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The curriculum ideology of the South African secondary school Biology

Lindelani Mnguni
Department of Science, Mathematics and Technology Education, University of Pretoria, South Africa
lindelani.mnguni@up.ac.za

South Africa has had a number of curriculum reforms since 1994 which have been based on both political and education grounds. However, there is a dearth of knowledge about the nature of the envisioned graduates, especially with respect to social challenges. This can be addressed by exploring the curriculum ideology which outlines the vision of subjects within an education system by clarifying the aims of the subject, the content knowledge taught, the instructional process, the roles of teachers and students, as well as the assessment processes. There are at least four curriculum ideologies, namely, the scholar academic ideology, efficiency ideology, student-centred ideology and social reconstruction ideology. The aim of the current study was to investigate the curriculum ideology of the Grade 11 Biology curriculum by analysing the Curriculum and Assessment Policy Statement. Results show that Biology adopts a multi-curriculum ideology approach with greater emphasis on scholar academic and student-centred ideologies. Characteristics of the social reconstruction ideology were the least observed. This implies that Biology is designed to advance the discipline but will probably not lead to social and student empowerment with regard to current social challenges.

Keywords: Biology, CAPS; efficiency ideology; Grade 11; scholar academic ideology; social reconstruction ideology; South Africa; student-centred ideology

Introduction

Nelson Mandela stated that education is the tool that can be used to change the world. This was based on the view that a country is as good as its education. One wonders therefore about the form of graduates that South Africa will produce as a result of the introduction of the new Curriculum and Assessment Policy Statement (CAPS). The introduction of this new curriculum document is one of several significant curriculum reforms in South Africa since 1994, which are generally aimed at "redressing the inequalities and injustices caused by the apartheid regime policies, using education as its tool" (Bantwini, 2010:84). The objective of these curriculum reforms range from cleansing of syllabi from racist language and controversial and outdated content to the introduction of the outcomes-based education curriculum which promotes social justice as defined in the Constitution of the Republic of South Africa (De Villiers, 2011; Van Deventer, 2009). Nevertheless, regardless of these curriculum reforms, a number of socio-scientific challenges appear to be prospering. These include health problems, environmental mismanagement and poverty. The persistence of these social challenges is reflected in Hodson's (2004:2) argument that education

> "is often regarded as a body of knowledge that is transmitted by teachers, memorized by students, and reproduced on demand in examinations. Regrettably, education is often portrayed as the depersonalized and disinterested pursuit of objective truth, independent of the society in which it is practised and untouched by ordinary human emotions, values, and conventions."

One wonders therefore whether the curriculum reforms in South Africa are able to urgently address current social challenges through student development. Given this paradox, the aim of this study was to investigate the overarching objective of the South African school's curriculum, with specific reference to the Grade 11 Biology curriculum. Of interest in the study reported here was the formal curriculum which, according to Goodlad and Associates (1979), is prepared by curriculum designers and approved by authorities for adoption to their institutions. This formal curriculum is documented in curriculum statements and details statements of goals which are subject to various interpretations by teachers and others who work with them.

Objectives of education

There are varying views about the objective of education in general. In the 1800s, Lester Frank Ward argued that transmitting cultural knowledge should be the main objective of education (Cotti & Schiro, 2004). Charles Eliot attested to this by suggesting that, in order for social progress to occur, the intel-

ligence of students must be empowered allowing for greater power to think (Ravitch, 2000). Eliot further indicated that there needs to be a "plurality and autonomy of academic disciplines and the associated knowledge" (Schiro, 2008:33). However, in the 1900s, Franklin Bobbitt argued that students should learn to use knowledge and techniques of production developed by industries. Further still, Jean-Jacques Rousseau believed that education should facilitate the growth of students by helping them develop their skills and abilities, adding that students should have a role in directing their own education (Kliebard, 1986). Lester Frank Ward, on the other hand, believed that education should be used to enhance intelligence and development of problem-solving skills (Schiro, 2008). With these varying views, there is evidently no consensus on what the objective of education should be.

Roberts (1982:245) classifies the various possible objectives of education in what he calls curriculum emphases, which are "coherent messages to the student about education...that constitute objectives which go beyond learning the facts, principles, laws and theories of the subject matter itself – objectives which provide an answer to the student question: 'Why am I learning this?'" Roberts (1982) provides seven different curriculum emphases in science education. These are the everyday coping emphasis; structure of science; science education and decisions; scientific skill development; correct explanations; and self as explainer emphasis. On the same subject, Schubert (1996:169), who asks the question "What is worth knowing … worth experiencing, doing, being", identifies four curriculum traditions, namely, the intellectual traditionalist, social behaviourist, experientialist and the critical reconstructionists. More recently, Schiro (2008) refers to the objectives of education as curriculum ideologies. He defines a curriculum ideology as beliefs about what should be taught, what the outcomes should be and what the purpose for teaching should be (Schiro, 2008). The curriculum ideology according to Schiro (2008) provides a direction for the practices of a school, classroom and subject areas. Therefore, curriculum ideology outlines the vision of education by clarifying the process and outcomes of student development. The envisioned graduate can therefore be forecast based on the curriculum ideology. Evidently there is no universal approach on what the curriculum emphases/traditions/ideology should be and whether to use the curriculum emphases strategy, the curriculum traditions, and the curriculum ideology format or yet a different format all together. For the purpose of the study, the current author adopted Schiro's (2008) curriculum ideologies due to the clear framework for analysing and classifying curricula which has been developed over the years (see Table 1).

Theoretical framework

There are at least four curriculum ideologies, namely, scholar academic ideology, social efficiency ideology, student-centred ideology and social reconstruction ideology. The scholar academic ideology (also known as humanist disciplinarian (Kliebard, 1986)) or intellectual traditionalist (Schubert, 1996) deals with disciplining students by transmitting discipline specific knowledge (Cotti & Schiro, 2004). This ideology ensures that students develop a discipline-specific thinking ability and therefore reflect disciplines they specialized in (Schiro, 2008; Cotti & Schiro, 2004). In the social efficiency ideology, the objective is preparing students for particular roles in society as adults (Schiro, 2008). This ideology is inspired by Bobbitt's (1918:42) views that

> "education that prepares for life is one that prepares for the specific activities. The curriculum will then be that series of experiences which children and youth must have by way of attaining those objectives ... that series of things which children and youths must do and experience by way of developing abilities to do the things well that make up the affairs of adult life; and to be in all respects what adults should be."

A student-centred ideology, on the other hand, believes that education should facilitate the growth of students by helping them develop their skills and abilities further (Schiro, 2008). This is because "artisans learn to forge by forging, to carve by carving, to paint by painting...let children learn to write by writing, to sing by singing, and to reason by reasoning" (Schiro, 2008:112). There is also a social reconstruction ideology that argues that humans have the ability to influence their world by using intelligence, knowledge and skills to solve social problems (Cotti & Schiro, 2004). Education therefore could enhance intelligence and development of problem-solving skills (Schiro, 2008). This by implication means that in order for science education to effectively lead to social transformation, social reconstruction curriculum ideology would need to be adopted. Each curriculum ideology has specific features which relate to the aim of the subject, content knowledge, the instructional process, the roles of the students and teachers, as well as assessment (Table 1).

Table 1 A comparison of curriculum ideologies (Schiro, 2008)

Curriculum features		Scholar academic ideology	Social efficiency ideology	Student-centred ideology	Social reconstruction ideology
Aim of the subject	Purpose for knowledge	Understanding	Doing / action	Actualizing oneself	Interpret and reconstruct society
Content knowledge	Nature of knowledge	Didactic statements	Capabilities for action	Personal meanings	Intelligence and a moral stance
	Source of knowledge	Objective reality as interpreted by academic disciplines	Normative objective reality as socially interpreted	Individuals' personal creative response to experience	Individuals' interpretation of society's past, present and future
Instructional process	Learning viewed from	Transmitter	Transmitter	Receiver	Transmitter
	Primary function of learning	Social transmission	Social transmission	Growth	Social transmission
	Result of learning	Changed mindset	Changed behaviour	Changed mindset	Changed behaviour
	Primary actor during learning	Agent	Agent/student	Student	Agent/student
	Student readiness	Simplification of difficult topics	Providing prerequisite behavioural capabilities	Stages of growth	Gestalt of prior experience
The student	Role during learning	Passive	Active	Active	Active
	Teacher focuses on	Child's mind	Child's behaviour	Child's mind	Child's behaviour
	Teachers concerned with children	As they ought to be	As they ought to be	As they are	As they ought to be
	Viewing children	In relation to standardized norms	In relation to standardized norms	As individuals	In relation to standardized norms
Teaching	Role of teacher	Transmitter	Supervisor	Facilitator	Colleague
	Standards used to measure teacher effectiveness	Accurate presentation of discipline	Efficiency of student learning	Facilitation of growth	Effective transference of the vision
	Teachers stimulate	Uniformity	Uniformity	Diversity	Uniformity
	Teachers	Directly implement curriculum	Directly implement curriculum	Adapt curriculum (according to children's needs)	Adapt curriculum (according to social concerns)
	Media used during learning	Didactic discourse	Programmed instruction	Child-environment interaction	Group dynamics
	Intent of teaching	To advance students in a discipline	To prepare students to perform skills	To stimulate child growth	To acculturate students into educators' vision
Assessment	Purpose of evaluation to the evaluator	Rank students for a future in the discipline	Certify that students have the skills	Diagnose students' abilities to facilitate growth	Measure student progress with respect to ability
	Nature of assessment tools	Norm reinforced	Criterion reinforced	Informal subjective diagnosis	Informal subjective diagnosis
	Assessments are	Objective	Objective	Subjective	Subjective
	Point of assessment	After instruction	After instruction	During instruction	During instruction

Aim of the study

Based on the above statements, the aim of the study was to investigate the curriculum ideology of the Biology curriculum by analysing the Grade 11 CAPS document. This curriculum ideology would then be used to make inferences about envisaged Biology graduates within the parameters of curriculum ideologies. The research method is presented below.

Research methods

In this qualitative study, an inductive curriculum analysis approach was used to determine the curriculum ideology of Biology. There are various methods that can be used to analyse curricula (e.g. Houang & Schmidt, 2009; Martone & Sireci, 2009; Blank, Porter & Smithson, 2001). In the study, the researcher performed close reading of the Biology CAPS document (Department of Basic Education, 2010) to ensure that he could familiarise himself with the structure and content of the document. This was followed by curriculum mapping, which involves reviewing components of the curriculum document (Nieuwenhuis, 2007; Ferreira, Lucen, Stoffels & Soobrayan, 2003). With regard to curriculum mapping, a previously validated instrument (Table 2), which was adapted from Schiro (2008), was used to examine sections of the Biology curriculum document in order to identify specific emerging themes and subthemes which are typical of curriculum ideologies. These emerging themes and subthemes were then classified into specific curriculum ideologies as guided by Table 1 (Britton, Letassy, Medina & Er, 2008; Plaza, Draugalis, Slack, Skrepnek & Sauer, 2007). The instrument (Table 2) had been previously validated through a panel of experts who determined its content and face validity with regard to its suitability for the intended purpose (Creswell, 2008).

In the process of examining sections of the Biology curriculum, as suggested by Schiro (2008:7), the researcher probed for "the overarching aims or purposes of education, the nature of the child or student, the way learning must take place, the role of the teacher during instruction, the most important kind of knowledge that the curriculum is concerned with and the nature of this kind of knowledge, and the nature of assessment" using a standard data collection instrument as a guide. This instrument consisted of six open-ended questions (Table 2) which, according to Nicholls (2003) and Evans and Davies (2000), are formulated by the researcher prior to document analysis based on the objectives and the research question of the study. In the current study, these questions were adopted from Schiro's (2008) previously validated standard inventory for curriculum analysis. Responses were then formulated inductively by the researcher using verbatim and narrated extract from the document being analysed. The verbatim extracts from the curriculum document are indicated in "italics" in the Results section of this article.

Table 2 An instrument used for reviewing components of the Biology curriculum (Adapted from Schiro, 2008).

Purpose of analysis	Data sources	Open-ended questions used to analyse the curriculum document
- To examine the Biology curriculum in order to determine its curriculum ideology	- Curriculum and Assessment Policy Statement (CAPS) Biology (Department of Basic Education, 2010)	a) What is the aim of the curriculum? b) What kind of knowledge is prescribed in the curriculum? c) How is learning supposed to take place? d) What is the nature and the role of students in the learning process? e) What is the role of teachers during instruction? f) What is the purpose of assessment?

The formulated responses were then used to make inferences regarding the curriculum ideology of Biology that is best represented in the curriculum document.

This inferencing was based on the characteristics of the curriculum ideologies in Table 1 and is presented directly after each quote from the curriculum statement. Two independent researchers were tasked with supervising the entire process to ensure scientific rigour, credibility and trustworthiness. Final results of the above process are presented in the next section.

Results

The data showed that the four curriculum ideologies presented in Table 1 are reflected in the Biology curriculum. This was based on the identification of at least six themes (Figure 1) which emerged in response to the questions of the standard inventory for curriculum analysis (Table 2) and which are indicative of the curriculum ideologies in Table 1. Within each theme, sub-themes were also identified

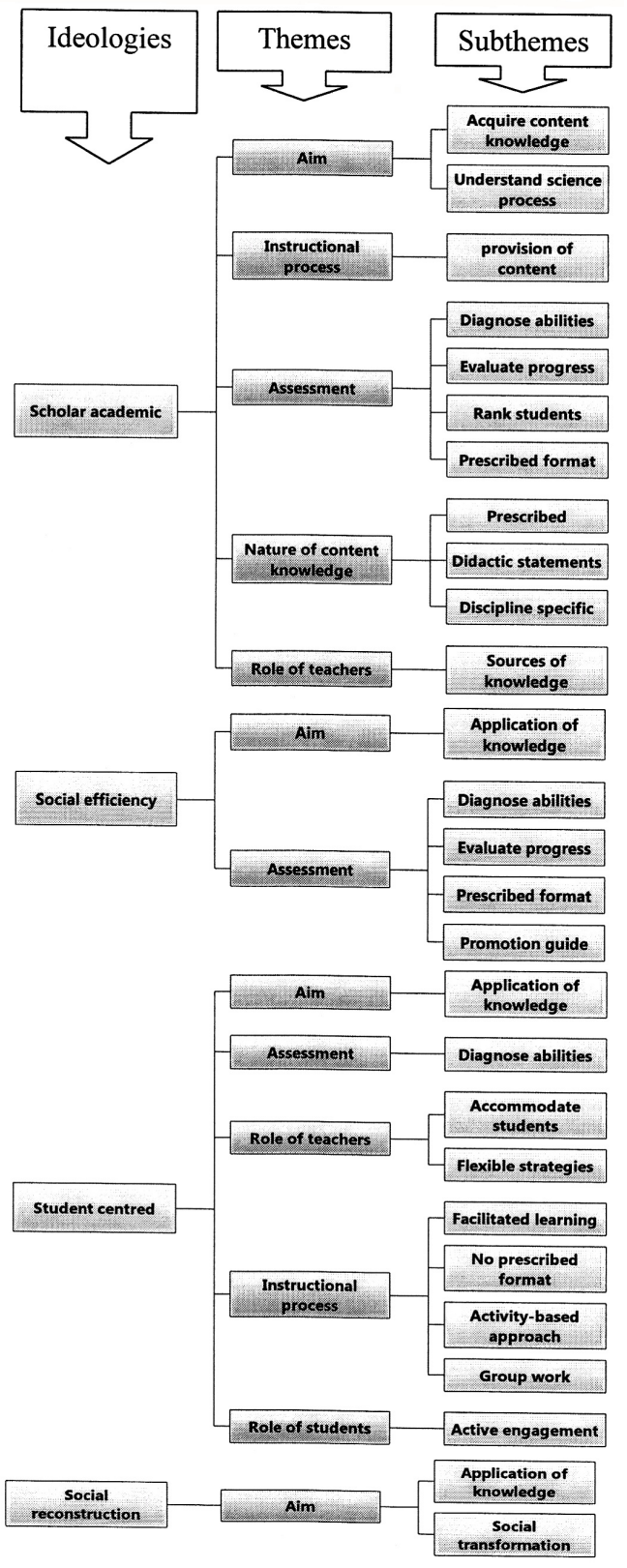

Figure 1 Emerging themes and subthemes indicating the curriculum ideology of Biology

inductively from the curriculum document. These subthemes are concepts which are typical of characteristics of the curriculum ideologies presented in Table 1. Consequently, they were used to determine the ideology of Biology. Each sub-theme is discussed in detail under the various themes in the following section.

The aim of the subject of Biology

The fundamental aim of Biology is "social transformation" (Department of Basic Education, 2010:3). This social transformation is related to social reconstruction (Table 1), and is aimed at ensuring that the educational imbalances of the past are redressed and that equal educational opportunities are provided for all sections of the population.

Extending from the above, Biology has three subject-specific aims which are related to the scholar academic ideology. According to the CAPS Biology (Department of Basic Education, 2010) these aims relate to content knowledge, the science process and the application of Biology in everyday life (Table 3). With regard to content knowledge, the aim of Biology is to ensure that students "acquire knowledge" by "accessing information from a variety of sources (such as teachers, reference books, textbooks, the internet, experts, peers, parents, etc.), selecting key ideas obtained from resources and recalling and describing knowledge related to Biology" (Department of Basic Education, 2010:8). Knowledge that students need to acquire includes biology concepts, processes, mechanisms, principles, theories and laws (Table 3) in accordance with Bloom's taxonomy. Regarding the scientific process, Biology aims to facilitate the development of inquiry skills for science. In this regard, students are taught the scientific process of designing and carrying out experiments under the supervision of teachers (Table 3). This is done using various experiments focusing on seven science skills (Table 3). According to the Department of Basic Education (2010:11), "these skills can apply to the variety of different types of practical work that is appropriate for ... Biology, including investigations/experiments."

Table 3 A summary of the aims of Biology (Adapted from Department of Basic Education, 2010)

Aim	Components and skills developed
1. Acquiring knowledge of Biology (concepts, processes, phenomena, mechanisms, principles, theories, laws, models etc.).	1.1 Acquire knowledge. 1.2 Understand and make meaning of Biology. 1.3 Apply knowledge of Biology in new and unfamiliar contexts.
2. Investigating phenomena in Biology.	2.1 Following instructions. 2.2 Handle equipment/apparatus. 2.3 Make observations. 2.4 Record information/data. 2.5 Measure. 2.6 Interpret. 2.7 Design/plan investigations or experiments.
3. Appreciating and understanding the importance and applications of Biology in society.	3.1 Understanding the history and relevance of scientific discoveries. 3.2 Relationship of indigenous knowledge to Biology. 3.3 The value and application of Biology knowledge in industry, for career opportunities and everyday life.

The third aim of Biology is to ensure that students "appreciate and understand the importance and applications of Biology in society" (Department of Basic Education, 2010:11). In this instance, students are taught the history and relevance of science and how this relates to indigenous knowledge of Biology. With that, students are taught "about the applications, impact and relevance that knowledge of Biology has found in various aspects of society" (Department of Basic Education, 2010:12).

Content knowledge prescribed in the Biology curriculum

A scholar academic ideology is also evident from the curriculum's prescription of content knowledge taught in Biology. The CAPS document (Department of Basic Education, 2010) indicates that Biology content knowledge is divided into four strands, which develop progressively from Grade 10 to Grade 12 (Table 4). These knowledge strands are i) life at the molecular, cellular and tissue level (Knowledge Strand 1), ii) life processes in plants and animals (Knowledge Strand 2), iii) environmental studies (Knowledge

Strand 3), and iv) diversity, change and continuity (Knowledge Strand 4) (Department of Basic Education, 2010:6). Within each strand there is prescribed content that must be taught (Table 4). This prescription of content knowledge to be taught is typical of a scholar academic ideology, where knowledge organized as didactic statements that accurately represents a discipline (such as biology) is acquired by students (Cotti & Schiro, 2004).

Table 4 Content knowledge within the three knowledge strands extracted from the Grade 11 CAPS document (Department of Basic Education, 2010:61-75)

Strand	Content
1. Diversity, change and continuity.	- Biodiversity and classification of micro-organisms. - Biodiversity and of plants. - Reproduction in plants. - Biodiversity of animals: invertebrates.
2. Life processes in plants and animals.	- Support and transport systems in plants. - Support systems in animals. - Transport systems in mammals (human). - Excretion in humans.
3. Environmental studies.	- Population ecology. - Human influences: impact on the environment.

It should be noted that, as shown in Table 4, the curriculum (Department of Basic Education, 2010:61-75) does not indicate content that must be taught in Grade 11 for Strand 4 (that is, diversity, change and continuity). Furthermore, content knowledge for Strand 3, environmental studies, "must be completed in Grade 11 but this topic is examined at the end of Grade 12" (Department of Basic Education, 2010:74).

Instructional process

With regard to the instructional process, it appears that Biology adopts elements of a scholar academic ideology to foster "acquisition" of knowledge. By stipulating that students "acquire" knowledge, Biology rejects a student-centred ideology in which students "construct" their own knowledge through personal creative response to experience (Table 1; Schiro, 2008). In the scholar academic ideology, learning is a process of "transmitting" knowledge whose purpose is "understanding" an "objective reality as interpreted by academic disciplines" (Table 1). Furthermore, the Biology curriculum (Department of Basic Education, 2010:44) states that "it is very important [for teachers] to help students link related topics so that they acquire a thorough understanding of the nature and inter-connectedness of life." This statement suggests that, as part of the instructional process, teachers need to "facilitate" and "supervise" learning. The idea of "helping" students "acquire" knowledge suggests that Biology integrates scholar academic and the student-centred ideologies in that even though knowledge is prescribed, students retain the freedom to use their creativity to develop an understanding of knowledge.

It is further stated in the CAPS document that the curriculum "does not prescribe particular instructional strategies, instead teachers have the freedom to expand concepts and to design and organise learning experiences according to their local circumstances" (Department of Basic Education, 2010:44). This means that the curriculum is not always implemented as is (that is, scholar academic and social efficiency ideologies), but can be adapted to suit the needs of students and societies.

The role of students in the instructional process

Regarding the role of students, the Biology curriculum (Department of Education, 2010:3) encourages "active and critical learning; encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths." This view clearly demonstrates that a student-centred ideology is favoured. The curriculum (Department of Education, 2010:3) also emphasizes elements of a student-centred ideology in that students are expected to "work effectively with others as members of a team, group, organisation and community" as well as "organise and manage themselves and their activities responsibly and effectively." Furthermore, the Biology curriculum (Department of Basic Education, 2010:3) suggests that it aims to equip "learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country; providing access to

higher education; and facilitating the transition of learners from education institutions to the workplace." Based on Table 1, the nature and the role of students in the learning process in Biology can be regarded as a student-centred ideology.

The role of teachers during instruction

According to the curriculum (Department of Basic Education, 2010), teachers are viewed as a source of information for students, which is characteristic of scholar academic ideology. In this regard, the curriculum (Department of Basic Education, 2010) lists teachers among various sources from which students must access information. However, the curriculum (Department of Basic Education, 2010:7) also adopts a student-centred ideology in that teachers need to make "decisions regarding the [instructional] sequence" based on students' abilities. This is emphasized in that teachers ought to "have a sound understanding of how to recognize and address barriers to learning, and how to plan for diversity" (Department of Basic Education, 2010:3-4). In other words, teachers should adapt the curriculum and instruction according to the needs and abilities of students. This student-centred ideology is also echoed by the CAPS document (Department of Basic Education, 2010:11) which states that teachers "should make judgments about a student's ability to do science" and adapt instruction accordingly.

Besides the above, teachers are responsible for assessing students by "designing assessment tools" (Department of Basic Education, 2010:16) which are used to assess students in all skills throughout the course of learning. Biology teachers are also expected to design and use assessment tools using specific procedures that are prescribed by the Department of Basic Education and the School Management Team (SMT) at the start of the school year (Department of Basic Education, 2010). Therefore, it appears that teachers' assessment in Biology favours scholar academic and social efficiency ideologies. This is due to the fact that in these ideologies, the nature of assessment tools is normative and criterion reinforced (Table 1). In general, the role of Biology teachers overlaps between student-centred, scholar academic and social efficiency ideologies.

The purpose of assessment

According to the Department of Basic Education (2010:53), "formal assessment provides teachers with a systematic way of evaluating how well students are progressing in a grade and a particular subject. Formal assessment tasks are recorded and used to determine whether students should be promoted to the next grade". In other words, the purpose of assessment is to measure student progress and to certify that students have the skills that are developed in a particular grade, a feature of scholar academic and social efficiency ideologies. In this regard, there are two types of formal assessment, namely, continuous or school-based assessment as well as internal end-of-year examination. As indicated above, continuous assessment is used to measure students' progress in attaining skills and knowledge within a grade. Continuous assessment may also be used to diagnose students' abilities to facilitate further learning. End-of-year assessment is used to certify that students have attained skills and knowledge required in the subsequent Grade. Both continuous and end-of-year assessments described here are typical of scholar academic and social efficiency ideologies. A character of the scholar academic ideology is also observed in that assessment may be used to rank students for a future in the discipline, such that only those students who acquire a certain level (rank) are deemed ready to progress to the next grade. The curriculum provides a clear guideline for the development of assessment tools. In this regard, continuous assessment weighs 25% and end-of-year examination 75% toward the final mark. Therefore, as far as the assessment is concerned, Biology favours a social efficiency and scholar academic ideology.

Discussion: the curriculum ideology for Biology and its implications

Based on the above results, Biology adopts a multi-curriculum ideology approach (Figure 2) which emphasises scholar academic and student-centred ideologies. This scholar academic ideology is observed in that the curriculum specifies which discipline-specific knowledge should be taught. Looking at the instructional process however, there seems to be an indication that Biology does not strictly adhere to a scholar academic ideology but also incorporates a student-centred ideology. Furthermore, a student-centred ideology was observed with respect to the role of students and teachers during instruction. To this end, scholar academic and social efficiency ideologies were also evident. While there is obvious overlap between curriculum ideologies (Figure 2), there is minimal evidence of social reconstruction.

Þórólfsson and Lárusson (2010), and Kliebard (1986) support the findings of the current study in that in reality there will always be an overlap between curriculum ideologies. However, Cotti and Schiro (2004) argue that each subject area ought to have a distinct curriculum ideology which frames the subject

in terms of content knowledge, instructional processes, assessment strategies as well as learning outcomes. This would ensure that the objectives related to the subject area are easily attained.

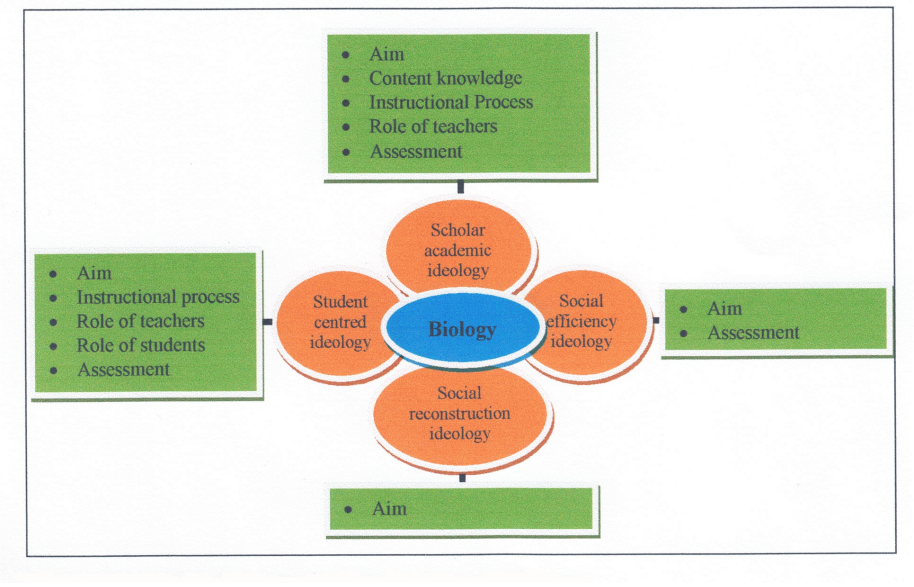

Figure 2 Indicating the curriculum ideology of Biology

According to Kliebard (1986), the scholar academic ideology is important in ensuring that there is continued existence of the discipline because students are taught content knowledge that is fundamental to the discipline using discipline specific instructional processes and assessment approaches. As a result, students are trained to become future members of the discipline by understanding fundamental principles of that discipline (Cotti & Schiro, 2004). For example, Gregg, Eisenberg, Duffy & Longo (2008) indicate that in the medical profession, students are trained within a hospital setting. This setting ensures that students learn the fundamental principles of the profession within the discipline's parameters. Consequently, the researcher believes that the nature of Biology with regard to curriculum ideologies will ensure that the biology discipline has future professionals who are well grounded in the principles and philosophies of the subject.

These future members of the biology discipline may have a greater sense of creativity since the subject incorporates a great deal of a student-centred ideology. Schiro (2008) and Posner (1992) indicate that subjects that are based on a student-centred ideology tend to stimulate growth and development of students because students are exposed to experiences through which their needs and interests are served. This is also because students are allowed to creatively construct meanings of reality. In this way, students have the chance of self-discovery as they grow and develop. Consequently, the adoption of a student-centred ideology implies that Biology students will probably be more creative in their pursuit of growing themselves and their discipline.

The multi-curriculum ideology approach however may have negative consequences. For example, the number of socio-scientific challenges (such as Human Immunosuppresive Virus (HIV)/AIDS (Acquired Immunodeficiency Syndrome) and environmental management) facing South Africa indicates that ideally there ought to be a greater emphasis on the social efficiency and social reconstruction ideologies. In this way, students would be taught context specific knowledge and skills to enable them to actively promote social transformation. The author believes therefore that the lack of social reconstruction characteristics suggests that Biology and its students may not be able to respond to socio-scientific challenges that students and their societies face.

In addition to the above, Bantwini (2010), Van Deventer (2009) and Goodlad and Associates (1979) present evidence showing that what is intended in the formal curricula is not always what students receive. The perceived curriculum is what teachers, students, parents and various interested persons perceive in their mind as the curriculum. Goodlad and Associates (1979) posit that persons working with curricula (for

example, teachers and parents) have different perceived curricula even if they work from the same formal curriculum. The operational curriculum is what teachers actually teach in class. This, according to Goodlad and Associates (1979), also differs from the perceived curriculum. Furthermore, the operational curriculum differs to the experiential curriculum, which is what students actually experience. The current author argues therefore that the lack of a distinct curriculum ideology means that teachers, parents, and other stakeholders are left to define for themselves what the overall objective of the curriculum is.

Based on the findings, the researcher concludes that Biology is designed to advance the discipline but will probably not lead to social and student empowerment with regard to current social challenges. Further research is necessary to explore the actual impact of the curriculum's lack of social reconstruction ideology on students' ability to deal with socio-scientific challenges.

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