

EXPLORING THE STUDENT AND SOCIAL ACCOUNTABILITY OF THE LIFE SCIENCES CURRICULUM: A CASE OF HIV/AIDS

Lindelani Mnguni

University of South Africa, South Africa

E-mail: mngunle@unisa.ac.za

Abstract

Science is generally expected to respond to students and societal needs by adopting student and social accountability principles. Therefore, school science curricula are revised regularly to address emerging socio-economic, political, and scientific issues. Similarly, the National Curriculum and Assessment Policy Statement of South Africa was introduced to foster a student and social accountable education that adopts relevant curriculum ideologies. Partly, it attempts to equip students with relevant skills and knowledge related to emerging societal challenges such as HIV/AIDS. The aim of the present research, therefore, was to determine the extent to which the curriculum is student and social accountable concerning HIV/AIDS. The current research explored the extent to which HIV/AIDS knowledge was presented in the CAPS Life Sciences curriculum and selected textbooks, and how curriculum ideologies informed this presentation of HIV/AIDS knowledge. Data were collected from the Life Sciences CAPS document and selected textbooks. Results revealed several HIV/AIDS-related topics, which were taught in Life Sciences. While the literature suggests that the citizenship-centered ideology is most relevant for student and social accountability, the present study found that the Life Sciences curriculum adopted a predominantly discipline-centered ideology. It is concluded that Life Sciences may not provide students with HIV/AIDS-related skills and knowledge required in a student and socially accountable curriculum.

Keywords: curriculum ideologies, HIV/AIDS education, life sciences, school science curriculum.

Introduction

Countries around the world regularly revise their education policies and school curricula to respond to emerging socio-economic, political, and scientific issues (Hoeg & Bencze, 2017; Pietarinen, Pyhältö, & Soini, 2017). Similarly, the dawn of democracy in South Africa has seen school curriculum revisions which are aimed at aligning the education system with the democratic constitution of the country to ensure that the curriculum is student accountable and socially accountable. To this end, at least three major curriculum reforms have taken place, including the adoption and revision of Curriculum 2005, National Curriculum Statement (NCS) and the current Curriculum and Assessment Policy Statement (CAPS). The primary contention behind these curriculum reforms can be traced back to Hebert Spencer's question, "what knowledge is of most worth," particularly in the 21st century, and should, therefore, be included in the curriculum (Spencer, 1896, p. 21). Dowden (2013, p. 2) suggests that the curriculum should respond to "the needs of the individual student, the demands of wider society, and the vested interests of subject areas" (Dowden, 2013, p. 2).

Consequently, some countries use the school science curriculum to respond to various emergent socio-scientific issues. Christenson and Chang Rundgren (2015), for example, proposed that curriculum could be used to facilitate students' argumentation skills using content related to genetically modified organisms. Similarly, Atabey and Topcu (2017) used a science curriculum to teach primary school learners about global warming. In some instances,

the school science curriculum is used to promote social justice, citizenship, and democracy (Nuangchalerm & El Islami, 2018). Within the South Africa context, one of the significant socio-scientific issues which has impacted significantly on the socio-economic, political and scientific landscape is HIV/AIDS (Kharsany & Karim, 2016), which has led to the death of thousands of citizens over the last three decades (Statistics South Africa, 2018). To this end, HIV/AIDS is one of the significant social threats to South Africa in the 21st century. It is, therefore, imperative that the curriculum should respond to HIV/AIDS by providing learners with cutting-edge knowledge and skills required to deal with the socio-economic challenges caused by HIV/AIDS. The extent to which this is the case currently has been addressed by various scholars who suggest that the curriculum may not be playing a significant role in the fight against HIV/AIDS (e.g., Mnguni & Abrie, 2012; Mnguni, Abrie, & Ebersohn, 2016). The underlying cause of this misalignment between the curriculum and social needs has not been extensively explored. The present research, therefore, examined the extent to which the school curriculum is student and socially accountable by determining the curriculum ideologies that foreground the presentation of HIV/AIDS knowledge.

Student and social accountability can be defined as the commitment to ensuring that education including teaching, learning, and research are directed toward addressing existing socio-economic and educational needs of students and societies (Lindgren & Karle, 2011). A student and social accountable curriculum, therefore, would be one where the curriculum ideology is student and citizenship-centered. A curriculum ideology refers to the underlying values of the curriculum as reflected on the overarching purpose of education, the characterization of the student and the teacher and their respective roles during teaching and learning as well as the nature, function, and purpose of knowledge, instructional process, and assessment (Schiro, 2013).

While curriculum reform intentions may include student and social accountability, the extent to which teaching and learning in school science is student and social accountability remains to be explored in great detail, both in South Africa and other countries. For example, Bird (2014) suggests that science should go beyond responsible conduct of research to include macroethics, which provides for social responsibility of science and scientists as an ethical standard. Macroethics is based on the “expectation that scientists will pay attention to the health, safety, and welfare of the public and the environment” as reflected in the Uppsala Code of Ethics for Scientists (Bird, 2014, p. 169). The extent to which school science responds to macroethics, however, remains to be understood. Therefore, in light of the HIV/AIDS challenge in South Africa, the present study sought to research the extent to which HIV/AIDS is addressed in the school science curriculum, as a preliminary effort to understanding science’s responsiveness to social issues.

Problem Statement and Rationale

HIV/AIDS was of interest in the present research because official reports suggest that in 2018, the prevalence of HIV in South Africa was 13.06% compared to 10.74% in 2008 (Statistics South Africa, 2018). It is also reported that among women aged 15 to 49, approximately 23% are living with HIV. Furthermore, 19% of adults aged between 15-49 are HIV positive. These figures suggest that HIV/AIDS is one of the significant social threats for South Africa, which must be addressed, amongst other means, through a student and socially accountable education. However, the extent to which the current CAPS science curriculum can respond to the HIV/AIDS challenges faced by the youth remains to be researched in great detail. It is on this basis that the present research explores the ideology that informs the integration of HIV/AIDS in the science curriculum.

The concerns about the extent to which the curriculum is student and socially accountable spiked recently when students engaged in what is locally known as *#FeesMustFall* protests. In these protests students from universities and schools across the country called for rigorous nation-wide decolonization and Africanisation of the curriculum across the entire education system (Le Grange, 2016; Luescher, Loader, & Mugume, 2017). Such a curriculum, they argued, would address students and society's immediate socio-economic needs, including social empowerment concerning everyday issues such as health, safety, and job creation. Subsequently, education authorities and the government are currently engaged in various projects that seek to explore the modalities related to possible curriculum reforms.

In light of the above discourse; therefore, the current researcher posits that the extent to which the current South African school curriculum is student and socially accountable requires urgent attention. Additionally, there is a need to explore the extent to which subject-specific curricula address the needs of students and societies concerning everyday socio-economic dynamics. Perhaps more specific to the present research is the need to explore the extent to which the science curricula are student and socially accountable concerning socio-scientific issues such as HIV/AIDS.

Findings of this research could necessitate a global effort in addressing student and social accountability in science. Additionally, findings could contribute to discourses among researchers, curriculum designers, and society in general about the role of science education in social reform. Such discussions could lead to renewed interest in designing and implementing curriculum and instructional design strategies for the empowerment of students and societies in response to emerging global and local socio-scientific issues.

The Aim of the Present Research

The present research, therefore, sought to determine the extent to which the Life Science is student and socially accountable. This was done by exploring the extent to which HIV/AIDS knowledge is presented in the CAPS Life Sciences curriculum and textbooks, and how curriculum ideologies inform this presentation of HIV/AIDS knowledge. The research question framing this research asks: *To what extent is the Life Sciences student and socially accountable as reflected in the curriculum ideologies that inform the presentation of HIV/AIDS knowledge in the CAPS curriculum and related textbooks?*

Theoretical Framework

The present research adopted Mnguni's (2018a,b) curriculum ideologies as a framework for exploring the extent to which the Life Sciences curriculum is student and socially accountable (table 1). As stated earlier, a curriculum ideology refers to the underlying values of the curriculum as reflected on the overarching purpose of education, the characterization of the student and the teacher and their respective roles during teaching and learning as well as the nature, function and purpose of knowledge, instructional process and assessment (Schiro, 2013). Mnguni (2018a,b) and Schiro (2013) suggest that there are at least four curriculum ideologies that inform school curricula. These curriculum ideologies are the discipline-centered ideology, service-centered ideology, student-centered ideology, and citizenship-centered ideology. As suggested by scholars (e.g., Good, 1959; Schiro, 2013; Tanner & Tanner, 1987; Waks, 2003), a curriculum should specify the subject content matter and its purpose, the instructional process, the role of teachers, the role of students as well as the assessment process. These are therefore uniquely defined in each of the four curriculum ideologies. To this end, the discipline-centered ideology primary objective is to enhance the development of the discipline by transmitting discipline-specific ontology and epistemology to students with the view to initiate them into

the discipline as certified members through the attainment of relevant qualifications (Cotti & Schiro, 2004; Mnguni, 2018b; Schiro, 2013). The service-centered ideology seeks to prepare students for their roles in service delivery for society by helping them develop relevant practical skills and acquire relevant knowledge (Schiro, 2013). The citizenship-centered ideology seeks to bring about social transformation and empowerment of citizens beginning with students, by teaching social reconstructionist epistemology and ontology (Cotti & Schiro, 2004). It attempts to provide students with knowledge and skills required to identify, transform, and/or reconstruct social ills, norms, and values to enhance social empowerment (Kliebard, 2004). The student-centered ideology adopts a view that places students at the center of teaching and learning by supporting student development concerning his/her individual and social needs. In this ideology, teachers are tasked with nurturing student development and facilitate social and individual learning (Schiro, 2013). Researchers generally agree that the student-centered and citizenship-centered ideologies are most suitable for a student and socially accountable curriculum (Cotti & Schiro, 2004; Mnguni, 2013; Schiro, 2013).

The four curriculum ideologies, therefore, were adopted in the current study to determine the extent to which the Life Sciences curriculum is student and socially accountable in relation to HIV/AIDS knowledge. Research methods followed in this regard are discussed below.

Table 1. Curriculum ideologies and their characteristics (adapted from Mnguni, 2018a,b).

Components of the curriculum	Discipline-centered ideology	Service-centered ideology	Student-centered ideology	Citizenship-centered ideology
Purpose for knowledge	Understanding reality	Performing tasks	Actualizing oneself	Interpreting and reconstructing society
Nature of knowledge	Objective reality as explained by academic disciplines	Normative objective reality as socially understood	Individuals' creative meaning in response to experience	Individuals' interpretation of society's past, present, and future
Purpose and nature of instruction	Mastering discipline-specific knowledge for the advancement of the discipline	Understanding social principles and acquiring knowledge for providing predetermined services to society	Understanding oneself and acquiring and/or constructing knowledge for individual growth	Understanding social principles and acquiring and/or constructing knowledge for social transformation
Role of the student during instruction	Students viewed relation to standardized norms as they passively absorb pre-existing knowledge which transforms mindsets	Students viewed relation to standardized norms as they actively learn predetermined knowledge which transforms their behavior	Students viewed as individuals as they actively construct knowledge which transforms their mindsets	Students viewed relation to standardized norms as they actively learn emerging knowledge which transforms their mindsets and behavior
Role of the teacher during instruction	Accurate 'representor' of the discipline who transmits didactic knowledge to stimulate uniformity by directly implementing the curriculum to advance students in the discipline	Learning supervisor who follows programmed instruction to stimulate uniformity by directly implementing the curriculum to prepare students to perform tasks.	Growth facilitator who adapts the curriculum according to students' needs to stimulate growth and diversity	Visionary and colleague who adapts the curriculum according to social concerns to effectively transfer a social vision by stimulating uniformity to prepare students for their roles as change agents
Purpose and nature of assessment	Used at the end of instruction to rank students for a future in the discipline through norm-referenced objective assessment	Used at the end of instruction to certify that students have acquired skills as determined through criterion-referenced objective assessment	Used during instruction to diagnose students' abilities and to facilitate growth through informal subjective diagnosis	Used during instruction to measure student progress concerning ability using informal subjective diagnosis

Research Methodology

General Background

The realist research paradigm was adopted in the present research as a lens through which reality is viewed. Realism allows for the use of mixed methods as it integrates elements of different research paradigms (Denzin & Lincoln, 1994; Krauss, 2005). For example, similar to positivism, realism assumes that reality is independent of the researcher (Healy & Perry, 2000; Krauss, 2005). However, similar to critical theory and constructivism, realism also accepts that reality is virtual in that it is context specific and may be socially constructed shaped by social, economic, ethnic, political, cultural and gender values crystallized over time (Healy &

Perry, 2000). Because of these ontological and epistemological views, realism accommodates a mixed-methods approach to research as is the case in the present study.

Sampling and Data Collection

As a starting point, the Life Sciences CAPS document (Department of Basic Education, 2011), which is the official curriculum document mandated by the South African government Department of Basic Education was purposively sampled and analyzed as a way of identifying topics in which HIV/AIDS knowledge is taught. By identifying these topics, the researcher had a structured approach to identifying section of the textbooks that were analyzed.

A purposive sampling approach was then used to sample three Life Sciences textbooks for document analysis. Life Sciences, previously known as Biology, is an optional school science subject which is taught in Grades 10 to 12. This subject was purposively selected in the research because it is the only South African basic education subject where students learn biology content related to HIV/AIDS.

The three textbooks analyzed were selected randomly from the list of textbooks accredited by the Department of Basic Education for use in teaching and learning Life Sciences. These are:

- *Focus on Life Sciences* (Clitheroe, Doidge, Marsden, van Aarde, Ashwell, Buckley, & Dilley, 2008).
- *Shuters Life Sciences Grade 11 Students Book* (Ayerst, Langley, Majozi, Metherell, Raciborska, & Smith, 2008).
- *Solutions for All Life Sciences* (McKay, Webb, Marchant, Freedman, Simenson, de Fontaine, & van der Merwe, 2012).

Data Analysis

The analysis of the CAPS document and textbooks was done using an instrument adapted from Wolff and Mnguni, (2015). The instrument is made up of two sections. The first section has semi-structured items through which the researcher identified, classified, and interpreted text and visual models that represent HIV/AIDS-related knowledge. This section of the instrument focused on how the textbooks describe:

- the nature and characteristics of HIV;
- the nature and attributes of AIDS;
- mechanisms of HIV infection;
- treatment of AIDS;
- strategies for the prevention of HIV infection; and,
- skills that students must develop concerning HIV/AIDS.

The second part of the instrument has semi-structured items which were used to determine the curriculum ideology that foregrounds the presentation of the HIV/AIDS knowledge in the textbooks. The curriculum ideology foregrounding the CAPS document was not studied in the present research as this has already been done in other studies (e.g., Mnguni, 2013; 2018). In the current research, therefore, the instrument was used to determine the:

- purposes of teaching HIV/AIDS content;
- role of the students and teachers in teaching and learning about HIV/AIDS;
- instructional strategies recommended for teaching about HIV/AIDS; and,
- assessment strategies and the purpose of assessment related to HIV/AIDS.

Document analysis in the present research, therefore, meant the researcher analyses the textbooks to formulate responses to the above items inductively using verbatim and narrated

extracts from the textbooks. A keyword search using *AtlasTi* was used to identify these text extracts. Emerging responses were then quantified and classified into the different ideologies as described in table 1.

Validity and Credibility

The use of a standard instrument for analyzing all three textbooks improved the consistency, credibility, and validity of the results. This was also supported by the fact that the instrument in its original form had been used in previous research (e.g., Wolff & Mnguni, 2015). However, in the present study, the instrument was also piloted on a different textbook which was not part of this study. This was done to ensure that the researcher is familiar with the instrument's content and can use it effectively. Additionally, a panel of three other experts was asked to determine the face and content validity of the instrument before its use. The same panel also moderated the results of the study as generated by the researcher. Through these measures, the present researcher is confident that the results are credible and valid.

Research Results

Content Knowledge Related to HIV/AIDS in the CAPS Document

Results show that Life Sciences has four knowledge strands (table 2; Department of Basic Education, 2011, p. 10). HIV/AIDS-related content is taught in all these strands. It is however explicitly taught only in Grades 11 and 12 (table 2). The term "HIV" is mentioned twice in the CAPS document (Department of Basic Education, 2011) under the "Biodiversity and Classification of Microorganisms" topic in Grade 11 (Department of Basic Education, 2011, p. 39) and under "Evolution by Natural Selection" in Grade 12 (p. 61). The CAPS document refers to HIV in the Grade 11 curriculum concerning diseases caused by viruses. However, in Grade 12, HIV is mentioned concerning the evolution of bacteria and viruses, including where the curriculum discusses the development of HIV resistance to anti-retroviral drugs. The term "AIDS" is mentioned only once in the CAPS document under "Biodiversity and Classification of Microorganisms" topic in Grade 11 (Department of Basic Education, 2011, p. 39). Within the CAPS document, there is no evidence that HIV/AIDS knowledge is taught to foster the construction of knowledge for individual or societal behavioral change.

Table 2. A summary of topics taught in Life Sciences (Adapted from the Department of Basic Education, 2011).

Strands	Life at molecular, cellular, and tissue level	Life processes in plants and animals	Diversity, change, and continuity	Environmental studies
Grade 10	Chemistry of life Inorganic compounds Organic compounds Cell - unit of life* Cell division (mitosis) Plant and animal tissues	Support and transport systems in plants Support systems in animals The transport system in mammals*	Biodiversity and classification* History of life on Earth	Biosphere to ecosystems
Grade 11**		Energy transformations to support life: photosynthesis Animal nutrition Energy transformations: respiration Gas exchange Excretion	Biodiversity - classification of microorganisms** Biodiversity - plants Reproduction - plants Biodiversity - animals	Population ecology* Human impact on the environment: current crises
Grade 12**	DNA code of Life* RNA and protein synthesis* Meiosis	Reproduction in invertebrates Human reproduction* Nervous system Senses Endocrine system Homeostasis	Darwinism and Natural Selection** Human evolution	Human impact on the environment: current crises Grade 11

** indicate instances where HIV or AIDS are mentioned explicitly in the CAPS document

* Indicates cases where textbooks or teachers could integrate HIV or AIDS during lessons.

Skills Related to HIV/AIDS in the CAPS Document.

In addition to teaching content knowledge reflected in the CAPS document and textbooks, Life Sciences also seeks to help learners develop various skills within its three broad subject specific aims. These skills could be used in acquiring, constructing and applying HIV/AIDS knowledge in everyday life. Results show that skills developed in Life Sciences are classified as cognitive skills, science process skills and skills for the application of knowledge in everyday life (Department of Basic Education, 2011, p. 13-18), as summarized in Table 3.

The CAPS document suggests that the cognitive skills are developed to assist students to “acquire knowledge” and “understand and make connections between ideas and concepts to make meaning of life sciences” (Department of Basic Education 2011, p. 13-14). This view suggests that there is already existing knowledge that students must “acquire” and make meaning of rather than “construct” on their own. This is typical of discipline-centered ideology where knowledge is regarded as an “objective reality as interpreted by academic disciplines” and students must “master such discipline-specific knowledge” (Table 1). The service-centered ideology is also reflected in that students are expected to “follow instructions by adhering to safety rules when handling apparatus and making observations (Table 3). This is because the service-centered ideology is concerned with training students to “performing tasks” where teachers are viewed as “supervisors who follow programmed instruction to stimulate

uniformity” (see Table 1). The student-centered and social reconstruction ideologies were observed in that students develop the ability to “apply knowledge of life sciences in new and unfamiliar contexts, by using information in a new way; and applying knowledge to new and unfamiliar contexts” (Table 3). This suggests that students will be able to use knowledge as “personal creative meaning in response to experience” which is a characteristic of the student-centered ideology (see table 1). This is also applicable to the citizenship-centered ideology in that students learn the ability to “interpret society's past, present and future” by “acquiring and/or constructing knowledge for social transformation” (Table 1).

Table 3. HIV/AIDS-related skills reflected in the CAPS document (adapted from the Department of Basic Education, 2011).

Type of skills	Skills	Related curriculum ideologies
Cognitive skills	Acquire knowledge including accessing information by selecting key ideas, recalling and describing phenomena	Discipline-centered ideology
	Create meaningful connections between ideas and concepts by building a conceptual framework of ideas by organizing knowledge and recognizing patterns	Discipline-centered ideology Service-centered ideology
	Apply knowledge in new contexts by using and applying knowledge to novel contexts	Discipline-centered ideology Service-centered ideology Student-centered ideology Citizenship-centered ideology
	Analyze, evaluate and synthesize scientific knowledge	Discipline-centered ideology Service-centered ideology Student-centered ideology Citizenship-centered ideology
Science process skills	Follow instructions and adhere to guidelines.	Discipline-centered ideology Service-centered ideology
	Handle equipment and/or apparatus	Discipline-centered ideology Service-centered ideology
	Make and record observations	Discipline-centered ideology Service-centered ideology Student-centered ideology Citizenship-centered ideology
	Record information/data	Discipline-centered ideology Service-centered ideology
	Measure using appropriate instruments and procedures	Discipline-centered ideology Service-centered ideology
	Interpret information	Discipline-centered ideology Service-centered ideology Student-centered ideology Citizenship-centered ideology
	Design and/or plan investigations or experiments	Discipline-centered ideology Service-centered ideology Student-centered ideology Citizenship-centered ideology

	Understanding the history, importance, and relevance of scientific discoveries	Discipline-centered ideology Service-centered ideology
Skills for the application of knowledge	Understand the relationship between indigenous knowledge and scientific knowledge	Discipline-centered ideology Service-centered ideology Student-centered ideology Citizenship-centered ideology
	Appreciate the value and application of Life Sciences knowledge in the industry and everyday life, and career opportunities in Life Sciences	Discipline-centered ideology Service-centered ideology Student-centered ideology Citizenship-centered ideology

Content Knowledge Related to HIV/AIDS in the Textbooks

Textbook analysis, however, revealed that HIV/AIDS-related content could be taught in other topics as shown in the CAPS document (Table 2). For example, teachers could use the structure of the cell (in Grade 10), immunology (in Grade 11 under Biodiversity and classification of microorganisms), cell division (in Grade 10 and 12) and DNA code of Life, RNA and protein synthesis (in Grade 12) to teach about HIV target cells, its binding mechanisms and entry to the target host cell as well as its reproduction and multiplication (Figure 1). It was, however, noteworthy that textbooks are not consistent in their presentation of HIV/AIDS-related content. For example, the term HIV is mentioned 19 times in the Focus on Life Sciences and only nine (9) times in Shutters Life Sciences. Similarly, AIDS is mentioned 12 times in Focus on Life Sciences and only six (6) times in Shutters Life Sciences. Some topics which are identified in the literature (Audesirk, Audesirk, & Byers, 2004; Dimmock, Easton & Leppard, 2007) as significant for learning about HIV/AIDS were not integrated into the CAPS document and in the textbooks (Figure 1).

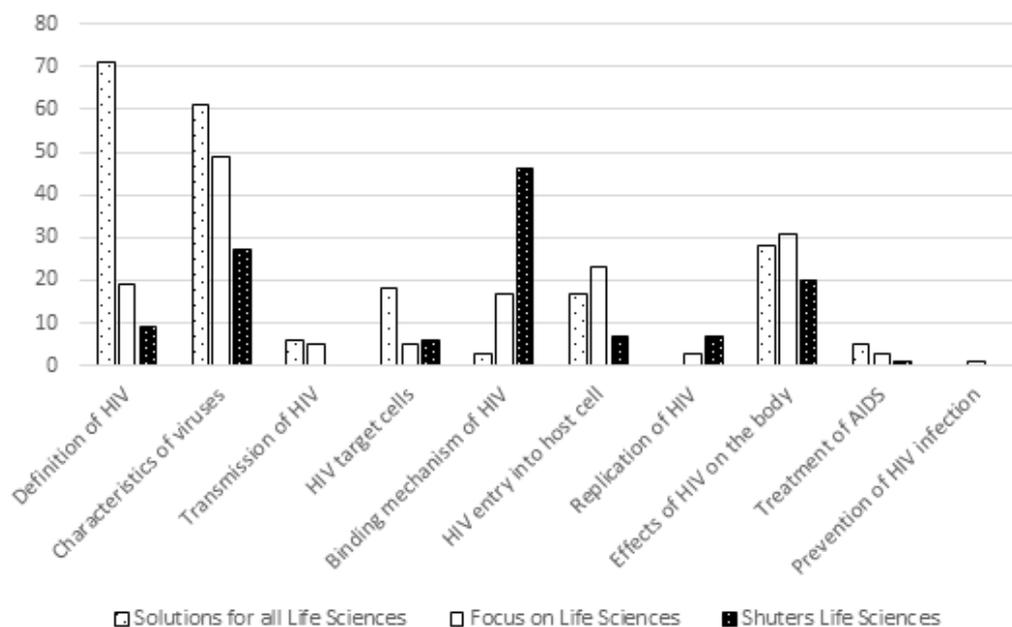


Figure 1. The presentation of HIV/AIDS-related concepts and their appearance frequency in grade 11 textbooks.

The manner in which HIV/AIDS-related content is presented suggests that Life Sciences generally follows a discipline-centered ideology where knowledge is presented as an objective reality that is factual as discovered by the authorities in the disciplines. The purpose of learning this HIV/AIDS is, therefore, to help learners acquire this factual knowledge (see table 1). However, the textbook analysis shows that other ideologies, such as service-centered and social-reconstruction ideologies are also reflected. Results show, for example, that a real-life case study is used to represent and explain patterns of the prevalence of HIV/AIDS in South Africa (e.g., *Focus on Life Sciences*). Information related to the characteristics of HIV/AIDS which could be used by learners to “understand reality”, and “interpret... society” is presented in a manner typical in the discipline-centered and citizenship-centered ideologies respectively (see table 1). Furthermore, the use of knowledge in this regard as “normative objective reality as socially interpreted” to “understand social principles and acquiring knowledge for providing predetermined services to society” and for “social transformation” is typical of service-centered and citizenship-centered ideologies (see table 1). These observations suggest that concerning teaching about HIV/AIDS the curriculum reflects the discipline-centered ideology while the textbooks reflect various ideologies.

It was not possible to classify the concepts reflected in the CAPS document into the different ideologies as the CAPS document only presents topics and does not offer the context in which they are to be taught. However data shows that based on Schiro’s (2013) characterization of the curriculum ideologies (table 1) and the frequency of appearance of HIV/AIDS-related concepts, in Shuters Life Sciences, the discipline-centered ideology was found to be the most depicted ideology in the HIV/AIDS-related concepts (63%) compared to citizenship-centered (21%), service-centered (11%) and student-centered (5%) ideologies. The same pattern was also found in *Focus on Life Sciences* where the discipline-centered ideology is the most reflected ideology in the HIV/AIDS-related concepts (52%) compared to citizenship-centered (31%), service-centered (10%) and student-centered (7%) ideologies.

Discussion

Previous research has shown that the Life Sciences curriculum adopts various ideologies (e.g., Mnguni, 2013). Before the present research what had not been studied however are the curriculum ideologies reflected in the science textbook, in general, and in Life Sciences in particular. Furthermore, the curriculum ideology informing content knowledge in the subject had also not been explored. To this end, the present research examined the extent to which HIV/AIDS knowledge is presented in the Life Sciences and the curriculum ideology that inform this presentation of HIV/AIDS knowledge.

Similar to Mnguni (2013, 2018a), the present research has found that the Life Sciences textbooks integrate the four curriculum ideologies to inform the nature of content knowledge presented and how that knowledge is presented. The present research also shows that HIV/AIDS-related content is presented predominantly from a discipline-centered ideology. This is important to note given the fact that previous research has suggested that in the citizenship-centered ideology students acquire knowledge and skills that enable them to actively identify and solving social ills (Schiro, 2013). In the context of the present research, such social ills may include risk behavior related to HIV/AIDS. Consequently, it would be ideal that a student and socially accountable curriculum would present HIV/AIDS-related content in line with the principles of the student-centered and citizenship-centered ideologies. The present research, however, has found that this is not the case in the Life Sciences curriculum and textbooks.

Previous research has also shown that HIV/AIDS knowledge taught within school curricula does not seem to affect behaviors (Anderson & Beutel, 2007). Mnguni and Abrie (2012) suggest that this is probably because such knowledge lacks depth and is presented in a mode that

is not relevant to students. Other scholars also argue that HIV/AIDS knowledge is presented in the school curriculum as academic knowledge rather than functional knowledge (Wolff & Mnguni, 2015). What these studies have not shown are the underlying reasons that foreground how HIV/AIDS knowledge is presented in the curriculum. For example, the extent to which the curriculum promotes the adoption of student and socially accountable content knowledge has, before the present research, not been explored. The current study, however, has found that both the student-centered and citizenship-centered ideologies are not the primary ideologies that foreground the integration of HIV/AIDS knowledge. Instead, it is the discipline-centered ideology that foregrounds this content. The researcher, therefore, posits that the textbooks and teachers will most likely not be able to present functional HIV/AIDS knowledge which could lead to behavioral changes among students. This is because the curriculum document is meant to guide textbook authors and instructional designers in identifying content knowledge that must be taught in the subject.

The high prevalence of HIV/AIDS in South Africa suggests that the schooling system may not be able to provide students with sufficient skills for safe behavior adequately. This may be because the majority of students rely on school-based biology knowledge to make decisions related to HIV/AIDS (Mnguni & Abrie, 2012). This highlights the need to ensure that students develop skills required to use scientific knowledge in making informed decisions that support safe behavioral practices. According to Schiro (2013), the student-centered ideology is most suitable for this purpose as it allows students to understand themselves by acquiring and/or constructing knowledge for individual growth which transforms their mindsets and ultimately behaviors. Interestingly, the present research has found that the student-centered ideology is least reflected on HIV/AIDS-related knowledge and skills. As such, it is plausible to suggest that student may not be developing the relevant and necessary skills for constructing knowledge and decision making. Consequently, students continue to adopt risk behaviors. This is in line with Mnguni, Abrie and Ebersohn's (2016) assertion that the availability of HIV/AIDS knowledge is not always related to self-reported safe behavioral preferences.

Conclusions

Critical to the present research, therefore, is that the Life Sciences curriculum recommends vital knowledge and skills related to HIV/AIDS which is presented in the textbooks. This knowledge is regarded as relevant because it is in line with socio-political needs of the country as reflected in the South African constitution. It was however found that in spite of presenting some relevant HIV/AIDS knowledge, the subject may not be student and socially accountable. This is because the present research has found that HIV/AIDS-related content is presented predominantly from a discipline-centered ideology. The student-centered and citizenship-centered ideologies are not used to foreground HIV/AIDS knowledge in the Life Sciences curriculum and textbooks. Consequently, it is unlikely that the presented functional HIV/AIDS knowledge could lead to behavioral changes among students. In light of the findings, the researcher posits that Life Sciences may not be macroethical as it does not address a critical socio-scientific issue that is affecting the global society generally and the South African society in particular.

The researcher, therefore, believes that further research is required globally to determine the social responsiveness of school science education. The actual role of school science in empowering the youth and their societies requires thorough investigation. Policy makers and curriculum designers should also reflect on criteria used to accredit textbooks, mainly reflecting on the extent to which textbooks reflect the social responsiveness intended in curriculum statements. Strategies for ensuring that textbooks and curricula are aligned to students' emerging socio-scientific needs should also be explored. Ultimately, based on the findings of the present

research, the researcher recommends that further research be conducted to determine the extent to which school science is student and socially accountable.

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Lindelani Mnguni

PhD, Associate Professor, Department of Science & Technology Education, University of South Africa, 7-15 AJH vd Walt Building, Muckleneuk Campus, UNISA Pretoria, South Africa.

E-mail: mngunle@unisa.ac.za

ORCID : <http://orcid.org/0000-0002-0361-0002>