# Analysis of Higher Education (HE) Systems' Approach in South Africa

## National Infrastructures for Digital Educational Resources

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## 1. Introduction

In this chapter, we present the case of open learning resources in distributed learning infrastructures in South Africa. The case will consist of and present not only macro, meso, and micro levels, but also focus on the specific elements of infrastructure, quality, policy, and change.

South African (higher) education is not exempt from the dramatic changes in international higher education, such as an increasingly competitive higher education landscape, funding constraints, competing narratives about graduate attributes, the growing phenomena of the casualisation of faculty, and the disruptive role of technology (Altbach, Reisberg, & Rumbley, 2009; Bleiklie, 2018; Golden & Katz, 2018; Gyamera & Burke, 2018). In the context of South African higher education, the impact of these changes is often exacerbated and deepened by context-specific issues such as demands for free access to higher education, expediting the transformation of South African higher education, and specifically racial and curriculum transformation, and the impact of competing in international ranking regimes (see, for example, Badat, 2016; du Preez, Simmonds & Verhoef, 2016; Ndlovu-Gatsheni, 2018).

When this chapter was conceptualised in 2017/2018, the notion that a pandemic caused by a microscopic virus would change and interrupt many dimensions of our lives, particularly education, was almost unthinkable. No one could not have foreseen or predicted the turmoil for education that unfolded during this study as the provision of educational opportunities globally were severely disrupted (e.g., Bozkurt et al.,2020). While many believed that the pandemic would be a great equaliser, the opposite happened, with intergenerational and structural inequalities being worsened (Belluigi et al., 2020). For example, Dube (2020) shares evidence of how COVID-19 deepened the digital divide, especially in rural South Africa where educators and learners alike were at a loss how to negotiate, afford and use various technologies, including low-technology solutions. The challenges faced by rural learners included the absence of network coverage, the closure of internet cafes, the lack of computer skills by some educators, and the cost of connectivity. As the pandemic is still far from over in the South African context, its impact on South African education will be felt for many years to come, as issues of lack of infrastructure crudely illustrated the continuing impact of the legacy of colonialism and apartheid.

Though it falls outside the scope of this country study, it is important to note that access to educational resources is part and should be part of the need for epistemic freedom and epistemic justice as proposed by Ndlovu-Gatsheni

(2018) and others. Against the need for epistemic justice, the sharing of educational resources (ER) and/or Open Educational Resources (OER) are two distinct but overlapping phenomena and practices. For the sake of this country study, we will use the abbreviation of (O)ER, and in line with the broader project, to explore and map digital infrastructures for the dissemination of both forms.

While there has been an increasing interest in OER "as a means of addressing key challenges in education and research... [m]ost OER research has, however, taken place in countries in the Global North" (Arinto, Hodgkinson-Williams, King, Cartmill & Willmers, 2017, p. 5). In this country study it is therefore important to situate South Africa in the context of the broader notion of the Global South with its "notable disparities in the level of access to the physical infrastructure and inputs needed for education (such as computer labs, classroom space and textbooks) as well as access to an enabling environment for educational innovation (such as policy and technical support) (Arinto, Hodgkinson-Williams, King, Cartmill & Willmers, 2017, p. 6). There is a real risk that digital interventions, such as foreseen by this project, may not ameliorate but reinforce these inequalities. In South Africa, as in the broader context of the Global South, access to (O)ER "is often exacerbated along spatial, gender and class lines" (Arinto, Hodgkinson-Williams, King, Cartmill & Willmers, 2017, p. 7).

The notion of 'open' in the nexus of (O)ER and digital infrastructure in the Global South therefore "hides a reef of complexity" (Hodgkinson-Williams & Gray, 2009, p. 101).

Three important considerations are of essence in this country study:

Firstly, the educational landscape in South Africa cannot be understood without accounting for and recognising the massive impact colonialism and apartheid had on society, and on education in particular. Education, and educational resources were an integral part of the colonial and apartheid imaginary and ideologies and were used to not only sustain these imaginaries but also to perpetuate them. These imaginaries and ideologies flowed from but also sustained and perpetuated particular epistemologies and ontologies. Knowledge – what counted as knowledge, what types of knowledge and whose knowledges were allowed to be (re)produced and disseminated – as informed and sustained by the colonial/modern imaginary. Education has been used through many years to sustain and perpetuate inequality through two main mechanisms, namely exploitation and opportunity hoarding (Tilly, 1999). Not only is education a valuable resource that "powerful, connected people command" but also a resource from which they "draw significantly increased returns by coordinating the effort of outsiders whom they exclude from the full value added by that effort" (Tilly, 1999, p. 10). Opportunity hoarding "operates when members of a categorically bounded network acquire access to a resource that is valuable, renewable, subject to monopoly, supportive of network activities, and enhanced by the network's modus operandi" (Tilly, 1999, p. 10). In Tilly's (1999) exploration of some 'future inequalities' he suggested that "educational institutions [will continue to] exercise greater and greater influence on the sorting of people into categories and hence into the receipt of differential rewards", and that exploitation may decrease but that opportunity hoarding will increase with "small, segregated camps of hoarders emerg[ing]" (p. 242)

Secondly, education has always been and continues to be ideological and value-laden (Apple, 2017; Bernstein, 2015). (O)ER are no exception. Hall (2011), for example, proposes that we should see OER in terms of and as a form of cultural oppression. We cannot disentangle OER from political and ideological influences and contexts. In line with understanding (O)ER as ideological, we need to understand (O)ER also as a "knot of social, political, economic and cultural agendas that is riddled with complications, contradictions and conflicts" (Selwyn, 2014, p. 6).

Thirdly, we cannot (and should not) expect of education or specifically (O)ER to address the vast inequality and disparities in South African (higher) education, on its own. Apple (2010) states that most of the hype and promises on the potential of (higher) education to make a dent in the inequalities and injustices, pretend as if education as institution and practice exist in a 'vacuum'. "The naïveté of these positions is not only ahistorical; but it also acts as a conceptual block that prevents us from focusing on the real social, ideological, and economic conditions to which education has a dialectical and profoundly intricate set of connections" (pp. 7-8). We need to see education, and the rhetoric of broadening access as connected and embedded in "relations of exploitation and domination – and to struggles against such relations – in the larger society" (Apple, 2010, p. 15). In a keynote in 2015 in South Africa, Tressie McMillan Cottom

pointed to the fact that if you "expand education in an unequal society without a redistribution of resources, you will [merely] reproduce inequality." Without the dedicated and intentional redistribution of resources and allocation of funding to support and widen access to quality higher education, "we create a situation where for-profit colleges and venture capitalists move in to "fix" education" (Prinsloo, 2015). This may result in a "two-tier system where the most disadvantaged students pay the most for the least quality education" (McMillan Cottom, 2015 in Prinsloo, 2015b). Commenting on the transformative potential of ICTs in/for South African higher education, Czerniewicz, Ravjee and Mlitwa (2007) wrote "It is possible to argue that changes arising from the innovative use of ICTs are dependent both on the broader socio-economic and political contexts, and on the local institutional struggles and strategies around the distribution of resources as well as the relational aspects of redressing historical inequities in educational institutions" (p. 68).

Figure 1 (below) illustrates our understanding of individual and institutional perceptions, (re)use and production of (O)ER in the context of South Africa. In the middle (A) we have the individual's perceptions, (re)use and production of (O)ER. Evidence suggests that "Personal motivation, especially the desire to enhance one's reputation, underpins some educators' practice of creating and sharing teaching materials as OER", as well as feelings of "personal fulfilment and confidence" and educators seeing their participation in (O)ER as "a way of asserting an epistemic stance, or one's own unique (individual or collective) perspective of knowledge" (Hodgkinson-Williams, Arinto, Cartmill & King, 2017, p. 586). [In the conclusion to this chapter, we revisit this figure in the light of the macro, meso and micro-analyses].

**Figure 1**

*An overview of the case of open learning resources in distributed learning infrastructures in South Africa.*
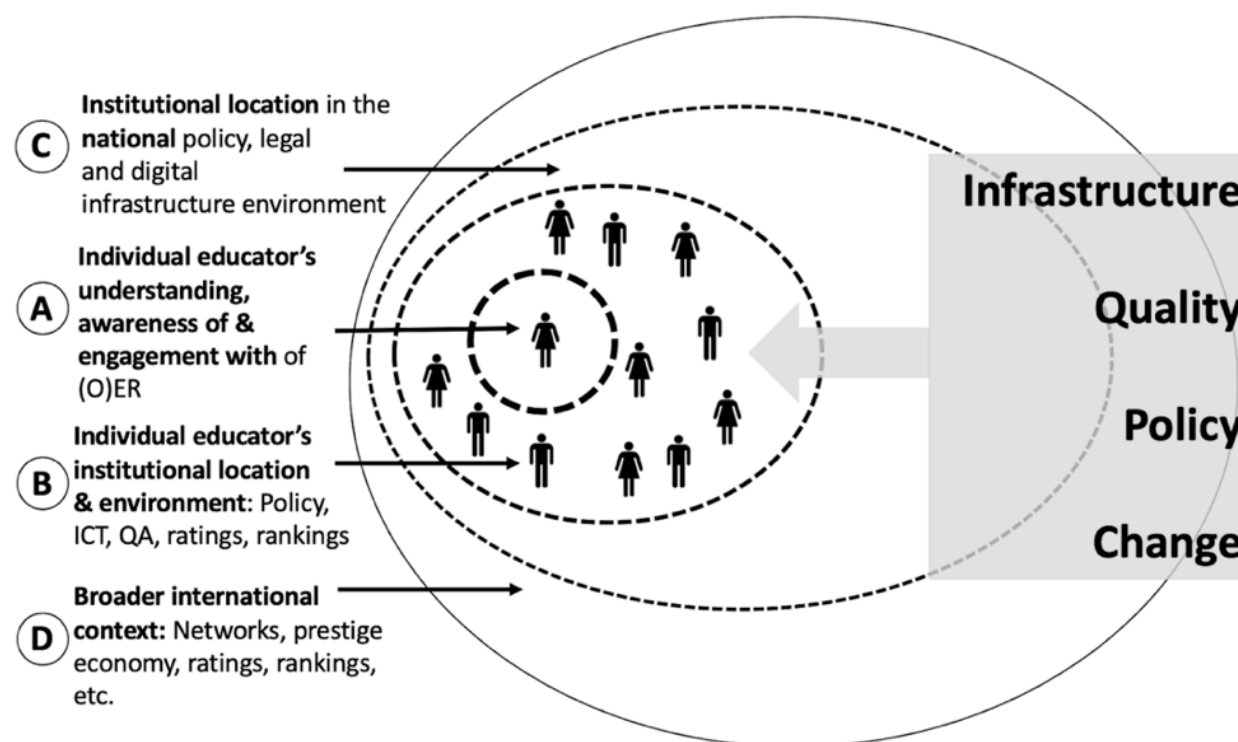


There is also evidence that in the context of South African universities, individuals' understanding, awareness of, and engagement with (O)ER are also shaped, and in many ways determined by their institutional location (e.g. role, department, discipline) and institutional environment (the character, values and mission and vision of the institution) (Point B). The institutional environment (Point B) is also constituted by (digital) infrastructure, quality assurance regimes and processes, policy and change. As we will see in the analysis below, the institutional environment also embodies and perpetuates particular understandings of Intellectual Property (IP), scholarly quality and gravitas, or the academic prestige economy (Ball, 2000; Blackmore 2016; Morley 2016). The institution (Point C), while having its own

unique characteristics, processes and values, is, however, embedded in a national policy and legislative context (e.g. copyright) and (digital) infrastructure. We also cannot, and should not, ignore or underestimate how the broader international context (Point D) with its networks of inclusion and exclusion, asymmetries in knowledge production, the prestige economy, ratings and rankings impacts on national systems of higher education, individual institutions and individual faculty or staff member in a higher education institution.

The analysis in this chapter follows the following sequence: the analysis moves from macro, meso to micro level and concludes with illustrating how individual (O)ER practices are entangled in institutional policies, and the broader international context and how these responses (on both individual and institutional levels) are shaped by infrastructure, quality, policy and change. The pandemic has also illustrated how (O)ER are impacted by macro-societal factors whether environmental, social, technological, political, economically and/or legally.

## 1.1 A brief note on the methodology used

At the inception of this study, the researchers did a desktop study on publicly available institutional documents, conducted a literature research on (O)ER in South Africa and contacted several individual South African researchers who published in the field. We acknowledge respondents at the end of this chapter.

# 2. Macro level

## 2.1 OER Infrastructure

From the analysis of the policy and regulatory environment as well as feedback from the respondents it is clear that there is, at present, no national repository, or indeed, plans to establish a national repository with the subsequent infrastructure. Respondents were unanimous in stating that a national repository could potentially be hugely valuable to raise the profile of OERs across HE and to the public. It was suggested that such a repository and its infrastructure could have materials from multiple institutions (e.g. Open Education Consortium model). A repository could be designed to share resources from academics and clustered not only around disciplines but also levels of study. For example, a web tab for students leaving High school, first years, post graduates etc.

With regard to the technological and technical set-up behind it (meta data standards, host servers etc.) and how such a national infrastructure underpinning a repository is maintained, evidence suggests that new open source platforms are being developed for open repositories. One respondent suggested that a national repository could potentially be built in something like Drupal. Hosting and maintenance are important considerations and it would be preferable if such a repository will not be hosted by any individual institution but rather by government (e.g. DHET) or other organisations.

The following elements such as copyright, funding and public and commercial collaboration will illuminate some aspects of an emerging infrastructure.

## Copyright

South Africa's maturity and infrastructures pertaining to (O)ER "revolves around the Copyright Act of 1978" (ROER4D, 2017, p. 4). "This implies that all educational resources produced by school educators belong to their employers (i.e. provincial departments of education, school governing boards or private institutional management) and, in the case of college or university educators, to their HEIs" (ROER4D, 2017, p. 4). This is of importance with regard to understanding two potential producers of (O)ER, namely educators as users and as creators, and the institutions as copyright holders. Having said that, it is also crucial to note that "[w]hile national legislation and the relevant education departments play an important role in enabling or constraining OER activity, South African HEIs can set their own IP regulations, which can further influence OER opportunities" (ROER4D, 2017, p. 4). At the time of its publication, ROER4D (2017) reports that 20 out of 25 universities have IP policies that align with the Copyright Act meaning that the IP of the works produced by academics vest in the affiliate institution. In the light of increasing competition (Bleiklie, 2018), it is therefore unlikely that universities may have "any strategic intent to openly share these resources" (ROER4D, 2017, p. 4). One exemption in the context of the higher education institutional landscape is the University of Cape Town (UCT) who "'automatically

assigns' copyright to the authors, allowing them to relicense their teaching materials and share them as OER" (ROER4D, 2017, p. 5).

In the case of UCT, the institution automatically assigns to the author(s) the copyright, unless UCT has assigned ownership to a third party in terms of a research contract, in: scholarly and literary publications; paintings, sculptures, drawings, graphics and photographs produced as an art form; recordings of musical performances and musical compositions; course materials, with the provision that UCT retains a perpetual, royalty-free, nonexclusive licence to use, copy and adapt such materials within UCT for the purposes of teaching and or research; and film (UCT, 2011).

## Funding

Goodier (2017) reports on an investigation pertaining to the allocation and use of public funding through the South African National Treasury dedicated and channelled specifically to OER. "In South Africa, education expenditure has been on the increase for decades, from ZAR 31.1 billion in 1995, to ZAR 59.6 billion in 2002, and to ZAR 105.5 billion in 2007 (OECD, 2008)" (Goodier, 2017, p. 235). In this context, learning and teaching materials are highly-valued and often costly resources. In general, learning and teaching support materials (LTSM) "range from teacher and learner created resources to commercially produced classroom resources such as wall charts, workbooks, textbooks, e-books, readers, stationery, science kits, dictionaries, encyclopaedias, etc." (DBE, 2014, p.3). Goodier (2017) mentions that despite austerity that has seen the decrease in funding on public education, an increase in funding for LTSM "has been seen as a valid strategy" (p. 236). There is also evidence that "LTSM (including textbooks) form a large part of the South African publishing industry's print output, with the government as one of its largest consumers (PASA, 2004)" (Goodier, 2017, p. 242).

## Public and commercial collaboration

Goodier (2017) mentions an education technology company and OER publisher, Siyavula, who is dedicated to making open textbooks and other materials available for all school grades in South Africa. Siyavula is in a successful partnership with the Department of Basic Education (DBE) who reviews and endorses the materials produced by Siyavula released under Creative Commons licences and "are free for users to print and adapt as needed, depending on the licence chosen" (Goodier, 2017, p. 242). With regard to the collaboration model/agreement between Siyavula and the South African government, Goodier (2017) writes "Siyavula produces textbooks as OER through a sponsorship model where a sponsor signs on to fund production costs in exchange for advertising in the books, which is one of the factors that makes the books cheaper for the government" (p. 243).

Evidence of a growing attention to digital resources and access platforms is found in, for example, the digital education initiatives of two of the seven provinces in South Africa, namely Gauteng and Western Cape (Goodier, 2017). "Having resources available on these platforms explicitly under an open licence would help to facilitate adoption and use as well as potentially reduce costs over time" (Goodier, 2017, p. 245).

Also see Kwet (2019) for a critical discussion on the increasing commercialisation of South African education's foray into digital and elearning and the worrying role of Silicon Valley in this regard.

## 2.2 Quality of OER

There are no national quality standards for (O)ER. However, there are quality criteria developed specifically for distance education (see, for example, Welch & Reed, n.d.) and these are being revised to include open education practices.

The relationship between (O)ER with quality can be understood in terms of three aspects, namely, (1) to what extent can (O)ER improve the quality of learning materials; (2) how (O)ER can improve the quality of teaching practices; (3) and how OER can influence student outcomes. There is evidence that (O)ER has the potential to improve the quality of education (e.g. Kanwar, Kodhandaraman & Umar, 2010), but its potential is linked to the quality of (O)ER which had been the subject of a number of studies (Arinto, Hodgkinson-Williams, King, Cartmill & Willmers, 2017).

## National standards regarding (O)ER and their creation, dissemination and quality assurance

The Open Learning Policy Framework (DHET, 2017) refers to funding for infrastructure support and quality measures and sustainability of OER. There is not currently a system in place. Institutions where OER are placed in a repository have their own quality assurance. In the case of UCT formal measures are not in place but the repository relies on a pride of authorship model where the author only puts resources out into the open that they believe are valuable and of a high standard. (See the discussion of the Open Learning Policy Framework, DHET, 2017 later in the document).

### Who are the actors involved in setting and assuring them?

Respondents indicated that depending on the potential model, there may be different layers of quality assurance. One respondent specifically mentioned "the authors' pride of publication is one step". There is also the issue of the responsibility to ensure that there is no third- party copyright infringement, or, if institutional branding is used, whether its use is in aligned with institutional policy. Of crucial importance to the author's pride and institutional reputation is the need for proof reading and editing that is a fundamental step that could be managed by the host. Assuring the quality of the content would require some peer review which would more than likely deter authors and certainly it would slow the process of publication.

### How do they relate and adhere to international elearning standards and specifications?

More than one respondent indicated that the issue of context is of crucial importance and it will have to be ensured that these international standards take into consideration the specificities of the local/national context. Home-grown models need to be developed that correlates with international standards.

## 2.3 OER Policy

There are, currently, no overarching national policy with regard to digital infrastructures and their implementation in the specific context of (O)ER. As such, the following section focuses on the South African policy environment as it pertains to (O)ER and specifically attends to any mention of digital networks or infrastructure.

Evidence from the policy and regulatory environment is very scarce with regard to (O)ER. The National Education Policy Act (No. 27, 1996) mentions, for example, "achieving the cost-effective use of education resources and sustainable implementation of education services" (p. 7). The Department of Basic Education's (DBE) Action plan 2014 (2011) mentions "Apart from assisting learners, libraries in schools provide an additional resource base that teachers can draw from when preparing lessons" (p. 129; emphasis added). The Draft National Policy for the provision and management of Learning and Teaching Support Material (LTSM) (DBE, 2014) states

> *The process of LTSM development may be undertaken by commercial companies, non-governmental organisations, Open Educational Resource initiatives as well as by internally producing / commissioning the development of LTSM for subjects where necessary, i.e. state publishing. In cases where the DBE commissions the development of material, all intellectual property and reproduction rights shall reside with DBE (p. 12).*

Interestingly, while (O)ER is specifically mentioned, what is more concerning is a seeming contradiction where the copyright of all commissioned materials will reside with the DBE. When materials are obtained from a "single source (provider) for the development of LTSM, the intellectual property rights will remain with the creator (author) and producer, unless the DBE procures the copyrights from the creator" (p. 12). Where CC licenced materials are used, the prevailing licencing regimes will remain in place but when "material is created by a teacher for use in the classroom, the intellectual property shall reside with the particular teacher and/or school" (p. 13).

Of concern is the fact that the 2008 review of South African policies for education does not mention (O)ER once (OECD, 2008). The report (OECD, 2008) mentions that "The curriculum was also heavily reliant on resources, textbooks and

even classroom space, whereas many poor schools were already struggling with few and outdated textbooks and minimal resources" (p. 82). The report furthermore confirms that "In many schools, textbooks are the main – sometimes the only –educational resource" (p. 180).

In the next section we will discuss a number of South African policies and regulatory frameworks and map any reference to, or guiding principles pertaining to (O)ER.

## White Paper on Post School Education and Training (DHET, 2014a)

The main policy objectives of the White Paper tie in with the introduction above and address the elements of education and social justice, expanding access, improving quality and increasing diversity, co-operation between education and the workplace and the provision of a single coordinated system. (O)ER are specifically mentioned in the Policy and the Policy provides a broad framework for situating the discussion pertaining to the role and scope of a national infrastructure for (O)ER.

The key elements of the White Paper (DHET, 2014a) are as follows:

- The aim of the paper is to set a framework that provides the focus for post school education in South Africa. The Department of Higher Education and Training (DHET) in South Africa will use this framework to develop their HE plans until the year 2030.
- An emphasis is placed on a diverse range of HE institutions for post school education. These include universities, colleges and vocational training centers.
- The importance of partnerships between educational institutions and the workplace is stressed
- The post-school education system should strive to develop political, social and cultural thinking graduates who are able to function effectively, creatively and ethically in a democratic society
- Transformation is one of the key elements of the white paper. Education is seen as a means of addressing the high-income gap in South Africa, as well as poverty and inequality. It strives to do so through building a non-racial and non-sexist post school education system.
- The paper also addresses the concept of differentiation in order to meet a range of social, economic and educational requirements
- A target of 25% university enrollment of the population of South Africa should be achieved by 2030 (up from the current rate of 17.3%)

Universities are seen as the main provider for high-level educational skills for the labour market in South Africa and are the dominant producers of new knowledge. The White Paper focuses on growing research and innovation, particularly in areas that have been identified as important for national development. In addition, the universities are mandated with strengthening social justice and democracy in order to overcome the inequities that were inherited from the apartheid government.

Despite very significant growth, South Africa still has a post-school education and training system that does not offer sufficient places to the many youth and adults seeking education and training. Expansion is needed, both in terms of numbers of available places, and the types of education and training that are available. There should be greater differentiation and diversity among our institutions in order to provide for the wide variety of need of both students and employers" (DHET, 2014a, p. 2).

The White Paper (DHET, 2014a) also makes mention of the role of DE as well as Open earning (OL) and these elements are formalised in the "Policy for the provision of distance education in South African universities in the context of an integrated post-school system" (DHET, 2014b) which will be discussed below. Outside of the UNESCO definition of OER, as referred to at the start of the document, the Policy mentions OER in the context of "building an expanded, effective and integrated post-school system" (DHET, 2014a).

The previous White Paper on Education and Training (DE,1995) introduced the concept of open learning, which it defined as follows: "Open learning is an approach which combines the principles of learner centeredness, lifelong

learning, flexibility of learning provision, the removal of barriers to access learning, the recognition for credit of prior learning experience, the provision of learner support, the construction of learning programmes in the expectation that learners can succeed, and the maintenance of rigorous quality assurance over the design of learning materials and support systems" (DE, 1995, p. 24).

The White Paper (DHET, 2014a) mentions that digital technology should be used to enhance access to learning materials and to optimise student engagement and that collaborative development should be employed to develop these high-quality learning materials as OER. "The DHET will support efforts that invest a larger proportion of total expenditure in the design and development of high-quality learning resources, as a strategy for increasing and assuring the quality of provision across the entire post-school system. These resources should be made freely available as open resources. This would be in line with a growing international movement, supported heavily by organisations such as UNESCO and the Commonwealth of Learning, which advocate the development of open education resources. Key motivations for OER are the potential improvements in quality and reductions in cost" (DHET, 2014a, p. 13).

Of specific interest in this country study, is the fact that OER is mentioned in the context of establishing a "network of education providers supported by learning support centre and/or connectivity for students" (p. xv). One of the advantages of such a network of providers will be

> ...the development and availability of well-researched, high-quality national learning resources (made available as open education resources [OER]1), collaborative development of learning resources, more efficient use of existing infrastructure, and an increasing emphasis on independent study as preparation for subsequent lifelong learning (DHET, 2014a, p. xv).

OER is furthermore an integral part of achieving the goal of "attaining meaningful post-schooling [that] must be supported by the development and sharing of well-designed, quality learning resources that build on the expertise and experience of top-quality scholars and educators" (p. 54). The White Paper (DHET, 2014a) states that "The advent of the OER movement with open licensing of content provides a framework for such engagement" (p. 54). As such the DHET will "invest a larger proportion of total expenditure in the design and development of high-quality learning resources, as a strategy for increasing and assuring the quality of provision across the entire post-school system. These resources should be made freely available as open resources" (p. 54; emphasis added).

Of particular importance is the commitment of the DHET to

- Provide support for the production and sharing of learning materials as open education resources at institutions in the post-school sector. In particular, all material developed by SAIVCET will be made available as OER. Other potentially successful initiatives in the area of OER across the post-school education and training sector will be supported.
- Develop an appropriate open licensing framework for use by all education stakeholders, within an overarching policy framework on intellectual property rights and copyright in the post-school sector. In particular, the policy framework will seek to address the dissemination, adaptation and usage of education resources developed using public funds.
- Acquire electronic resources through the South African National Library and Information Consortium (SANLIC) for the entire sector, to ensure equal access to learning material and information resources.
- Encourage the use of open-source software wherever possible, as well as the purchasing of shared software licences by collective entities such as the South African Technology Network and other consortia that may be created (DHET, 2014a, p. 54; emphasis added).

The White Paper (DHET 2014a) also emphasises two specific aspects of OER namely that it should be well-researched and of high quality (DHET, 2014a, p. xv), as well as the use of ICTs for teaching purposes, "including open learning resources" (p. 22).

With regard to the provision of technology and a technology infrastructure to realise its aspiration to "building an expanded, effective and integrated post-school system" (DHET, 2014a), the White Paper mentions the provision of "up-

to-date information technology capacity for conducting … management and academic functions" (p. 19). Central to the White Paper (DHET, 2014a) is the notion of "equitable access to appropriate technology" as "an indispensable infrastructural component for effective education provision, and … central to the notion of opening learning opportunities in the post-schooling sector" (p. 53).

The White Paper (2014a) commits the government to improve ICT access by:

- developing an integrated ICT plan that will provide strategic direction to the DHET for the improvement of equitable access to and use of appropriate technology across the post-school education and training system;
- prioritising collaboration with the Department of Communications and other government departments and stakeholders to facilitate increased bandwidth and reduced costs for educational purposes, with particular emphasis on reaching those in more remote areas;
- engaging with stakeholders to negotiate easier access to and reduced costs for Internet-enabled devices;
- bidding for funds to ensure that a comprehensive, enabling ICT infrastructure is put in place for all providers of post-schooling, particularly providers of distance higher education;
- facilitating the shared establishment and management of ICT-enabled, networked learning support centres in areas where home-based provision is likely to be difficult in the short to medium term (DHET, 2014a, p. 53).

The White Paper (DHET, 2014a) furthermore sets out the vision of a transformed post-school system which is integral to the government's stance on policies that ensure economic and social improvement for all South Africans, in order to redress the legacy of apartheid and overcome the injustices and inequities of colonialism and apartheid. In summary, the White Paper (DHET, 2014a) commits itself to the following:

- "Digital technology, and therefore e-learning, has become more accessible in South Africa" and therefore needs to be incorporated into educational provision (DHET, 2014a, p. 49).
- "Digital technology should be used where appropriate to enhance access, improve communication and generally optimise student engagement" (DHET, 2014a, p. 50).
- The development and availability of well-researched, high-quality national learning resources (made available as open education resources).
- The definition of OER's that is used is the one provided by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) referring to OER as "educational resources that are openly available for use by educators and students, without an accompanying need to pay royalties or licence fees" (UNESCO and Commonwealth of Learning, A Basic Guide to Open Educational Resources (2011: 5).
- Due to improved technology infrastructure, the development and availability of well-researched OER's will enhance the learning opportunities of students.

Policy for the provision of distance education in South African universities in the context of an integrated post-school system (DHET, 2014b)

The Policy for the provision of distance education in South African universities in the context of an integrated post-school system (DHET, 2014b) needs to be read in conjunction with the White Paper on Post School Education and Training (2014a). The Policy (DHET, 2014b) focuses mainly on university education and "is part of a broader focus on building the capacity of the post schooling system" and "Since the current infrastructure within the South African university sector cannot accommodate the needed expansion, distance education would make a significant contribution to the required growth in the sector" (p. 3). In the White Paper (DHET, 2014a) the target university student numbers were set at to increase from 17.3% to 25% of the South African population. In order to allow for the increased number of students, DE Is seen to make a significant contribution to this required growth. In addition, DE is important to address the affordability issues of university education. According to this policy DE is a distinct subset of education provision because it has the potential to:

1. "Open access to post-schooling education opportunities for those who cannot or who chooses not to attend traditional campus-based provision.
2. Lower costs per student by amortising curriculum design, materials development and some teaching costs across larger numbers of students and by obviating the need for continuing investment in physical infrastructure" (2014b, p. 6).

Therefore, this policy has as its central theme the notion of a triple challenge: greater access for students, turning access into success and finally, affordability. One of the key provisions of the policy is to promote the development and use of Open Educational Resources (OER's). One of the issues that is stated as being most important in the provision of DE is the collaborative development of shares high quality learning programs and resources using OER's. This will be done through improved access to and use of appropriate technology and the provision of technological infrastructure.

The Policy (DHET 2014b) notes that "High quality learning resources are integral to high quality distance education and a growing reliance on resource-based learning among universities generally is noted" (p. 14). The Policy (DHET 2014b) also confirms the position that

> … DHET will pursue the adoption or adaptation, in accordance with national needs, of an appropriate Open Licensing Framework, such as the Creative Commons, foruse by all university stakeholders, within an overarching policy framework on intellectual property rights and copyright in university education. In particular, in line with the Unesco Paris Declaration on OER of 2012, learning resources developed partly or wholly using public funds administered by the DHET will be published under an open licence that encourages their use and adaptation for re-use (p. 16).

Two other aspects worth mentioning is the fact that Teaching Development Grants will also be "utilised to encourage collaborative development and use of OERs" (DHET, 2014b, p. 16), and that the Policy (DHET, 2014b) allows for the sharing of OERs with other countries "especially when these are released under an open licence that permits adaptation" (p. 17).

## DHET Call for Comments on the Open Learning Policy Framework for Post-School Education and Training (2017)

This Framework (DHET, 2017) sets out the strategic intent of the DHET in steering the post-school education system towards increasing access, improving quality cost-effectively through the concept of Open Learning. It is important to note that the Framework (DHET, 2017) "The DHET does not view open learning as the only solution for the many challenges in the post-school sector in South Africa" but introducing "open learning practices as one practical way of addressing crucial issues of widening access to affordable, quality learning opportunities: (p. 366).

The Framework (DHET, 2017) defines OER as

> Any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are published under an open licence and are available for use without an accompanying need to pay royalties or licence fees. Openly licensed content can be produced in any medium: text, video, audio, or computer-based multimedia (p. 363).

Its aims are, inter alia, to "provide a framework for building a shared, common post-school education and training (PSET) system, making extensive use of open learning approaches and distance education methodologies" (DHET, 2017, p. 368). The Framework (DHET, 2017) also aim to "identify instruments and mechanisms for steering the PSET system towards increasing access and quality through the incremental adoption of open learning approaches and through appropriate monitoring, evaluation and quality assurance" (p. 368).

Outside of a broad discussion of open learning as it relates to various aspects of curriculum and pedagogy, the first time OER is mentioned is in the context of discussing "cost efficiency". The Framework (DHET, 2017) states that "Operational and ongoing costs may be kept low, both through economies of scale (in cases where enrolment numbers

are substantial and expenditure on additional physical infrastructure is unnecessary or limited) and by making use of open education resources (OER) and open licensing" (p. 374). Interestingly, the Framework (DHET, 2017) states that the "motive of cost efficiency" should be viewed in context and that "Cost-benefit ratios and economies of scale in open learning are complex rather than absolute, and should not be taken for granted" (p. 374). The Framework (DHET, 2017) recognises that "putting in place expensive technological infrastructure, and the need for collaboration in developing the high-quality courses and learning materials which produce not only deeper and more satisfying learning, but also higher success rates, usually result in considerably higher levels of initial expenditure than more traditional approaches" (p.374) but that this expenditure may decrease over time in cases of large-enrolment courses considering the incremental effect of economies of scale.

The Framework (DHET, 2017) acknowledges the proliferation of OER, open education licencing policies and OER repositories "in both school and post-school education and training, often driven by public policy and facilitated by the extensive use of ICT in materials development" (p. 375). As such it commits itself to "building a network of educational institutions supported by learning support centres and appropriate technology, collaborating in the development of learning materials, and committing to the development and use of OER" (p. 378). Interestingly, the Framework (DHET, 2017) discusses "open licencing" separate from, but in the context of its discussions on OER. It states that "Open Licences have been developed to ensure that copying and sharing happen within a structured legal framework that is more flexible than the traditional 'all rights reserved' status of copyright. This allows for more flexible use, re-use and adaptation of materials for local contexts and learning environments, while still allowing authors to have their work acknowledged" (DHET, 2017, p. 396).

The DHET (2017) also commits itself to raising awareness pertaining to a number of key OER issues that include

> …writing up and sharing case studies of good practice to support implementation efforts, assisting stakeholders to understand issues around Intellectual Property Rights (IPR), open licencing, quality in OER, and how IPR are being challenged and reshaped by the rapid digitisation and online sharing of information and resources (p. 397).

Part of the DHET's (2017) commitment include "the development of OER as one of the priorities for recognising staff excellence in PSET institutions" and supporting "the sustainable development and sharing of quality learning and teaching materials" (p. 397).

## Policy on Free and Open Source Software Use for South African Government (2006)

This Policy (South African Government, 2006) states that all new software that is developed by and for the South African government will be based on open standards. This will include learning materials for higher education developed by employees of government institutions (universities and TVETs). All content developed using government resources will be made open content. To this end all staff and student's work that is published in the course of their work or studies should carry a copyright.

## South Africa Connect – South Africa's Broadband Policy (Republic of South Africa, RSA, 2013)

This national broadband policy and its associated strategy aims to provide a roadmap for achieving affordable broadband access to all South Africans. It presents a model for the development of an open access broadband network. The underlying concept is that evidence indicates that an increase in broadband penetration is correlated with an increase in the Gross Domestic Product (GDP). The Policy (RSA, 2013) also states that access to broadband enables flexible, pen learning environments.

The Policy (RSA, 2013) refers to the National Development Plan (2012, in RSA, 2013, p. 5) which foresees an

> … ecosystem of digital networks, services, applications, content and devices, will be firmly integrated into the economic and social fabric of the country. Together, these broadband elements provide an enabling

*platform for economic enterprise, active citizenship and social engagement and innovation. It will connect public administration to the active citizen; promote economic growth, development and competitiveness; drive the creation of decent work; underpin nation-building and strengthen social cohesion; and support local, national and regional integration.*

As such the Policy (RSA, 2013) addresses four key variables that need to be addressed to ensure a link between economic growth and broadband namely:

- broadband must reach a critical mass of South Africans;
- access to broadband must be affordable;
- demand-side skills must be developed so broadband services can be used effectively; and
- supply-side skills must be developed so that the economic and innovative potential of broadband can be exploited (p. 6).

Four aspects are addressed namely "digital readiness" (p. 7), "digital development" (p. 8), "digital future" (p. 8), and "digital opportunity" (p. 9). With regard to "digital readiness", the Policy (RSA, 2013) speaks on the importance of removing bottlenecks, and an "autonomous, accountable and well-resourced regulator" (p. 7).

The overall goal of the Policy (RSA, 2013) is "to achieve a universal average download speed of 100 mbps by 2030" (p. 11). In reflecting on this Policy, Katz (2013) commented that if the broadband targets are achieved through an investment of R65 billion, over R130 billion would be added to the GDP of South Africa. One of the targets of the policy is that 50% of all schools must have broadband at a speed of 5 Mbps and by 2020 this figure should be 100% of schools with broadband at 10 Mbps.

## E-Education Policy 2004 and Operation Phakisa (OPE) 2015

The White Paper on e-Education (RSA, 2004), set some of the core goals for e-education in South Africa and emphasised a shift from traditional 'bricks and mortar' learning institutions to a collaborative, personalise system, embracing the use of digital technologies. The Policy (RSA, 2004) stated that "It is no use having state-of-the-art technology unless it can be sustained" (p. 10), and that deployment of ICTs does not, per se, "guarantee their efficient utilisation" (p. 11). The Policy (RSA, 2004) foregrounds the issue of equity as a key criteria for the deployment and use of technology in South African schools.

The SA Broadband policy (RSA, 2013; discussed above) set targets for 50% of all school to have access to broadband at 5MBps. In 2015, the Department of Basic Education (DBE) realised that this target was not going to be achieved and thus Operation Phakisa in Education (OPE) (2015) was put forward.

OPE was developed to fast track digital technology for the transformation of public education and aims to digitise all schools and the entire South African society. The White Paper on e-Education (RSA, 2004) envisaged that all learners should have become computer literate by 2013. This was not achieved and thus the launch of OPE in 2015 in partnership with the big players in the industry – Google and Microsoft. See Kwet (2019) for a critical overview of not only OPE but the increasing engagement of Silicon Valley in South African education.

## Copy Right Amendment Bill (Republic of South Africa, 2017)

The Copyright Reform Bill is being considered currently in South Africa. This new law (still under consideration) will dramatically redefine the notion of 'fair use' and impact on the promotion and use of OER. Commenting on the draft bill, Gray and Oriakhogba (2019) state that "The new educational right combined with the proposed adoption of a fair use policy will make clear that open education resource producers have a green light to produce the best possible materials". For an overview of the Bill's origins and processes, see Nicholson (2019). There has also been, and continue to be fierce criticism against the Bill, see for example, Mostert (2017).

## Summary

In summary, the South African government has developed and published policy documents on the transformation of the HE sector, ranging from post-school education, distance education and open learning. The main thrust of all the policy documents is to redress the inequalities in education brought about by the apartheid government, and their focus is on providing education for the purpose of employment for its citizens. The policies refer to improved technological infrastructure in order to support online learning and the use of OER's. However, there is currently no policy on OER's – only the Open Learning Policy Framework (RSA, 2017) that promotes the concept of OER's. Many of the policies are forward thinking but will need to rely on the efficient implementation, particularly of technological infrastructure, to support these ideals.

## Which actors are involved?

As can be seen in the above analysis of the South African policy and regulatory environment, there is a clear understanding that the government will not be able to address the various challenges on its own and is open for and will actively seek engagement from civil society and the corporate world. It is however important to heed the warnings of Kwet (2019) and others of the increasing interest and influence of venture capital and commercial entities to offer solutions at a price.

## 2.4 OER Change

## How is change (in terms of funding, managing and promoting the infrastructure) promoted on the national level?

Change in terms of driving an open philosophy in education as foreseen by various policies and frameworks has not yet materialised. The Open Learning Policy Framework for Post-School Education and Training (DHET, 2017), however, stipulates clear guidelines and a vision based on open learning principles. Currently, much of the change happens at individual institution-level, for example at institutions such as UCT and Unisa.

## Who drives change on this level (universities, governments, commercial entities…)?

Once again it is clear from the preceding discussion on the national policy and regulatory framework that the government has put in place a number of guidelines and frameworks to steer change. As stated above, most of the current change, however, happens at individual institutional-level. Also see the comments about the warnings issue by Kwet (2019) regarding the role of venture capital and specifically Silicon Valley. Also see Hoosen and Butcher (2019).

A leitmotif running throughout this country study is, firstly, a recognition of the immense legacy and continued impact and structural inequalities arising from colonialism and apartheid. Whether in referring to digital infrastructure and who has access, who is included and who continues to be excluded without recognising apartheid's legacy, will not understand the potential and desperate need for (O)ER. Another leitmotif is a concerted policy-focus on addressing the legacy of apartheid but also preparing our students for a digitally connected world. As such there is ample recognition of the role of open learning and specifically (O)ER.

Having recognised the support for and various initiatives from government to increase access and to support the development and dissemination of educational resources with open licencing, much of this still need to be realised. There is, however, ample evidence of individual institutions such as UCT, and to a much smaller extent Unisa, who have embraced and foreground (O)ER.

# 3. Meso Level

"Information and communication technologies (ICTs) provide a range of opportunities to share educational materials and processes in ways that are not yet fully understood" (Hodgkinson-Williams & Gray, 2009, p. 101).

## 3.1 Framing institutional responses in the nexus of (digital) infrastructure and (O)ER

In the context of the Global South, disparities in the level of access to physical and digital infrastructures impact immensely on educational innovation (Arinto et al., 2017). "Rural communities generally have poorer physical infrastructure and internet connectivity" (Arinto et al, 2017, p. 7). It is also concerning that "improving access to it through infrastructure, repositories and software tools has not resulted in the predicted increase in use, due largely to the lack of attention to practices supporting OER uptake, use and reuse" (Arinto et al, 2017, p. 10). Together with the availability of OER, awareness, an appropriate technological infrastructure is crucial in ensuring access to OER which, in turn, influences participation in OER and empowerment through OER creation (Figure 2 below)

**Figure 2**

*Levels of social inclusion through OER use, adaptation and creation, with the structural, cultural and agential factors that impact on each type of OER engagement (Arinto, Hodgkinson-Williams & Trotter, 2017, p. 587)*
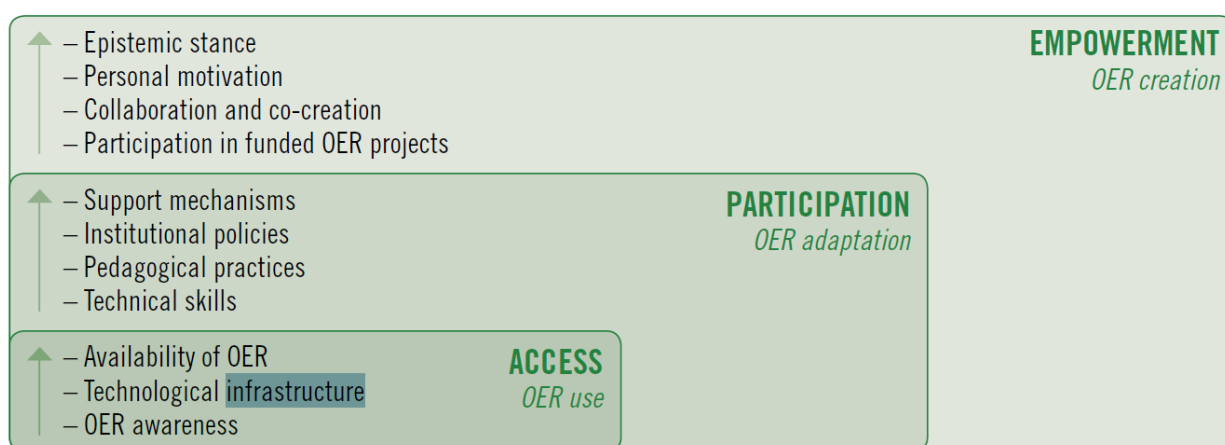


The link between the deployment of OER and digital infrastructure is "one of the most challenging questions that has emerged in the literature concerns how the deployment of OER – as a largely digital innovation – may in fact reinforce global, regional and national economic and social inequalities through a 'digital divide'" (de Oliveira Neto, Pete, Daryono & Cartmill, 2017, p. 71). While there is no doubt that the internet and digital technologies have impacted dramatically on society, as well as the production and dissemination of knowledge, it is crucial to understand that in many respects, the benefits of increased access to the internet is not evenly distributed (PewResearch, 2016; World Bank, 2016). We have to consider evidence that with the growing access to

> ...the internet and to wireless communication, abysmal inequality in broadband access and educational gaps in the ability to operate a digital culture tend to reproduce and amplify the class, race, age, and gender structures of social domination between countries and within countries (Castells, 2009, p. 57; emphasis added)

It is therefore important to note Castells' concern that networks not only include, but also exclude, and "the cost of exclusion from networks increases faster than the benefits of inclusion in the networks" (p. 42). Central and agentic to being included or excluded is the issue of (digital) infrastructure. In their study on" Adoption and impact of OER in the Global South", Hodgkinson-Williams and Arinto (2017), define 'structure' 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 (p. 34).*

In the context of this analysis, it is therefore crucial that we note that though (digital) infrastructure plays an important role in the adoption, production, use and dissemination of OER, it is part of a broader structural context including policies, funding and culture. While it is taken for granted that "Educators and students require access to particular infrastructure to adopt digital OER" we often forget that "A prerequisite for accessing digital OER is some form of power supply. In the Global South, access to uninterrupted electricity cannot be taken for granted" (Hodgkinson-Williams & Arinto, 2017, p. 37).

Amid the variables impacting on OER development, use and adaptation in the Global South, infrastructure, and specifically digital infrastructure plays a crucial role. In the research done by de Oliveira Neto et al, 2017), they identified the following variables in determining the adoption, development and use of OER by instructors in terms of digital infrastructure - location of internet access, devices to access the internet, and internet cost, speed and stability. Regarding the role of 'location of internet access'. They've found that use of OER does "not appear to be highly influenced by the types of locations that respondents use to access the internet" (p. 94). Instructors that are employed by an HEI, access to the internet was not a defining feature of whether they use OER or not" (p. 94). The devices used by the instructors also were not found to have a significant impact on the use of OER. Neither internet cost, speed not stability of internet provision plays a significant role in instructors' adoption of OER. "The reason for this is that they worked or studied in contexts that provided at least the minimum level of ICT access for them to engage with OER. Once that condition was met, infrastructure issues no longer acted as a defining set of variables for OER use" (de Oliveira Neto et al, 2017, p. 111).

It is crucial to emphasise that the above research points to the role of digital infrastructure in instructors' adoption of OER, but not students' access to OER. Hodgkinson-Williams and Arinto (2017) - "adequate internet access was available only to educators" (p. 38). The impact, especially in the context of Unisa (to be discussed later) is that "all teaching materials must be printable and deliverable by post so that every student gets the same educational experience"; should an academic wish to use OER in their teaching, and that "these resources [can] only be offered as 'additional' or 'optional' materials for the online students" (Cox & Trotter, 2017, p.309). Research also shows that access to digital infrastructure may not be a significant variable in higher education institutions, but it is a huge factor in pre-higher education settings, and also in rural environments (Hodgkinson-Williams et al, 2017).

Hoosen and Butcher (2019) found that in the South African context, there is "no national or institutional policy that mandates that educational materials produced with public funds be openly licensed" (p. 22). They found evidence that there are some higher education policies that are supportive of academics and senior students who want to publish their work at OER, but there is not "the same expectation to publish learning and teaching materials as there is to publish research — which is an income-generating activity for the universities and often for the academics themselves" (p. 22). Another factor to consider is the fact that Section 12 of the South African Copyright Act (98 of 1978) already "allows reproduction of copyrightable materials for educational purposes" (in Hoosen & Butcher, 2019, p. 22). This means that academics are already sanctioned to reuse copyrighted materials for teaching purposes and are "not really required to engage with OER" (Hoosen & Butcher, 2019, p. 22). The proposed Amended Bill will furthermore mandate the "open sharing of publicly funded research" (Hoosen & Butcher, 2019, p. 23).

Hoosen and Butcher (2019) found that the "adoption of OER is increasing at universities where either the institution or individual educators are able to attract funding from international donors and government to support OER initiatives" (p. 33). Examples of such are, the University of Cape Town (UCT)(to be discussed later), where OER initiatives are financially supported from funds in the office of the Vice-Chancellor and institutional seed funding for the development of a MOOC. The UCT's Centre for Innovation in Learning and Teaching (CILT — formerly the Centre for Educational Technology) "has been able to attract donor funding each year from 2007 to date in order to pursue an OER and Open Educational Practices (OEP) agenda" (Hoosen & Butcher, 2019, p. 33). The South African Department of Higher Education and Training (DHET) also supports cross-institutional OER development activities (such as the OER Term

Bank) and has "been able to attract funding from the European Union to fund additional OER projects" (Hoosen & Butcher, 2019, p. 33).

## 3.2 Mapping the context

### Re-visiting the national context

Without duplicating the previous analysis (macro-level), it is important to understand the potential and role of institutions in producing, adapting and using (O)ER and the digital infrastructures that would make this (more) viable, by taking note of the following:

- Since the publication of the previous analysis, South African higher education gained one additional public traditional university bringing the total of state-funded, public tertiary institutions to 26 institutions (including six comprehensive universities, and universities of technology and eight universities of technology (updated 5 November 2019)
- The growth of private, for-profit higher education institutions may have a different approach and sentiments pertaining to (O)ER than public, state-funded higher education institutions. Currently there are as many as 119 private higher education institutions, including a number of theological seminaries (Macha, & Kadakia, 2017).
- There is (still) only one dedicated, comprehensive distance education provider in South Africa with close to 350,000 students.

In the light of the fact that there is still "no uniquely South African definition for OER, or (O)ER" (previous analysis), and no national initiative to develop such, institutions are left to their own understanding of the need, the role and infrastructures needed to development institutional approaches to (O)ER. As noted previously
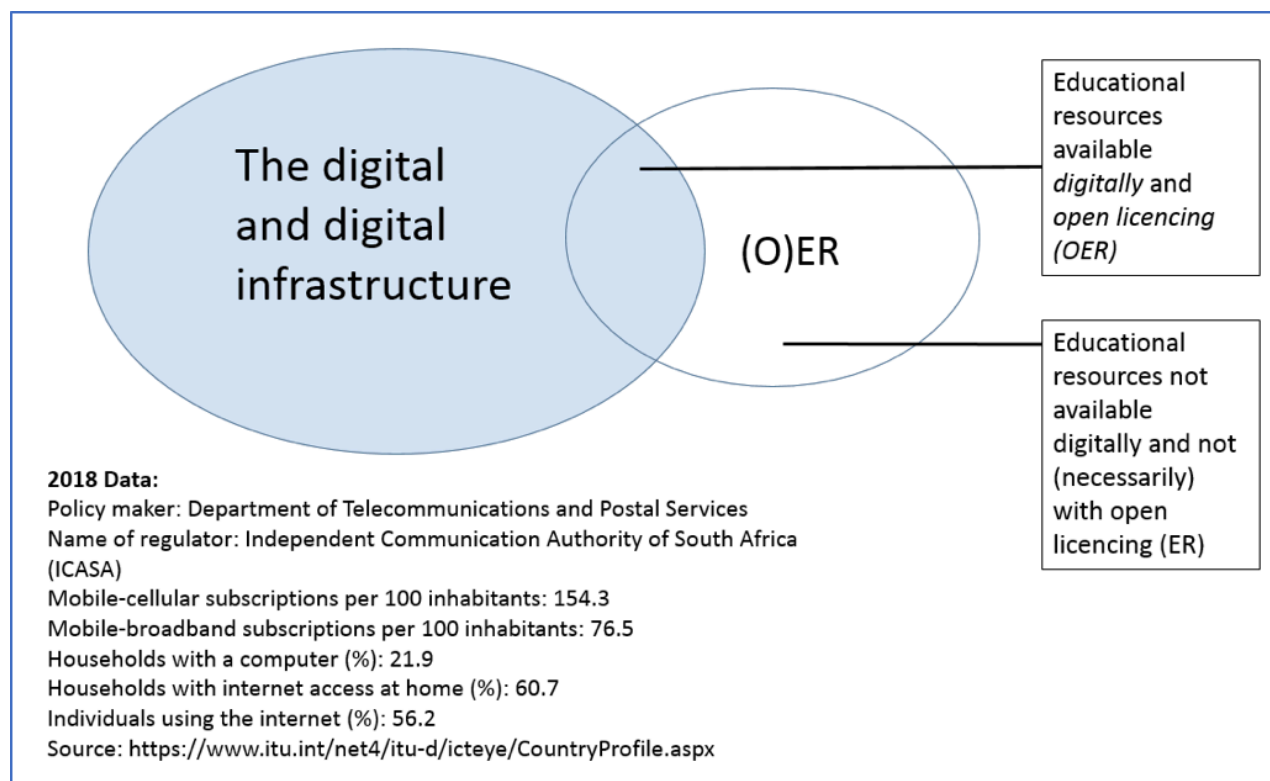
For the sake of understanding some of the idiosyncrasies of (O)ER as it overlaps with and intersects with the digital and digital infrastructures in South Africa, it may be useful to understand that educational resources (ER) in the context of South African higher education are mostly not licenced under an open licencing regime, and there are also examples of ER being licenced with open licencing, but which are not available digitally.

In this particular analysis, the below figure (Figure 2), from the previous analysis, also shape and impact on institutional responses to (O)ER. For example, though institutions can provide Wifi on campuses and in the case of traditional universities, residences, individual institutions rely on national initiatives to provide digital infrastructure (as indicated on the left-hand side of the below figure). Important to remember specifically in the context of the Global South, is the reality that "It is worth noting that, while this discussion has been premised on OER being digitally mediated, it is not the case that all OER are digital" (Hodgkinson-Williams & Arinto, 2017, p. 39). There is ample evidence of how OER are distributed making use of printed copies (see Arinto et al, 2017).

It is therefore important to understand this analysis of institutional responses in the context of the right-hand side of the figure (Figure 3).

**Figure 3**

*Mapping the intersections between digital and digital infrastructure and (O)ER*

The digital and digital infrastructure

(O)ER

Educational resources available *digitally* and *open licencing* (OER)

Educational resources not available digitally and not (necessarily) with open licencing (ER)

2018 Data:
Policy maker: Department of Telecommunications and Postal Services
Name of regulator: Independent Communication Authority of South Africa (ICASA)
Mobile-cellular subscriptions per 100 inhabitants: 154.3
Mobile-broadband subscriptions per 100 inhabitants: 76.5
Households with a computer (%): 21.9
Households with internet access at home (%): 60.7
Individuals using the internet (%): 56.2
Source: https://www.itu.int/net4/itu-d/icteye/CountryProfile.aspx

As institutions also have different pedagogical approaches and various approaches to using technology in education, it is useful to look at the different options provided in the South African Department of Higher Education and Training (DHET) "Policy for the provision of distance education in South African universities in the context of an integrated post-school system" (DHET, 2014b). Though the Policy deals specifically with the provision of distance education, the diagram provided in the Policy (p. 9) on the different modalities of using online technologies provide a useful heuristic for this study on institutional responses. As can be seen in Diagram 1 below, the different possibilities arise from institutions being totally campus-based, to, on the right-hand side of the spectrum, fully remote. In the South African context, the University of South Africa (Unisa) is the only dedicated fully remote institutions offering non-compulsory face-to-face classes comprising of no more than 40% of the total credit time for undergraduates (30% for postgraduates) as allowed by the Policy (DHET, 2014b, p. 9).

As can be seen in Diagram 1 (below), an institution can be fully remote and digitally supported (position 'A') which means that all the learning may comprise of printed study materials while the learning may be supported digitally via non-compulsory online discussion forums and availability of digital learning resources. The second illustrated possibility is where the institution is remote from its learners but fully online (position 'B'), and the third option illustrates campus-based fully online learning. Particularly helpful for our discussion of the nexus of digital infrastructure and (O)ER is the different forms of technology-enabled learning as illustrated by the vertical axis in Diagram 1 - ranging from fully offline, digitally supported, internet supported, internet dependent to fully online.

**Diagram 1**

*Mapping different modes of teaching and learning (adapted from DHET, 2014b, p. 10).*
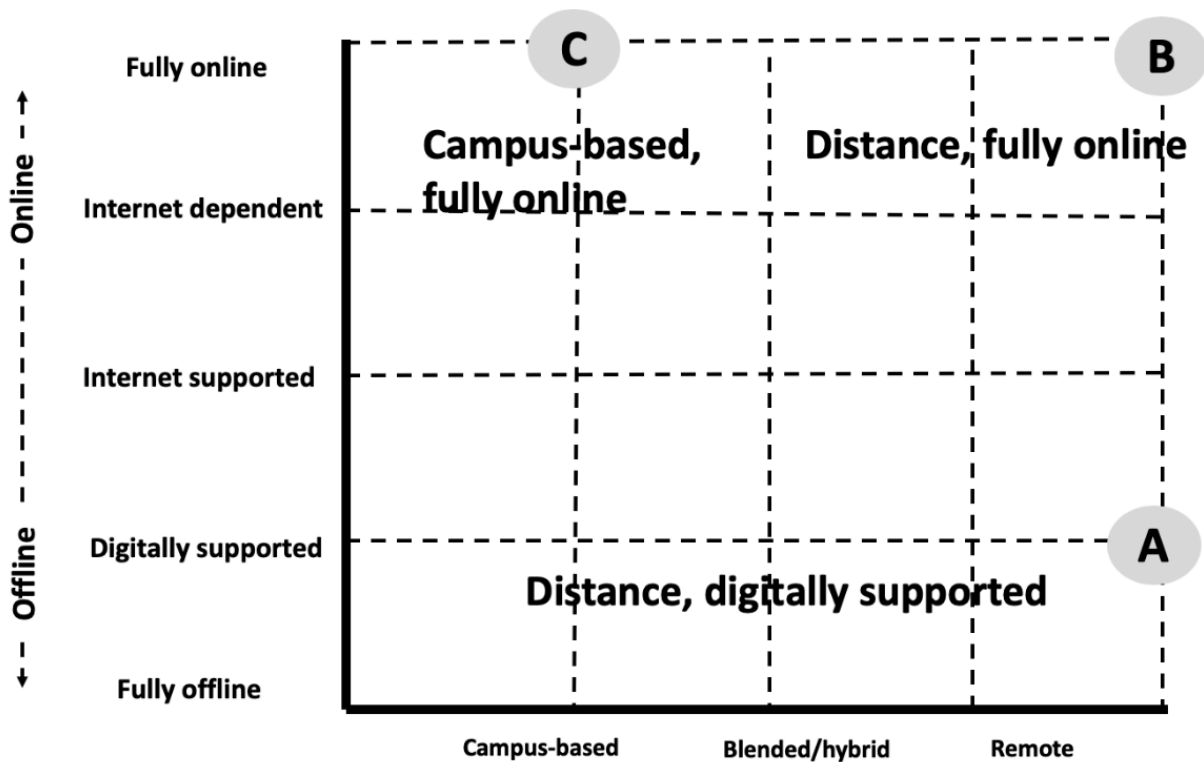
Currently there is no comprehensive database regarding the use of digital platforms for learning in the context of South African higher education. Complicating the matter is the fact that the Policy on Distance Education Provision (DHET, 2014b) does not distinguish between the different modalities (as represented on the left-hand side in Diagram 1), and we therefore have no reliable and comprehensive source to indicate how many students access institutional digital learning platforms to support their learning or whether their learning is dependent on accessing these platforms (e.g. Prinsloo, 2019).

In the next sections we will briefly provide an overview of some aspects of digitality in South Africa, the use of Learning Management System (LMS) and institutional repositories in South African higher education.

## 3.3 A short overview of Digital South Africa

The following overview (Table 1) is based on a report "Digital 2019 South Africa" (2019):

**Table 1**

*Some aspects of digitality in South Africa*

| Aspect | Figures |
|---|---|
| Total population | 57.73 million (urban % 67%) |
| Mobile subscriptions | 98.05 million (170%) |
| Internet users | 31.18 million (54% penetration) |
| Active Social Media Users | 23 million (40%) |
| Mobile Social Media Users | 22 million (38%) |
| Annual digital growth - mobile subscriptions | +9.8% |
| Annual digital growth - internet users | +1.2% |

| Aspect | Figures |
|---|---|
| Annual digital growth - Active Social Media Users | +28% |
| Annual digital growth - Mobile Social Media Users | +38% |
| Average daily time spent using the internet via any device | 8 hours 25 minutes |

The eLearning Africa Report (2019) (p. 165) states that 56.2% of the population has access to the internet, with close to 2% of the populations having fixed broadband subscription. South Africa has 23 million active Facebook users, and 23 million active users on Instagram.

The World Bank (2016) reports that "the effect of technology on global productivity, expansion of opportunity for the poor and the middle class, and the spread of accountable governance has so far been less than expected" and "Digital technologies are changing the world of work, but labour markets have become more polarized and inequality is rising—particularly in the wealthier countries, but increasingly in developing countries" (p. 2; emphasis added). There is also evidence that it is the "better educated, well connected, and more capable have received most of the benefits—circumscribing the gains from the digital revolution" (World Bank, 2016, p. 3). The Report (World Bank, 2016) states that "Access to the internet is critical, but not sufficient" (p. 4). The Pew Research report (2016) on smartphone ownership and internet usage in emerging economies states that 42% of adults own a smartphone. They Report (Pew Research 2016) that in general men have greater access to the internet than women. In South Africa 46% of men have access to the internet compared with 39% of females. Of the total population, 47% access the internet several times a day, 18% once a day and 29% at least once per week. Regarding smartphone use, 37% of the population in South Africa own a smartphone, 52% own a mobile phone that is not a smartphone with only 10% who do not own a mobile phone. It is also clear that access to the internet, and smartphone ownership is directly correlated with higher socio-economic income and status.

## 3.4 Learning Management System (LMS) use in South African public higher education: a brief overview

There is, as far as we could establish, no recent comprehensive overview of LMS use, or the scope and details of fully online teaching in South African public higher education. Most of the research reports, share findings of single institutional, or multi-institutional use (students, lecturers) of the LMS. Research by Bagarukayo & Kalema (2015) found that "there is no common approach to it across South African Higher Education Institutions" and "the level of eLearning usage and adoption varies in different universities due to several challenges such as those of technology and institutions" (p. 168). These authors provide an overview of LMS use in nine South African higher education institutions (Table 2).

**Table 2**

*A summary of LMS use at nine South African higher education institutions (Bagarukayo & Kalema, 2015)*

| Institution | Description and use |
|---|---|
| University of Pretoria (UP) | • WebCT |
| University of South Africa (Unisa) | • Open Source Software (OSS) Sakai |
| University of Cape Town (UCT) | • Initially used WebCT and Moodle |
| University of Western Cape (UWC) | • Home-grown OSS KEWL |
| Nelson Mandela Metropolitan University (NMMU) | • Initially SharePoint 10, replaced by Moodle |

| Institution | Description and use |
| --- | --- |
| University of Johannesburg (UJ) | • A commercial LMS |
| University of Kwazulu Natal (UKZN) | • Moodle |
| Tshwane University of Technology (TUT) | • Blackboard |

Ng'ambi, Brown, Bozalek, Gachago, and Wood (2016) present an analysis of literature regarding 20 years technology-enabled learning in South African higher education. This research entailed "a national survey of all 22 HEIs to uncover possible associations between use of such technologies and transformation of pedagogical practice" (p. 846). They propose to understand the development of technology-enabled learning in four phases. Phase 1 was characterised by using technology "predominantly for drill and practice, computer-aided instruction, with growing consciousness of the digital divide" (p. 843). During the second phase "institutions primarily focused on building ICT infrastructure, democratizing information, policy development and research" and "they sought to compare the effectiveness of teaching with or without technology" (p. 843). During phase 3 "institutions began to include ICTs in their strategic directions, digital divide debates focused on epistemological access, and they also began to conduct research with a pedagogical agenda" (p. 843). In the fourth phase, "mobile learning and social media came to the fore" (p. 843). During this phase the "research agenda shifted from whether students would use technology to how to exploit what students already use to transform teaching and learning practices" (p. 843). The authors conclude that "there is a clear shift in South Africa's HE from relatively low/poor ICT infrastructure where institutions were solely responsible for both infrastructure and education provision to a more cloud-based ICT infrastructure with 'unlimited' educational possibilities, with a higher reliance on low-cost, mobile, flexible, ubiquitous technology solutions often initiated and provided by academics and students" (pp. 852-853).

The research by Ng'ambi et al, (2016) provides a useful meta-framework to understand the evolution of technology-enabled learning in South African public higher education. Considering the range of potential use of technology in South African higher education - ranging from fully offline, digitally supported, internet supported, internet dependent to fully online (Diagram 1), available evidence suggests that most of the teaching in South African higher education can be classified in the spectrum of digitally supported, internet supported, and internet dependent. There is, however, an emergence of fully online teaching such as the various MOOCs offered by UCT (Czerniewicz, Deacon, Walji & Glover, 2017) and the signature courses at Unisa (Baijnath, 2014; Hülsmann & Shabalala, 2016).

## 3.5 Focus of this meso-analysis

In this analysis, we will firstly focus on the role and extent of institutional repositories in (O)ER, before looking in more detail at two selected two institutions as case studies to investigate and map the nexus between (digital) infrastructure and (O)ER. The choice of the two institutions was purposeful. The first institution, the University of Cape Town (UCT) is not only the best research-intensive public higher education institution in South Africa, but also has a unique approach to (O)ER, Intellectual Property, Copyright and (O)ER. UCT is furthermore at the forefront of offering MOOCs, many of these as OER. The Centre for Innovation in Learning and Teaching (CILT) led by Laura Czerniewicz, is prolific in its research into (O)ER, and its professional development. The second institution, the University of South Africa (Unisa), is the largest open distance education provider on the African continent and one of the mega institutions in the world with more than 350, 000 students. As an Open Distance Learning provider, one would expect Unisa to be at the forefront of (O)ER policy and praxis. In each of the two cases, we made use of publicly available information, policies, and personal communication between the researchers and specific individuals in these two institutions.

After the discussion of these two case studies, we will also present and briefly discuss governmental repositories and the role of commercial publishing in the specific context of South Africa. Finally, we will provide an illustrative overview of (O)ER repositories 'outside' of formal higher education but with links to a network of higher education institutions and other stakeholders across the African continent.

## Analysis and findings

### The role of institutional repositories

"South African higher education institutions are the largest producers of research output on the African continent" and as such, South African researchers have a "moral obligation to share their research output" (Raju, Raju & Claassen, 2015, p. 263). Bangani (2018) traces the first Institutional Repository at a South African university to the repository at the University of Pretoria (UP) in 2000 and the "library's open access policy was approved in 2010 with UP becoming the first university in South Africa to have an open access policy" (Bangani, 2018, p. 42). In 2015, most South African public universities had an institutional repository (IR). In the light of the definition of 'open data' as "as data that is free to access, free to use, and free of most restrictions for reuse", Raju et al, (2015) state that "librarians and researchers in South Africa are grappling with the management of open data: there are no policies and strategies nor are there efficient implementation roll-outs" (p. 268). In 2015, by the time these authors published their research findings, they stated "Of the 23 established South African institutions of higher education, 19 institutions have institutional repositories" (p. 269). There are furthermore "four South African higher education libraries that offer a hosting (or acting as publisher) open access journals service" (p. 273).

Van Wyk and du Toit (2016) state that the "digital curation of scholarship is expected to add value to existing knowledge and assist in creating new knowledge" (p. 107) and as such the sustainability of digital collections and services has to be secured. "Sustainability in institutional repositories and digital scholarship curation requires a socio-technical approach, where decision-makers need to realise its value and align technical and financial operations in support of scholarship curation" (p. 108). Their research indicates that there "are 35 institutional repositories in Southern Africa registered on OpenDOAR (Open DOAR 2016)" and that "Public higher education institutions have most of the registered institutional repositories in Southern Africa" (p. 108). These authors raise a concern pertaining to the reasons "why the management of digital scholarship appears to be underdeveloped, in terms of lack of visibility, ranking and open access to research in South Africa" (p. 108). The research found that "all indications are that the institutional repositories may be at peril, as serious sustainability threats surfaced" (p. 113). The research furthermore raises concerns pertaining to "insufficient understanding and support of scholarship curation at governance level", "serious gaps in the understanding of open access and application of open access protocols and standards" and the "lack of awareness and knowledge regarding scholarship curation, and the value that web visibility holds for the entire institution" (p. 114).

## 3.6 Two institutional case studies – the University of Cape Town (UCT) and the University of South Africa (Unisa)

### University of Cape Town (UCT)

Hodgkinson-Williams, Paskevicius, Cox, Donnelly, Czerniewicz, and Lee-Pan (2013) have documented the emergence of OER in the context of UCT. They pinpoint the emergence in 2007 in which a Shuttleworth Foundation funded an 18-month-long research project, called Opening Scholarship. The project aimed "to explore the opportunities that digital media and open dissemination models could offer for enhanced communication and more effective knowledge sharing at UCT" (p. 33). The project mapped the "current status of OER in South Africa and at UCT, as well as of policy, organisational, technological, legal and financial issues that would need to be addressed to maximise the fragmented approach to sharing teaching and learning resources by individual academics at UCT" (Hodgkinson-Williams, 2009, in Hodgkinson-Williams et al, 2013, p. 33). Interestingly, the researchers found that

> ...many resources already being shared on the Internet by academics at UCT. The problem of lack of visibility was due to the absence of metadata — a necessary component that attaches descriptive information to a resource. It could be said that these resources were being 'shared below the radar,' as it was the intent of the creators that they be shared, but the lack of metadata meant materials were not easily discoverable (Hodgkinson-Williams et al, 2013, p. 35; emphasis added)

In the light of the existence of many shared materials, the team decided "... from the outset that the planned [OER] directory should operate as a portal for accessing content rather than hosting content, as initial investigations showed

that most teaching materials at UCT were already online" (Hodgkinson-Williams et al, 2013, p. 36). Significant in the context of UCT is that

> Although the OER team had, in principle, the support of UCT's senior management to undertake the project, there was no formal policy, mandate or set of procedures in place obliging academics to share their teaching and learning materials outside their classroom. There is no regulation forbidding academics to publish a selection of their materials as OER at UCT (Hodgkinson-Williams et al, 2013, p. 39).

By the time OER emerged, many academics at UCT were already sharing educational resources.

In the context of this meso-analysis, the principles that were used to institutionalise OER at UCT is worth noting (Hodgkinson-Williams et al, 2013, p. 41-42):

1. The OER initiative would be resource-based and not course-based (i.e., based on individual learning resources such as e-books, manuals, lectures captured on podcasts or webcasts, lecture notes or presentations), so that materials from the current collection held by academics could be made available after undergoing a moderation process where potential third-party copyright issues are investigated.
2. A 'moderation' process by the OER team would only include checking for copyright compliance and not include an institutional quality assurance process, so the responsibility of the accuracy of the resource was taken by the academic author, following the 'pride-of-authorship' model
3. UCT OpenContent would generally not host resources, but rather act as a directory, referring to where the resources are already hosted (on the institutional learning management system, on departmental websites, on the Cloud, etc.) in order to reduce duplication and to maximise the use of existing infrastructure (emphasis added).
4. The software selection would favour open source software to reduce costs and would need to be integrated with the UCT login system. A single sign-on service would be provided so that there was no additional username and login required for academics to contribute their resources.
5. The software would need to allow individual academics to upload and maintain their resources directly so that the process of making materials available would not need intermediary technical personnel (emphasis added).
6. The management of the OER initiative would be built into the portfolio of the Curriculum Development Officer in CET, as this person already deals with supporting the development of digital resources for teaching and learning.
7. The maintenance of the UCT OpenContent directory would be included in the portfolio of the CET's Learning Technologies team.
8. The OER initiative would be seen as part of a more ambitious OpenUCT project that included making research and community engagement resources available to the general public, and would need to work collaboratively with these "open" initiatives and any other OER initiative …

Interesting, in the context of this analysis, are the directions for further research pointed out in Hodgkinson-Williams et al, (2013) that included, inter alia, the following:

- What are the key constraints that inhibit academics from sharing a selection of their teaching and learning materials as OER on UCT OpenContent or any other platform
- How does an institutional "directory" compare with a repository model?
- How can educational analytics help to map the OER terrain more accurately and immediately and identify direct or indirect return on investment?
- How does OER challenge, extend or improve the status quo of dissemination of scholarly materials at universities?
- How can OER be made more "discoverable" and most appropriately targeted?

Cox and Trotter (2016) define the institutional culture at UCT as collegial despite it having "modestly tight (coherent) policies that are also reasonably well-implemented, but these policies happen to preserve the autonomy of the university's scholars who, themselves, engaged in the policy-development process to ensure this" (p. 151). The collegial culture did, however not flow from policies-as-steering mechanism, but rather that the collegial culture "produced the policies which reinforce and protect it" (p. 151).

In the South African context, the University of Cape Town (UCT) has been at the forefront of OER development. The UCT Centre for Innovation in Learning and Teaching (CILT) has since 2007 attracted both external and institutional funding for OER-type initiatives. Hoosen and Butcher (2019) mentions the following initiatives:

- The first initiative was the Opening Scholarship project (2007-2009) funded by the Shuttleworth Foundation
- the OER UCT project (2009-2010)
- the UCT Vice-chancellor's OER Adaption Project (2012-2014)
- the Canadian International Development Research Centre (IDRC)-funded Research on OER for Development (ROER4D) project (2013-2017).
- The current Digital Online Textbooks for Development (DOT4D) project (2018-2020) is also funded by the IDRC.

In addition to these projects, UCT has also funded the development of twelve Massive Open Online Courses (MOOCs), and several of the materials in these courses are released under Creative Commons (CC) licences.

## UCT Intellectual Property Policy (2011)

"UCT asserts legal and beneficial ownership of Intellectual Property arising from work by Employees and Students except as otherwise agreed in writing by an authorised officer of UCT" (UCT, 2011, p. 13). As such UCT holds the copyright for all syllabi and curricula, UCT produced publications, photographs and digital images taken by employees "for UCT media or publicity or specifically commissioned by UCT" as well as specifically "commissioned works and course materials that fall outside the scope of normal academic work" (p. 14). What is unique about UCT is that, as far as we could establish, it is the only public higher education institution that "automatically assigns to the author(s) the copyright" with regard to "scholarly and literary publications" as well as course materials, "with the provision that UCT retains a perpetual, royalty-free, non- exclusive licence to use, copy and adapt such materials within UCT for the purposes of teaching and or research" (p. 14). Regarding research and teaching related to software development at the university, UCT has adopted an Open Source as the default.

In terms of Creative Commons, UCT "supports the publication of materials under Creative Commons licences to promote the sharing of knowledge and the creation of Open Education Resources. UCT undertakes certain research projects that seek to publish the research output in terms of a Creative Commons licence" (p. 15).

## UCT Metadata and Information Architecture Policy (2012)

The purpose of the policy is to provide guidance on managing "metadata and its application to information assets and services to improve the governance, interoperability, retrievability, re-use, storage optimisation, structure and classification of information assets and services" (p. 2). In terms of this analysis it is important to note that the "Metadata and Information Architecture for all of UCT's scholarly resources are managed on behalf of UCT by Library Service" and "Ownership of and responsibility for metadata as they are applied to information resources, while under the custodianship of Library Services and Information and Communication Technology Services (ICTS), nevertheless resides with the owner of the data or information collection" (p. 4). The Policy also states that "All content objects generated, managed and published by the University of Cape Town and its direct affiliates must be tagged and stored with sufficient metadata" (p. 5). Where applicable "metadata should support re-use and interoperability of content between content management systems and content publication media" (p. 5).

## UCT Open Access Policy (2014)

The Policy (UCT, 2014) origins are to be found in the fact that UCT is a signatory of The Berlin Declaration on Open Access to the Sciences and Humanities. As such the institution is committed to follow and promote "an open access approach with regard to scholarly communication and education. This policy provides the basis for the University to preserve the scholarly work of UCT scholars and to make this scholarship discoverable, visible and freely available online to anyone who seeks it" (p. 1).

The Policy provides guidance to UCT to achieve the following:

- increase discoverability and visibility of scholarly output at UCT
- preserve, present and facilitate access to the institution's research and knowledge production;
- ensure the full participation of the UCT academy in global knowledge communities;
- contribute their academic resources to social and economic development;
- develop research capacity within the institution and region by sharing research knowledge and practices;
- manage the rising costs of library materials and access to scholarly knowledge;
- increase citations to and maximize the visibility of UCT scholarship (p. 1).

Interestingly, the Policy (UCT, 2014) acknowledges that "sharing scholarly content predates the internet and there is strong evidence that there are many and various current activities at the level of the individual academic as well as by research and development groupings" (p. 1). The Policy also states that "activities in the digital scholarship, scholarly communication, and open scholarship and education arenas to date have tended to take place through funded projects, and it is evident that the time has come to move from project status to the coordination, support and embedding of digital scholarship within the institution" (p. 1).

The Policy also mentions the pressures "exerted by the policy environment in the global north which increasingly requires academics to make their work available through open access" (p. 1), resulting in an urgent need to increase the visibility of academic work from the Global South.

The Policy (2014) furthermore describes specific responsibilities for authors and the institution. The responsibilities of authors include:

1. must deposit an appropriate version [peer-reviewed] of Scholarly Publications into an officially designated Institutional Repository or into an acceptable curatorial system which can be harvested by UCT; or
2. if prevented by a publisher's copyright terms or other good reason from doing so, must notify the Institutional Repository in writing that he/she will not be doing so and the reasons for this (p. 3).

The University's responsibilities are as follows:

1. encourages Employees and Students to make all forms of works of scholarship available through the appropriate platforms and service in digital format and of a type that is consistent with policies and practices. This includes (but is not limited to) essays, books, conference papers, reports (where permitted by a funder of the research leading to the report), educational resources, presentations, scholarly multimedia material, audio-visual works and digital representations of pictorial and graphical materials.
2. Recommends that Authors avoid the transfer of copyright to publishers, where the publisher does not permit archiving, re-use or sharing, as a minimum, of a submitted version of a Scholarly Publication. UCT will provide a simple mechanism through which Authors can inform publishers of their need to comply with UCT's policy so it is consistent with the permissions granted by the staff member to the University; and
3. encourages Authors to publish their Scholarly Publications in peer-reviewed open access journals. In this case the Author should supply the metadata to the Institutional Repository in order to maximise institutional and personal discoverability.

The Policy (2014) furthermore acknowledges that the Institutional Repository as central to realising the Policy but also that staff and students may already/also "make their works available through repositories such as arXiv and PubMed Central" (p. 4). The Policy states that authors" may satisfy preservation and access requirements" (p. 4), on the condition that "such a repository makes the work accessible in full-text to the public, without costs or other restrictions (other than customary restrictions) and that it offers to preserve and maintain the work indefinitely" (p. 5).

In their reflection on the policy and the development of OER in the context of UCT, Cox and Trotter (2016) state that the Policy "does not mandate that academics share their teaching and learning materials as OER, but simply encourages them to do so, as is befitting in a collegial cultural environment" (p. 153). The importance of institutional policy, financial, technical and legal support are important as structural elements in the acceptance and production of OER, but Cox and Trotter (2016) state that - "UCT scholars do not view these institutional policies and support mechanisms as

'motivating' factors for OER activity, but simply as hygienic factors creating the conditions necessary to allow them to act on their own personal volition regarding OER" (p. 153). As such institutional culture is more important than policy in motivating academics to engage with OER (Cox & Trotter 2016). "The behaviour and judgment of peers acts as a powerful mechanism in shaping academics' own beliefs and pursuits" (Cox & Trotter 2016, p. 156) and the pressures of publishing in scholarly peer-reviewed journals in the context of the institutional and individual researcher prestige economy, partially explains "the relatively low levels of OER contribution at the university" (Cox & Trotter, 2016, p. 156).

In the research done by Cox and Trotter (2016) they confirm that individual lecturers' agency plays a much more important motivating role than policy - the latter being regarded as "merely a hygienic factor" (p. 158).

The study by Hoosen and Butcher (2019) lists several OER initiatives at UCT, such as:

- UCT's Vice-Chancellor's OER Student Adaptation project provided funds for senior students for each Faculty to work with lecturers to make existing learning and teaching materials available as OER. Funding of ZAR 150,000 was provided by the university (p. 151)
- UCT provided funding and technical support to academics to create MOOCs, some of which were released as OER (p. 151)
- UCT has an institutional repository OpenUCT
- In 2018, an institutional instance of Figshare was launched at UCT, Zivahub which is specifically intended as an open data repository but has the functionality to curate OER and open access materials.
- UCT hosts an OERTerm Bank where equivalents of academic terms can be sought in 11 of the 12 official languages in South Africa. This is a collaboration between the South African Department of Higher Education and Training (DHET), the University of Pretoria (UP) and UCT.

## UCT's Institutional Repository

In contrast to Unisa Open that does not form part of the Unisa Institutional Repository (see discussion below), Open UCT functions as the Institutional Repository and offers a range of sources such as research outputs, OER, theses and dissertations, and other publications. The repository hosts the following communities:

- Open Education Resources
  - Teaching and Learning
  - MOOCs
- Disability Inclusion in Education: Building Systems of Support Brochure (Weeks 1-5)
- Other Publications
  - Book reviews
  - Other / General
  - Policy Briefs
  - Presentations
  - Reports
  - Working Papers
- Research Output
  - Books
  - Chapters in books
  - Conference Publications
  - Journal Articles
  - Other / General
- Theses / Dissertations
  - Masters
  - Other / General
  - PhD / Doctoral

Of particular interest to this study is the dates of resources contributed to this repository:

- 2010 - 2020 (14220)
- 2000 - 2009 (7895)
- 1990 - 1999 (2959)
- 1980 - 1989 (1490)
- 1970 - 1979 (593)
- 1960 - 1969 (215)
- 1950 - 1959 (130)
- 1940 - 1949 (91)
- 1930 - 1939 (23)
- 1926 - 1929 (2)

Interestingly, the repository's statistics (on 10 February 2020) show the following most viewed resources (Figure 4, below):

**Figure 4**

*Statistics of most viewed resources*

## Statistics
### Total Visits

| | Views |
|---|---|
| Quantitative methods for economics(legacy) | 17919 |
| Construction Technology I: part A & B(legacy) | 14474 |
| Studying at University: a guide for first year students(legacy) | 11702 |
| Land degradation in South Africa(legacy) | 11459 |
| Introduction to project planning(legacy) | 11301 |
| Lower limb anatomy wiki(legacy) | 10777 |
| Academics' online presence: a four-step guide to taking control of your visibility(legacy) | 10403 |
| South African economic issues(legacy) | 10319 |
| Curation for participation: an eight-step guide to curating open scholarly content(legacy) | 9785 |
| Tim Noakes 'Order of Mapungubwe' award reception(legacy) | 8998 |

## University of South Africa (Unisa)

The University of South Africa (Unisa) is the only dedicated distance higher education institution in South Africa. It is furthermore a comprehensive university offering vocational as well as academic certificates, diplomas, in addition to undergraduate and postgraduate degrees. Founded in 1873 as the University of the Cape of Good Hope, it became the first public university in the world to offer teaching solely by means of distance education in 1946 (Unisa, 2019). Unisa has the largest student population in South Africa with close to 350 000 students. Unisa accounts for around 40% of all HE students in South Africa.

Being a distance education institution, Unisa students are not centrally located in one geographical area. The students are dispersed around the whole country with a substantial percentage of students living in rural areas. Access to the appropriate physical infrastructure and hardware therefore remains a challenge to these students. In addition, the regular supply of electricity and connectivity relies on national provision of these services. The electricity supply in South Africa is often unpredictable due to "load shedding" which affects all communities. However, the students living in poor, rural areas where there is weak infrastructural support, tend to rely on the correspondence form of teaching as these isolated areas can often only be connected through using the postal system.

Unisa enjoys a relatively high level of internet and computer access on their main campus in Pretoria as well as their six regional offices. Internet access however, varies in different parts of the country – some provinces enjoy high speed, consistent bandwidth, while other provinces e.g. Limpopo and the Eastern Cape which are more rural, have unpredictable and slow connectivity.

Bergquist and Pawlack (2008) define institutional cultural types according to six academic types – collegial, managerial, developmental, advocacy, virtual and tangible. The managerial institutional culture revolves around bureaucracy, hierarchical, efficiency and assessment of work. Chetty and Louw, 2012, define the culture of Unisa as a managerial one. The managerial culture, according to Cox and Trotter (2017), is hierarchical, employs an expansive policy with tight implementation. The university utilises a top-down, hierarchical approach and the agency of the academics is controlled by the tightly-defined policies. In their study, Cox and Truter (2017) suggest that the institutional culture at Unisa is a demotivating factor for the uptake of OER's for the staff in that they would have to deviate from their usual practices. In a managerial culture, this could cause fear as the academics are used to working within a strict framework and are concerned about the repercussions of not operating within a strict policy framework.

## OER Adoption at Unisa

In 2014, Unisa approved its OER strategy, called Unisa Open (de Hart, 2019). This strategy was developed to guide the university in terms of its use of OER's, licensing of teaching and learning materials, as well as the management of its own intellectual property. It was set up as a special project in the office of the Pro-Vice Chancellor and was developed by Kerry de Hart in order to align the university with the imperatives of the South African White Paper for Post-School Education and training in South Africa (2014a).This White Paper states that post-school education will follow the principles of openness and that the Department of Higher Education and Training (DHET) supports the development of high quality OERs which should be made freely available.

The 2014 Unisa strategy document (de Hart, 2019) focused on 5 strategies:

1. Development of an effective management system for intellectual property.
2. Establishment of an open licensing framework.
3. Systematic integration of high quality, available OER as appropriate into courses and their subsequent release for use by others.
4. Contribution to the global OER repository of resources.
5. Evaluation and review of institutional policies to incorporate OER values and processes.

The 1st strategy refers to the collection and curation of all Unisa course material and how to effectively manage the institutional intellectual property. The 2nd strategy refers to the establishment of an open licensing framework and states that Unisa will have to develop a policy on the licensing of material to allow publication under suitable licenses. To this end it was proposed that Unisa creates a copyright office to address all the copyright issues involved in developing OERs. The strategy also makes recommendation that Unisa needs to develop a framework and policy on licensing of their intellectual assets.

The 3rd strategy proposed was the systematic integration of high quality, available OERs into courses and their subsequent release for use by others. The procedure to do this includes: awareness raising and changing pedagogical approaches, providing appropriate technical infrastructure, extensive skills training, amendment of existing policies,

development of guidelines for the use of OER in study material and finally, linking existing institutional systems, policies and strategies.

The 4th strategy revolves around the contribution of Unisa OERs to the global repository of resources, not only through their materials but also in the form of MOOCs.

The final strategy proposed was the evaluation and review of institutional policies to incorporate OER values and processes. This should be done through and evaluation, review and revision of all relevant Unisa policies and procedures.

It must be noted however, that this 2014 document is only a strategy for OER adoption. The intention was to develop it further into a Unisa policy and to date, this process is still underway. Until the strategy is formalised into Unisa policy, it will be difficult to meet many of the targets proposed in the strategy.

The 2014 strategy was further developed as the Open Educational Resources (OER) Strategy: 2017 – 2021 by the Centre for Professional Development (CPD) in 2017 and approved by Unisa senate on 31 May 2017 (Mashile, 2019). This strategy refers to the 2014 strategy but proposes that the implementation was seemingly unrealistic to be incorporated into the daily work at Unisa.

According to Alice Goodwin-Davey from the Centre for Professional Development (Goodwin-Davey, 2017), the 2017 OER strategy supports the following:

- Development of an effective in-house strategy for openness at Unisa
- Systematic integration of high quality available OERs into Unisa courses
- Quality Assured, targeted, open Unisa courses as contributions to the global OER repository of resources
- Contributions to the global OER repository of researchers
- Integrated campuses with other HE institutions

Deadlines were set for each of the above activities and many of these deadlines have already passed.

## Unisa Intellectual Property Policy (2012)

This policy states that Unisa is the owner of all IP created by members of the staff within the normal course and scope of their employment (Unisa, 2012a). In addition, Unisa is also the owner of all IP created by students during their postgraduate studies. The lecturers, who are the actual developers of the teaching materials, do not hold the copyright over these materials and therefore are not able to share them openly. According to Cox and Truter (2017), this means that Unisa possesses the copyright over the lecturer's developed materials and maintains the management of the creation side of OER adoption. The 2014 strategy document (de Hart, 2019) made recommendations that the policy on licensing of Unisa intellectual assets needs to be developed. The current IP policy was approved in 2012, so to date, this recommendation has not been implemented.

The Unisa policy does however make provision for the individual lecturers to petition their relevant tuition committees in order that they may make their own creations available as OER. Cox and Truter (2016: 25) found in their research that "while this appeal mechanism does not appear to be well advertised, it does offer an opening for some lecture-led OER".

## Unisa Policy on prescribing books, readers and journal articles and recommending books and journal articles (2013)

This policy states that when prescribing a book for use in a study course, the availability of appropriate OERs should be considered before taking the decision to prescribe the book. The quality of those OERs first needs to be assessed to ensure that the OER is the best source that is available and if found to be not the best resource, then the OER should be recommended and not prescribed (Unisa, 2013 b).

At postgraduate level, the academic teaching staff are encouraged to make use of e-reserves or OERs as prescribed readers, rather than a textbook.

Following the recommendations made in both the 2014 and 2017 strategies, it can be noted that Unisa policies have not been updated to incorporate the creation and use of OERs. The current Policy on Implementing the Unisa Curriculum (2012) and the Framework for the Implementation of a Team Approach to Curriculum and Learning Development at Unisa (2013) make no reference to OERs and neither do any of the ICT policies (Unisa, 2012a; Unisa 2013 b).

### The Unisa Library Guides

Academic staff at Unisa are however, encouraged to make use of existing OERs in their teaching. This is demonstrated through the Unisa library, which through their Library Guides, offers comprehensive information on OERs and guidelines for the academic staff on how to find suitable material for use in their teaching practices. These library guides provide information and links to webinars from UNESCO, COL and Open Professional Education Network (OPEN). In addition, links to recent publications by Unisa staff on OERs are also provided.

### The Unisa Institutional Repository (http://uir.unisa.ac.za/)

This is an open archive of scholarly intellectual and research outputs generated by Unisa and consists of theses and dissertations, research articles, conference papers and other digital assets. Although, as mentioned earlier, Unisa retains the Intellectual Property of all outputs generated by its staff and students, these are accessible through the Unisa Institutional Repository. At this stage only research outputs are available in the open digital archive and there is little course material that is being shared openly.

### Centre for Professional Development

The CPD department at Unisa has been charged with providing capacity building for staff in OER and offers face to face workshops, roadshows and a free online course for staff who are interested in learning more about OERs (Goodwin-Davey, 2017).

### Unisa Open

An anomaly in the context of Unisa is a site dedicated to OER outside of the institutional repository (discussed above). Possibly resembling the state of limbo of OER adoption and use at Unisa, much of the site's links are no longer active.

The site has a useful overview of "What are OERs" and contain links to various sources. Disappointingly, the two links provided on Unisa Open are both broken. The first link is supposed to link to "OER documents @ Unisa (Unisa OpenCourseware and learning objects)" and the second link is supposed to link to "A collection of all Unisa documents which support OER - Examples of resources (full courses and learning objects) that have been created by Unisa and openly licensed." The site also hosts a list of search engines for OER but many of the hyperlinks have been removed.

A useful OER provided on this repository, is basic conversational skills in several South African languages e.g. Zulu, Tswana and Northern Sotho. In the context of this discussion, it is crucial to note that Unisa Open is hosted separately from the Unisa Institutional Repository.

## 3.7 Government Associated Repositories

In the context of South Africa, higher education institutions have been the main players of the open access movement, through the development of institutional repositories. South African university libraries have taken on this role of managing, creating and populating these institutional repositories. The International African Institute (2020) states that there are 38 digital repositories in South Africa, the vast majority being associated with Higher Education institutions. This number includes separate repositories at some universities for theses and dissertations.

According to the Academy of Science of South Africa (ASSAF, 2020), online, open access ( "Gold route") versions of South African research journals should be funded in significant part through a per-article charge system (linked in the case of higher education institutions to an agreed fraction of output publication subsidies, and in the case of other research-producing institutions to adapted budgeting practice), but publishers should still sell subscriptions to print copies and should maximise other sources of income to lower the article-charge burden.

- A federation of institutional Open Access repositories, adhering to common standards, should be established ("Green route"), with resources made available to help institutions in the preliminary stage, this virtual repository to be augmented by a central repository for those institutions which are unable to run a sustainable repository.
- National harvesting of South African open access repositories should be undertaken as a matter of urgency, preferably by the NRF.
- The importance of affordable bandwidth for research communications for this purpose be drawn to the attention of DST officials negotiating for better rates.

Most South African repositories are university based (International Africa Institute, 2020). Below is a list of those repositories that are not hosted by an individual university but are rather associated with a government funded institute (International Africa Institute, 2020).

## Africa Portal

This is a collaborative project between the Centre for International Governance Innovation (CIGI) and the South African Institute of International Affairs (SAIIA). It is a research repository on African affairs and not just South Africa. It provides a digital platform for sharing informed perspectives on matters relating to development, economics and politics in Africa. All material is available for free.

## SciElo South Africa (Scholarly Publishing Unit – SPP)

The Academy of Science of South Africa's (ASSAF) SciELO (Scientific Electronic Library Online) SA open-access publishing platform is funded by the Department of Science and Technology (DST) and endorsed by Department of Higher Education and Training (DHET). Journals on the SciElo platform are also indexed on the Web of Science (Czerniewicz, 2014).

SciElo SA is the Scientific Electronic Library Online in South Africa and is the main open access searchable full-text journal database serving the South African academic community. The database covers a selected collection of peer-reviewed South African scholarly journals and forms an integral part of the SciELO Brazil project. SciELO SA is managed by the Academy of Science of South Africa (ASSAf), funded by the South African Department of Science and Technology and endorsed by the South African Department of Higher Education and Training (DHET) (www. Scielo.org).

The objective of SciELO is to contribute to the development of scientific research by disseminating and making freely available, using electronic publishing, academic publications in developing countries, including South Africa.

ASSAF's Scholarly Publishing Program maintains quality of publication through an external, independent review system of all South African research journals and is carried out every 5 years. This quality review is undertaken in addition to the one that is carried out and overseen by the Council on Higher Education (CHE) in South Africa. The following aspects of quality control are reviewed:

- Quality of the editorial and review process
- Fitness of purpose
- Positioning in the global cycle of new and older journals listed and indexed in selective, established databases; financial sustainability; and scope and size issues

The methodology used to review the journals comprises of a questionnaire that is sent to all the editors, peer reviews of the journals and a panel discussion on the findings. Recommendations are thereafter sent to each of the publisher and editors of the journal. In addition, the findings are also reported to the South African Departments of Science and Technology (DST) and of Higher Education and Training (DHET), the Council for Higher Education (CHE), the National Research Foundation (NRF), Universities South Africa (USAf) and all research–active institutions.

The Scholarly Publishing Unit takes responsibility for ensuring that Open Access initiatives are promoted to enhance the visibility of all South African research articles and to make them accessible to the entire international research community. For a journal to be included in SciELO, it has to be a South African open access journal with no "embargoes"

and must be willing to adopt a Creative Commons licence. Other criteria that must be adhered to for inclusion in SciELO relate to the editorial process, peer reviews, business related criteria and bibliometric assessments.

Currently there are 8 subject areas available on this database. There are:

- Agriculture (8 titles)
- Applied Social Sciences (17 titles)
- Biological Sciences (17 titles)
- Engineering (9 titles)
- Exact and Earth Sciences (8 titles)
- Health Sciences (17 Titles)
- Human Sciences and (30 titles including the South African Journal of Education)
- Linguistic, literature and arts (9 titles)

## African Journal Archive

The African Journal Archive is a retrospective open access journal service that preserves and makes available African journal literature dating as far back as 1906, originating from a wide base of publishers and societies on the African continent. The Carnegie Corporation of New York initiated and sponsored the Sabinet (South African Bibliographical and Information Network) Gateway project. Sabinet makes it available as a collection via the Sabinet African Journals' platform which has been available online since 2001. The collection includes more than 430 titles and over 350 000 full text articles. However, a subscription fee is charged for access to the collection.

Sabinet offers the following open access models: gold, green and article level open access which means that certain articles in an issue are open access while the remaining ones are subscription based.

## Council for Scientific and Industrial Research (CSIR)

The CSIR has an open access electronic archive called ResearchSpace. Dedicated to archive, collect, preserve and distribute scholarly digital materials created by the CSIR.

## National Research Foundation (NRF)

The National Research Foundation (NRF) was established as an independent government agency in 1998. With the mandate of prompting and supporting research in all fields of science and technology to contribute to the improvement of the quality of life in South Africa. They have a limited number of publications that are free to access.

## Southern Africa Labour and Development Research Unit (SALDRU) (Open SALDRU)

The SALDRU repository contains publications from research conducted within the research unit. The repository is however curated by the University of Cape Town. Other than universities, repositories are available from state owned institutes and foundations.

## African Higher Education Research Online (AHERO)

AHERO is an open access archive of texts from Higher Education in Africa. It is however, maintained by the University of the Western Cape. The collection includes research reports, journal articles, conference papers, book chapters, working papers, booklets, and policy documents. All the resources have been submitted by the authors and are reproduced with their permission. South African authors are starting to publish their articles in this repository. Submissions to AHEORA are reviewed to ensure that the content is relevant. Authors retain copyright for their articles.

# 3.8 Private and commercial publishing houses in South Africa

As can be seen from the information presented above, university repositories are the main source for open access for academic publications in South Africa. In addition, there are a few government-funded repositories as listed above. A

search to establish whether any private or commercial entities manage, and curate repositories yielded very scarce information.

According to Crow (2002), the open access journal publishing model has impacted on and changed the roles for conventional commercial model for journal publication. The Open access journal publishing model has two streams in their business model. The first is "for profit" publishers. Publisher makes content free to the end-user, profit is generated through payment of article processing charges paid for by the author or their academic institution. Costs of publication are therefore paid for up front and not through subscriptions at the end of the supply cycle. The 2nd model is "not for profit" using open source software such as Open Journal Systems (OJS). There are no costs incurred by the authors or the end-user and referred to as the "Diamond Open Access Model (Fuchs & Sandoval, 2013 & Clobridge, 2014).

The following is a list of the most popular and well-known academic publishers in South Africa. A search on their websites indicated that only AOSIS publishers have a repository of their academic publications available as open access. AOSIS makes it content free to the use through open access but charges upfront page fees from the author or their institution in order to make their business profitable. Some of the other publishers have e-resources available but essentially these are only electronic versions of their publications which are for sale to the end user.

Academic publishers in South Africa comprise of the following:

1. Aosis (see discussion below)
2. Juta
3. Oxford University Press
4. Imbali academic publishers
5. Wits University Press
6. Maruma publishing
7. Johnathan Ball publishers
8. Macmillan Education South Africa
9. Protea Books
10. Penguin/Random House
11. Pearson Publishers.
12. Van Schaik

According to the website, Aosis Open Journals (https://aosis.co.za/about-journals/) is an open access publisher meaning that all their content is available without charge to the reader. They follow the 'for profit' funding model discussed above, and profit is generated through charging page fees to the author(s) or their institution (Crow, 2002). A strict peer review policy is in place to ensure ethical and quality standards. Raju, Rauju and Claasen (2015) assert that South African Higher Education libraries through their institutional repositories (IR), provide open access publishing. They suggest that these libraries will start to take on the role of the publishers in the future. From the above information this might indeed be the case as the academic publishers seem to be stuck in their traditional role of publication.
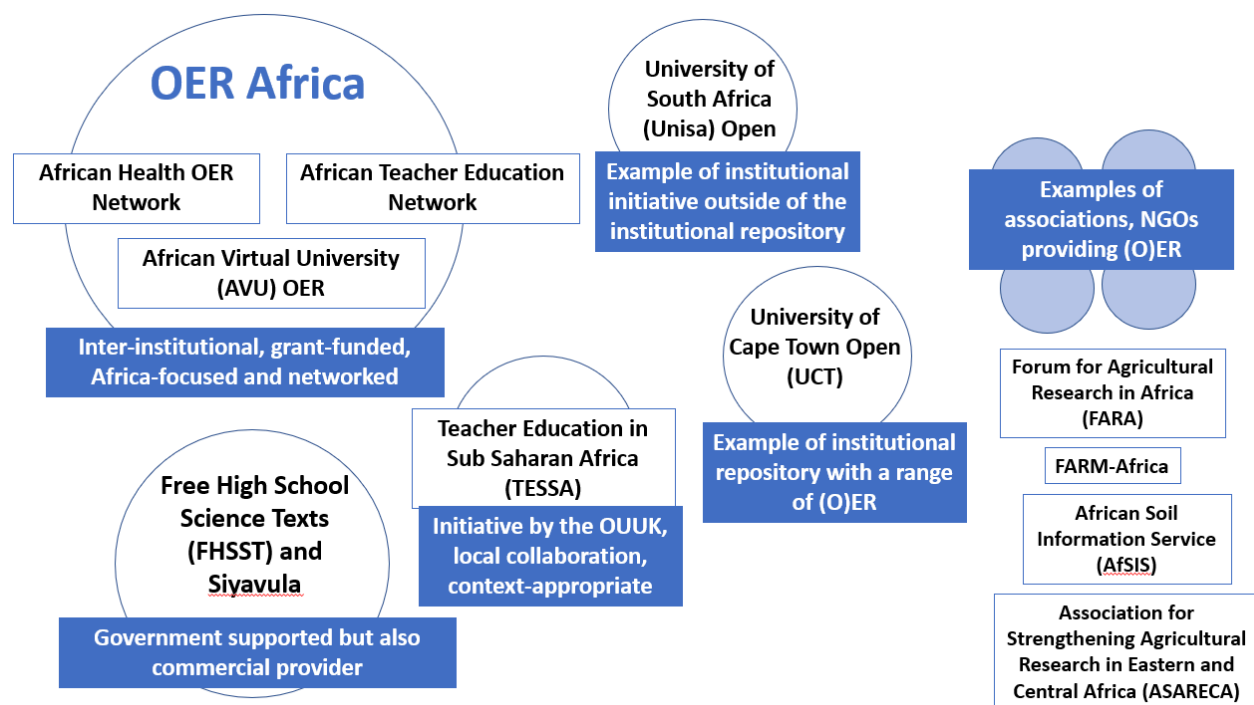
## 3.9 Inter-institutional consortia, association-based and non-governmental repositories

Hoosen and Butcher (2019) in their report on the creation and adoption of OER links the creation, adoption, and impact of OER on the maturity of the (digital) infrastructure in its geo-political context. The following overview attempts to provide a descriptive overview of several regional repositories comprising of inter-institutional, non-higher education and non-governmental repositories. Figure 5 (below) provides and overview of the diversity, nuances, and scope of (O)ER in a selection of players, that will be discussed in the section that follows:

**Figure 5**

*An overview of a selection of inter-institutional consortia, association-based, non- and non-governmental repositories*

**OER Africa**

African Health OER Network

African Teacher Education Network

African Virtual University (AVU) OER

Inter-institutional, grant-funded, Africa-focused and networked

University of South Africa (Unisa) Open

Example of institutional initiative outside of the institutional repository

Examples of associations, NGOs providing (O)ER

University of Cape Town Open (UCT)

Example of institutional repository with a range of (O)ER

Forum for Agricultural Research in Africa (FARA)

FARM-Africa

African Soil Information Service (AfSIS)

Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)

Free High School Science Texts (FHSST) and Siyavula

Teacher Education in Sub Saharan Africa (TESSA)

Initiative by the OUUK, local collaboration, context-appropriate

Government supported but also commercial provider

We start this overview with, in our opinion, the sterling and comprehensive work by OER Africa.

## OER Africa

Established in 2008, OER Africa has the vision to support the emergence of: "Vibrant and sustainable African education systems and institutions that play a critical role in building and sustaining African societies and economies through free and open development and sharing of common intellectual capital". OER Africa benefited with grants from The William & Flora Hewlett Foundation have provided OER Africa with grants with the aim

> …to establish dynamic networks of African OER practitioners by sensitizing and connecting like-minded educators – teachers, academics, trainers, and policy makers – to develop, share, and adapt OER to meet the education needs of African societies. By creating and sustaining networks of collaboration – face-to-face and online – OER Africa supports African educators and learners to harness the power of OER. In turn, they can develop their capacity and join emerging global OER networks as active participants who showcase Africa's intellectual property, rather than passive consumers of knowledge produced elsewhere.

OER Africa states that they:

- Develop and test effective models of continuous professional development for supporting OER practices, and
- Share knowledge gained through a range of mechanisms.
- Develop an evidence-based CPD framework comprising a set of inter-related learning pathways on effective OER practices.

From the information presented, the work done by OER Africa is made possible by grants. The first grant was used for planning and the partner institutions were:

- Kwame Nkrumah University of Science and Technology (KNUST)
- University of Cape Town (UCT)
- University of Ghana (UG)
- University of the Western Cape

The report by Bateman (2008a) "Revisiting the challenges for higher education in Sub-Saharan Africa: The role of the Open Educational Resources Movement" informed the choices OER Africa had as to where we might geographically work most effectively. Bateman (2008) states that "the OER movement offers a substantial opportunity as a catalyst for reform within the HE sector. A central tenant of the movement on which Africa could capitalize is the power that comes from sharing knowledge in all its forms and at all levels" (p. 44). This early grant/planning phase also saw the development of the African Health OER Network (discussed below) in collaboration with the University of Michigan.

The second and the third grant allowed OER Africa to focus

> attention on raising awareness about the benefits of OER, supported collaborative development, adaptation and implementation processes within faculties, courses and programmes, and supported development and elaboration of OER policy frameworks at institutional, national, regional and continental levels.

During this period OER Africa expanded to include:

- African Council for Distance Education (ACDE)
- Agriculture Education Network – this included collaborating with the Agshare planning and pilot project, funded by the Bill and Melinda Gates Foundation. OER sensitisation took place at Makerere in Uganda, USIU and Moi in Kenya and Haramaya in Ethiopia. Agshare II was a collaboration with three institutions, Haramaya and Mekelle Universities in Ethiopia and Makerere University in Uganda to create and openly share different types of OER that strengthen MSc agriculture faculty. RUFORUM came on board as a new partner in this phase
- African OER Teacher Education Network which included working with the Open University (UK) TESSA Initiative.
- Health OER Network – Work here was expanded during this period through a separate grant from the Hewlett Foundation. A consultative forum with partners and representatives from other African countries was held in 2009.

Network spaces were being strengthened with both internally developed resources and external resources, such as:

- Saide Education Studies
- Agshare course materials
- Course design and development guide
- Count materials
- Health Information Building Blocks

OER Africa also conducted research and documented the creation and use of OER in several case studies, including but not limited to:

- Bunda College of Agriculture, University of Malawi
- Kamuzu College of Nursing
- Partnership for Higher Education in Africa (PHEA)
- KNUST (Health OER Project)
- University of Ghana (Health OER Project)
- UCT (Health OER Project)
- Exploring the Business Case for OER.

This period also saw the development of several resources and toolkits such as:

- Policy Review and Development Toolkit (Mays, 2012)
- Copyright and Licencing Toolkit (Saide, 2012).
- A Basic Guide on OER (Butcher, 2011)
- Open Educational Resources and Change in Higher Education: Reflections from Practice (Glennie, Harley, Butcher, & van Wyk, 2012)

Communities of practice were also established during this grant periods and provided space on the OER Africa website to collaborate in the development of course materials and to provide a home for their OERs such as

- Skills for a Changing World included English Literacy & Language Development (Greyling, W., & van Wyk, 2010); Finding Your Way in the World of Work. Activity Guide for Office Administration: Level 2 (Randall, 2006); and Mathematical Literacy University of Free State, 2010)
- Ace Maths (see Sapire & Reed, 2011)
- Health OER
- Household Food Security Facilitators Programme – consisting of 6 different modules written by different combinations of Ferreira, Barlow-Zambodla, and Kruger (2012, 2010).

During the second and third grant periods, OER Africa also published two research reports, namely:

- OER Africa's Potential Domain Areas and Partners (Bateman, 2008b)
- OER Africa: Communities of Practice.

The fourth grant (ended 2017) allowed OER Africa "to embed OER practices within African Higher Education Institutions through improving both content and delivery of higher education by promoting a contextually relevant model for harnessing OER." As such OER Africa worked with the following institutions:

- Africa Nazarene University – ANU (Kenya) on block teaching
- University of Pretoria, Faculty of Veterinary Science on continuing professional development.
- Open University of Tanzania in developing teaching and learning resources.
- University of the Free State on continuing professional development.

The continuing development of specific OER policy and the incorporation of the use of OER in intellectual property regimes of selected institutions were galvanised in this grant. A significant number of conference papers and publications, workshops, etc., were presented. A full list of these are available here.

During August 2017 and February 2019 OER Africa received a fifth grant that allowed them to

> ...determine what kinds of continuing professional development (CPD) are needed by African faculty to be able to implement these improvements successfully and sustainably, as well as to model approaches to CPD that might be scaled successfully without additional cost once they have demonstrated their effectiveness.

The following higher education and training institutions were involved during this period:

- Haramaya University
- Dire Dawa University
- Mekelle University
- Vaal University of Technology (VUT)
- National Open University of Nigeria (NOUN)
- Open University of Tanzania
- Dar es Salaam College of Education (DUCE)
- University of the Free State (UFS)
- South Africa's Technical and Vocational Education and Training (TVET) Colleges

During the current (sixth) grant period, OER Africa "aims to develop collaboratively the professional competences and skills of stakeholders within African higher education institutions so that they can implement OER practices to improve the quality of teaching and learning." An evidence-based CPD framework comprising a set of inter-related learning pathways on effective OER practices will be developed. OER Africa will furthermore "seek to systematically develop African academics' competence while providing immediate access to relevant and useful skills and knowledge that will make their teaching and learning easier to implement and more effective."

# African Health OER Network (URL: https://edtechbooks.org/-NsJE)

The African Health OER Network "seeks to enable participants to develop, adapt, and share health education resources to augment limited human and other resources in the health sector and impact positively on overall health provision in Africa and beyond". Although the repository hosts a wide number of resources, the website features the following:

- Health Promotion I Module Guide (Schaay et al., 2002)
- Growing an Institutional Health OER Initiative: A Case Study of the University of Cape Town (Mawoyo, 2012).
- Haematology - The White Blood Cell Count (Koffuor, 2012)

The full list of resources available on the African Health OER Network is as follows:

- Behavioural Sciences (1)
- Dentistry (8)
- Ethics (49)
- Health Services Administration (4)
- Informatics (40)
- Medicine (41)
- Nursing (2)
- Nutritional Sciences (1)
- Optometry (2)
- Pharmacology (11)
- Public and Community Health (21)
- Reports (12)
- Research Design (11)
- Useful Guides (6)

## African Virtual University (AVU) OER

"African Virtual University offers OER's that are linked to specific courses. There are 73 published modules of ICT Integration in Mathematics, Biology, Physics, Chemistry and Education, ICT Basic Skills and B.Ed. professional courses available in 3 languages, English, French and Portuguese."

The English resources include areas such as:

- Applied Computer Science (Administration Resources; Computer Science Resources; Informatics Resources; Linguistics Resources; and Mathematics Resources)
- Online Journal Publications (Access, equity, and ethics; Open, distance and eLearning systems and institutions)
- Policy Briefs (on a wide range of topics such as, but not limited to ICTs in Open and Distance Learning, Mobile Learning Resources, Massive Open Online Courses, Quality Assurance, etc.)
- Teacher Education (including, but not limited to resources in Biology, Chemistry, ICT Basic Skills, Mathematics, Physics, and ICT Integration in Education)

The French and Portuguese resources include, inter alia, resources in biology, Chemistry, and Physics.

## African Teacher Education Network

The aim of the African Teacher Education OER Network (ATEN) is about "encouraging understanding, use, and sharing of Open Educational Resources (OER) to support teacher education and development in Africa". The Network is "a loosely connected group of teacher educators – with participants from Botswana, Ghana, Kenya, Malawi, Mauritius, Mozambique, Nigeria, South Africa, Swaziland, Tanzania, Togo, Uganda, Zambia, UK and USA."

The Network lists its resources under a broad category named "Teacher Education OER Projects" that include the following:

- ACEMaths
- Advanced Certificate: Education
- Creating a Caring School
- Data Informed Practice Improvement Project (DIPIP) Project
- Saide Teacher Education Series
- University of Fort Hare B Prim Ed

Under a different category called African Teacher Education OER, the following are listed:

- Early Childhood Development (16)
- School Leadership, Management, Administration and Governance (105)
- Subject Teaching (94)
- Assessment (15)
- Curriculum (13)
- Discipline, safety and security (26)
- Human resource management (5)
- ICT integration (8)
- Inclusive education (37)
- Information literacy (10)
- Outcomes based education (6)
- Quality assurance (9)
- Teachers and teaching (105)

## Free High School Science Texts (FHSST) ([Siyavula](#))

In 2002, "The Free High School Science Texts project begins publishing Open Educational Resources (OER) as a group of students get together with the conviction that they need to share their knowledge, for free. With the collective power of volunteer collaboration, the project produces open textbooks for Gr 10-12 Mathematics, Physics and Chemistry, allowing teachers and learners to print or share them digitally." Flowing from these early beginnings, in 2007 "Siyavula is born as a fellowship project within the Shuttleworth Foundation, with the aim of making openly licensed content available for all grades and subjects within South Africa". Siyavula collaborates with the South African government that "prints and distributes millions of the open textbooks to all learners in the country". Siyavula furthermore produces "additional open content in Gr 4-9 and refines the collaborative authoring process, volunteer contribution and unique content production pipelines."

A major development in the lifecycle of Siyavula takes place in 2007 when Siyavula transitions into a technology company with help from the Shuttleworth Foundation (international) and a local financial services group, PSG Group Limited. "Siyavula Education is spun out as a company in pursuit of long-term sustainability and stability" and focuses on "building an integrated learning experience, drawing on the benefits of open content and adaptive practice for mastery in Maths and Science". In 2014, "Siyavula becomes part of the Omidyar Network" and the company "turns its attention to expanding into international markets bringing Siyavula Practice to the world."

A wide range of resources on primary and secondary Maths and Sciences are freely [available and downloadable](#) under two different CC-licencing schemes:

### CC-BY-ND

You are allowed and encouraged to freely copy these versions. You can photocopy, print and distribute them as often as you like. You can download them onto your mobile phone, iPad, PC or flash drive. You can burn them to CD, email them around or upload them to your website. The only restriction is that you cannot adapt or change these versions of the textbooks, their content or covers in any way as they contain the relevant Siyavula brands, the sponsorship logos and are endorsed by the Department of Basic Education. For more information, visit [Creative Commons Attribution-NoDerivs 3.0 Unported](#).

## Teacher Education in Sub Saharan Africa (TESSA)

In 2005, Teacher Education in Sub-Saharan Africa, TESSA, was started by "a team from The Open University, led by Professor Bob Moon, with funding the Allan and Nesta Ferguson Foundation, and later from the William and Flora Hewlett Foundation." The founding strategy included forming a consortium with "14 Higher Education institutions from nine

African countries, and four international organisations." The consortium's founding partners were as follows:

- Egerton University, Kenya
- Kigali Institute of Education, Rwanda
- Kyambogo University, Uganda
- Makerere University, Uganda
- National Teachers' Institute, Nigeria
- The Open University of Sudan
- The Open University of Tanzania
- The Open University, UK
- University of Cape Coast, Ghana
- University of Fort Hare, South Africa
- University of Education, Winneba, Ghana
- University of KwaZulu-Natal
- University of Pretoria, South Africa
- University of South Africa
- University of Zambia

The following international organisations were involved at the time of the founding of the consortium:

- The BBC World Service
- African Virtual University (AVU)
- The Commonwealth of Learning (CoL)
- South African Institute of Distance Education (SAIDE)

TESSA is a network of teachers and teacher educators stretching across Sub-Saharan Africa. At the heart of the network is a bank of open educational resources (OER), linked to the school curriculum, and designed to support teachers and teacher educators in developing active approaches to learning. The network is co-ordinated by The Open University, UK.

The large databank of materials developed, sourced and administered by TESSA "is available to enhance and improve the quality of and access to local school-based education and training for teachers". Tessa is a project of The Open University (UK) and "have been produced in partnership with local African educational experts". The resources are "free to everyone to use and adapt, under a creative commons license". Of particular interest for the discourses surrounding the importance of context in OER, it is important to note that the "TESSA units have been adapted to ten country contexts and are available in four different languages on the TESSA website: Arabic, English, French and Kiswahili. In addition, these materials are also available in generic versions in English and French, so are applicable for you wherever you are in sub-Saharan Africa." The units developed by TESSA focus on several activities that teachers may apply depending on their local needs and contexts. There are also handbooks to help teachers and teacher educators "integrate and make effective use of the resources in their classrooms and in their courses."

Of further importance is the fact that "The Open University we work with partners to facilitate the use of TESSA resources in contextually appropriate ways."

Between 2005 and 2007, "colleagues from these institutions worked together to develop a bank of resources to support student learning and teacher learning. Resources were developed in English and translated into French Kiswahili and Arabic". The modus of operandi entailed that participating colleagues "formed local teams and versioned the resources for use in their own country.' During this period the consortium was joined by La Direction des Formations à Lomé in Togo.

The TESSA website became fully operational in 2010 "with ten different versions of the resources, published as OER. Materials were also made available in print and on CDs, as required." Since 2010 TESSA worked on several individually funded projects namely:

- widening participation (to include Colleges of Education, Government agencies and Civic society organisations);
- embedding TESSA in institutions (including universities, colleges and schools);
- improving access using tablets, mobile phones and a re-developed web-site;
- developing new materials (including TESSA Secondary Science, Teaching Practice Supervisors Toolkit and Inclusive Education Toolkit).

In the period 2016-2019 TESSA obtained funding from the Ferguson Foundation that was used for "strengthening the network, involving new partners, and enabling institutions and Governments to take ownership of the OER and the ideas they contain." The latest update (on the TESSA webpages) regarding TESSA's strategic objectives refer to:

- Improving access to TESSA resources
- Building the capacity of teacher educators through the provision of a MOOC
- Embedding TESSA in teacher education institutions in selected countries
- Ensuring sustainability through the strengthening of the network and the development of new collaborations and partnerships.

## Forum for Agricultural Research in Africa ([FARA](#))

The Forum for Agricultural Research in Africa (FARA), is "the apex continental organization responsible for coordinating and advocating for agricultural research for development (AR4D)" and functions as an umbrella organization bringing together and forming coalitions of major stakeholders in agricultural research and development in Africa. FAR furthermore "serves as the technical arm of the Africa Union Commission on matters concerning agriculture science, technology and innovation". Conceived in the late 1990s, FARA was founded by a "core group of committed champions, including both African scientists and enlightened donor aid officials, who believed in agriculture's potential to lift the continent from poverty, yet realized that this would only be achieved if the continent's weak and fragmented agricultural research systems could somehow be brought together and strengthened under a common banner". Central to FARA's Strategic Plan (2019-2028) is "Providing access to global and regional knowledge and data systems to identify expert solutions and funding opportunities for priority issues such as food security, nutrition, poverty and climate change".

In service of this strategic goal, FARA offers a library with free, downloadable resources including research reports, dissemination notes, books, policy briefs, annual reports, country and technical reports, presentations and journals.

## [FARM-Africa](#)

FARM-Africa was established in 1985 in response to the famine in Ethiopia and currently its 200 staff works in the Democratic Republic of the Congo, Kenya, Tanzania, and Ethiopia. Core to the values of FARM-Africa is a commitment to "Deep expertise and insightful evidence-based solutions are at the heart of everything Farm Africa does." Though not specifically only a repository of resources, [FARM-Africa](#) services included a range of resources but as far as we could establish, none published specifically as OER, or under a CC-licence. What is interesting, and a first in this short overview of open repositories on or for the African continent, is FARM-Africa's commitment to participate in the Open

Data initiative - "At Farm Africa we believe in transparency in our work and this is highlighted by our commitment to the IATI (International Aid Transparency Initiative)." As such their data are published on the [IATI](#) repository

## African Soil Information Service ([AfSIS](#))

The mission of Africa Soil Information Service (AfSIS) (established January 2009)

> ...is to rapidly expand the use of world-class information technology and data science to ensure that Africa's soil and landscape resources are described, understood and used effectively to raise agricultural productivity and lower ecological footprints as a means of increasing the prosperity of Africa's communities and nations.

As such AfSIS works "with a wide range of stakeholders to develop demand-driven spatial data and information products and services and helps to build institutions for improving the management of soils and landscapes". Their research and development include:

- Development of soil and landscape information infrastructure and systems including core databases, protocols, standards, software, IT and data science.
- Creation of agronomic decision support applications that add value and inform decision making at multiple levels, from national and regional policy formation to farm-level land management with project partners.
- Institutionalization, capacity strengthening and learning support for deploying institutional soil and landscape information systems and services.
- Sustainable business development and communications innovation support.

AfSIS provides access to a range of published research under the following categories:

- Agriculture
- Carbon Storage
- Climate Change
- Digital Soil Mapping
- Ecology
- Food Security
- Forestry
- Geostatistics
- Land Degradation
- Land Use
- Remote Sensing
- Soil
- Soil Fertility
- Spectroscopy
- Water

At the time of this research, it was unclear how many of the linked research papers were available for free, and how many of the articles were hosted on other platforms such as ResearchGate or behind publisher paywalls. Of particular interest for this research, is the fact that AfSIS had a Wiki page but the service has since been disabled/discontinued. The following message provides the rationale for its closure:

Approximately 18 months ago, we completed a technical review of the infrastructure and software we used to serve Wikispaces users. As part of the review, it became apparent that the required investment to bring the infrastructure and code in line with modern standards was very substantial. We explored all possible options for keeping Wikispaces running but had to conclude that it was no longer viable to continue to run the service in the long term. So, sadly, we had to close the site - but we have been touched by the messages from users all over the world who began creating wikis with it and now running them on new platforms.

Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) (URL: http://www.asareca.org/)

The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) is a "not-for-profit sub-regional organization of the National Agricultural Research Systems (NARS) of 11-member countries, namely: Burundi, the Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, South Sudan, Sudan, Tanzania and Uganda." As such ASARECA "brings together scientists from the national agricultural research institutions of the member countries, national agricultural extension service providers and other strategic development-oriented partners to generate, share and promote knowledge and innovations to solve common challenges facing agriculture in the member countries" (emphasis added).

The publications include the following:

- 11 Annual Reports
- 10 ASARECA in the Media
- 7 Books
- 5 Briefs
- 21 Brochures and Leaflets
- 20 Climate Change
- 29 Conference/Workshop Materials
- 11 Discussion Papers
- 6 Impact Stories
- 1 Operational Manuals/Guidelines
- 3 Policies and Frameworks
- 89 Policy Newsletter Documents
- 10 Posters
- 12 Programme publications
- 14 Project Documents
- 38 Research Papers
- 13 Strategies
- 9 The Agriforum Newsletter
- 12 Training Manuals

Once again, it is notable that while none of these resources, as far as the researchers could establish, is published as OER, the will fall under the broader definition of (O)ER as used in this research project.

## 3.10 Summary of findings of the meso-analysis

The above overviews and analyses focused on South African institutional repositories as broader context, two specific higher education case studies, government and commercial providers, as well as a selection of inter-institutional consortia, association-based and non-governmental repositories. We have found that:

1. International digital infrastructure and trends in higher education, copyright regulation, and publication regimes/rankings impact on (O)ER – not only the institutionalisation of (O)ER, but also the production, dissemination and use of (O)ER. For example, in the context of UCT, academics were sharing resources in several formats before the advent of (O)ER as phenomenon, but as a research-intensive institution, publishing in high-impact journals and the role of university rankings shape individual researchers' practices.
2. Understanding the geopolitical context is crucial. For example, we cannot ignore the intergenerational legacies of colonialism and apartheid, and evidence of the continued marginalisation of knowledges from the Global South in the historical asymmetries of knowledge production, validation and dissemination in the Global North and the Global South.
3. To comprehend the scope, nuances and various forms of (O)ER in any geopolitical context, it is important to map and understand the role of national policy and the regulatory environment and such as copyright legislation, and funding, but also the role of inter-institutional consortia, external higher education institutions and stakeholders (such as in OER Africa and the TESSA project), government repositories, as well as repositories for specific communities (e.g. health, education and agriculture), often provided by associations and/or non-governmental organisations.
4. Also flowing from the geopolitical context is the provision of (digital) infrastructure. Higher education institutions depend on the provision of (digital) infrastructure e.g. access, cost, bandwidth and sustainability of internet connectivity, but also on basic levels such as the provision of sustainable electricity, water, and security. In this respect, the analysis of inter-institutional consortia and NGOs play an important role in making training and information resources available.
5. The institutional mandate and character of a higher education institution plays an important role as it responds to a range of factors, e.g. research-intensive (e.g. UCT) or open distance learning (e.g. Unisa), with differences in student numbers, course offerings, and use of the LMS and Institutional Repository.
6. (O)ER, in each of the institutions that formed part of this analysis, therefore must be understood as emerging from and entangled in all these different intersecting, and often mutually constitutive (f)actors.

Figure 6 (below) illustrates these different (f)actors as (1) international digital infrastructure and trends in higher education, copyright regulation, and publication regimes/rankings; (2) the geopolitical context; (3) the national policy and regulatory environment & steering mechanisms, e.g. copyright, funding and policy; (4) the national (digital) infrastructure; (5) the role, scope, and strategic and operational priorities of higher education institutions; (6) the LMS and Institutional Repositories; and (7) (O)ER, which may be found in the LMS and Institutional Repositories, in digital formats, but also (8) outside of not only the LMS and Institutional Repository, but also in non-digital formats.

**Figure 6**

*Overview and synthesis of findings*
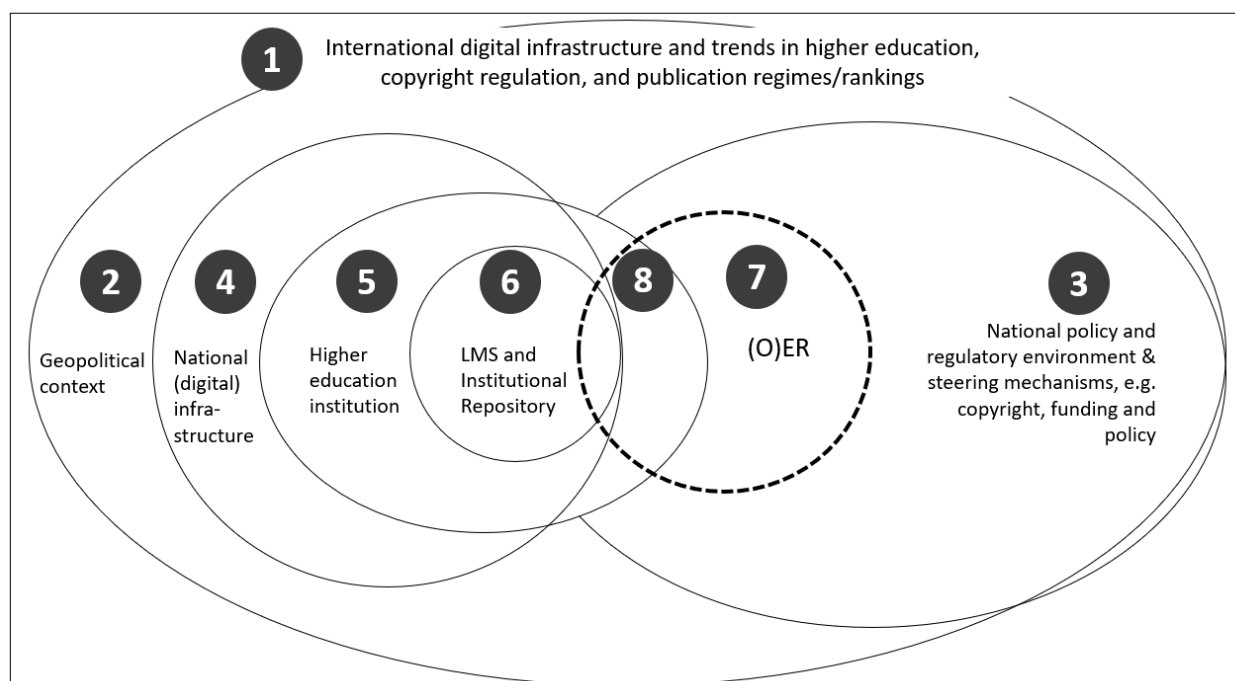
Context is everything. As our analysis has shown, the two institutions' responses to (O)ER must be understood in context – whether referring to international (digital) infrastructure or trends in higher education, copyright regulation, and publication regimes and rankings, the national or the institutional context. We introduced this Part 2 of the broader project with a quotation from Hodgkinson-Williams and Gray, (2009) stating "Information and communication technologies (ICTs) provide a range of opportunities to share educational materials and processes in ways that are not yet fully understood" (p. 101). These authors referred to the fact that these opportunities hide "a reef of complexity" (Hodgkinson-Williams & Gray, 2009, p. 101).

While the purpose of the analysis was on looking at the nexus of digital infrastructure and (O)ER, we conclude with the reminder that the notion of 'structure' or infrastructure denotes far more than physical structures but also illuminate the role of "enduring relations among human actors, the social positions they occupy, and things made by humans", issues "such as power supply, hardware, software, connectivity and information and communication technologies (ICT)", platforms, licensing regimes, as well as "government or institutional policies, strategies, programmes and procedures; and funding from donors, governments and/or institutions" (Hodgkinson-Williams & Arinto (2017, p. 34). And, as these authors remind us, we ignore the impact of the "socioeconomic and geographic context in which students and educators are located" (p. 34).

# 4. Micro level of the digital infrastructures for digital educational resources

## Early evidence pertaining to the impact of COVID-19 on perceptions, (re)use and production of (O)ER

Interestingly, one would have expected more early evidence of how learners, faculty and educational institutions' perceptions, (re)use and production of (O)ER changed as a result of, and during the pandemic. While there are a number of published papers reflecting on responses in the South African educational context, there is very little evidence, so far, of changes to the perceptions, (re)use and production of (O)ER in response to the pandemic.

For example, Lopes and McKay (2020) point to the impact of education and specifically literacy on a population's understanding of the risks, and of making informed choices. The authors point out how the formal education sector "is

primarily focused on preparing people for the labour market, and little or no learning is related to citizenship or individuals' capacity as social actors to take collective action in critical or emergency situations" (Lopes & McKay, 2020, p. 18). The authors, though they mention access to correct and trustworthy information, do not discuss the role and potential of (O)ER. Anciano et al. (2020) report how many, if not most South African learners were stuck at home without resources and without access to resources. They refer to attempts by the government to make education accessible on TV and radio - but these efforts were not enough "to bridge the divide of South Africa's unequal access to resources" (p. 2). Some schools attempted to make printed materials available, but most schools were left without recourse.

Dube (2020) shares evidence of how COVId-19 deepened the digital divide, especially in rural South Africa where educators and learners alike were at a loss how to negotiate, afford and use various technologies, including low-tech solutions. The challenges faced by rural learners included the absence of network coverage, the closure of internet cafes, the lack of computer skills by some educators, and the cost of connectivity. Interestingly, (and disappointedly) the recommendations only refer to the provision of hardware, training and skills with no mention of the huge potential of (O)ER. This may, however, be embedded in the need to solve first issues first, namely access to the internet. In a non-peer reviewed paper, Mhlanga and Moloi (2020) provide an overview of initiatives to reach learners and to capacitate educators during this time, especially on primary and secondary school levels. From the government's side it included making a number of national TV channels available as two recording studios. Other initiatives included zero-rated data applications and educational websites. Looking at the list of strategies and interventions provided by the South African government (South African Government, 2020), the majority of initiatives refer to providing access or making access to the internet available. One specific reference to making materials available is the initiative by the National Reading Coalition (NRC) who has "identified extensive lists of additional resources and organizations that are willing to make their materials available". No further information is provided. While the website of the NRC has a comprehensive list of reading resources, there is very little other information on either the update of these resources, or specific additional interventions in terms of (O)ER in response to the pandemic. From the information provided, the main 'driver' of providing access to (O)ER during this period was and continues to be the Department of Basic Education (DBE). The website of the DBE (DBE, 2020) provides access to a range of materials such as study material, multimedia, reading material, COVID-19 guides, related links, broadcast support, tips for parents, links for schools and links for parents. Of concern is the report by Spaull (2020) that for "the poorest 80% of learners in South Africa, virtually no curricular learning is taking place during lockdown" and that "At most, 5–10% of learners can continue learning at home given their access to computers and the internet. (p. 6).

In the context of higher education the published information mainly refers to access to hardware and the internet - whether through data vouchers or zero-rated access. For example, Vally, Shiohira, Nyoni, Mapatwana, Muchesa & Makhoabenyane, (2020) refer to Friedman (2020) reporting on UCT's strategy for students - "Students, many of whom are from poor socio-economic backgrounds and lack access to the internet and other resources, have been provided with data (30GB), USBs, printed materials, zero-rated (or free to access) educational websites and smart devices to help them access learning resources and lessons (p. 20). In the light of the dearth of published research on the use of (O)ER at Unisa, it is significant that van den Berg (2020) states that the pandemic has revealed the need for open content. She points to the

> current economic climate as well as the unavailability of textbooks [which] reiterated the need for the implementation and development of quality open educational resources (OERs). They do not only have the potential to replace full textbooks, but additionally provide a wide range of resources [...] such as assessment worksheets, shorter texts for courses, videos, lab exercise guides, and more. Different platforms for the use and development of OERs exist, such as OERAfrica and OERu. The call for OERs is not unique to ODL, as national and international media have also made similar requests in the past few months (p. 9).

Though evidence may still emerge on how the pandemic changed and continues to change perceptions, the (re)use and production of (O)ER, the pandemic does signify the importance of openness in education and highlights (O)ER issues

that should be taken into consideration, such as the importance of the buy in from the teachers and lecturers that needs to be underpinned by robust institutional policies, quality control and improved access.

With the above as an introduction, we now turn to positioning individual responses in terms of perceptions, (re)use and production of (O)ER in the South African higher education context.

## Positioning the micro level of the digital infrastructures in the South African context

As we explored the different layers of this analysis of digital infrastructures for digital educational resources in the specific context of South Africa, we referred to how mapping the notion of 'open' in the nexus of (O)ER and digital infrastructure in the Global South "hides a reef of complexity" (Hodgkinson-Williams & Gray, 2009, p. 101). Individuals' production, use and re-use of digital (O)ER are entangled and have to be understood in broader international trends and contestations, for example, the asymmetries in knowledge production between the Global North and the Global South, the marginalisation of ontologies and epistemologies that falls outside the sanctioned canons of the Global North as well as role of publishing, editorial boards, copyright, impact and ranking regimes and dynasties, most of these situated in the Global North.

Research outside the context of South Africa on reasons why individuals (re)use and produce (O)ER include, but are not limited to He & Wei, (2009), Pegler (2012), Reed (2012), Rolf (2012) and in the broader context of the developing world, Hattaka (2009).

This analysis documents individual responses in the specific context of South Africa, in the nexus between (digital) infrastructure and (O)ER. At the start of this chapter, we referred to the below figure (Figure 7) to provide an overview of our understanding of the individual or micro-level in the context of South Africa.
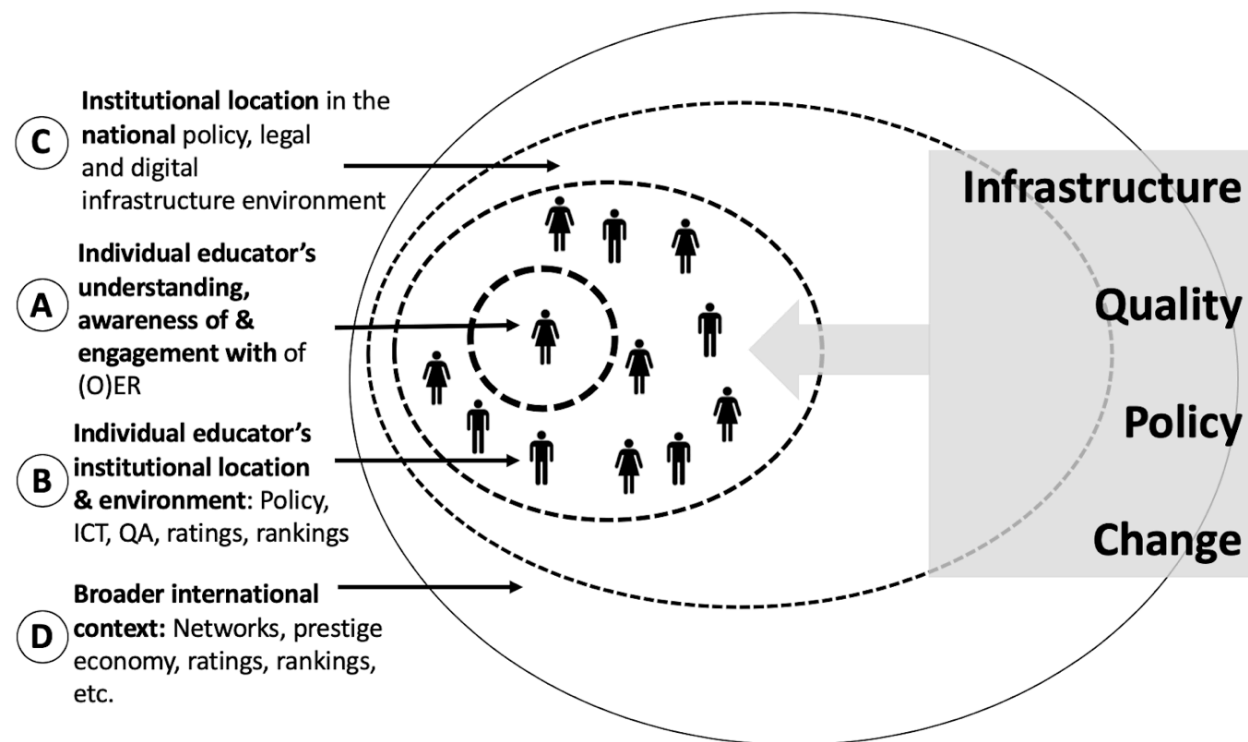
**Figure 7**

*Mapping the micro-level*

Figure 7 illustrates our understanding of individual perceptions, (re)use and production of (O)ER in the context of South Africa. In the middle (A) we have the individual's perceptions, (re)use and production of (O)ER. Evidence suggests that "Personal motivation, especially the desire to enhance one's reputation, underpins some educators' practice of creating and sharing teaching materials as OER", as well as feelings of "personal fulfilment and confidence" and educators seeing their participation in (O)ER as "a way of asserting an epistemic stance, or one's own unique (individual or collective) perspective of knowledge" (Hodgkinson-Williams, Arinto, Cartmill & King, 2017, p. 586). This is vital for people from marginalised communities whose histories and knowledge have been side-lined or suppressed by colonial or hegemonic powers" (Hodgkinson-Williams, Arinto, Cartmill & King, 2017, p. 586). There is also evidence that in the context of South African universities, individuals' understanding, awareness of, and engagement with (O)ER are also shaped, and in many ways determined by their institutional location (e.g. role, department, discipline) and institutional environment (the character, values and mission and vision of the institution) (Point B). For example, the research by Cox and Trotter (2016) points to how "OER-related policy intervention is mediated by an institution's existing policy structure, its prevailing social culture and academics' own agency (the three components of what we're calling 'institutional culture')" (p. 147). In their research, Cox and Trotter refer to the work of Archer (1996; 2003) and specifically Archer's understanding of the relationship between culture/structure and agency, and two guiding concepts namely, 'analytic dualism' and 'concerns' of agents. Analytic dualism refers to the interplay between 'structure' and 'agency' while the 'concerns' of agents refer to "those internal goods that they care most about" (Archer, 2007, p. 42). Individuals' agency are flowing from what they care about but are tempered by social structure.

The institutional environment (Point B) is also constituted by (digital) infrastructure, quality assurance regimes and processes, policy and change. As we will see in the analysis below, the institutional environment also embodies and perpetuates particular understandings of Intellectual Property (IP), scholarly quality and gravitas, or the academic prestige economy (Ball, 2000; Blackmore 2016; Morley 2016). The institution (Point C), while having its own unique characteristics, processes and values, is, however, embedded in a national policy and legislative context (e.g. copyright) and (digital) infrastructure. We also cannot, and should not, ignore or underestimate how the broader international context (Point D) with its networks of inclusion and exclusion, asymmetries in knowledge production, the prestige economy, ratings and rankings impacts on national systems of higher education, individual institutions and individual faculty or staff member in a higher education institution.

Research by de Oliveira Neto, Pete, Daryono and Cartmill, (2017) explored, inter alia, whether countries with higher levels of GDP per capita produced more (O)ER. Their research covered Brazil, Chile, Ghana, Kenya, Colombia, India, Indonesia and Malaysia and they found that "South Africa – the most economically developed country by GDP per capita [...] had the lowest rate of instructor OER use compared to Ghana and Kenya" (p. 83). Interestingly, "it is instructors from countries that are less economically developed who have sought out more OER for use" (p. 84). Their research found that gender, age, digital proficiency, or qualifications of instructors played a significant role in instructor's use of (O)ER. Of significance for this study is their finding that most (63%) South African respondents "say their institutional policies support OER, but only a minority (37%) have used them" (de Oliveira Neto, Pete, Daryono & Cartmill, 2017, p. 101). The majority of South African instructors have not applied any form of open licencing to their work, and/or have retained full copyright to their work (p. 106).

A recent study on South African institutions' (re)use and production of (O)ER, Hoosen and Butcher (2019) state that "There has been modest uptake of OER in South Africa" (p. 147). While Hoosen and Butcher (2019) provide an excellent overview of the higher education institutional landscape, there is very little, if any findings on the micro-level.

The most recent publication is the research by Cox, Masuku and Willmers (2020) on "Open textbooks and social justice: Open educational practices to address economic, cultural and political injustice at the University of Cape Town". The authors found that

> *open textbooks have the potential to disrupt histories of exclusion in South African HE institutions by addressing issues of cost and marginalisation through the creation of affordable, contextually-relevant learning resources. In addition to this, they provide affordances which enable lecturers to change the way they teach, include student voices and create innovative pedagogical strategies (p. 1).*

The research "sought to surface the various barriers academics face in creating

> open textbooks as well as the barriers faced by students in accessing materials" (p. 4). The first finding of
> the research is "Academics at UCT are aware of the challenges related to the cost and utility of traditional
> textbooks and are experimenting with new approaches towards resource creation through open practice"
> (p. 5). The second finding was that "Time is a significant cost to the academic in open textbook
> production" (p. 5). While open textbooks address the issue of cost to students, "there is still a cost
> involved in the production and ongoing delivery of open textbooks, particularly in terms of the time
> required on the part of the academic to author, format and publish these resources" (p. 5). The issue and
> impact of 'cost' is "therefore shifted from the student to lecturers, a situation which is compounded by the
> lack of formal institutional recognition for activity in this area" (p. 5; emphasis added). The third finding
> refers to how "Open textbook authorship models are providing avenues to explore innovative, student-
> centred pedagogical approaches" (p. 6). Another finding was "Open textbook authors are attempting to
> make content more accessible in terms of relevance, format and genre in order to promote greater
> inclusivity" (p. 6). Of particular importance in the context of this chapter is the finding that "Open textbook
> activity appears to be on the rise at UCT despite a range of institutional barriers to open textbook
> development activity" (p. 6). The most important barrier mentioned was "the current 'Ad Hominem'
> academic promotion system" (p. 6) referring to "the fact that the academic reward system at UCT was
> skewed towards the publication of research outputs over textbooks and otherlearning materials, and that
> their resource creation efforts were seen as something over and above what they were supposed to be
> doing" (p. 6). The sixth finding was that "Academics at UCT acknowledge that there is a legacy of
> gatekeeping in the selection of prescribed textbooks which serves to perpetuate political misframing and
> exclusion" (p. 7), and the 7th finding refers to student involvement - "Open textbook authors at UCT are
> including students in content development processes in order to shift power dynamics and build
> confidence in terms of students' ability to contribute" (p. 8).

We will now turn to map evidence and our analysis pertaining to four different aspects namely infrastructure, quality, policy and change before summarising our findings. In the preceding meso-level analysis, we focused on two specific institutions namely the University of Cape Town (UCT) and the University of South Africa (Unisa). These two institutions, while subject to the same international trends and national policy and legislative environment, have very different mandates and institutional cultures. UCT is a research intensive institution and the highest ranked South African higher education institution on the Times Higher Education (THE) university rankings. Unisa, is a comprehensive higher education institution, offering vocational as well as academic qualifications ranging from higher certificate to PhD levels. Unisa is also a dedicated distance education institution and classifies itself as research-active (in contrast to research-intensive) (see Prinsloo and Nthebolang, 2020). Selecting these two institutions and mapping individuals' agency in these two very different institutional contexts allow for interesting, contrasting but also complementary analysis.

## 4.1 Methodological pointers

While we did find new published research, especially with regard to individuals' understanding, use and production of (O)ER, we continue to be at loss to provide a comprehensive overview due to a relative dearth of published research on individuals and institutional perceptions, (re)use and production of (O)ER. Except for the research by Hoosen and Butcher (2019) on institutional responsiveness and policy frameworks pertaining to (O)ER, and the research on open textbooks in the context of UCT by Cox, Masuku and Willmers (2020), most of the research dates from 2017 - Arinto, Hodgkinson- Williams and Trotter, (2017); Cox & Trotter (2017); Czerniewicz, Glover, Deacon & Walji, (2017); de Oliveira Neto, Pete, Daryono and Cartmill (2017); as well as Hodgkinson- Williams, Arinto, Cartmill and King, (2017).

As in analysis of the macro and meso-levels, we approach the micro-analysis by discussing the four different subsections - infrastructure, quality, policy and change - first in general terms in the context of South Africa, before discussing findings to two cases studies namely the University of South Africa (Unisa) and the University of Cape Town (UCT). In the previous macro and meso analyses we provided a rationale for the use of these two institutions as case

studies. With this micro-analysis focusing on individuals' perceptions, (re)use and production of (O)ER, our findings provide evidence that in both cases, individuals' perceptions, (re)use and production of (O)ER are shaped and determined by institutional policies, processes, infrastructure, and support, or the lack of. Interestingly, of the two institutions, one would have expected that in the light of the fact that Unisa is an open, distance learning institution that the institution and individuals in the institution would be at the forefront of celebrating the potential of (O)ER. The analysis and findings below provide interesting insights into the context of individuals' perceptions, (re)use and production of (O)ER in the two case studies. It is also evident while the four shared elements in the chapter - infrastructure, quality, policy and change - are distinct elements in the awareness/perceptions, (re)use and production of (O)ER, there are also considerable overlaps and in many cases, these four elements are mutually constitutive.

## 4.2 OER Infrastructure

Infrastructure refers to, not only the digital infrastructure, but also the processes, the policies and, importantly the institutional culture. The previous analyses provide evidence of the digital infrastructure of South African higher education institutions (including, but not limited to their learning management systems, and digital repositories). While these digital infrastructures impact and shape individual's perceptions, (re)use and production of (O)ER, individuals may also decide to use extra-institutional infrastructures to (re)use and produce (O)ER. While there is anecdotal evidence of individuals using extra-institutional digital infrastructures and platforms (e.g. blog spaces, open data repositories, etc), we could not trace published evidence of such. We now turn to institutional culture as infrastructure.

If we consider institutional culture as infrastructure, the research by Cox and Trotter (2016) points to the impact of institutional culture on individuals' awareness, use and engagement with (O)ER. For example, the UCT has a "collegial institutional culture" (emphasis added) and "modestly tight (coherent) policies" that "preserve the autonomy of the university's scholars who,themselves, engaged in the policy-development process to ensure this" (p. 151). Unisa, according to Cox and Trotter (2016), has a "managerial institutional culture" (emphasis added) and "a hierarchical power structure, but its heavy rules and regulations contribute to a relatively clear institutional mission and vision" (p. 152). Scholars, at Unisa, according to Cox and Trotter (2016) "must comply with these tight policies, but doing so yields productive results because academics see how they contribute to the broader institutional strategy" (p. 152). They point out that a strong policy imperative will be crucial for faculty in the context of Unisa to actively embrace (O)ER.

As pointed out in the previous meso-level analysis, the national policy and legislative frameworks provide a clearly defined structure in which institutions and individual researchers and faculty enact their agency (e.g. Archer, 2003). Cox and Trotter (2016) refer to the Copyright Act of 1978 "which grants certain types of employers copyright over certain outputs of their employees' work-product" (p. 152). Most universities in South Africa "interpret this to mean that the copyright of their academics' teaching materials is vested in the institution, not in the individual creator or creators" (p. 152). Even when institutions confer the copyright of teaching materials to faculty, the institution continues to own, by default, the copyright (Cox & Trotter, 2016).

### University of Cape Town (UCT)

Unlike other South African universities, "UCT academics are allowed to possess

> the copyright of their teaching materials and thus turn them into OER" (Cox & Trotter, 2016, p. 152). This view is supported by both the UCT Intellectual Property Policy and the UCT Open Access Policy (Cox & Trotter, 2016). UCT also supports academics in this endeavour by, inter alia, the OpenUCT Institutional Repository, "provision of OER grants by theCentre for Innovation in Learning and Teaching (CILT)" as well as "the regular OER workshops and training sessions held by CILT and the legal advice scholars can obtain when licensing their materials as OER" (Cox & Trotter, 2016, p. 153).

### University of South Africa (Unisa)

Unisa owns all the Intellectual Property [IP] of work by staff members created "within the normal courses and scope of their employment" (Cox & Trotter, 2016, p. 154) and although staff could petition the relevant tuition committees to make the works available as (O)ER, at the time of the research done by Cox and Trotter (2016) most of the staff

interviewed were not aware of the possibility and/or the processes. Nothing prevents staff from incorporating (O)ER in the courses and offerings on condition that all students have access to the same quality of education. This confirms the research done by de Hart, Chetty and Archer (2015) who found that "although there is knowledge and understanding of OER, this has not been converted into active participation" (p. 18). The research also found that participants in the research had a limited understanding pertaining to IP and open licencing formats and processes. de Hart, Chetty and Archer (2015) also found that "Activities relating to the use of OER (accessing, redistributing and re-using) are far more frequent than activities relating to contributing to OER (revision, remixing, developing)" (p. 32).

## Summative comments: Infrastructure

From the relatively outdated and scarce evidence pertaining to educators' awareness, perceptions, re(use) and production of (O)ER it would seem as if we have to agree with Hoosen and Butcher's (2019) assessment that (O)ER adoption in South Africa and by South African educators has been "modest" (p. 147). The huge difference in (O)ER adoption in the two cases - UCT and Unisa - clearly point to the crucial role institutional culture as infrastructure plays on not only the awareness of educators, but also the institutional support and availability of platforms. It is clear that while both institutions have institutional repositories, awareness and use of the institutional repositories and digital infrastructures at UCT are alive and getting stronger while, as we pointed out in the previous analyses, the current impasse, or seeming lack of political will and leadership at Unisa, has a negative impact on the micro-level of re(use) and production of (O)ER. Intellectual Property (IP) regimes at these two institutions are also vastly different. While there is evidence from UCT of the use of MOOCs in their teaching (Czerniewicz, Glover, Deacon & Walji, 2017), we could not find any evidence of what kind of and the scope of use of (O)ER in teaching at Unisa. While all teaching materials (outside of prescribed textbooks) are available on the institutional LMS, there is no centralised database of what types of (O)ER are included. At not one of the two institutions could we find evidence of functionalities that would be helpful for teachers to edit their own or others' (O)ER and/or for collaborative work.

## 4.3 Quality of OER

According to Hodgkinson-Williams, Arinto, Cartmill and King (2017), quality assurance of (O)ER is an essential part of the Open education cycle where (O)ER are "ideally certified through some type of quality assurance mechanism, either by the OER creator, their peers, an educational body or the hosting organisation" (p. 32). There is evidence that many educators feel overwhelmed by the amount of available online resources and are "anxious for quality guidelines; without these they doubted whether they had sufficient expertise to judge whether a resource was of appropriate quality" (Hodgkinson-Williams, Arinto, Cartmill & King, 2017, p. 42). Interestingly, while many educators emphasise ensuring the quality of (O)ER, there was no evidence of quality assurance and feedback activities as "personal practices" (Hodgkinson-Williams, Arinto, Cartmill & King, 2017, p. 50). There are also concerns by educators about the quality of their own work and to open their work for peer assessment, and evidence that educators would use existing (O)ER to benchmark the quality of their own work. The research also found that "While the formal quality assurance mechanisms are still nascent in individually developed OER, these are more well developed in OER creation that is supported by institutions or NGOs" (p. 57). In the research by Madiba (2018) skepticism about the quality of (O)ER remains a challenge in the adoption, use, production and dissemination of (O)ER. Interestingly, Madiba (2018) refers to lecturers' misunderstanding and feeling frustrated "about how to strike a balance between determining the quality of educational resources on the open platforms and the maintenance standards that their respective departments or faculties demand from them" (p. 73) and fearing use of (O)ER by authors whose reputation is in doubt, or not yet established. Of particular interest is Madiba's (2018) point that the production of high quality (O)ER will need " constant support and encouragement from all quarters to ensure sustainability" and that the use of most (O)ER is based on a needs or just-in-time basis instead of "for more strategic, reflective integration" (p. 90).

With regards to the quality aspect of (O)ER in Africa, Butcher and Baijnath (2020) assert that there does not seem to be any kind of quality control for OERs. They state that the reason for this could be that lecturers prefer textbooks as they will have been through a rigorous review process whereas the (O)ER might not have been subject to this kind of review. (O)ER Africa does however recommend that the quality criteria on evaluating an (O)ER as developed by British Columbia

OER Librarians, be used by lecturers as a checklist. Little evidence exists to suggest that South African lecturers are indeed using this checklist and further research will have to be carried out in order to assess this.

## University of Cape Town (UCT)

While the University of Cape Town (UCT) has an Open Access Policy (2014) referring to UCT's adoption of The Berlin Declaration on Open Access to the Sciences and Humanities (p.1) there is no explicit mention of the notion of 'quality' in this policy. Having said that, as the highest rated higher education institution on THE University Rankings (Boonzaier, 2020) and as a research intensive higher education institution, it can be assumed that UCT is synonymous with quality. The second aspect to consider is that the Intellectual Property Policy of UCT (2011) confers the IP of all outputs to individuals and in the light of UCT's rankings and the impact of the prestige economy, one can only assume that when individuals (re)use and produce (O)ER that quality will be at its core. These assumptions are, however, play out differently in the production of (O)ER, as reported by Cox, Masuku and Willmers (2020) on the barriers impacting on faculty's adoption of and production of (O)ER. They report that "the lack of institutional reward for open textbook development was compounded by a lack of support for the textbook development process, a lack of established quality assurance mechanisms and a lack of funds to buy out academics from their teaching commitments" (p. 6). Another factor impact on the quality of open textbooks "related to the specialist expertise required to review a textbook, particularly in highly technical subject areas where the resource embodies an author's particular vision regarding an innovative or unconventional pedagogical approach" (p. 7).

## University of South Africa (Unisa)

In the research by de Hart, Chetty and Archer (2015) they found that "Respondents were apparently confident about the quality of their [(O)ER] offerings and were not concerned about their work being subject to scrutiny by others" (p. 33). According to these authors, this was a change from previous research done in 2011 "where the attitude of academics to exposing their work to extensive peer review was regarded as a perceived barrier to OER implementation at the institution" (p. 33). The research did not investigate participants' view of the quality of (O)ER.

In 2014, Unisa launched an OER strategy (ICDE, 2014) but since then, the strategy has been withdrawn from the institutional repository and as indicated in the meso-analysis, communication between the researchers and stakeholders at Unisa suggest that the strategy is being revised. Unisa was however, one of the first South African universities to have developed a framework for the implementation of (O)ER. While Mays (2020) refers to the [Unisa Open site](#) and provides an overview of what this repository contains, the subsequent links on OER @ Unisa that, according to anecdotal evidence contained the Framework for the implementation of OER @ Unisa, are no longer functional.

The research by Cox and Trotter (2017) pointed to the scope and impact of the 'managerial culture' at Unisa, and the impact of the policies guiding Intellectual Property Rights on the production of (O)ER at Unisa. There is also the issue of the increasing emphasis on commercialising Unisa's IP (Prinsloo & Nthebolang, 2020), and the fact that despite it being distance education institution and not research intensive but 'research active', individual faculty is not exempt from the impact of the 'prestige economy' on faculty's commitment to produce high quality research. With all of these factors at play, the notion, practice and assurance of (O)ER is, currently, dormant, at Unisa.

## Summative comments: Quality of OER

The issue of quality of (O)ER foregrounds the different discourses, power-relations and ideologies impacting on individual instructors' awareness/perceptions, (re)use and production of quality (O)ER. The quality of (O)ER is not exempt from the 'prestige economy', rankings, and the cost (Cox, Masuku &Willmers, 2020) of producing high quality (O)ER. Both the macro and meso analyses highlight the absence of both a national approach, and institutional approaches to ensuring quality in (O)ER. As the above analysis shows, while there is evidence (in the case of UCT) of individual lecturers being committed to producing high quality (O)ER, there is no uniform understanding of quality in (O)ER, nor frameworks and processes to ensure quality in (O)ER.

## 4.4 OER Policy

In the previous analyses (macro and meso), we detailed the national and higher education institutional policy environments, and the preceding analyses show, individuals' awareness/perceptions, (re)use and production of (O)ER is intimately linked to these policy environments. Chikuni et al. (2019) identified four dominant discourses in OER policy, being access, collaboration, empowerment and transformation. They found that

The extent to which OER can democratise access to education and redress socio-historic inequalities in the provision of educational resources is not guaranteed. Some scholars argue that OER could in some contexts perpetuate inequalities if the same barriers of accessing education in a traditional classroom have not been dealt with. OER policies are written as optimistic accounts on how to publish OER but they do not do a good job in encouraging reuse (p. 165).

In their paper, Chikuni et al (2019) explored the institutional policy environment at four South African universities who have OER policies in place: UCT, University of North West University (NWU), University of the Western Cape (UWC) and University of Witwatersrand (Wits). UWC has had a specific OER policy in place since 2004, whereas Wits does not have a policy but only a strategy which was developed in 2011. UCT has OER embedded into their Open Access policy and at NWU they have statements and declarations on OER. Chikuni et al (2019) concluded that access, collaboration and transformation emerged as dominant themes. With regard to access, significant challenges were found among the learners (and by deduction all users including the lecturers). Some of these challenges have already been mentioned and included, among others, lack of knowledge about OER, lack of institutional support and socio-economic factors such as digital literacy knowledge, access to hardware and bandwidth.

Another important finding from Chikuni et al (2019) was the emphasis that has been placed on the use of OER but not on the reuse and adoption of them. They found that the main constraint among users is once again their unease with the quality of the OER.

With regard to the Policy environment of the two institutions we used as case studies - UCT and Unisa - the different policies have already been documented in the meso-analysis. In the case of UCT we provided evidence of how, on the one hand, the policy environment supports the (re)use and production of (O)ER (Cox & Trotter, 2017), but how the institutional culture, role and maintenance of a 'prestige economy' and endorsement of particular forms and notions of research are barriers to the production of quality (O)ER (Cox, Masuku & Willmers, 2020).

### Summative comments: Policy

While we found ample evidence of how policy-as-infrastructure shapes individuals' (re)use and production of (O)ER, we found no published evidence of how individuals' actions inform policy development for (O)ER. Having said that, it goes without saying that the voices we cited in the macro and meso analyses, as well as this one, are known to have impacted on policy development at their respective institutions. Individuals who come to mind are Laura Czerniewicz and Cheryl Hodgkinson-Williams in the context of UCT, and Elizabeth Archer and Kerry de Hart in the early days of the formulation of a strategy for the implementation of (O)ER at Unisa. Without underestimating the role and influence of individuals in shaping institutional policy and implementation, and taking into account the current impasse regarding (O)ER in the context of Unisa - it takes more than individual agency to change institutional thinking and policy as El Khawas (2000) so clearly illustrates.

## 4.5 OER Change

There is a danger that amid the hype but also the hope of how (O)ER can address intergenerational inequalities and injustice, that we may assume that all educators have embraced (O)ER and all are committed to (re)use and produce (O)ER. Though there has been change, and there are increased levels of awareness and (re)use, an analysis of research articles on the uptake of (O)ER by educators in South Africa paints a different picture and varies from little to modest acceptance (Hoosen & Butcher, 2019). The reasons for the relative low uptake of both the use of, and reuse of (O)ER in South Africa, have been discussed in macro and meso analyses relating to the lack of national and institutional policies

at many South African universities (e.g. Cox & Trotter, 2017; de Hart, Chetty & Archer, 2015; Hodgkinson-Williams & Arinto, 2017).

Though the issue of change runs like a leitmotif throughout the analysis, we briefly recap some of the analyses and link these to the individual or micro-level in the context of this chapter.

Cox and Trotter (2016, 2017) present an (O)ER framework (the OER Adoption Pyramid) based on educators' understanding and adoption of (O)ER at different institutions - namely Unisa, UCT and the University of Fort Hare (UFH). According to them the "success of a proposed OER-related policy intervention is mediated by an institution's existing policy structure, its prevailing social culture and academics' own agency (the three components of what we're calling 'institutional culture)'(Cox & Trotter, 2016, p. 147). The Adoption Pyramid focuses "on the factors that are essential for OER activity in an institutional setting, sequenced according to the level of personal control lecturers have over them (from externally determined to internally determined)" (Cox & Trotter, 2017, p. 287). Their findings indicate that OER adoption "is shaped by a layered sequence of factors – infrastructural access, legal permission, conceptual awareness, technical capacity, material availability, and individual or institutional volition – which are further influenced by prevailing cultural and social variables" (p. 287). Their framework "utilises a layered analytical approach, focusing on the factors that are essential for OER activity in an institutional setting, sequenced according to the level of personal control lecturers have over them (from externally determined to internally determined)" (p. 300). The pyramid (figure 8) is constituted by a number of levels - starting with 'access' at the bottom, followed by 'permission, 'awareness', 'capacity' , 'availability' and 'volition to adopt (O)ER.

**Figure 8**

*OER adoption pyramid (Cox and Trotter, 2016)*
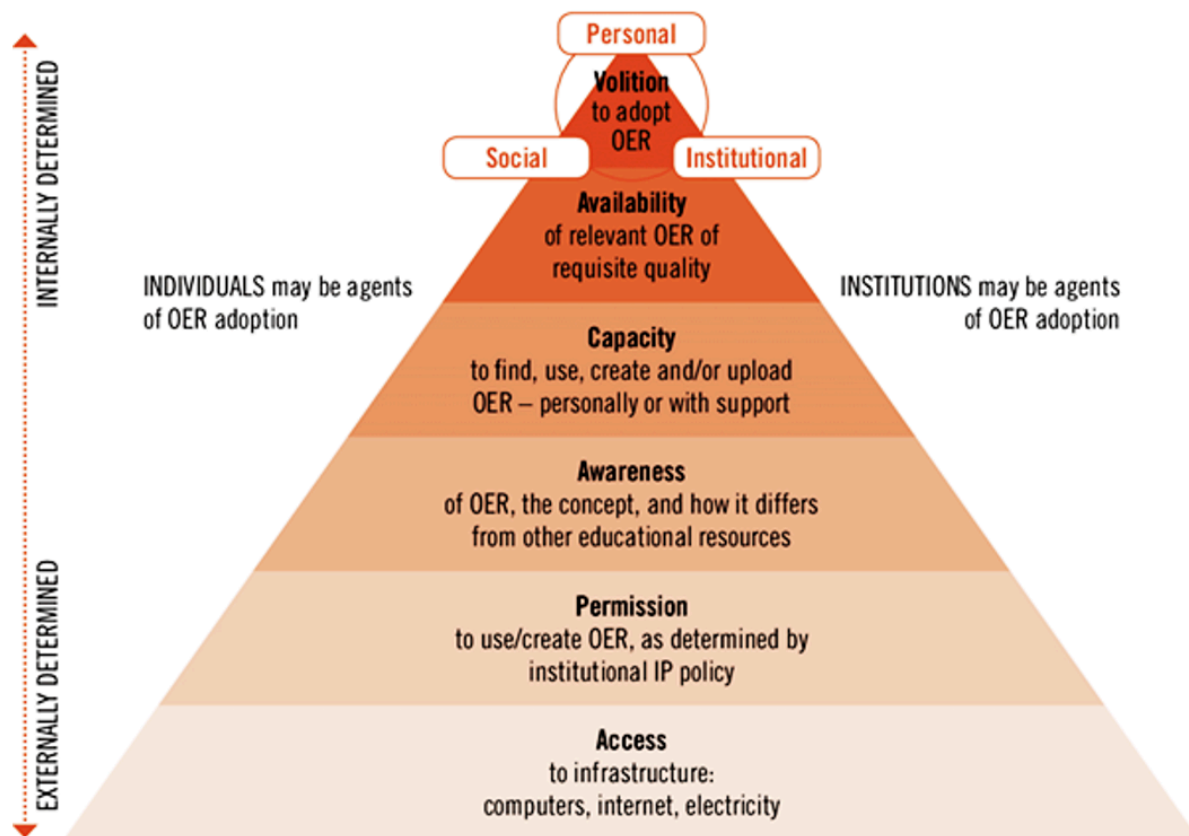


According to Figure 8 above, individual academic staff members may either be agents of (O)ER adoption themselves or alternatively, the institution needs to be the agent of (O)ER adoption. The externally determined variables relate to

factors often outside of the control of the individual but within the control of the institution. The institution, through its infrastructure, provides the hardware and software as well as band width etc that the academic staff members need. In addition, top management determines the (O)ER policy and strategy that their particular institution will adopt and follow. This also includes the institutional policy on copyright and ownership of the (O)ER.

It is at the access level where individual staff members have the least control, particularly where the culture of the institution is a managerial or bureaucratic one. The second level refers to the use and reuse of the individuals' work and is based on who owns the IP for that particular work. Some institutions retain ownership of all work created by their staff members (e.g. Unisa), while other institutions, such as UCT, allow individual creators control of their IP. This has implications for whether the actual creator of the (O)ER has permission to share it or not. Awareness, as third level, can refer to either the individual or the institution's awareness and understanding of (O)ER. It involves an understanding of how OER differs from other copyright-restricted materials.

The fourth level refers to the capacity of the individual staff member to be able to find and create (O)ER – their technical skills and ability to perform the task. Institutional support services pay an important role here. Roberts (2016), in a survey of teaching and research staff at Unisa, found that the respondents' perception of their own ability to be technically sound, was very low and that training in this area was required.

Availability (as fifth level) refers to the actual accessibility of (O)ER that is relevant to the lecturers to use and/or share. A general concern in South Africa, is the lack of availability of context relevant (O)ER. Most works are from the Global North and are particularly Eurocentric. This is at a time when the movement towards the decolonisation of the curriculum is a central trajectory in South Africa. In addition, in South Africa, we have eleven official languages and so large gaps exist is finding language relevant content too. This opens a large opportunity for South Africans to develop and create their own context and language relevant (O)ER or at least to reuse existing ones and change them to suit the local requirements.

The final factor of the pyramid is volition (illustrated in Figure 9), referring to the academic staff members' and their institution's motivation and desire to adopt (O)ER. This suggests that if one enjoys the access, permission, awareness, availability that are necessary for participation in OER, then volition is the main factor that determines whether OER will be used, reused and created

**Figure 9**

*Figure 9: The final factor of the OER adoption pyramid – volition (Cox and Trotter, 2017, p. 303)*
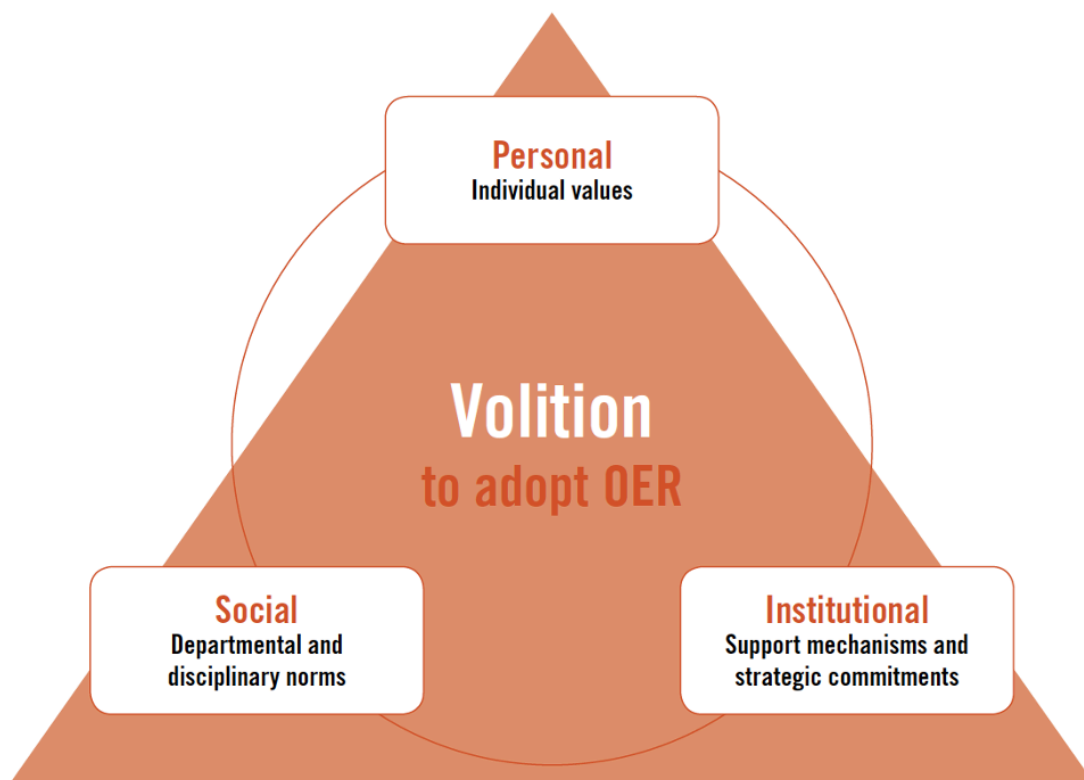
The notion of a lecturer's or institution's volition is, however, complicated because – regardless of who holds copyright over the teaching materials – individual volition is potentially shaped by both social context (departmental and disciplinary norms) and institutional structures (policies, strategies and mechanisms), while institutional volition is often shaped by its lecturers' desires and the social context that pertains across multiple sites at the university (pp. 302-303).

Though individuals are potential (O)ER agents based on their internal volition - their "personal, idiosyncratic, internal beliefs and practices that have bearing on whether or not they might adopt OER" (p. 303), it is the institution, who at the end, "is in fact the unit of agential analysis regarding the 'creation' side of OER adoption" - "the institution would need to decide whether it wanted to openly license and share the teaching materials that it holds copyright over" (p. 303).

To discuss change, and the possibility for change, we will now discuss the findings of Cox and Trotter (2017) of the application of their Adoption Pyramid to UCT and Unisa (See the summary in table 3 below and the discussions following the table)

**Table 3**

*University of Cape Town (UCT) and the University of South Africa (Unisa)*

| | **University of Cape Town (UCT)** | **University of South Africa (Unisa)** |
|---|---|---|
| Access (First layer) | "comparatively good access, with stable, high-speed broadband and Wi-Fi on campus, computers for all staff members, many computer laboratories and terminals for student use, and reasonably stable electricity provision. | "UNISA enjoyed a similar level of access to UCT, but with slightly less predictability in its electricity supply. This good level of access, however, pertained only to academics, as many students did not have reliable access because they live in poor, rural areas with weak |

|  | University of Cape Town (UCT) | University of South Africa (Unisa) |
|---|---|---|
|  | Its electricity supply was, however, not Uninterrupted…" (p. 306) | infrastructural support, or in urban townships far from the UNISA satellite centres" (p. 306) |
| Permission | "UCT lecturers possess copyright on their teaching and learning materials, allowing them to transform any of their teaching resources into OER" (p. 307) | Unisa retains the copyright of everything produced by staff, but at the time of this research (2017) there was a view that lecturers could apply to have the materials shared under a different copyright regime |
| Awareness | Due to the policy environment and collegial culture at UCT, lecturers "the onus of OER action on individual lecturers" (p. 310). | "the fact that the institution holds copyright over teaching materials developed by staff means" that even if staff wanted to share materials openly, they could not (p. 312) |
| Capacity | "technical capacity was relatively high, sometimes at a personal level, depending on a lecturer's prior level of engagement with OER, but quite certainly at an institutional level where OER experts were available for consultation and support" (p. 313) | While most staff were "relatively fluent technically because so much of their work was mediated by computers and the internet" |
| Availability | Lecturers were generally aware of databases but had anxiety about sharing their own resources. | Respondents were positive about the availability of resources but could not make their own products available due to institutional policy on IP |
| Volition | The collegial and supported environment at UCT meant that the choice to participate in (O)ER dependent on the individual | Most lecturers were positively inclined to support (O)ER the "most meaningful action regarding OER is located within the managerial strata at UNISA, where policy and other structural elements are controlled" (p. 326). |

The differences between UCT and Unisa with regard to the possibility and scope of change is well-illustrated through the research by Cox, Masuku and Willmers (2020) in the context of UCT on Open Textbooks (as discussed earlier) and the research by de Hart, Chetty and Archer (2015). Taking into consideration that the research by Cox et al. (2020) was discussed earlier in this chapter, we will just highlight their findings: (a)"Academics at UCT are aware of the challenges related to the cost and utility of traditional textbooks and are experimenting with new approaches towards resource creation through open practice" (p. 5); (b) "Time is a significant cost to the academic in open textbook production" (p. 5). While open textbooks addresses the issue of cost to students, "there is still a cost involved in the production and ongoing delivery of open textbooks, particularly in terms of the time required on the part of the academic to author, format and publish these resources" (p. 5); (c) "Open textbook authorship models are providing avenues to explore innovative, student-centred pedagogical approaches"; (d) "Open textbook authors are attempting to make content more accessible in terms of relevance, format and genre in order to promote greater inclusivity" (p. 6); (e) "Open textbook activity appears to be on the rise at UCT despite a range of institutional barriers to open textbook development activity" (p. 6); (f) "Academics at UCT acknowledge that there is a legacy of gatekeeping in the selection of prescribed textbooks which serves to perpetuate political misframing and exclusion" (p. 7); and (g) "Open textbook authors at UCT are including students in content development processes in order to shift power dynamics and build confidence in terms of students' ability to contribute" (p. 8).

During 2015, de Hart, Chetty and Archer (2015) undertook an investigation to gauge the uptake of OER by Unisa staff. The results of their survey indicated that staff were aware of OER and understood them, but they were reluctant to actively engage in the process. Although this research was carried out with staff at Unisa, the authors suggest that the results might be generalisable to other contexts as well. De Hart et al. (2015) found that participation in accessing OERS was relatively high (74.1%), however, only 31.0% of the respondents indicated that they had developed their own OER. A further interesting finding was that the respondents indicated generally that they were prepared to share their

own work only if they could make money from this. This shows that many of them did not understand or comprehend the ethos of OER. The concern was not that they were not confident about the quality of their work but that other people could make money from it.

Figure 10 (below) shows the perceived barriers of Unisa staff to engagement with OER. The biggest barrier was a lack of an adequate ICT infrastructure, followed closely by difficulty in finding suitable OER for the South African context. Other concerns expressed by the respondents include lack of quality OERs, concern about the copyright and legal considerations, and insufficient support and policies to support them. The respondents did, however, suggest that lack of interest in creating and using OERs was not a factor but that they needed to learn the necessary skills to create OERs. In addition, they were concerned about the additional time constraints that would arise as many academic staff are already overworked.

**Figure 10**

*Perceived barriers of Unisa staff engagement with OER (de Hart, Chetty and Archer, 2015, p. 34).*
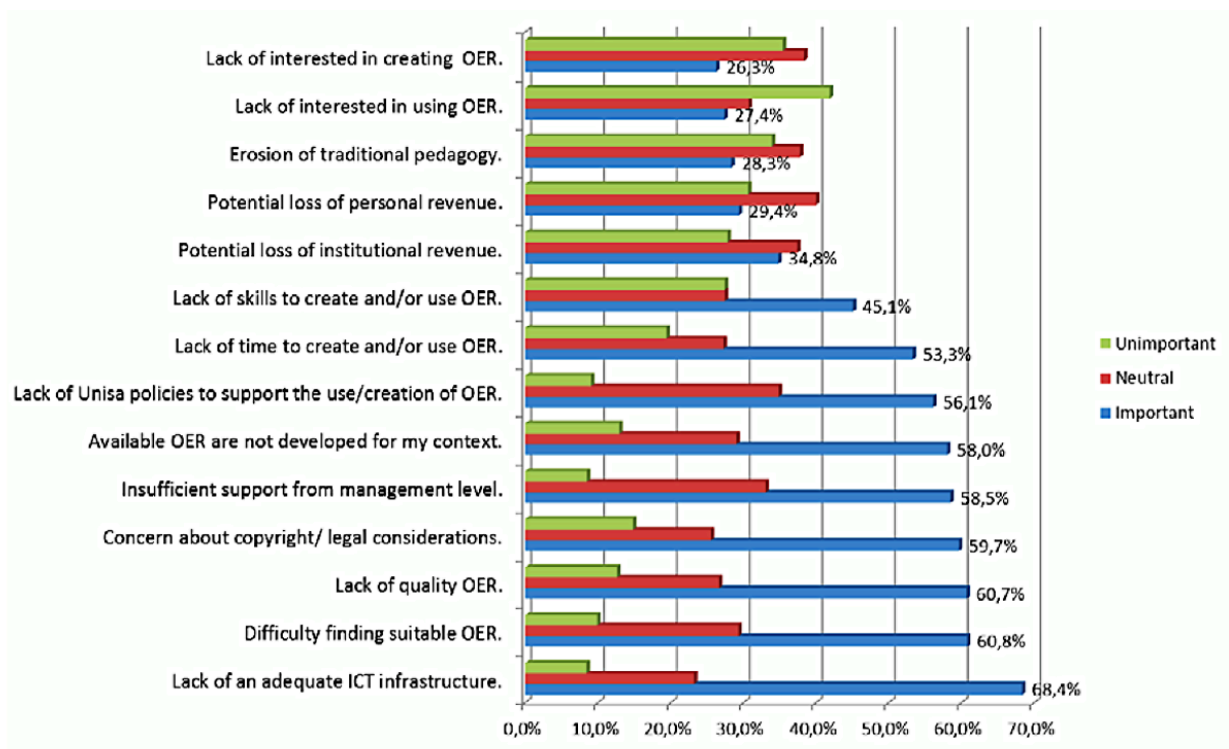


The authors of this paper grouped these barriers into three different groups, namely, the intrinsic natures of OER, institutional infrastructure challenges and the personal attributes of the staff members. The barrier according to de Hart, Chetty and Archer (2015) with the highest response, was the lack of adequate infrastructure to assist and support the use and creation of OER. Staff need to be guided by institutional policies regarding OER and at this stage Unisa does not have an OER policy – only a strategy document from 2014 which was updated and scaled back in 2017.

According to Bergquist and Pawlack (2008) there are six types which define the culture of an academic institution - collegial, managerial, developmental, advocacy, virtual and tangible. Cox and Trotter (2017) describes Unisa in terms of a managerial type of institutional culture, utiltising a top-down, hierarchical approach where the agency of the academics is controlled by tightly defined policies. They further suggest that this type of culture at Unisa could be a demotivating factor for the staff buy in and uptake of OER. Unisa staff are used to working within strict policy frameworks and the lack of an OER policy could be a contributing factor to the perceived barriers to staff engagement with OER.

The Unisa results indicate that academic staff access OER on a regular basis but are less enthusiastic to revise and re-use OER. They also seem hesitant to develop new OER for sharing. As mentioned above, sharing OER is not a common practice among Unisa staff. They are generally amenable to sharing their work only if they are compensated financially for doing so. This goes against the general ethos of OER. In addition, there is a large concern that other people could make money from their own work. This indicates that training is definitely required for the Unisa staff in order for them to fully understand the true spirit of OER and the various copyright procedures that are available.

## Summative comments: OER Change

As illustrated in the two case studies, increased adoption, (re)use and production of (O)ER is found at the intersection of individual choices, skills and motivation, and institutional understandings, mandates, and infrastructures (ICT, culture and policies).

# 5. Conclusion

We would often assume that individuals in higher education institutions have total agency on whether to participate in open education, and specifically in the form of (re)use and production of (O)ER. Our findings and analysis in this chapter, show however, that individuals' (re)use and production of (O)ER is found in the nexus between individuals' understandings, skills, motivation and engagement and disciplinary and institutional contexts. Institutions are also not totally independent and context-free but embedded in broader discourses and ranking regimes, a 'prestige economy' and political, economic, social, technological, environmental and legal factors.

We started this final micro- analysis by pointing to the impact the COVID-19 pandemic had on education systems across the world and how the pandemic exacerbated intergenerational inequalities in the South African context. As we analysed the early emerging findings of how education in South Africa responded to the pandemic, we noted the lack of evidence that the pandemic forced individuals and institutions to re-assess (O)ER. Maybe it is too early. We mentioned the brief glimpses (Butcher & Baijnath, 2020; van den Berg, 2020) pointing to a re-assessment of (O)ER but only the future will tell to what extent the COVID-19 pandemic may be a turning point, or not.

We conclude this analysis of the micro-level with an adaptation of the first figure at the start of this chapter by adding the impact of macro-societal factors on the awareness/perceptions, (re)use and production of (O)ER (Figure 11).

**Figure 11**

*Final mapping individual perceptions/awareness, (re)use and production of (O)ER*
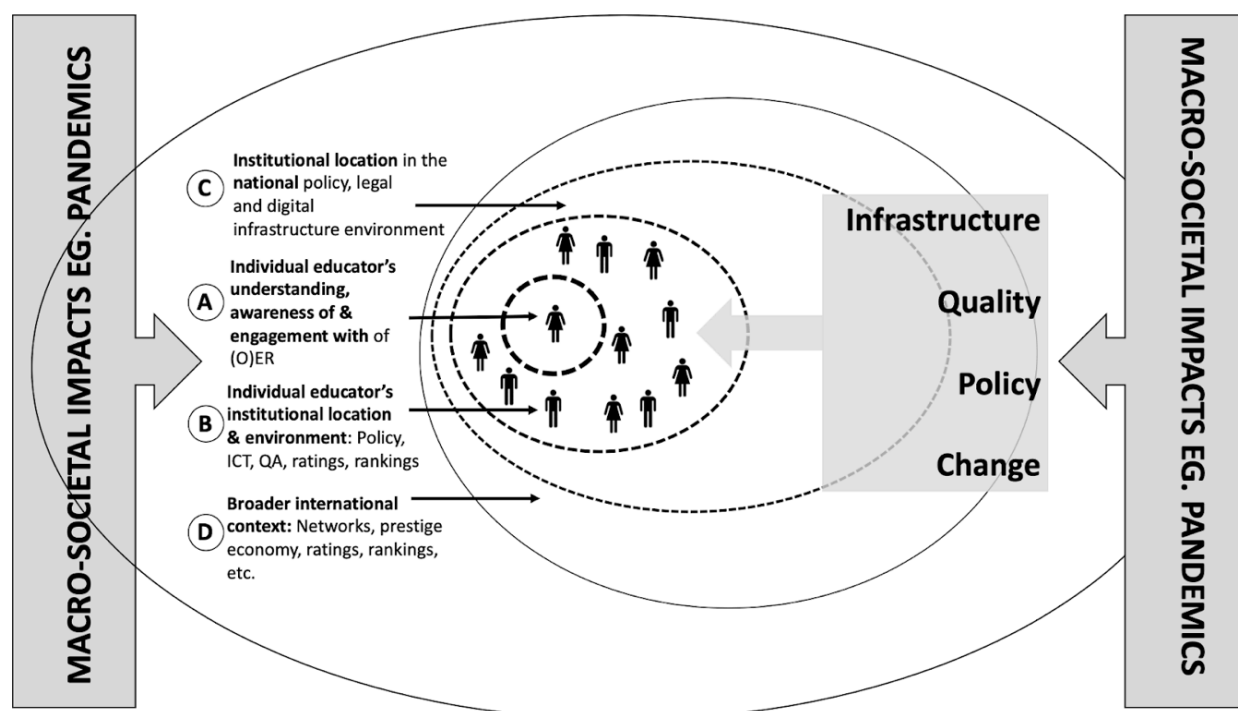
Drawing from this figure (figure 11) we can summarise the findings for the South African context around the national ideology for education. Context is everything, and the history of an unequal, colonial country, driven by apartheid ideals, is forefront in the recovery and the development agenda for South Africa. The key focus of the post-apartheid national policies is the transformation of the higher educational landscape, in order to address the inequalities of the apartheid strategies. This is the overarching educational philosophy for the new economic, social and political structures in South Africa.

Against this background of transformation, educational resources need to be seen as part of the epistemic freedom and justice as proposed by Ndlovu-Gatsheni (2018). Taking this forward is the statement by Walker (2019),

> To be fully involved in learning and development and fair-achieved outcomes in formal education, students would need opportunities to develop their epistemic capability of being able to both retrieve information and make interpretative contributions to the common pool and practical deliberation (Walker, 2019, p. 264).

It is this transformational background that runs that through the South African case study. A leitmotif running throughout this country's study is, firstly, a recognition of the immense legacy and continued impact and structural inequalities arising from colonialism and apartheid. Referring to digital infrastructure and who has access, who is included and who continues to be excluded, without recognising apartheid's legacy, will not lead to an understanding of the potential and desperate need for (O)ER. Another leitmotif is not only a concerted policy-focus on addressing the legacy of apartheid, but also preparing our students for a digitally connected world. As such there is ample recognition of the role of open learning and specifically (O)ER at a national level.

Institutional policies and practices vary considerably in South Africa, which can be seen as a country of two contrasts – pockets of world class educational excellence on the one end of the spectrum, and a continual struggle with a developing country's unique challenges with respect to broadband availability, connectivity, ownership of suitable devices and levels of digital literacy, on the other. This is evident from the two case studies that were presented. The University of Cape Town (UCT) operates under a collegial managerial style where collaboration is central to its ethos and enjoys good access to physical and digital structures (see Bergquist and Pawlack, 2008). As such, acceptance of OER is encouraged and rewarded. UCT's policy on copyright also plays a significant role – because researchers are the owners of their work, they are more inclined to share and make it openly available.

The second case study focused on Unisa. Being a distance educational institution, many Unisa students are physically removed from the necessary technological infrastructure and lack the prerequisite digital competencies. In addition, Unisa operates under a managerial framework where staff are expected to adhere to institutional policies – and Unisa does not have an approved policy on OER. This is particularly challenging to the research staff and is exacerbated by the copyright policy which states that all work produced remains the property of the university.

We would often assume that individuals in higher education institutions have total agency on whether to participate in open education, and specifically in the form of (re)use and production of (O)ER. Our findings and analysis in this chapter, show however, that individuals' (re)use and production of (O)ER is found in the nexus between individuals' understandings, skills, motivation and engagement and disciplinary and institutional contexts. Institutions are also not totally independent and context-free but embedded in broader discourses and ranking regimes, a 'prestige economy' and political, economic, social, technological, environmental and legal factors.

We started this chapter by pointing to the impact the COVID-19 pandemic had on education systems across the world and how the pandemic exacerbated intergenerational inequalities in the South African context. As we analysed the early emerging findings of how education in South Africa responded to the pandemic, we noted the lack of evidence that the pandemic forced individuals and institutions to re-assess (O)ER. Maybe it is too early. We mentioned the brief glimpses (Butcher & Baijnath, 2020; van den Berg, 2020) pointing to a re-assessment of (O)ER but only the future will tell the extent of the COVID-19 pandemic as be a turning point, or not.

Figure 11 illustrates how individual (O)ER practices are entangled in institutional policies, and the broader international context (on the left) and how these responses (individual and institutional) are shaped by infrastructure, quality, policy, and change. And how, as the pandemic has illustrated, how (O)ER are impacted by macro-societal factors whether environmental, social, technological, political, economically and/or legally.

# 6. Acknowledgements

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