META-SYNTHESIS CONCEPTUAL AND ANALYTICAL FRAMEWORKS

ROER4D team;

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IDRC Grant/ Subvention du CRDI: 108700-001-Communicating Research on open educational resources for development (C-ROER4D)

ROER4D
Open Research Toolkit

June 2018
http://roer4d.org/

The Research on Open Educational Resources for Development (ROER4D) project was a four-year (2013–2017), large-scale networked project which set out to contribute a Global South research perspective on how open educational resources can help to improve access, enhance quality and reduce the cost of education in the Global South. The project engaged a total of 103 research team members in 18 sub-projects across 21 countries from South America, Sub-Saharan Africa and Asia, coordinated by Network Hub teams at the University of Cape Town and Wawasan Open University.

This output forms part of an open research toolkit sharing the conceptual and other tools utilised to conduct the meta-synthesis of the sub-project research findings published in the edited volume, *Adoption and Impact of OER in the Global South*.

Meta-synthesis conceptual and analytical frameworks

Overview

The conceptual and analytical frameworks presented here form the basis of the meta-synthesis of the final sub-project chapters and research reports from the Research on Open Educational Resources for Development (ROER4D) project, as presented in Chapters 2 and 16 of the project edited volume, *Adoption and Impact of OER in the Global South* (Hodgkinson-Williams & Arinto, 2017).

The conceptual framework was developed throughout the project period (2013–2017) by the ROER4D Principal Investigator (PI) Cheryl Hodgkinson-Williams through a series of iterative refinements drawing on developments in the open education literature and Archer's (2003) theory of social change. Work was undertaken in collaboration with the ROER4D researcher network in order to incorporate the key concepts arising in sub-project studies.

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The analytical framework was developed in collaboration with members of the University of Cape Town (UCT) Network Hub, who operationalised the concepts from the conceptual framework and refined them during the qualitative data analysis of research reports and penultimate chapters of the edited volume produced by sub-project researchers. In essence, the content of 13 chapters and four research reports, particularly the findings sections, constituted the data source for the meta-synthesis and were coded according to the analytical framework.

The explication of the conceptual framework into a set of related concepts was used to undergird the analytical framework and enabled the distillation of themes and insights emerging from the sub-project studies into a "higher order synthesis that promotes broad understandings of the entire body of research, while still respecting the integrity of the original reports" (Scruggs, Mastropieri & McDuffie, 2007, p.395).

Conceptual framework

The final conceptual framework contained two analytically distinct, but related elements. The first was a conceptual framework that informed the concept of adoption of OER and OEP, and the second was the more theoretically informed framework that categorised factors that might influence the impact of OER and OEP.

The ROER4D project aimed to establish an empirical baseline of research on the adoption of open educational resources (OER) and open educational practices (OEP) in the Global South. Mindful of the fact that nascent OER activity can be studied from multiple perspectives through various frameworks and methodologies, the project opted not to dictate which conceptual and theoretical frameworks should be employed by sub-project researchers. They therefore developed their own frameworks in line with their research imperatives and areas of expertise. The UCT Network Hub, led by the PI and Deputy PI Patricia B. Arinto, undertook an analysis of sub-project findings to surface the overarching themes and concepts common across the study sites. This enabled them to articulate an overarching conceptual framework to synthesise key trends in OER and OEP adoption, as well as identifying influencing factors.

The final conceptual framework contained two analytically distinct, but related elements. The first was a conceptual framework that informed the concept of *adoption of OER and OEP*, and the second was the more theoretically informed framework that categorised *factors that might influence the impact of OER and OEP*.

The first iteration of the meta-synthesis conceptual framework (Figure 1) was articulated in the project scoping process in December 2013 and was comprised of seven broad dimensions of OER practice:

- Awareness of OER
- Access to OER
- Creation of OER
- Use or non-use of OER
- Reuse, revision, remixing, retention and redistribution of OER
- Perceived value of OER
- Impact of the use of OER on cost-savings, quality of materials, teaching practice, student performance and/or policy change

As demonstrated in Figure 1, there were early ambitions to use activity theory (Engeström, 2001) and a social realist account of social change (Archer, 2003), respectively, to describe how OER was being adopted and then provide an explanation of the causal mechanisms that might influence the impact of OER and OEP on improving access to, enhancing the quality of and reducing the cost of education in the Global South.

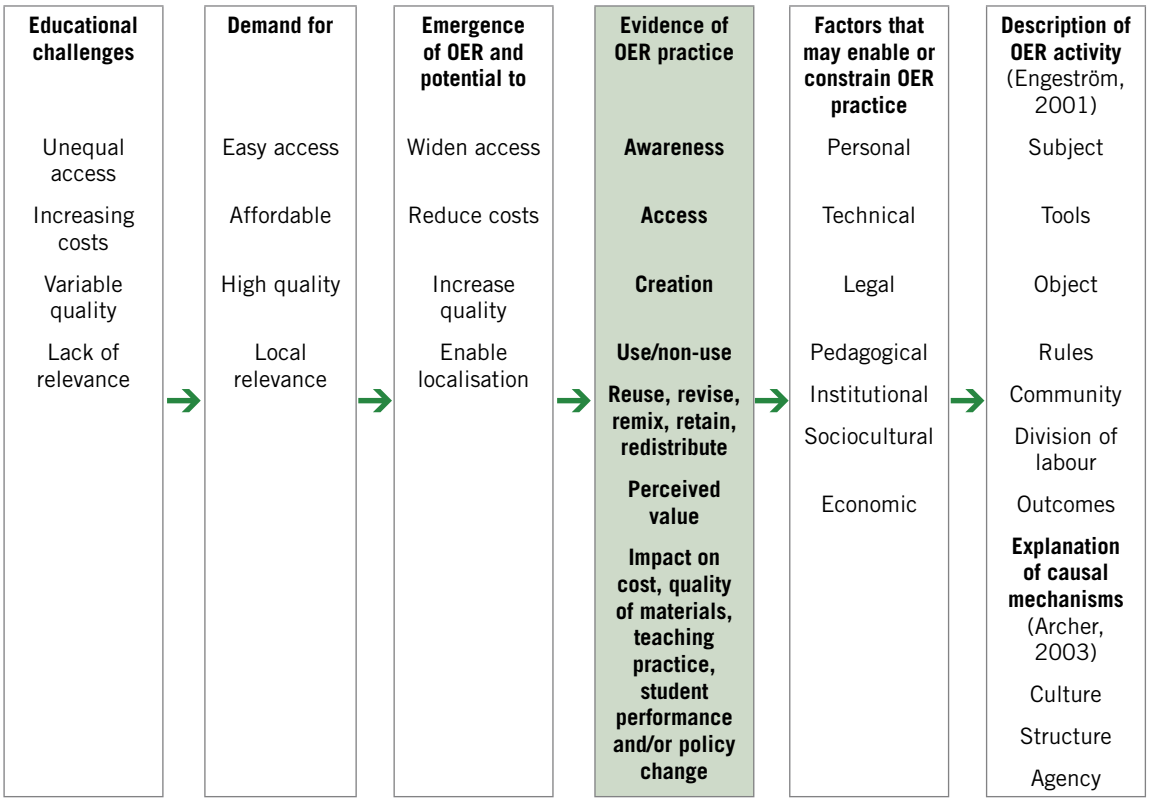

Figure 1: Early iteration of the ROER4D conceptual framework (Hodgkinson-Williams, 2013)

OER adoption: The 10Cs open educational cycle

As the project evolved and sub-projects began to report their findings, the concept of "OER practices", or OEP, become increasingly prominent. Although these were alluded to in the project scoping document (Hodgkinson-Williams, 2013), it became clear that these open practices needed to be more explicitly integrated. Existing analytical frameworks, such as Okada, Mikroyannidis, Meister and Little's (2012) 12-step model, focused heavily on the specifics of OER adaptation; while Open Learning Network (OLNet)[1], White and Mantons' (2011) and Wiley's[2] models referenced aspects of the broader OER ecosystem. Few studies had articulated a complete end-to-end open education cycle that included implicit epistemic choices made prior to the creation, use or adaptation of OER and the subsequent sharing, quality assurance and ongoing feedback and improvement of these resources. The PI undertook to explicate this interrelationship in a new conceptual framework, in which she expanded upon the early concept of OER practices in a 10-step open education cycle that presented an idealised process for the creation and reuse of OER. The practices of conceptualisation,

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1 http://www.open.ac.uk/wikis/iet/OPLRN_proposal
2 http://opencontent.org/blog/archives/3221

certification and critique were added to the existing concepts (although differently named) of creation, circulation, customisation, combination, curation, location and copying articulated by OLNet[3], White and Manton (2011), Okada *et al.* (2012) and Wiley[4]. The relationship between the pre-existing concepts and the newly proposed concepts (grouped in a heuristic as "10Cs") is compared in Table 1.

The concepts were illustrated in the first iteration of the open education cycle (Figure 2), presented at the 2014 OERAsia symposium in Penang, Malaysia.

3 http://www.open.ac.uk/wikis/iet/OPLRN_proposal
4 http://opencontent.org/blog/archives/3221

Table 1: The 10Cs open education cycle in relation to prior literature

10C concepts	OLNet (2010)	White & Manton (2011)	Okada et al. (2012)	Wiley (2014)
Conceptualise (plan, propose, imagine)				
Create (develop, produce, make)	design	designing		
Curate (add licence, ascribe metadata, host or archive)				retain – make, own and control copies of content
Circulate (communicate availability)		delivering		restribute – share copies of original content, revisions and remixes
Certify (quality assure, accredit)				
Critique (judge, provide feedback)				
LoCate (find, choose)	select	discovering, discerning, deciding		
Copy				reuse "as is", verbatim
Customise (edit, translate, localise)			re-authoring, contextualising, re-designing, summarising, repurposing, translating, personalising, re-sequencing	revise – adapt, adjust, modify or alter the content
Combine (mix, group, mashup)			decomposing, remixing, assembling	remix – combine the orginal with other open content to create something new

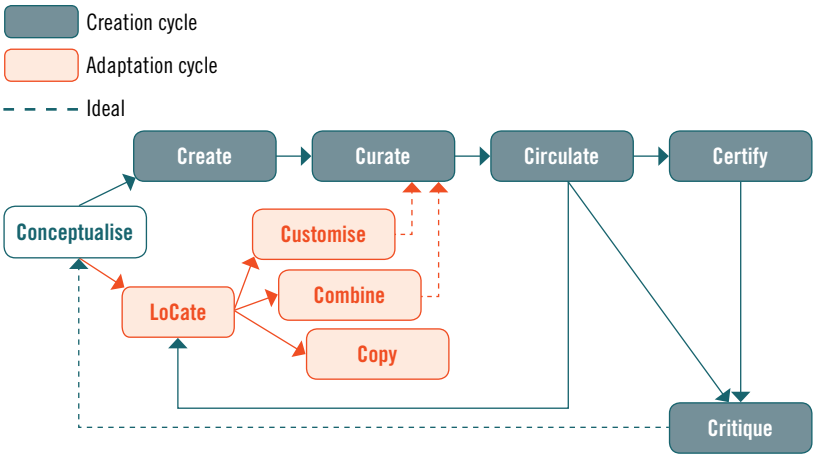

Figure 2: The 10Cs open education cycle (Hodgkinson-Williams, 2014)

During the meta-synthesis coding process, the 10Cs model evolved as sub-project findings were interrogated. It became apparent that certain steps, such as the creation and circulation phases, required refinement – specifically as relates to the differentiation between co-creation with immediate colleagues compared to collaboration with external partners, as well as differentition between informal sharing with colleagues and formal distribution to external audiences. This refinement prompted further integration of OEP into the model, with continuous adaptation such as re-curating adapted OER and the related re-circulation and certification (which are key activities in the claims of OER to address Global South educational challenges) receiving greater attention.

As a result, the 10Cs model was refined into an "optimal" open education cycle (Walji & Hodgkinson-Williams, 2017). This cycle is based on a common conceptualisation activity, followed by three distinct phases: a creation phase (create, curate, circulate, certify and critique), a use phase (loCate and copy) and an adaptation phase (adapt, re-curate, re-circulate, re-certify and re-critique) (Figure 3).

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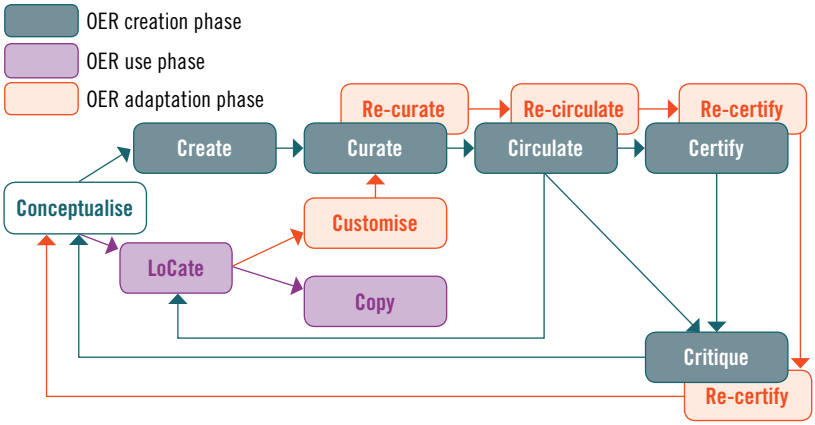

Figure 3: The 10Cs in the "optimal" open education cycle (Adapted from Hodgkinson-Williams, 2014; Walji & Hodgkinson-Williams, 2017)

The **conceptualisation** activity includes planning what OER and which pedagogical strategies might be most suitable in a specific context. It is implicit in OER creation, use or adaptation phases, and explicitly or implicitly indicates epistemic stances on what constitutes "valuable" knowledge.

The **creation** phase refers to the development of original materials and/or tuition by an author or institution, either as a "self use" of existing materials or as "born open" OER (i.e. developed with the view of being shared freely and openly with others). In order for these materials to be made publicly available, they need to be **curated** – that is, they need to be hosted on a publicly accessible platform with sufficient descriptive information (i.e. metadata) and appropriate open licensing (e.g. Creative Commons [CC]) for them to be easily found through internet search tools and be legally reusable. Further **circulation** or explicit sharing amongst potential users of the OER is required to raise awareness of the existence of the OER (e.g. via social media and OER portals), which are then ideally **certified** through some type of quality assurance mechanism, either by the OER creators, their peers, an educational body or the hosting organisation. Best practice also requires that the OER can be **critiqued** to ensure that user feedback informs subsequent phases of conceptualisation of existing OER and of new OER.

The **use** phase refers to finding OER (artificially referred to as "**IoCate**" in this heuristic) so that it can be used in its original form (i.e. copied) in other contexts. This use phase, where OER are used "as is", implies a finite path as no subsequent OER are created from this activity. This does not mean that mere use "as is" is not a valuable OER activity, but rather that it is insufficient to fulfil the broader OER value proposition of providing more current and locally suitable educational resources.

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The **adaptation** phase refers to OER being customised (e.g. revised, modified) or combined (e.g. remixed with more than one set of OER) in order for these derivative OER to be re-curated, re-circulated, re-certified and re-critiqued.

Examples of how these concepts were coded for the meta-synthesis are provided in a later section on the analytical framework.

Factors influencing the impact of OER adoption: Structure, culture and agency

Exploration of the influencing factors that facilitate or inhibit OER and OEP activity was a key focus of ROER4D research activity. Initially, Engeström's activity theory (2001) was posited as a model to understand these mechanisms alongside Archer's (2003) social realist theory of social change. Activity theory was initially identified as an analytical lens because of the number of projects that expressed an interest in utilising it as a theoretical framework in their research. However, activity theory was dispensed with in the course of the meta-synthesis process

due to the fact that although a number of sub-projects found it useful in their research approach, many did not utilise it in their final analysis of findings which formed the basis of the meta-synthesis. Moreover, as activity theory has limitations on its explanatory power (Wheelahan, 2007), the social realist social change framework (Archer, 2003; 2013) was deemed to be more compelling as a means to explore causal mechanisms underlying OER and OEP.

In the meta-synthesis, the PIs adopted Archer's social realist perspective that "for any process to merit consideration as a generator of social change it must necessarily incorporate structured human relations (context-dependence), human actions (activity-dependence) and human ideas (concept-dependence)" (Archer, 2013, p.4). In other words, "every theory about the social order necessarily has to incorporate SAC: structure, agency and culture" (Archer, 2013, p.4). Porpora elaborates upon Archer's conception and suggests that "social change involves a dialectical relation between human agency and the contexts in which those agents find themselves, contexts that include culture, structure, and physical things" (2013, p.29). He includes "things, both natural and humanly made, since … new or transformed things also play a role in social change" (2013, p.29) and mentions the invention of computers and the internet as prominent examples.

Structural factors

Broadly speaking, structural conditions can refer to government and/or institutional policies, systems and infrastructure. Archer describes social "structure" as the "objective features of society" (2003, p.i) or the "material … aspects of social life" (1988, p.xi), as evidenced in "roles, organisations, or institutions" (2003, p.5). She maintains that "the identification of structures is possible because of their irreducible character, autonomous influence and relatively enduring character, but above all because this means that they pre-date any particular cohort of occupants" (1995, p.168). In Archer's theory, social structure also refers to "human relations among human actors – relations like power, competition, exploitation, and dependency [or more precisely the] relations among social positions that human actors occupy" (Porpora, 2013, p.25).

In the ROER4D meta-synthesis, the concept of structure is understood to denote relatively enduring relations among human actors, the social positions they occupy and things made by humans. These can include infrastructure, such as power supply, hardware, software, connectivity and information and communication technologies (ICT); the availability of OER in various repositories and portals as well as support of OEP on collaborative platforms; open licensing (such as CC); government or institutional policies, strategies, programmes and procedures; and funding from donors, governments and/or institutions. Structure also refers to the socioeconomic and geographic context in which students and educators are located (Table 2).

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Table 2: Structural factors potentially influencing OER adoption (Hodgkinson-Williams, Arinto, Cartmill & King, 2017)

Structural factors	
Physical factors	**Relations and social positions**
Infrastructure – power supply, hardware (devices and printing facilities), software, connectivity OER repositories, aggregators, collaborative platforms and learning management systems (LMS) Geographic contexts (urban and rural)	Policies, strategies, programmes and/or procedures at government, national, provincial and/or institutional level with respect to: – Initial teacher training, teacher professional development, academic staff development in HEIs – Intellectual property, copyright and CC licensing – Free and Open Source Software (FOSS), Open Access, OER Funding – Donor – Government – Institutional – Self-funding Institutional support – Technical support – Curriculum and learning design support – Library services

In the ROER4D meta-synthesis, OER are seen as the "products" that form the "cultural systems"; whereas the "socio-cultural domain" is seen as the prevailing social, institutional and/or disciplinary values, norms, conventions, expectations and practices that may encourage or deter educator and student engagement in the adoption of OER and OEP.

Cultural factors

Archer describes "culture" as "ideational aspects of social life" (1988, p.xi) that are manifest in "beliefs, theories, value systems, mathematical theorems, and novels etc" (2014, p.97). In order to undertake cultural analysis, she distinguishes more specifically between cultural "products" as the "cultural system" and "ideas" as the "socio-cultural" domain. The former has "an objective existence and autonomous relations among its components (theories, belief, values, arguments, or more strictly between the propositional formulation of them) in the sense that these are independent of anyone's claim to know, to believe, to assert or to assent to them" (Archer, 1996, p.107).

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Table 3: Cultural factors potentially influencing OER adoption (Hodgkinson-Williams et al., 2017)

Cultural factors	
Cultural system (relations between ideas)	**Sociocultural domain (differences in ideas among people)**
OER as a product – Cultural content – Language	Institutional/disciplinary norms or conventions Epistemic stance Perceptions of quality Pedagogic practices

Agential factors

As a number of individuals, institutions, government agencies and/or NGOs are involved in the need for and provision of formal education, the ROER4D meta-synthesis endeavoured to identify the agents who can influence and who are influenced by a range of factors in the process of adopting OER and/or engaging with OEP. The term "agent" (Archer, 2000) is used deliberately to indicate intentional agency exhibited by stakeholders, and their uptake (or not) of OEP and OER in response to the "structural and cultural" (Archer, 2003) conditions they face. In relation to open education, individuals and/or institutions are accorded the choice of whether (or not) to engage in OEP and/or adopt OER (Table 4).

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Table 4: Agential factors potentially influencing OER adoption (Hodgkinson-Williams et al., 2017)

Agential factors	
Institutional	**Individuals or groups of individuals**
Intergovernmental agencies Government – national and/or provincial (e.g. ministries of education) – Educational institutions – Schools – Teacher training colleges – Universities – NGOs	Students (primary, secondary and university students) Educators (school teachers, teacher educators and university lecturers) Formal communities of practice or informal networks And their: – Digital proficiency – Curriculum and learning design skills – OER awareness (including knowledge of copyright and open licensing) – Professional identity (including reputation) – Motivation and beliefs – Priorities (including time constraints)

In a networked project employing divergent theoretical and conceptual frameworks, the articulation of a preliminary, broad conceptual framework was valuable as it provided a foundation for later analytical synthesis by establishing a shared understanding of concepts and how they were reported upon in sub-project findings.

Analytical framework

The analytical framework drew from the primary categories articulated in the development of the conceptual framework. The UCT Network Hub developed an initial coding framework using the core OER adoption concepts identified in the development of the 10Cs open education cycle (e.g. create, conceptualise, curate) and the structural, cultural and agential factors (Archer, 2003) influencing those practices as the baseline codes. Sub-project findings were imported into NVivo and coded separately by two members of the UCT Network Hub, who then compared their coding results

and created a single transcript that combined their insights to address inter-rater reliability. This consolidated transcript was then discussed with the PI who offered feedback on the process by suggesting refinements to the coding schema or by re-coding certain sections for greater accuracy. Table 5 provides sample coded excerpts from the four key phases in the open education cycle – conceptualisation, creation, adaptation and use – and their associated sub-concepts from the 10Cs framework (such as curate and circulate) alongside examples of synonymous terms in the sub-project findings (taken either from chapters or sub-project research reports) that guided coding choices.

Table 5: Analytical framework for OER adoption in the context of the 10Cs open education cycle

Concepts	Sub-concepts	Similar terms
Conceptualise	**N.A.**	**plan, propose, imagine, discern, decide, choose**
(Ch9, p.318) Users said that they often found pedagogical value in OER. As one lecturer said, "when there are concepts that are difficult to explain, seeing how other people have explained it is useful, providing another perspective".		
Create	**N.A.**	**develop, produce, make, design**
(Ch10, p.369) The MOOC design tools mediated OER creation and enabled educators to make their knowledge publicly available, an indicator suggested by Beetham et al. (2012) as a form of OEP.		
Create	**Curate**	**add licence, add metadata, store, retain, host, platform, portal, learning management system (LMS)**
(Ch10, p.375) Upon release of the MedArts MOOC, lead educator SL remarked that it was important for the MedArts resources to be accessible after the MOOC run and reported that the process of making the MOOC had compelled her to start thinking about the importance of "building an archive" for the interdisciplinary field in which she was engaged.		
Create	**Circulate**	**communicate, share, redistribute, deliver, market**
(Ch8, p.274) In two of the institutions, small groups of teacher educators attempted to disseminate regularly what they had learned from such exploration, wanting to create an explicit sharing culture in their organisation. While this activity was tentative and on a small scale, it offered a promising space for shaping the community regime of competence in these institutions.		
Create	**Certify**	**quality assure, accredit, approve**
(SP7, p.34) It can be seen from the findings that the quality assurance framework followed for developing the OER integrated course is a very robust one involving a number of systematically sequenced standard operational practices including a feedback loops at relevant stages of curriculum formulation, OER selection, material development and draft material trials. This has resulted in developing the new OER integrated course of quality as observed by the course developers. Even when good OERs identified for the purpose are of high quality integration of these within the new course will require QA practices as shown by the present study.		
Create	**Critique**	**judge, provide feedback**
(Ch10, p.372) The experience of making a MOOC thus not only exposed educators to new open pedagogical strategies, but also to feedback from MOOC participants. The feedback (in the form of completed assessments, peer review, comments, discussion threads, and assignments) thus enables the educators to witness the effect of the pedagogical strategies they have employed on the MOOC as they teach in a distributed network and as part of a diverse community.		
Use	**LoCate**	**search, find**
(Ch8, p.273) Many were not specifically searching for open resources, but using "open" as a criteria for selection and use. One educator described her practice as: "going through Google and get this article, this resource, if it's good and at the end of the day they mention it's an open resource so I might use it" (TE08).		

Use	**Copy**	**use "as is", verbatim, original**
(Ch11, p.413) Thus, respondents showed a high proclivity for using OER "as is" (without any modification). In 11 of the 15 format categories, this comprised the top use style for respondents, especially for textbooks, images and research articles.		
Adapt	**Customise**	**edit, translate. localise**
(Ch13, p.483) By the end of the intervention, as indicated by the LMS records, further increased use of OER by teachers was observed. Science and technology, mathematics and information technology are the subjects where most active use was observed. Even though the number of participants in many centres had decreased due to various challenges by the end of this stage, a majority of the participants who remained were actively engaged not only in reusing OER, but also in adaptation or revision by translating them into local languages, adapting resources to suit their contexts and even creating OER on their own.		
Adapt	**Combine**	**mix, group, mashup**
(Ch14, p.531) An analysis of the KOER pages pertaining to the resource topics (forming chapters in the grades 8–10 mathematics and science textbooks) on the KOER platform is summarised in Table 15, which lists the resource units and states which resources have web pages, concept maps, links from the internet, audio-visual resources, lesson plans and animations. The data indicate that teachers remixed a variety of text, image and audiovisual resources for each topic on the KOER resource topic pages.		
Adapt	**Re-curate**	**re-licence, add metadata, re-store, retain, re-host, platform, LMS**
(Ch10, p.375) She hoped that the content of the MOOC would be reused and "replicated", noting that this was part of making content open. Specifically, SR expressed a positive view of flipped learning and noted that it would be preferable in the face-to-face classroom setting for learners to view video content before class so that discussions could start at a higher level.		
Adapt	**Re-circulate**	**communicate again, share, re-distribute, re-deliver**
(Ch14, p.532) The number of emails containing resources created by teachers (102) is higher than the number of resources accessed elsewhere (56). This suggests that teachers are open to sharing the resources they have created. The lower number of resources accessed elsewhere could, however, also be due to limitations in internet search habits amongst teachers and a paucity of resources in the Kannada language.		
Adapt	**Re-certify**	**re-quality assure, re-accredit, re-approve**
(SP10.2, p25) The degree program on the other hand was to be awarded by the institutions within their existing accreditation structures. However, without a joint certification for the degree program, the AVU OER was viewed more as a resource, with varying extent of use depending on nature of use and users, with some using them as a primary resource, while others using them as supplementary resources.		
Adapt	**Re-critique**	**re-judge, provide further feedback**
(SP7, p.34) It can be seen from the findings that the quality assurance framework followed for developing the OER integrated course is a very robust one involving a number of systematically sequenced standard operational practices including a feedback loops at relevant stages of curriculum formulation, OER selection, material development and draft material trials. This has resulted in developing the new OER integrated course of quality as observed by the course developers. Even when good OERs identified for the purpose are of high quality integration of these within the new course will require QA practices as shown by the present study.		

Structural, cultural and agential factors influencing OER adoption

Following the coding process for the 10Cs open educational cycle, the UCT Network Hub coded the sub-project findings for the structural, cultural and agential factors that seemed to influence the OER adoption activities outlined in the 10Cs framework. As the coding process developed, additional sub-codes were introduced to more accurately reflect the factors that exerted most strongly across the Global South contexts investigated in the ROER4D project. Tables 6, 7 and 8 provide examples of the coded text from these influencing factors, mapped to the sub-concepts that emerged during the coding process.

Table 6: Analytical framework for the structural factors influencing OER adoption

Concept	Sub-concept	Sub-sub-concept	Similar terms
Structural factors	**Demographics**	**Age**	**young**
(Ch9, p.318) For instance, one young lecturer who said that he had not been in his department long enough to grasp what the departmental social norms or expectations were, saw this as a "mindset" problem, in that many non-user lecturers – especially "older" ones, in his estimation – had a different conception of what higher education is or should be.			
Structural factors	**Demographics**	**Gender**	**sex**
(Ch14, p.523) The COA and Comparable groups are, however, different in terms of sex composition. In the overall population of government school teachers in the state, there is an equal distribution of sex. The Secondary education in India: Progress towards universalisation report (NUEPA, 2015b) indicates that the percentage of female teachers in Karnataka is 41.42%. The COA group had 76% male teachers, while the Comparable group had 75% female teachers. One factor that could have caused this difference is that the COA group was predominantly comprised of district-level resource personnel. Selection of district resource personnel tends to favour inclusion of male teachers due to the difficulties female teachers experience in terms of travel, accommodation, alternative child care, etc. Many female teachers tend to opt out of this role as it often involves additional responsibilities beyond regular teaching. Another factor could be that the Comparable group of teachers were from the district headquarters (Bengaluru and Yadgir town), where more female teachers tend to be appointed.			
Structural factors	**Demographics**	**Geographical location**	**rural, outside of a city**
(Ch8, p.266–267) UU3 in Uganda was an outlier, with no institutional connection and 50% of respondents reporting no access of any kind to the internet. This is possibly caused by multiple intersecting factors: UU3 is a lower-status institution with no research activity in its mandate, it is the one research site situated outside a capital city (although located in a commercial city only 80 km from the capital city), and staff are on lower pay scales than those at other institutions, making it more difficult for them to afford their own internet-enabled devices and the cost of online access. It could, however, be argued that UU3 is typical of the majority of institutions training primary school teachers across the continent.			
Structural factors	**Demographics**	**Socioeconomic status**	**GDP per capita**
(Ch3, p.83) African instructors surveyed revealed a range of 35–53% OER use by country, with "unsure" rates at about 30% each. South Africa – the most economically developed country by GDP per capita (see Table 4) – had the lowest rate of instructor OER use compared to Ghana and Kenya. In this instance, it does not appear that national GDP per capita rates played a positive role in promoting OER use amongst instructors, comparatively speaking. In fact, an opposite phenomenon may be at play. Perhaps it is precisely the relative lack of "development" (as expressed through GDP per capita) – and all this might entail, such as less local educational publishing, etc. – that may have encouraged more Ghanaian and Kenyan instructors to consider the use of OER.			
Structural factors	**Demographics**	**Qualifications**	**educational level**
(Ch15, p.564) At the same time, the relatively high number of teachers demonstrating instructional competency in competencies 1, 2, 3 and 5 may reflect the educational and experience levels of teachers in the study (many teachers had a bachelor's degree or a two-year teaching certificate, which is a comparatively high proportion relative to the overall teaching population in the country).			
Structural factors	**Demographics**	**Years of professional experience**	**young academic, length of time**
(Ch9, p.319) For instance, one young lecturer who said that he had not been in his department long enough to grasp what the departmental social norms or expectations were, saw this as a "mindset" problem, in that many non-user lecturers – especially "older" ones, in his estimation – had a different conception of what higher education is or should be. "I think the greatest [obstacle to OER adoption] is a traditional view of … higher education versus a very swiftly changing picture of higher education."			
Structural factors	**Demographics**	**Discipline**	**subjects**
(Ch13, p.483) By the end of the intervention, as indicated by the LMS records, further increased use of OER by teachers was observed. Science and technology, mathematics and information technology are the subjects were most active use was observed.			
Structural factors	**Demographics**	**Language**	**accent**
(Ch8, p.270) Students' limited experience of different cultures and languages was also raised as an impediment to promoting student use of OER: "Most of the videos we find online are from the UK or that sort of thing and sometimes when the people are talking and there is an accent, an English accent, and sometimes I find that students would find it a bit difficult to follow."			
Structural factors	**Infrastructure**	**Power supply**	**electricity**
(Ch9, p.306) Lecturers reported that they sometimes faced three load-shedding sessions per day, lasting hours at a time, combined with electricity problems internal to the university. As one lecturer indicated, "Especially this year we've been without electricity for like two weeks running on campus."			

Structural factors	Infrastructure	Hardware	devices, computers, printing facilities
(Ch8, p.266) In line with the findings of numerous previous studies, the critical issue for OER across all institutions in this study remains access to hardware (desktop computers, laptops and internet-enabled mobile devices) and to the internet. Access to the internet is central; without this, individual use of OER is static.			
Structural factors	**Infrastructure**	**Hardware / printing facilities**	**CD-ROM, photocopy**
(SP10.2, p.29) Some respondents pointed specifically to use of print copies of the OER. For example, 20UA Kenya (E-learning project leader, instructor AVU ICT Basic Skills) noted that at the start of the project students received the original hardcopy textbooks, but for subsequent groups photocopies were reproduced and given to students. He also noted that providing the modules as CD-ROMs was not useful if students did not have computer skills; 8UC Uganda (Dean Faculty of Science, has used AVU OER for teaching) cited not enough copies of the AVU OER module; similarly, 4UB Tanzania (In charge of Regional Center, has used AVU OER modules for teaching) indicated that AVU materials are in limited supply, thus only few could get access of them.			
Structural factors	**Infrastructure**	**Connectivity**	**internet, broadband**
(Ch9, p.306) This is the situation that UFH lecturers deal with as a norm. As one UFH lecturer responded, "if I'm talking in terms of rural areas, which is where we're working, access would be a challenge". This concern for students' varied access capacities was echoed by a UNISA lecturer who said, "We do have regions in the country where the internet access is first class, like Pretoria and Joburg and Durban and Cape Town, but if you go to other provinces like Limpopo and Eastern Cape, which are very rural, then it becomes very difficult to access internet."			
Structural factors	**Infrastructure**	**Software**	**free and open source software (FOSS)**
(Ch14, p505) A further limitation in developing the Indian public education system is the use of proprietary software (limited mostly to Microsoft Office applications) for generating content in the ICT@ Schools programme 10 (Kasinathan, 2009b). The absence of tools for developing subject based content has meant that creation of digital resources on the part of teachers is rare, as there is limited or no access to tools for resource creation. In response to this, India's National Policy on Information and Communication Technology in School Education (Department of School Education and Literacy, 2012) has recommended the establishment of a Free and Open Source Software (FOSS) approach and envisions that teachers will participate in the creation of digital resources.			
Structural factors	**OER availability**	**Platform**	**repository**
(Ch14, p 542) The emergence of the [Subject Teacher Forum professional learning community] as a space for OER sharing and adoption was a welcome but almost surprising outcome. While there was no benchmark for virtual interaction amongst teachers in a public education system in a developing country such as India, the poor availability of ICT infrastructure, the low competency levels of teachers in terms of adopting digital processes, and the complexity of a large public schooling system had kept expectations quite low. The high volume of emails on the PLC and the response of the COA teachers in terms of accessing these resources and publishing on the KOER platform was a gratifying outcome for the research team.			
Structural factors	**Policy**	**Legal permission**	**intellectual property policy**
(Ch4, p.134) In terms of the arrangements around calls for participation and agreements concluded by the state through the MECESUP2, the intellectual property policy adopted was that the copyright on project outputs should be transferred to implementing institutions. That is, the default intellectual property approach adopted by this programme is to limit access to the knowledge produced (through restrictive, full copyright provisions), unless the implementing institution assumes a different stance and decides to adopt an open licensing strategy.			
Structural factors	**Policy**	**OER or open access strategy and policy**	**national policy**
(Ch8, p.254) Whilst OER have yet to appear in the national policies of the countries studied here, over the last 10 years OER use in East Africa has been promoted by a number of institutions and initiatives, most notably OER Africa (an OER advocacy and policy initiative) through its work in various advocacy workshops and, most recently, in an action research project with four institutions, including one of the Tanzanian institutions included in this study (TU1) (Ngugi & Butcher, 2016).			
Structural factors	**Policy**	**OER or open access strategy and policy / governmental level**	**legislation**
(Ch4, p.127) The outcome of the efforts driven by LA Referencia can be seen in the shaping of national policies to ensure open access to publicly funded research. Argentina, Mexico and Peru are three of the LA Referencia member countries with Open Access legislation in place.			
Structural factors	**Policy**	**OER or open access strategy and policy / institutional level**	**policy framework**
(Ch9, p.308) This liberal policy framework is bolstered by the abiding collegial institutional culture through which academics enjoy high levels of autonomy in terms of the materials they choose to use in the classroom, including OER. UCT lecturers are therefore completely free to use and create OER.			

Table 7: Analytical framework for the cultural factors influencing OER adoption

Concept	Sub-concept	Similar terms
Cultural factors	**Norms**	**social practice**
(Ch14, p.538) This practice presented a disjunct between legal practice (where the default copyright provision is "All rights reserved") and social practice (where any resource available online is seen as being free to download/reuse/share in the absence of an explicit copyright clause, and any resource created and shared is intended to be reused, without specifying any copyright clause) and is an issue that requires further work – not only from a research perspective, but also in terms of policy advocacy.		
Cultural factors	**Disciplinary Norms**	**disciplinary/interdisciplinary approaches**
(Ch10, p.365) The integration of the MOOC with face-to-face classroom teaching emerged as a result of the educators' experience within online teaching. As SL remarked: "I would like our students to have access to those segments of the MOOC which could generate new interdisciplinary research projects." The role of the MOOC in promoting the interdisciplinary approach inherent in the Medical Humanities was still part of the core objective, but the MOOC experience appears to have given the educators new ways in which to enact that objective, i.e. through closer integration of the MOOC and their face-to-face teaching.		
Cultural factors	**Institutional conventions**	**institutional expectations**
(Ch9, p.318) For instance, one young lecturer, who said that the he had not been in his department long enough to grasp what the departmental social norms or expectations were, saw this as a "mind-set" problem, in that many non-user lecturers – especially "older" ones, in his estimation – had a different conception of what higher education is or should be. "I think the greatest [obstacle to OER adoption] is a traditional view of … higher education versus a very swiftly changing picture of higher education."		
Cultural factors	**Pedagogical practices**	**teaching practice**
(Ch5, p.163) These dimensions demonstrate the study's influence in terms of supporting a group of teachers in identifying the potential of OER for their educational practice, as well as generating an interest in copyright and Creative Commons licensing as a crosscutting issue, implicit in all aspects of their work with their students as well as their fellow teachers. Some teachers have become Open Educational within and outside of their educational institutions, not only by setting an example through publishing their OER, but also through implementing changes to their curricula, incorporating open licensing as criteria for the delivery of school assignments, organising lectures and institutional workshops, and sharing their experiences at academic events.		
Cultural factors	**Perceptions of quality**	**evidence of origin**
(Ch8, p.269) Many respondents found the sheer volume of available online resources daunting and were anxious for quality guidelines; without these, they doubted whether they had sufficient expertise to judge whether a resource was of appropriate quality. Several respondents mentioned that they looked for evidence that the resource originated from an academic as an indicator of authenticity and quality.		
Cultural factors	**Perceptions of quality**	**relevance**
(Ch13, p.484) Difficulty in finding OER for certain subjects and concerns about their quality, relevance and appropriateness in the local context were some of the other issues identified.		
Cultural factors	**Community of practice**	**group formation**
(Ch10, p.372) SR was impressed by the formation of online learning communities and a Facebook group that was created by cancer patients who were taking the course, remarking that the community appeared to have "congealed in a more palpable way on the MOOC site, than it does in my face-to-face teaching". The MOOC's openness fostered a unique sense of community that the educators had not found possible in a traditional classroom.		

Table 8: Analytical framework for the agential factors influencing OER adoption

Concept	Sub-concept	Sub-sub-concept	Similar terms
Agential factors	**Digital proficiency**	N.A.	**computer literacy/ competence**
(Ch15, p.528) The OER adoption process required use of the KOER online platform to host newly created or revised OER, which meant that teachers had to become proficient in the use of multiple applications (including MediaWiki) while developing the pedagogic competencies required for the revision of resources. This was seen as too complex a requirement by the teachers. They reported that imagining resources in an online format required pedagogic competencies as well as technological familiarity, which was a challenge. Though some COA teachers had a basic familiarity with ICT, some of the digital methods adopted in the programme were found to be challenging, such as editing content on the Wiki page or embedding resources in different formats (e.g. concept map, videos, images) directly on the Wiki page.			
Agential factors	**Learning design capacity**	N.A.	**pedagogic competencies**
(Ch8, p.270) At the course level, several educators discussed how they felt deficient in course or instructional design competence and hence were not confident about their ability to organise materials in a way which would offer students an effective learning journey. Anxiety about copyright issues also inhibited exploitation of OER in teaching.			
Agential factors	**OER awareness**	**Copyright knowledge**	**copyright, open licences**
(Ch10, p.370) The Ed4All educators were clear from the outset that they wanted to make their resources openly available. Despite some previous exposure to the Open Access and copyright debate, they found MOOC copyright issues complex and difficult to negotiate. While they knew about copyright, they were not familiar with the scope of open licences available and experienced copyright decision-making as a burden.			
Agential factors	**Professional identity**	N.A.	**agency**
(Ch14, p.533) The COA teachers spoke about their identity as teachers and resource creators, their capabilities as resource persons for training other teachers, self-awareness of professional development needs, possibilities for creativity and self-expression, and an increased sense of agency as they interacted with school administration and gained greater confidence.			
Agential factors	**Professional identity**	**Reputation**	**self-interest**
(Ch11, p.416) The next two most common responses were that "it helps other educators" (60%), an altruistic notion that taps into these educators' desire to share and connect, and "it enhances my reputation amongst my peers", a notion that taps into these same educators' self-interested desires to enhance their reputations. This is as it should be: the engagement with OER, if it is to be a successful, broad-based enterprise, needs to satisfy educator desires that are both self- and externally directed.			
Agential factors	**Motivation and beliefs**	N.A.	**reasons**
(Ch13, p.482) They were highly motivated about having free access to quality educational materials that they could adopt without any legal constraint. They were also happy about the opportunities available to them to translate quality learning materials into the local languages (Sinhala and Tamil) without any restrictions.			
Agential factors	**Confidence**	N.A.	**lack of confidence**
(Ch9, p.324) More than one lecturer stated that they were worried about what the institutional response would be to them deviating from the usual curricular practices, while others cautioned that even though some individuals might be interested in sharing their work, many others would be hesitant due to a more cautious mindset.			
Agential factors	**Time constraints**	N.A.	**workload**
(Ch12, p.444) The second highest ranked barrier to OER uptake for these respondents was their workload. They saw OER as additional work, and therefore saw current workload as a barrier to doing any additional work developing OER. In terms of high current workload and time constraints, Harishankar (2013) also found that teachers were not able to contribute due to higher work pressure.			

Conclusion

The conceptual and analytical frameworks presented here were used to plot the structural, cultural and agential factors influencing each of the conceptualisation, creation, use and adaptation phases of the ideal open education cycle in order to identify the various enabling and constraining factors influencing OER adoption and to ascertain where OER was being successfully enacted, or where there were key disjunctures.

In a networked project employing divergent theoretical and conceptual frameworks, the articulation of a preliminary broad conceptual framework in the project scoping period was valuable as it provided a foundation for later analytical synthesis by establishing a shared understanding of concepts and how they were reported upon in sub-project findings. This articulation may have influenced how the sub-project researchers understood those concepts in relation to their own research processes, and therefore how they reported their findings. A more bottom-up approach which drew from the sub-project findings' conceptual framing activities may have surfaced a different set of core concepts, and therefore a different conceptual framework, but would have made the project's meta-synthesis ambitions and the research capacity development processes more complicated.

In a networked project employing divergent theoretical and conceptual frameworks, the articulation of a preliminary broad conceptual framework in the project scoping period was valuable as it provided a foundation for later analytical synthesis by establishing a shared understanding of concepts and how they were reported upon in sub-project findings.

Using final sub-project chapters as the primary data source for the analytical framework placed limitations on re-coding and re-analysis, as the chapters were still undergoing editorial development while the coding and synthesis process was underway. Given more time and capacity, the UCT Network Hub would have undertaken multiple rounds of coding for verification purposes in order to further elaborate upon the themes emerging from the data. In an optimal scenario, the UCT Network Hub would also have preferred to access all sub-project microdata for additional verification and data mining. This was, however, not possible due to ethical (privacy) and logistical constraints.

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How to cite this resource:

ROER4D (Research on Open Educational Resources for Development). (2018). *ROER4D open research toolkit: Meta-synthesis conceptual and analytical frameworks*. Cape Town: Research on Open Educational Resources for Development. Retrieved from https://doi.org/10.5281/zenodo.1217423

ROER4D was funded by Canada's International Development Research Centre, the UK's Department for International Development (DFID) and the Open Society Foundations. It builds upon prior research undertaken by a previous IDRC-funded initiative, the PAN Asia Networking Distance and Open Resources Access (PANdora) project. It was hosted by the Centre for Innovation in Learning and Teaching at the University of Cape Town and Wawasan Open University in Malaysia.

The meta-synthesis methodology presented here was utilised in the project meta-synthesis published as Chapter 2 in the edited volume, *Adoption and Impact of OER in the Global South*, co-published by African Minds, ROER4D and the IDRC.

The published open dataset arising from the meta-synthesis can be accessed at https://www.datafirst.uct.ac.za/dataportal/index.php/catalog/696.

A full list of ROER4D outputs can be accessed at https://goo.gl/BMeCTH.

This work was carried out with the aid of a grant from the International Development Research Centre, Ottawa, Canada.