

**Peer-reviewed article****Marginalisation of 'global South' epistemics: the case of a soil science textbook**

**Milton Milaras** Department of Environmental Science, [milton.milaras@hotmail.com](mailto:milton.milaras@hotmail.com)  
University of South Africa and Department of  
Undergraduate Studies, St Augustine College  
of South Africa

**Tracey McKay** University of South Africa, Department of [mckaytjm@unisa.ac.za](mailto:mckaytjm@unisa.ac.za)  
Environmental Science

**Abstract**

Scientific textbooks are often seen as critical teaching and learning tools for undergraduate students. Furthermore, textbooks can shape and define students' comprehension and internalisation of academic disciplines. Despite this, textbooks are not necessarily error free. Additionally, textbooks can be laden with hidden representational presumptions and biases, foregrounding a particular culture, knowledge system, or hegemonic world-view. This can include the epistemology of the 'global North'. How appropriate it is to prescribe such textbooks in the 'global South' is, therefore, debatable. Thus, this research represents an attempt to determine the suitability of a soil science textbook – produced in the global North – for use in the global South, specifically the South African context. Accordingly, one particular textbook, in use at some South African universities, was analysed using textual analysis, in order to ascertain its applicability within the context of an Africanised curriculum. The study found that, despite the publisher's claim of 'universality', the book presents soil science knowledge as written with a northern geographical setting in mind and for a Western European or North American audience. Thus, for South Africa, with its radically different geographical, cultural, and soil conditions, the textbook is inappropriate and may even be moulding a particular global North worldview. On this basis it is recommended that academics of the global South adopt a critical approach when selecting textbooks; as well as actively promote and write textbooks directly suited to an African setting.

## 1. Introduction

The call for the Africanisation of the South African higher education system and its curricula, has, in recent years, been emphatic (Kamanzi, 2016). For example, the higher education student protests of 2015 and 2016, known as the #FeesMustFall and #RhodesMustFall movements, placed this discourse firmly into the public domain. Prior to this, the debate had been mostly contained within the walls of academia (Le Grange 2016). So, whilst the concept of Africanisation may be relatively new in the public discourse, conversations around Africanisation at tertiary institutions are long standing. As a result, there is a diversity of academic literature having been produced on the matter (see Makgoba 1997; Higgs 2003; Le Grange 2004; Waghid 2004, 2014; Nakusera 2004; Nkoane 2006; Higgs & van Wyk 2007; Metz 2009; Louw 2010; Prinsloo 2010; Nsamenang & Tchombe 2011; Letsekha 2013; Msila 2014; Mbembe 2016). The debate itself is broad ranging and is an indication of an ongoing search for an African identity in the postcolonial age (Makgoba & Seepe 2004). In this regard, the definition of an Africanised curriculum is hotly debated and highly contested. That said, there is broad agreement that, at the very least, Western epistemologies should be questioned. In particular, there is a strong argument that valuing Western scientific knowledge above all other knowledge systems must cease, as this is a legacy of colonialism (Restrepo 2014). The provision of a more balanced perspective, where multiple ways of knowing are valued, will help to undo the subjugation and oppression associated with colonialism, which tended to disavow and/or reject indigenous knowledge systems. Thus, there is a concerted call for the implementation of diverse epistemologies, as a necessary part of curriculum transformation in the African context. In this regard, Africanisation of the curriculum becomes an imperative (Asabere-Ameyaw, Dei & Raheem 2012; Nkomo 2013; Le Grange 2016).

It is to this end that prescribed or recommended textbooks become important, as textbooks are an important part of curricula. Thus, any contextually sensitive teaching, and any move to Africanise a curriculum, will have to take textbooks into account. Thus, from the perspective of the need to Africanise the curriculum, this research represents an attempt to interrogate one undergraduate soil science textbook in order to determine its usefulness with respect to Africanisation. For a number of years, the textbook in question, Mark Ashman and Geeta Puri's *Essential Soil Science* (2002), has been prescribed or recommended as an undergraduate soil science textbook at some South African universities. The structure of the paper is as follows: firstly Western epistemological biases of textbooks and the need to Africanise textbooks is outlined, specifically in the face of the dominance of textbooks produced in the 'global North'. The relevant principles for the analysis of textbooks are then briefly outlined. The results of the analysis are presented and then discussed. An argument for African academics to write, and teach from, Africanised textbooks concludes the study.

## 2. Textbooks as epistemological and value-laden pedagogy

The importation (or imposition, depending on authors' perspectives) into Africa of Eurocentric education models and curricula is well acknowledged in the literature (Semali & Stambach 1997; Lenoir & Jean 2012). In some cases, such models and curricula are brought to Africa by foreign 'experts' or aid organisations, but in many other cases, Africans themselves impose this type of curricula on their countries. Importantly, Eurocentric curricula actively discourages the production of relevant African teaching and learning resources such as textbooks (Katonga 2017). Moreover, Eurocentric education models and curricula are disconnected from the African context such that the

kind of educated person Africa needs is not produced. Thus, these curricula are not ‘fit for purpose’ (Lenoir & Jean 2012). This situation has continued for decades despite research indicating that the needs of African students, and African societies, are often at odds with ‘Western curricula’ (Ukwuoma 2016). Studies in, *inter alia*, Tanzania (Semali & Stambach 1997), the United States and Canada (Kirkness & Barnhardt 1991; Mack, Augare, Cloud-Jones, David, Gaddie & Honey 2012), Malawi (Phiri 2008), South Africa (Letsekha, Wiebesiek-Pienaar & Meyiwa 2014; Masemula 2013), and Zambia (Zinyeka 2014) found that the integration of indigenous knowledge into science curricula could improve student performance as it makes the content relatable and familiar. The situation means that Western *status quo* epistemologies are imposed upon African students by the means of Eurocentric curricula and teaching materials, more insidiously, however, and as famously argued by Paulo Freire (1970:47):

[e]very prescription represents the imposition of one individual's choice upon another, transforming the consciousness of the person prescribed to into one that conforms with the prescriber's consciousness. Thus, the behaviour [or knowledge] of the oppressed is a prescribed behaviour [or knowledge], following as it does the guidelines of the oppressor.

An important vehicle for the imposition of certain discourses is the textbook (Wang 1998; Devetak & Vogrinc 2013; Svendsen 2015). Iztok Devetak and Janez Vogrinc (2013:4) support this argument, highlighting that “ideas presented in a textbook could affect students’ learning in a direct or indirect way”. Ivan Ivić, Ana Pešikan and Slobodanka Antić (2013:28), for example, state: “[t]extbooks, by default, play a major role in the life of every person in the early stages of his or her development. [And that] this is the crucial period for the acquisition of knowledge and skills and the development of reasoning, personality traits, points of view, values, needs and habits.” Thus, the impact of textbooks on students’ and cultures’ epistemics should not be underestimated. Accordingly, textbooks are not simplistic ‘containers’ of discipline-specific scientific facts. They are cultural artefacts (Venezky 1992; Foster 2011). That is, manufactured objects or articles whereby the political, ideological, or worldview of the author or producer are embedded in the object (in this case, the textbook) – all of which are located within a particular cultural milieu or age (Wartofsky 1979). All too often, the embedded biases woven into textbooks remain unnoticed, uninterrogated, and unacknowledged. For example, Yves Lenoir and Valérie Jean (2012) show that textbooks in five French-speaking African countries are either entirely devoid of local contextualisation (so much so that they could be mistaken for textbooks meant for students living in France), or only add a local context in a shallow manner.

Such culturally mismatched didactic material can lead to learner alienation and significant academic underperformance (Cobern & Aikenhead 1997; Stein, Stuen, Carnine & Long 2001). Nevertheless, many education systems rely on textbooks as essential educator support tools without necessarily realising that a particular worldview is being perpetuated (often for decades) (National Education Union 2016). In particular, the role played by the content of science textbooks, and the commodification of textbooks, in foregrounding certain epistemological and geographical narratives (while marginalising others) remains unchallenged. Kurt Love (2012:133) succinctly argues that:

[s]cience, as a culturally constructed concept described in science textbooks, is created through the cultural values of capitalism, technocentrism, colonization, and globalization because those are the ideologies that supported by the dominant elites and further supported with hegemonic thinking by the disempowered masses.

Dawn Sutherland and Natalie Swayze (2012) further argue that contextualising science education within local contexts is an important component in fostering deep learning. Without contextually sensitive learning materials, students can be both alienated from the discipline and misconceptions can be fostered (Asabere-Ameyaw *et al.* 2012). In this regard, prescribing a textbook without taking its worldview and context into account is poor pedagogical practice.

Importantly, in South Africa, part of the #RhodesMustFall and #FeesMustFall dissent highlighted the mismatch between the locale and curriculum, with students demanding a decolonised and Africanised curriculum (Le Grange 2016). Thus, if academics are to engage with such calls, then the textbooks that are in use, or those that will be prescribed/recommended, must be critically interrogated. Ergo, if we are to successfully Africanise the curriculum, there is a need to consider an African philosophy of education, and the resulting Africanisation of tertiary curricula and their prescribed textbooks.

### 3. An African philosophy of education and the associated Africanisation of curricula

Notwithstanding the then-Minister of Higher Education Blade Nzimande's public call to Africanise university curricula in his address at the Higher Education Summit of October 2015, the topic has been extensively discussed in academic research since 1994 (Moulder 1995; Makgoba 1997; Horsthemke 2004; van Wyk & Higgs 2004; Waghid 2004; Cornwell 2006; Ntoui & Priebe 2010; Letsekha 2013; Singh 2015; Le Grange 2016; Horsthemke 2017). The departure point for almost all of this literature is the acknowledgement that indigenous ways of knowing in South Africa (and elsewhere) were historically denigrated by colonial powers, and that the legacy of this epistemic violence remains. That is to say, African ways of knowing were dismissed and relegated in relation to Western knowledge. Over hundreds of years of colonialism, this promoted an 'aspiration' in Africans to 'Westernise', and consequently, the self-negation of indigenous knowledge – such that these indigenous knowledge systems were diminished from one generation to the next. This propagation of Eurocentric knowledge is exemplified in university curricula (De Lissovoy 2010; Mutekwe 2015; Heleta 2016).

The response to this Eurocentric legacy, both in terms of South African university student protests and academic research and critique, is the call for tertiary curricula to Africanise and decolonise (Le Grange 2016). Some literature, and much rhetoric, uses the terms 'decolonise' and 'Africanise' interchangeably, but in this paper we define them separately. Decolonisation points to dismantling the domination and legacy of colonial power structures, such as to re-establish equity and human dignity in a postcolonial milieu (see Heleta 2016). While Africanisation may contribute to decolonisation – as the decolonisation project extends much farther than a curriculum – decolonisation itself is beyond the scope of this research. To reiterate, this research appertains itself with Africanisation, and not decolonisation. Importantly, the extent to which practical steps have been taken toward Africanisation is mostly unexplored. In this regard, this study contributes to the body of knowledge by interrogating the degree of Africanisation of an undergraduate soil science textbook used by some South African universities. To clarify, we defined an Africanised textbook as: one that is appropriately conceptualised, contextualised, and tailored for students operating from, and within, an African context. Thus, Africa (as part of a globalised world) is axiomatically affirmed as the focus of such a textbook, while balancing and gainfully including Western and other epistemologies, thus averting intolerant Afrocentrism (see Letsekha 2013).

Numerous authors have concerned themselves with an African ‘philosophy’ of education (see Higgs 2003; Le Grange 2004; van Wyk & Higgs 2004; Waghid 2014). Philip Higgs (2003), and Berte van Wyk and Higgs (2004), for instance, put forward an African philosophy of education which values diversity, respects lived experience, and questions Western universal knowledge. Such a philosophy, they argue, is built on an African identity that has reclaimed the interwoven values of communalism, *ubuntu* and humanism. Ubuntu is defined by Lesley Le Grange (2011:69) as being “aware of one’s own being, but also of one’s duties towards one’s neighbour.” By using these philosophical foundations as departure points, African universities and their curricula can consequently be transformed. However, Ben Parker (2003) critiques Higgs’ (2003) argument as being overly simplistic and decontextualised. Le Grange (2004:146) subsequently, and in detail, critiques both Parker (2003) and Higgs’ (2003) articles as “fundamentally flawed”; while Yusef Waghid (2014) defends a communitarian view of an African philosophy of education, Elrico Nakusera (2004) argues that transformation can stem from critical storytelling in indigenous languages. Thus, even though implementing an African philosophy of education may lead to the Africanisation of curricula and consequently their textbooks, there is no consensus as to what comprises such a philosophy (Horsthemke & Enslin 2009). Most authors however do acknowledge that a pluralism of epistemologies (Western, indigenous, and otherwise), is required in the process of Africanising curricula in order to preclude essentialising a curriculum. Higgs (2016:95), for example, advocates an ‘African Epistemic’, which can help to address local, and even global, problems effectively through “creative integration” of indigenous and Western knowledge systems – while ensuring that each is granted equal validity. In the words of Amasa Ndofirepi and Michael Cross (2014:297): “[t]here is a need to strike an honest balance between the African and the non-African in the curriculum.” Nevertheless, at this stage, it is beyond the scope of the current scientific study to interrogate in detail the subject of an African philosophy of education. Therefore, more practical, curriculum-centric research into Africanisation will now be discussed.

Only a few academic studies seek to Africanise knowledge and/or tertiary curricula. Even a book claiming to focus on contemporary issues in African sciences and science education, does not detail what a practically Africanised (school level) structured curriculum and its textbooks might look like, despite numerous claims that “[i]ndigenizing the school curriculum can strengthen young learners in the acquisition of scientific knowledge and skills” (see Asabere-Ameyaw *et al.* 2012:9). Most of these academic studies focus on the inclusion or interrogation of indigenous epistemologies and ways of doing. Gareth Cornwell (2006), for example, discusses the Africanisation of English literature curricula in South Africa, and highlights that African oral traditions need to be honoured. Francine Ntoui and Gunilla Priebe (2010) interrogate whether, after more than a decade of malaria research centres being located and funded in Africa, this has led to the Africanisation of malaria research. They find that obstacles remain. Sean Muller’s (2017) research is somewhat different, making a pragmatic attempt to Africanise an economics curriculum. For the sciences, there is little in the way of existing literature which explicitly looks at curriculum studies and textbooks, or gives practical suggestions on how to Africanise them. One of the reasons for this, perhaps, is the commercialisation and skewed production of textbooks in the global North. It is, thus, to this topic the paper now turns.

#### 4. Commodification of knowledge: the global North and textbook production and sales

Before 1970, a plethora of small, niche, academic publishing houses, university presses, and disciplinary societies published academic textbooks and journals. Circa 1970 this ended and academic

publishing became “big business” (Hagner 2018:2). Ivić *et al.* (2013) argues that this is because textbooks are far more likely to be purchased than other genres of printed books, making the writing, publishing, and distribution of textbooks a magnet for commercial enterprises. The arrival of commercial publishers resulted in a process of publishing house agglomerations such that only a few, very large, for-profit academic publishing houses now remain, namely: Elsevier and Wolters Kluwer (both of The Netherlands), Sage and Wiley-Blackwell (both of the United States of America), Taylor & Francis (England), and Springer-Nature (Germany/United Kingdom). (Hagner 2018). These large publishing houses (The ‘Big Six’) are located in the global North and now control the lion’s share of academic publishing (Larivière, Haustein & Mongeon 2015; Jandrić & Hayes 2019). Due to extremely limited competition and a ‘captive’ market, these publishers are essentially an oligopoly: able to dictate pricing, as well as strongly influence who, and what, gets to be published. It is a lucrative business, with Elsevier, for example, reporting profit margins in the order of 37% circa 2012 (Forgues & Liarte 2013; Logan 2017). In such a scenario, many voices are not heard, and more power accrues to these publishing houses over time (Paasi 2005).

Corporatisation also results in the aggressive marketing of textbooks to educational institutions and educators by the academic publishing houses. In this regard, a ‘general’ or ‘global’ type of textbook can be a global bestseller, making it the best option for a publishing house to punt. Generic textbooks that can be sold worldwide bring greater investment returns than books designed for small niche markets. However, some markets are dominant, so textbooks tend to be written to meet the demands of the dominant market, and then subsequently marketed to the rest of the world. In the case of scientific publications, the English-speaking world, consisting of the United Kingdom (UK), its former colonies, and the United States of America (USA) dominates (Paasi 2013). In such a situation, any author who does not write in a way that maintains the epistemological *status quo* in terms of a western worldview and western thought is unlikely to be commissioned to write for the publishing house; and even if they are, such books are unlikely to be easily sold (Love 2012). Thus African and/or indigenous knowledge perspectives in such textbooks are often lacking (Nichols 2012).

The corporatisation of the academic textbook market also poses an additional problem for the ‘global South’, where universities (their libraries, academics, and presses) are usually underfunded (Joseph 2015). This means, on the one hand, their academics and university presses do not have the human and financial resources to develop their own textbooks; while on the other hand, the limited resources they do have must be used to acquire very expensive books from the global North. Thus, there is a duplicity in which textbooks are written in, and for, the global North, yet are also sold in the global South for profit – while simultaneously marginalising subaltern knowledge systems. South Africa, with one of the most well-funded higher education sectors in Africa, highlights this problem. Annual reports of the Publishers Association of South Africa (PASA) for the years 2011-2013, indicate that on average only 40 scholarly books (mostly in the social sciences and humanities) were published in the country – a mere one percent of South Africa’s total printed book publishing output (Struik & Le Roux 2012, 2013; Struik & Borgstrom 2014). Furthermore, it appears that the publication of ‘locally-tailored’ scholarly books in the STEM (science, technology, engineering, and mathematics) fields is extremely difficult. Low volumes mean limited employment opportunities with these publishers reporting the employment of about 40 people nationally (Joseph 2015). Moreover, Charles Mather (2007) and Andrew Joseph (2015) both note that South African research outputs in academic journals have become increasingly published by global North publishing houses. That is, South African academics,

for various reasons, such as institutional pressure and National Research Foundation (NRF) rating criteria, are electing to 'publish internationally' in 'prestige journals' and in English, shunning local publishing bodies in the global South in the process (Mather & Ramutsindela 2007; Visser 2007; Trahar, Juntrasook, Burford, von Kotze & Wildemeersch 2019). This, in the long term, aggravates the situation in which local academics working in publicly funded South African research institutions and universities, can no longer access publications of their own labour (despite the research being funded by the South African State) – as these publications reside behind the high paywalls of international publishing giants (Forgues & Liarte 2013). Moreover, in South Africa, the Department of Higher Education and Training's (DHET) *Research Outputs Policy* (2015) (point 6.3b) explicitly excludes the publication of textbooks as being eligible for research subsidy. All this contributes to widening the knowledge gap on issues concerning the global South, reinforces the hegemony of global North academia, marginalises indigenous knowledge and non-Western learners, disincentivizes African academics from publishing locally, and results in a flow of money from the global South to the global North (Ndofirepi & Cross 2014). This could be regarded as a form of academic colonialism.

## 5. Methodology

There are multiple ways to evaluate textbooks (Steinley 1987; Richards 2001; Stein *et al.* 2001). The methodology for this study was informed by the work of Jesper Svendsen (2015), who indicates that there are three broad categories of textbook analysis: (1) process, (2) application, and (3) product. That is to say, analysis either focuses on (1) the production and distribution, or (2) how textbooks are used by teachers and learners, or (3) an analysis of the content. This research falls into the third category. In addition, there are innumerable frameworks that have been developed to undertake textbook content analysis, either qualitative or quantitative in nature. HsingChi Wang (1998) for example, tabulates 29 methods. Quantitative approaches tend to measure frequencies or volume of text allocated to certain concepts, in order to ascertain where the emphasis of a textbook lies. Such approaches use strict deductive coding frameworks to be as objective, reproducible, and comparable as possible. However, the selection of a quantitative coding framework is itself a subjective decision. Alternatively, qualitative approaches seek to interpret and understand the nuances and meanings of messages and values that lie implicit within the text (Pingel 2009). For example, posing questions such as: (1) is one perspective/form of knowledge/location favoured over others? And, (2) why is this likely to be the case? As such, qualitative analysis cannot follow the structure of quantitative methods, and instead relies on the researcher's values and understanding of the text (which should be transparent at the start, yet cannot be free of bias). Qualitative analysis can, therefore, investigate hermeneutic questions of the text. Moreover, qualitative analysis can be deductive or inductive. A deductive approach, in an *a priori* manner, imposes a conceptual frame by which to interpret the text; while an inductive approach, in an *a posteriori* manner, examines the text until common identifiable themes emerge (Berg 2000; Pingel 2009). It is therefore evident that both quantitative and qualitative approaches have advantages and disadvantages – and for this reason, they can complement each other. The research presented here, an analysis of an undergraduate soil science textbook, is of limited scope, and is quantitatively analysed in a deductive manner. The analysis was based on *a priori* manifest content analysis of representations of geographical location in the text (Bengtsson 2016). In the light of the work of Sutherland and Swayze (2012) and Akwasi Asabere-Ameyaw, George Sefa Dei and Kolawole Raheem (2012), the book was analysed for its diversity of geographies and contexts. Importantly, we, the authors, acknowledge that analysing only geographic representations is not a

definitive analysis of the degree of Africanisation. However, it is argued here that the use of geographical specific examples is a vital *indicator* of Africanisation.

## 6. Results

The results of an *a priori* manifest quantitative content analysis (following Bengtsson 2016) are presented in Table 1. In particular, this table presents the geographic locus of examples (of various soil characteristics, classifications, issues) used in the textbook under analysis. This was done to determine how geographically balanced, between the global North and global South, the book is. In this regard, we followed the definition of global North and global South of Malgorzata Blicharska, Richard Smithers, Magdalena Kuchler, Ganesh Agrawal, José Gutiérrez, Ahmed Hassanali *et al.* (2017), whereby the World Bank's classification of low, lower-middle, and upper-middle income countries comprise the global South, while high-income countries constitute the global North (World Bank 2019). This 'economic power' definition, with consideration for country specific examples, broadly defines Africa, Asia, and South America as the global South; with Europe, North America, and Australia classified as the global North. The first exception to this is Israel, which technically lies in the Middle East/Western Asia, but is a high-income country and so part of the global North. The second exception is Australia, which geographically lies in the south, but is also in the high-income category. These two minor exceptions have been taken into account in Table 1 and subsequent calculations.

**Table 1:** Quantitative analysis of the locality referenced in examples used in the textbook (source: authors).

<b>Global North Continent/Country</b>	<b>Count</b>	<b>Global South Continent/Country</b>	<b>Count</b>
<b>Australia Total</b>	<b>2</b>	<b>Africa Total</b>	<b>8</b>
Australia	2	Egypt	2
<b>Europe</b>	<b>115</b>	Ethiopia	1
Denmark	1	Kenya	1
France	4	Sudan	1
Germany	1	Africa as continent	3
Italy	3	<b>Asia Total</b>	<b>16</b>
Israel	1	China	1
Norway	1	India	1
Switzerland	1	Iraq	3
The Netherlands	3	Pakistan	1
United Kingdom	90	Russia	7
Europe as continent	10	Vietnam	1
<b>North America Total</b>	<b>44</b>	Asia as continent	2
Canada	3	<b>South America Total</b>	<b>2</b>
United States of America	40	South America as continent	2
North America as continent	1		
<b>Global North Total</b>	<b>161</b>	<b>Global South Total</b>	<b>26</b>
<b>Grand Total: 187</b>			

In total, 187 examples with geographical contexts are given in the textbook. The majority (169) refer to specific countries, while some examples (18) refer to a continent. These examples are spread across

185 pages, or 1.01 examples per page. Of the 187 examples in total, some 86% refer to localities of the global North, where Europe dominates, followed by North America and Australia respectively. Of this subset of global North examples, the UK and the USA comprise 81% (56% and 25% respectively). Consequently, very nearly 70% of all examples in the textbook stem from either the UK or USA (48% and 21% respectively). Thus, there is a strong didactic narrative focused on the UK. By way of illustration, the examples range from: (1) naming the Englishman John Bennet Lawes as responsible for the first agricultural trials in 1843 (p114); (2) indicating the irrigation rate for potatoes in the UK (p126); (3) quantifying the UK lime deficit (p134); and (4) citing numerous guidelines from the UK Ministry of Agriculture, Fisheries and Food (MAFF) (such as recommended fertilizer application rates, soil nitrogen supply, phosphorous and potassium targets, and manuring limits (see p139-142, p143, p148, p149). An emphasis so great may indicate that the textbook was written for an UK audience. Second to this, is the prominence of examples from the USA (21%). Some specific USA examples include tables on irrigation water classification (p127); liming rates (p137); and plant tissue analysis (p143). Thus, a USA audience is also catered for.

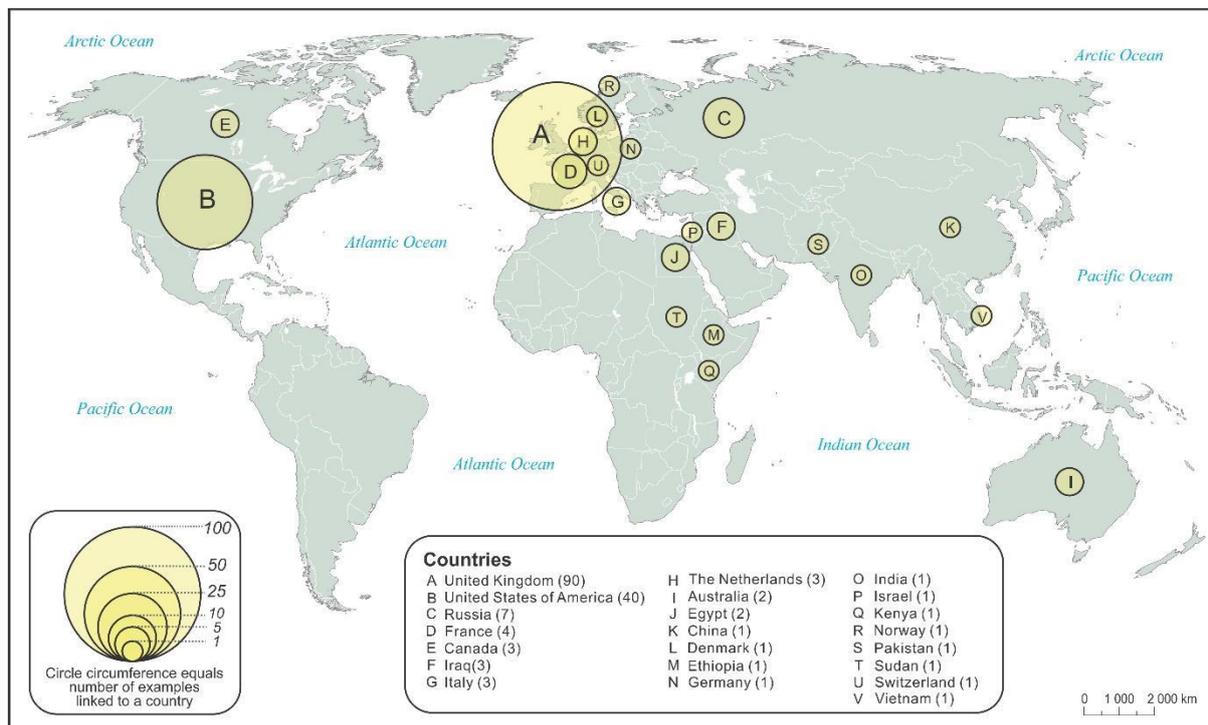
In terms of sheer number of examples, both the UK and USA are extreme outliers compared to all other countries. When compared to population served, however, the situation worsens. In terms of population for 2002 (when the book was published), the population of the UK was roughly 60 million, which equates to one mention to 67 000 people. For the USA, with 288 million people in 2002, this represents one mention to 7.2 million people. This is a huge over-representation when compared to India (with 1 billion people in 2002) but only one mention in total, and China (with 1.3 billion people in 2002) with also only one mention. Thus, in terms of population served, the USA and UK are over-served and the two most populous global South nations are severely underserved (U.S. Census Bureau 2004). In contrast to the dominant global North propaedeutic, examples from the global South comprise only 14% of all examples in the textbook. Of the global South examples, some 61% stem from Asia, 31% from Africa and 8% from South America. Africa, a continent of one billion people, comprises a mere 4% of all the locations mentioned. Examples are also limited to crop irrigation for Egypt and Sudan (p123), and erosion in Ethiopia and Kenya (p179 & 179). In terms of comparison by population size for 2002, countries in the global North representing 784 million people garner 157 mentions, compared to the global South, with a total population size of 2.7 billion but only 12 mentions. The implications of these results for an Africanised soil science pedagogy in an African context will subsequently be discussed.

## 7. Discussion

The distinction that 'western' examples are given, and the prominence of the UK and USA in particular, is at odds with what the publisher explicitly states about their intentions for the textbook. According to John Wiley & Sons, Inc. (2019) promotional webpage for the textbook:

This textbook is aimed at the majority of students, who need to quickly acquire a concise overview of soil science. [...] This short informative guide, will be particularly useful for students who do not possess a traditional scientific background, such as those studying geography, environment science, ecology and agriculture. [It is the] only textbook to cater for introductory courses in soil science; [...] provides an affordable concise overview of soil science; [and] no scientific background [is] assumed.

In this regard, the publisher appears to claim the book is a 'global' soil science textbook that can be used in *majority* contexts by *majority* soil science undergraduate students. It thus seems that the publishers synonymise 'majority' with 'Western'. The analysis provided in this article indicates that the book was written for students residing in the UK, Europe, and the USA – that is, the global North. Figure 1 illustrates the skewness of the geographic distribution of the examples, illustrating that the textbook lacks geographic diversity and sensitivity. The book is thus Eurocentric, and propounds an almost entirely Western epistemic, with seven-eighths of examples specifically located in the global North. The few non-Western examples, can at best, be described as tokenism (Lenoir & Jean 2012). Thus, the textbook authors and publishers had a specific audience in mind, one that is not actually aimed at "the majority" of students across the world, but rather at Western students.



**Figure 1:** Proportional circle map indicating both the skewed number and location of geographic examples provided in the textbook (note: data are for countries only, not continents) (source: authors).

This is further illustrated by the pricing of the book. In 2019, the e-book has a listed price of 75 USD and the paperback 92.50 USD (1 154 ZAR and 1 424 ZAR respectively).<sup>1</sup> Thus, the cost of this small 198-page textbook places it out of the purchasing range for most African students (Le Grange 2016). This is another indicator that textbook is produced for markets in the global North, which have greater purchasing power than those of the global South (Love 2012; Nichols 2012; Paasi 2013). Moreover, a basic core-periphery model within the knowledge economy is exemplified, in which the global North is the knowledge producer, and the global South is the knowledge consumer, with its own knowledge production accordingly marginalised, and from whom profits are extracted (Mather 2007; Joseph 2015; Trahar *et al.* 2019).

<sup>1</sup> At an exchange rate of 15.39 ZAR to 1 USD in August 2019.

This affirms van Wyk's (2002) argument that STEM epistemologies maintain a culture of power (and marginalise indigenous knowledge systems) by assuming the homogeneity of all scientific didactics, and consequently students, as well as the pedagogies required. Such heavily westernised course content creates epistemological hurdles for African university students due to the mismatch between the content of the book, and their culture and lived experience (Sennett, Finchilescu, Gibson & Strauss 2003). Learning under such circumstances is a challenge. If, for example, learning takes place in the 'zone of proximal development', where students cognitively move from the known to the unknown, African students will struggle to learn, as all their experiences (and the context they need to operate in once qualified as soil scientists), are unacknowledged in the book (Vygotsky 1978). Thus, the book is likely to generate an experience of alienation. It is very likely that students residing in the global South will underperform under such circumstances (Cobern & Aikenhead 1997). Prescribing such a book may result in students struggling to reconcile the dominant Western epistemic that it purports and their personal and geographical context.

In such circumstances, the global North didactic is undermining the ability of African students to become professional *African* soil scientists. In particular, the book, thus, projects the notion that much of soil science is universal or geographically transferable, thus creating misconceptions. For example, students taught with this book may undermine African farmers and African agricultural extension agents. In this regard, research has shown that significant errors occur when attempting to generalise models for crop yield, fertilizer concentrations, soil carbon, nitrogen leaching, and drainage across all contexts due to the incorrect aggregation of climate and soil data (Tabor 1992; Hoffmann, Zhao, Asseng, Bindi, Biernath, Constantin *et al.* 2016; Coucheney, Eckersten, Hoffmann, Jansson, Gaiser, Ewert *et al.* 2018). Thus, decisions based on generalised and western models may be inappropriate for an African environment, misleading farmers and possibly causing crop and financial losses.

## 8. Conclusion

While this research presents a small-scale empirical case study of one soil science textbook, the results indicate that despite the marketing rhetoric, the book has been written with a particular geographical setting (and market) in mind. The findings presented here do not support the claim that it is a generic undergraduate soil science textbook. Prescribing this book in a Southern African setting, with radically different geographical conditions, is unlikely to assist African students to become competent local soil scientists. What is more, from a geographical perspective, the book may well alienate African students and undermine their efficacy in African soil science, the context in which most will live and work. Importantly then, if the soil science curriculum is to be Africanised, research needs to be conducted to determine how textbooks can support the call to Africanise curricula. In this regard, genuine Africanisation of the curriculum may not be possible without disrupting the *status quo* of western hegemonic textbook production. Notably, if the epistemological imperialism of the global North is to be addressed, it seems imperative that local African publishers and academic authors are supported by the State, as well as public universities, to produce Africanised textbooks (especially ones in STEM).

**Funding sources:**

The South African Department of Science and Technology-National Research Foundation (DST-NRF) Centre in Indigenous Knowledge Systems (CIKS).

**Acknowledgments:**

The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. The authors thank Ingrid Booysen for generating the map. Opinions expressed and conclusions arrived at are those of the authors and are not necessarily to be attributed to the NRF.

**References**

- Asabere-Ameyaw, A, Dei, GJS & Raheem, K. 2012. Introduction to contemporary issues in African science education. In Asabere-Ameyaw, A, Dei, GJS & Raheem, K (eds.) *Contemporary issues in African sciences and science education*. Rotterdam: Sense Publishers, 1-14.
- Ashman, MR & Puri, G. 2002. *Essential soil science: a clear and concise introduction to soil science*, Hoboken: Wiley-Blackwell.
- Bengtsson, M. 2016. How to plan and perform a qualitative study using content analysis. *NursingPlus Open* 2: 8-14.
- Berg, BL. 2000. *Qualitative research methods for the social sciences*. Fourth edition. Boston: Allyn and Bacon.
- Blicharska, M, Smithers, RJ, Kuchler, M, Agrawal, GK, Gutiérrez, JM, Hassanali, A, Huq, S, Koller, SH, Marjit, S, Mshinda, HM, Hassan, MH, Solomons, NW, Van Staden, J & Mikusiński, G. 2017. Steps to overcome the North-South divide in research relevant to climate change policy and practice. *Nature Climate Change* 7: 21-27.
- Cobern, WW & Aikenhead, G. 1997. Cultural aspects of learning science. *Scientific Literacy and Cultural Studies Project* 13: 1-20.
- Cornwell, G. 2006. On the 'Africanization' of English studies in South Africa. *Arts and Humanities in Higher Education* 5(2): 117-126.
- Coucheney, E, Eckersten, H, Hoffmann, H, Jansson, P, Gaiser, T, Ewert, F & Lewan, E. 2018. Key functional soil types explain data aggregation effects on simulated yield, soil carbon, drainage and nitrogen leaching at a regional scale. *Geoderma* 318: 167-181.
- Department of Higher Education and Training (DHET). 2015. *Research outputs policy*. Pretoria: Government Printer.
- De Lissovoy, N. 2010. Decolonial pedagogy and the ethics of the global. *Discourse: Studies in the Cultural Politics of Education* 31(3): 279-293.
- Devetak, I & Vogrinc, J. 2013. The criteria for evaluating the quality of the science textbooks. In Khine, MS (ed.) *Critical analysis of science textbooks: evaluating instructional effectiveness*. Dordrecht: Springer, 3-16.

- Forgues, B & Liarte, S. 2013. Academic publishing: past and future. *M@n@gement* 16(5): 739-756.
- Foster, S. 2011. Dominant traditions in international textbook research and revision. *Education Inquiry* 2(1): 5-20.
- Freire, P. 1970. *Pedagogy of the oppressed*. New York: Continuum.
- Hagner, M. 2018. Open access, data capitalism and academic publishing. *Swiss Medical Weekly* 148(w1460): 1-8.
- Heleta, S. 2016. Decolonisation of higher education: dismantling epistemic violence and Eurocentrism in South Africa. *Transformation in Higher Education* 1(1): 1-8.
- Higgs, P. 2003. African philosophy and the transformation of educational discourse in South Africa. *Journal of Education* 30(1): 5-22.
- Higgs, P. 2016. The African renaissance and the transformation of the higher education curriculum in South Africa. *Africa Education Review* 13(1): 87-101.
- Higgs, P & van Wyk, B. 2007. Lifelong learning revisited: an African educational discourse. *Education as Change* 11(1): 111-123.
- Hoffmann, H, Zhao, G, Asseng, S, Bindi, M, Biernath, C, Constantin, J, Coucheney, E, Dechow, R, Doro, L, Eckersten, H, Gaiser, T, Grosz, B, Heinlein, F, Kassie, BT, Kersebaum, K, Klein, C, Kuhnert, M, Lewan, E, Moriondo, M, Nendel, C, Priesack, E, Raynal, H, Roggero, PP, Rötter, RP, Siebert, S, Specka, X, Tao, F, Teixeira, E, Trombi, G, Wallach, D, Weihermüller, L, Yeluripati, J & Ewert, F. 2016. Impact of spatial soil and climate input data aggregation on regional yield simulations. *PLoS ONE* 11(4): 1-15.
- Horsthemke, K. 2004. 'Indigenous knowledge', truth and reconciliation in South African higher education. *The South African Journal of Higher Education* 18(3): 65-81.
- Horsthemke, K. 2017. Africanisation and diverse epistemologies in higher education discourses: limitations and possibilities. In Cross, M & Ndofirepi, A (eds.) *Knowledge and Change in African Universities, Volume 1 – Current Debates*. Rotterdam: Sense Publishers, 101-120.
- Horsthemke, K & Enslin, P. 2009. African philosophy of education: the price of unchallengeability. *Studies in Philosophy and Education* 28(3): 209-222.
- Ivić, I, Pešikan, A & Antić, S. 2013. *Textbook quality: A guide to textbook standards*. V&R Unipress: Göttingen.
- Joseph, A. 2015. Scholarly publishing in South Africa: the global south on the periphery. *Insights* 28(3): 62-68.
- Kamanzi, B. 2016. #FeesMustFall: decolonising education. South African student protesters will not stop at freezing university fees. *Al Jazeera*, 3 November.  
Available: <https://www.aljazeera.com/indepth/opinion/2016/10/feesmustfall-decolonising-education-161031093938509.html>.  
Accessed: 28 August 2019.

- Katonga, H. 2017. *Teacher education and indigenous epistemological discourse in integrated science: The case of a college of education in Zambia*. Unpublished MEd, Oslo and Akershus University College, Oslo.
- Kirkness, VJ & Barnhardt, R. 1991. First nations and higher education: The four R's — respect, relevance, reciprocity, responsibility. *Journal of American Indian Education* 30(3): 1-15.
- Larivière, V, Haustein, S & Mongeon, P. 2015. The oligopoly of academic publishers in the digital era. *PLoS ONE* 10(6): 1-15.
- Jandrić, P & Hayes, S. 2019. The postdigital challenge of redefining academic publishing from the margins. *Learning, Media and Technology*, 1-13.
- Le Grange, L. 2004. (South) African(a) philosophy of education: A reply to Higgs and Parker. *Journal of Education* 34(1): 143-154.
- Le Grange, L. 2011. The philosophy of ubuntu and education in South Africa. In Veugelers, W (ed.) *Education and Humanism: Linking Autonomy and Humanity*. Rotterdam: Sense Publishers, 67-78.
- Le Grange, L. 2016. Decolonising the university curriculum. *South African Journal of Higher Education* 30(2): 1-12.
- Lenoir, Y & Jean, V. 2012. The competency-based approach in African textbooks: an approach dominated by economic, political, and cultural interests from the North. In Hickman, H & Porfilio, BJ (eds.) *The new politics of the textbook: Critical analysis in the core content areas*. Rotterdam: Sense Publishers, 65-85.
- Letsekha, T. 2013. Revisiting the debate on the Africanisation of higher education: an appeal for a conceptual shift. *The Independent Journal of Teaching and Learning* 8(1): 5-18.
- Letsekha, T, Wiebesiek-Pienaar, L & Meyiwa, T. 2014. Reflecting on the development of context-relevant teaching tools using local and indigenous knowledge. Proceedings of 5<sup>th</sup> World Conference on Educational Sciences - WCES 2013, Rome, Italy, 5 - 8 February 2013. *Procedia - Social and Behavioral Sciences* 116: 4577-4581.
- Logan, C.J. 2017. We can shift academic culture through publishing choices. *F1000Research* 6(518): 1-27.
- Louw, W. 2010. Africanisation: A rich environment for active learning on a global platform. *Progressio* 32(1): 42-54.
- Love, K. 2012. Politics and science textbooks: behind the curtain of “objectivity”. In Hickman, H & Porfilio, BJ (eds.) *The new politics of the textbook: Critical analysis in the core content areas*. Rotterdam: Sense Publishers, 133-150.
- Mack, E, Augare, H, Cloud-Jones, LD, David, D, Gaddie, HQ, Honey, RE, Kawagley, AO, Plume-Weatherwax, ML, Flight, LL, Meier, G, Pete, T, Leaf, JR, Scout, ERF, Sachatello-Sawyer, B, Shibata, H, Valdez, S & Wippert, R. 2012. Effective practices for creating transformative informal science education programs grounded in native ways of knowing. *Cultural Studies of Science Education* 7(1): 49-70.

- Makgoba, MW & Seepe, S. 2004. Knowledge and identity: an African vision of higher education transformation. In Seepe, S (ed.) *Towards an African identity of higher education*. Pretoria: Vista University, 1-44.
- Makgoba, MW. 1997. *Mokoko: the Makgoba affair – a reflection on transformation*. Florida: Vivlia.
- Masemula, MB. 2013. *Integration of modern science and indigenous knowledge systems: towards a coexistence of the two systems of knowing in the South African curriculum*. Unpublished M.Ed. Dissertation, University of South Africa, Pretoria.
- Mather, C & Ramutsindela, M. 2007. South African geographers and the spatial division of labour. *South African Geographical Journal* 89(2): 95-96.
- Mather, C. 2007. Writing for the wider audience. *South African Geographical Journal* 89(2): 97-103.
- Mbembe, AJ. 2016. Decolonizing the university: new directions. *Arts & Humanities in Higher Education* 15(1): 29-45.
- Metz, T. 2009. The final ends of higher education in light of an African moral theory. *Journal of Philosophy of Education* 43(2): 189-201.
- Moulder, J. 1995. Universities and “Africanisation”. *South African Journal of Higher Education* 9(1): 7-8.
- Msila, V. 2014. Fostering Africanisation: a lesson of identity formation among youth, *Mediterranean Journal of Social Sciences* 5(8): 431-440.
- Muller, SM. 2017. What does an (South) African economics look like? Proceedings of: *the 2017 Scholarship of Teaching and Learning (SoTL) in the South Conference*, Johannesburg 24-27 July 2017, 87-97.
- Mutekwe, E. 2015. Towards an Africa philosophy of education for indigenous knowledge systems in Africa. *Creative Education* 6(12): 1294-1305.
- Nakusera, E. 2004. Rethinking higher education transformation in terms of an African(a) philosophy of education. *South African Journal of Higher Education* 18(3): 127-137.
- National Education Union. 2016. *Eliminating unnecessary workload around planning and teaching resources*. Report of Independent Teacher Workload Review Group, London.
- Ndofirepi AP & Cross, M. 2014. Transforming epistemologies in the postcolonial African university? The challenge of the politics of knowledge. *Journal of Education and Learning* 8(4): 291-298.
- Nichols, BH. 2012. Green texts? Earth Smarts as a tool to critically examine textbooks for environmental assumptions, distortions and missions. In Hickman, H & Porfilio, BJ (eds.) *The new politics of the textbook: Critical analysis in the core content areas*. Rotterdam: Sense Publishers, 163-175.
- Nkoane, MM. 2006. The Africanisations of the university in Africa. *Alternation* 13(1): 49-69.

- Nkomo, M. 2013. South Africa's Achilles' heel and Phoenixian possibilities: reflections on structured underdevelopment and transformation challenges. *The South African Journal of Higher Education* 27(1): 395-410.
- Nsamenang, AB & Tchombe, TMS. 2011. Generative pedagogy in the context of all cultures can contribute scientific knowledge of universal value. In Nsamenang, AB & Tchombe, TMS (eds.) *Handbook of African educational theories and practices: A generative teacher education curriculum*. Bamenda, Cameroon: Human Development Resource Centre (HDRC), 5-20.
- Ntoumi, F & Priebe, G. 2010. Africanizing scientific knowledge: the multilateral initiative on malaria as a model? *Malaria Journal* 9(3): 1-4.
- Paasi, A. 2005. Globalisation, academic capitalism, and the uneven geographies of international journal publishing spaces. *Environment and Planning A* 37: 769-789.
- Paasi, A. 2013. Fennia: positioning a 'peripheral' but international journal under conditions of academic capitalism. *Fennia* 191(1): 1-13.
- Parker, B. 2003. Back on the chain gang: some difficulties in developing a (South) African philosophy of education. *Journal of Education* 30: 23-40.
- Phiri, ADK. 2008. *Exploring the integration of indigenous science in the primary school science curriculum in Malawi*. Unpublished PhD, Virginia Polytechnic Institute and State University, Blacksburg.
- Pingel, F. 2016. *UNESCO Guidebook on textbook research and textbook revision*. Second edition. Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO).
- Prinsloo, P. 2010. Some reflections on the Africanisation of higher education curricula: a South African case study. *Africanus* 40(1): 19-31.
- Restrepo, P. 2014. Legitimation of knowledge, epistemic justice and the intercultural university: towards an epistemology of 'living well'. *Postcolonial Studies* 17(2): 140-154.
- Richards, J. C. 2001. *The role of textbooks in a language program*. Cambridge: Cambridge University Press. Available: <https://www.professorjackrichards.com/wp-content/uploads/role-of-textbooks.pdf> Accessed 30 June 2018.
- Semali, L & Stambach, A. 1997. Cultural identity in an African context: indigenous education and curriculum in East Africa. *Folklore Forum* 28(1): 3-27.
- Sennett, J, Finchilescu, G, Gibson, K & Strauss, R. 2003. Adjustment of black students at a historically white South African university. *Educational Psychology* 23(1): 107-116.
- Singh, RJ. 2015. Current trends and challenges in South African higher education. *South African Journal of Higher Education* 29(3): 1-7.
- Stein, M, Stuen, C, Carnine, D & Long, R. 2001. Textbook evaluation and adoption practices. *Reading & Writing Quarterly* 17(1): 5-23.

- Steinley, GL. 1987. A framework for evaluating textbooks. *The Clearing House* 61(3): 114-118.
- Struik, W & Borgstrom, L. 2014. *Annual book publishing industry survey 2013: business economic report*. Study on behalf of the Publishers Association of South Africa (PASA), University of Pretoria, Pretoria.
- Struik, W & le Roux, B. 2012. *Annual book industry survey 2011*. Study on behalf of the Publishers Association of South Africa (PASA), University of Pretoria, Pretoria.
- Struik, W & le Roux, B. 2013. *Annual book publishing industry survey 2012: business economic report*. Study on behalf of the Publishers Association of South Africa (PASA), University of Pretoria, Pretoria.
- Sutherland, D & Swayze, N. 2012. The importance of place in indigenous science education. *Cultural Studies of Science Education* 7: 83-92.
- Svendsen, JT. 2015. Opening up the textbook: how textbooks can be read as seismographs of dominant discourses, exemplified through an analysis of upper secondary school textbooks in Denmark. *Critical Literacy: Theories and Practices* 9(2): 33-46.
- Tabor, JA. 1992. Ethnopedological surveys-soil surveys that incorporate local systems of land classification. *Soil Horizons* 33(1): 1-5.
- Trahar, S, Juntrasook, A, Burford, J, von Kotze, A & Wildemeersch, D. 2019. Hovering on the periphery? 'Decolonising' writing for academic journals. *Compare: a Journal of Comparative and International Education* 49(1): 149-167.
- Ukwuoma, UC. 2016. Educational development of Africa: changing perspectives on the role of indigenous knowledge. *Research in Pedagogy* 6(1): 109-121.
- U.S. Census Bureau. 2004. *Global population profile: 2002*. International Population Reports WP/02. Washington, DC: U.S. Government Printing Office. Available: <https://www.census.gov/prod/2004pubs/wp-02.pdf>  
Accessed 9 September 2019.
- van Wyk, B & Higgs, P. 2004. Towards an African philosophy of higher education. *South African Journal of Higher Education* 18(3): 196-210.
- van Wyk, J. 2002. Indigenous knowledge systems: implications for natural science and technology teaching and learning. *South African Journal of Education* 22(4): 305-312.
- Venezky, RL. 1992. Textbooks in school and society. In Jackson, PW (ed.) *Handbook of research on curriculum: A project of the American educational research association*. New York: Macmillan, 436-461.
- Visser, G. 2007. On citations, rating games and other pesky animals: which zoo for South African human geography? *South African Geographical Journal* 89(2): 135-144.
- Vygotsky, L. 1978. Interaction between learning and development. In Cole, M, John-Steiner, V, Scribner, S & Souberman, E (eds.) *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press, 79-91.

- Waghid, Y. 2004. African philosophy of education: implications for teaching and learning. *South African Journal of Higher Education* 18(3): 56-64.
- Waghid, Y. 2014. *African philosophy of education reconsidered: on being human*. New York: Routledge.
- Wang, HA. 1998. Science textbook studies reanalysis: teachers "friendly" content analysis methods? In Proceedings of: *71<sup>st</sup> Annual Meeting of the National Association for Research in Science Teaching*, San Diego, United States, 19-22 April 1998, 1-20.
- Wartofsky, MW. 1979. *Models: representation and the scientific understanding*. Dordrecht: D. Reidel Publishing Company.
- Wiley & Sons Inc. 2019. *Essential soil science: a clear and concise introduction to soil science*. Promotional webpage: Home/ Subjects/ Earth & Space Sciences/ Geology & Geophysics/ Soil Science & Geoarchaeology. Available:  
<https://www.wiley.com/en-us/Essential+Soil+Science%3A+A+Clear+and+Concise+Introduction+to+Soil+Science-p-9780632048854>  
Accessed 9 September 2019.
- World Bank. 2019. *World bank country and lending groups*. Available:  
<https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>  
Accessed 26 March 2019.
- Zinyeka, G. 2014. *The epistemological basis of indigenous knowledge systems in science education*. Unpublished PhD, University of Pretoria



This work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>