support* was developed to analyse teachers' need for support to adopt OER.

To assure the overall quality of the research study, the audit procedure as described by Akkerman, Admiraal, Brekelmans and Oost (2008) has been executed. An audit trail showed an auditor, who was not involved in the analysis of the data, the procedures of data collection and analysis for both the quantitative and qualitative data. It was concluded that the results were visible, comprehensible and acceptable.

3. Findings

In the subsequent sections, the findings of each layer of the Adoption Pyramid will be discussed. In each section, the questionnaire data will be presented after which the interview data will be used to illustrate or elaborate on the findings.

3.1. Awareness, Capacity and Availability

3.1.1. Awareness

A little under half of the teachers (42.0%) indicated in the questionnaire that they have heard of OER. However, teachers' awareness on Creative Commons is more limited: 14.0% of the teachers know what it means. In the interviews it became clear that teachers may have heard of it, but that they are not familiar with the defining characteristics. This is illustrated by Sebastian who showed his confusion by asking: '*For me it's like, where does it start and where does it end? When is something open?*' The findings from the questionnaire and interviews show that the current awareness is limited as teachers do not know how to recognise OER.

Table 5: Codebook.

Main code	Description of code
Awareness	Awareness of OER and Creative Commons
Behaviour	Behaviour in open sharing and reuse
Volition	Motives to share and use materials that others have developed
Barriers*	Factors that hinder (re)use of OER
Support	Support needed for (re)use of OER

* Availability and capacity are subcodes of barriers.

Table 4: Examples of initial questions.

Theme	Initial question
Awareness	How would you define Open Educational Resources?
Behaviour	In the questionnaire, you said you shared your own materials in the previous academic year. How did you share those materials?
Volition	What are your reasons to adopt materials created by others in your curriculum?
Support	What kind of support do you need to be able to adopt OER in your curriculum?

3.1.2. Capacity

The overall average of capacity shows that teachers perceive themselves as quite capable of using OER ($M = 3.32$, $SD = 0.61$). No significant differences were found based on gender, age and teaching experience. In the interviews, it became clear that some teachers do not know how to use or adapt OER due to their lack of awareness. At the moment, most teachers use resources based on their pedagogical needs, irrelevant of whether or not these resources are open. This is influenced by time constraints and therefore the need to prioritise as Chloe describes: *'There are ample opportunities, but I somehow do not have the time to explore it all.'* A few teachers emphasised that their colleagues do not have the capacity to adjust or share OER as Sienna explains: *'With all due respect, we have colleagues that are excellent in teaching, but I'd rather not have them create, adjust or share resources as they are not well-versed to do so.'*

3.1.3. Availability

The results from the questionnaire show that 11.2% of the teachers know where to search for OER. Teachers prefer using OER that are made by an author or institution with a good reputation (83.2%) or that are recommended by someone they know or trust (54.6%). Even though teachers stated that they prefer resources from an expert, in the interviews it became clear that content is decisive as Lily explains: *'Sometimes it is not clear who created the resource, but if I can verify it myself that the content is correct, then I might use it anyway.'* Teachers emphasised that finding qualitative resources is difficult and requires a time investment, but that it is still worth it. George, for example, said that *'based on the way I search, around 80 or 90% is not usable, but you basically do it for that 10%.'* Lily agrees with this because even though *'searching takes up time, I think the result is better than when I would create something myself.'*

3.2. OER Adoption

3.2.1. Current OER adoption

Table 6 shows the average use of resources ordered in frequency on the scale never (1) to often (5). The origins of these resources within five categories, ranging from openly licensed to more closed origins like publishers, can be derived from **Table 6** as well. Most often used open resources are pictures (7.2%), video/audio (6.4%), e-textbooks (6.3%) and lecture recordings (6.3%). These numbers are low, but they only provide an indication of the current adoption. 'Dark reuse' might occur more often, especially because most resources originate from the Internet or from colleagues. As most teachers have limited awareness to recognize OER, reuse might be more prevalent than it appears in numbers.

Sharing resources occurs often, albeit mostly without an open licence. Based on the results of the questionnaire, half of the teachers (50.3%) share. Most resources are shared without any kind of rights (35.7%), with an open licence (7.7%), with copyright for the university (4.9%) or with copyright for themselves (2.8%). In the interviews, it became clear that most teachers mainly share within their own team or school. Teachers are a bit more hesitant to share outside their own school, as they are not convinced that the resources are of sufficient quality or distinctive enough. Or as Lily emphasises: *'sharing within our team [and] department happens, and it may be shared nationwide, but it is not that we have something to add to that. That we do something that others do not.'* Matt on the other hand wonders why he would share: *'I am not going to promote resources we have and offer it openly available in a national meeting. I don't know why, but I just feel that it has cost us a lot of time to create it.'* These two quotes make clear that Lily and Matt have a different view about ownership of the resources. Lily does not mind sharing resources

Table 6: Average use and origin of resources.

Resources	Average use	SD	Origin (%)						
			Open	Internet	Own	Colleagues	Publisher	Commercial	Total (n)
Pictures, infographics	4.19	1.23	7.2	41.7	17.8	17.8	9.8	5.8	276
Presentations	4.11	1.29	2.6	12.6	43.7	31.6	7.4	2.2	231
Video or audio	4.05	1.09	6.4	48.6	11.8	18.6	8.6	5.9	220
Rubrics	3.53	1.50	1.3	3.3	41.8	48.4	2.6	2.6	153
Assessments/test items	3.25	1.52	1.2	6.0	48.8	31.0	11.9	1.2	168
Short clips	2.76	1.31	5.2	25.3	19.5	39.0	7.8	3.2	154
Peer feedback	2.37	1.34	1.7	5.1	44.4	44.4	1.7	2.5	117
Digital portfolios	2.23	1.41	–	4.7	30.2	62.8	–	2.3	86
E-textbooks	2.12	1.42	6.3	27.8	2.5	7.6	51.9	3.8	79
Segments of existing courses	2.02	1.30	3.6	17.3	28.2	38.2	4.5	8.2	110
Games of simulations	1.83	1.22	4.1	31.1	16.2	20.3	13.5	14.9	74
Lecture recordings	1.58	.96	6.3	15.6	29.7	42.2	4.7	1.6	64
Datasets	1.56	1.09	4.7	23.4	29.7	28.1	10.9	3.1	64
Existing courses	1.29	.80	–	20.7	24.1	44.8	6.9	3.4	29

on a national level; Matt, on the other hand, prefers exclusive use of the resources by containing their ownership.

3.2.2. Volition to adopt OER

In the interviews, it became clear that most teachers would like to use OER to improve the quality of education or to offer student flexibility within their educational programme. Reece, for example, mentions: *'there are phenomenal web lectures available via institutes [...] and well, based on that, I think we have to stop giving lectures by ourselves. [...], and then create more interactivity, more in-depth meetings.'* Volition to remix or adapt resources on the other hand is limited, as most teachers state that it will take too much of an effort whereas other teachers would like to create their own resources. Ralph explains that he values the work done by others and states:

'if I would have created it myself, I would have done it slightly different but if I read it and know I can tell my story with it, then I use the materials. [...] Why else would you use a book that someone else wrote? That person spent a lot of time on it, and then you would do it all over again just because you'd like to use other examples or words.'

3.3. Need for Support

Teachers' need for support was only discussed in the interviews as these more experienced teachers could recount the kind of support they would like to have had when reusing or sharing resources. **Table 7** shows the different aspects of support that were mentioned in the interviews by the specified number of teachers. In the subsequent sections, the need for support will be discussed in more detail.

3.3.1. Availability

Finding OER is a main barrier for teachers as became clear in the previous section. When discussing the support teachers would like to have, almost all teachers explicitly said that they would like to have an overview of available OER within their teaching subjects rather than having to search for it themselves. Or as Sienna explains: *'if I could receive an overview of what is available [...], that would be fantastic.'* Some teachers mentioned that it would be even better if this overview were curated, or as Ralph emphasises: *'that it is something you can trust that it has quality and can be used.'*

Table 7: Need for support as defined in interviews.

Availability	Support	
	Capacity	Institutional support
Overview (n = 10)*	Technical (n = 7)	Time (n = 8)
Communities (n = 10)	Pedagogical (n = 4)	Vision (n = 6)
Curated (n = 4)	Training (n = 2)	Culture (n = 5)
		Policy (n = 4)

* n = number of teachers reporting this aspect.

Another frequently mentioned method to increase the availability of OER is through teacher communities. As curricula are similar across institutes, collaboration with fellow teachers from other UASs can be beneficial. Or as Gary puts it, *'you would expect that with ten similar degrees in the Netherlands that there would be exchanges [between institutions], but it doesn't happen.'* Even on a smaller scale, it could be beneficial; some teachers would like to form a community within the institute as Lily explains:

'Right now [collaboration] is very ad hoc, random and purely fortuitous. Maybe a database [in which] I can search who teaches [my course], that would be a big advantage already. A database who does what, who has which specialisation so that it becomes possible to contact [teachers] outside your own school.'

3.3.2. Capacity

Provided that teachers have availability of OER, most teachers also emphasised the need for technical and pedagogical support in using and sharing OER. Sienna stresses: *'the first thing that is needed, is technical support. How does it [adoption] work?'* Ralph already shares his materials but likes to share it outside his network as well, but *'someone who has the expertise can meta-data it so that it can be found.'* In addition to this, some teachers also mention the need for pedagogical support. The main need for teachers is to understand how OER could benefit their teaching and student learning; as Chloe says: *'that is probably my wish regarding OER, how can exercises and assignments scaffold students' drive to study.'* Two teachers specifically mentioned the need for formal training sessions. Reece, for example, suggests that *'a serious course with proper assignments and with the objective that it [OER] must be integrated in the curriculum'* would be helpful.

3.3.3. Institutional support

Teachers believe it is important that there are supporting conditions within the institute to increase OER adoption. Most agreed on a limitation being the lack of time, which reduces their chance to explore the opportunities of OER, learn from each other, and be able to exchange resources and practices. Almost half the teachers experience a lack of vision and culture that encourages teachers to use and share OER. Sebastian, for example, is a novice teacher and he observes: *'it is not the culture, so as a new teacher I adjust to this culture. There is no culture at all to share, and that is a shame.'* A policy on OER might help for some teachers to create awareness about OER and the guidelines used in the UAS. Matt accentuated this by saying: *'I do not know what the rules are, [...] you first have to make agreements about that on a central level.'*

4. Conclusions and Discussion

Although over the years the conceptual understanding of OER has improved, more insights are needed on teachers' practices with OER (Beaven, 2018; Schuwer and Janssen, 2018). This study aimed to explore teachers' practices and to elicit the need for support to foster OER adoption within a Dutch University of Applied Sciences. The OER

Adoption Pyramid of Cox and Trotter (2017) was used as a conceptual framework. Based on the findings of this study, it can be concluded that the OER Adoption Pyramid does not properly describe the sequence of each layer within the context of this study. The findings indicate that the layer of availability must be lower in the pyramid as a prerequisite for teachers to explore their capacity and volition. The findings of the posed research questions will be discussed in the following sections.

4.1. Awareness, availability and capacity

Currently, most teachers select resources on the basis of the pedagogical benefits they offer, regardless of whether they are openly available. Most teachers think that OER are an equivalent of all available digital resources, which is a known issue (Belikov and Bodily, 2016; Ozdemir and Bonk, 2017). It is therefore important to increase awareness as OER not only offer teachers the advantages of '5R', but also decrease the risk of receiving an institutional claim on improper use of copyrighted materials from the Dutch organisation 'Stichting PRO' (n.d.).¹

Availability of OER is the main concern teachers have. The absolute number of OER available has increased in the past decade (Creative Commons, 2017), but teachers emphasise the effort and time investment that are required to search, find and evaluate OER. This is strengthened by their availability being dependent on not only the actual number available, but also their relevance as determined by the user based on the characteristics of OER (e.g. content, scope, level, language), the extent they fit the anticipated use and the perceived quality of those OER (Cox and Trotter, 2017). According to the OER Adoption Model, availability is near the top as it is a factor teachers have personal control over. However, even though there are many available repositories in which teachers can search for OER, teachers are not specialists in finding resources.

If teachers find a resource that would be of interest, then capacity will become an issue. Most teachers mentioned that the technical capacity to adapt OER is a concern, which is partly related to their limited awareness. Some teachers mentioned that they would encounter pedagogical issues when integrating OER in their curriculum. This might be explained due to the fact that teachers in a Dutch UAS have worked in a profession before becoming a teacher. In-service teacher training provides the necessary pedagogical skills and knowledge. In the Netherlands, the theme OER is however, often not included in this (Lam and de Jong, 2015).

4.2. OER adoption and volition

The current adoption of OER reflects the findings on teachers' awareness, capacity and the availability. This study shows that adoption of OER occurs but is minimal. However, 'dark reuse' could influence these results as teachers might not be aware of using OER or they might unconsciously engage with OER by using resources from other sources (e.g. colleagues, previous courseware). If adoption occurs, it is either 'as-is' to supplement existing curricular content or as a source of inspiration when developing resources. Adapting resources appears to be less common,

mainly due to time restraints and a lack of skills. While it might be less time-consuming to use a resource 'as-is', it will limit the fit between the resource and a teacher's teaching style, the learning objectives and the need of the students (Hood, 2018).

Although it appears that current adoption is limited, more insights are needed on the amount of 'dark reuse' occurring in Dutch higher education. Especially as the findings show that sharing occurs often albeit within the boundaries of the institution and without the use of open licences. This is in accordance with the findings of Rolfe (2012), which showed that local small-scale sharing is more common than formal ways of sharing. From a practical point of view, this local small-scale sharing can be beneficial as resources are already context specific. Yet this is merely practical as innovation will probably fail to transpire (Perryman and Coughlan, 2014). As of 2018, the funding policy of the Dutch Ministry of Education, Culture and Science has allocated a part of its funding to the creation of domain-specific national teacher communities on OER. Although it is known that communities could be efficient and effective as teachers will be aware of each other's expertise and commit to the exchange of resources (Cross, Parker and Borgatti, 2002), little is still known about the impact national domain-specific communities can have on adoption of OER.

Volition to adopt OER is present as most teachers value OER as a means of improving the quality of education or of increasing flexibility in curricula. Within a Dutch UAS, this is especially relevant due to the direct link in the curriculum between theory and the work field. It enables teachers to spend more time on acquiring skills during classes. It also allows students to have access to the resources to either prepare for classes or when encountering difficulties whilst in the field.

4.3. Need for support

Based on this explorative study, the importance of supporting teachers to foster OER adoption is stressed. The following recommendations are formulated for school leaders, educational support services and librarians. The first recommendation focuses on availability. Librarians might take the lead in searching, selecting and curating OER, and work together with other departments within the institute to advocate OER (Miller and Homol, 2016). Librarians could be supported by semantic search technologies (Little, Ferguson and Rüger, 2012) as well as by the formulated guidelines of Hassler et al., (2014) and Brent, Gibbs and Gruszczynska, (2012) on the development of an OER collection. It would, however, be futile to improve availability without increasing teachers' awareness of OER. The second recommendation therefore focuses on the need for an institutional policy that enables supporting conditions within the institute. The policy should be connected with developments within the institute; for example, during curriculum reforms or with the transition to blended learning (Schuwer and Janssen, 2018). As individual teachers or teacher teams define the curriculum and the resources that are used, awareness can be improved by joint efforts of school leaders, educational support services and librarians during curriculum reforms. Teach-

ers must be made aware of the policy of their institute, the OER collection that is made accessible and also how to adopt OER in their curriculum. Hence, the final recommendation is based on the findings that some teachers would like to know more on the pedagogical and technical use of OER. Integrating OER as part of the basic in-service teacher training as well as on-the-job support by educational support services, for example instructional designers, could increase awareness and enable teachers to take advantage of the '5R characteristics' when adapting an existing course or if participating in a curriculum reform.

4.4. Limitations and future research

Two aspects of the study limit its conclusions. First, the questionnaire was distributed online, and teachers volunteered to participate. This could have resulted in a response that might not reflect the overall situation at the UAS. The findings, however, are in line with the study by Schuwer and Janssen (2018) in which an overview of OER adoption in Dutch higher education was provided. For future research, it would be valuable to also investigate the time factor and the concept of 'dark reuse' in more detail. Second, teachers with some experience with OER were interviewed using a retrospective approach. This resulted in more generic findings. Further research should aim to increase the quality and in-depth understanding by designing a qualitative study that focuses on one specific project or case in which teachers engage with OER. As a result, it will become possible to identify to what extent context, both geographical and the level of education, defines the sequences and layers of the OER Adoption Pyramid.

4.5. Concluding remarks

The findings of this study complement the results of Schuwer and Janssen (2018) in which an overview of the current adoption in the Netherlands was established. Insights on the OER Adoption Pyramid within the context of a Dutch UAS have been provided. The findings imply that the sequence of the OER Adoption Pyramid might differ based on context. Within the context of this study, availability must be lower in the pyramid as a prerequisite for teachers to explore their capacity and volition. To construct an understanding of how daily teaching practices and curricula can be supported by OER, more research is needed.

Note

- ¹ The PRO Foundation was founded in 1997 by the Dutch Publishers' Association to take care of the collective administration of copyright. These are rights that publishers cannot or find it difficult to exercise individually.

Competing Interests

The authors have no competing interests to declare.

Author Contributions

The first author (a PhD student) was responsible for the design, data collection, analysis, interpretation of data and writing the manuscript. The second and third authors con-

tributed to this study by giving feedback on the research design and instruments as well as critically revising the draft manuscripts.

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