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## **African Culture in the Science Classroom**

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**Abstract:** What should and should not be taught in science classrooms in Mozambique? Who should decide? This paper, based on the arts-based doctoral research of an African science teacher educator, addresses these questions. I (Cupane<sup>1</sup>) am contributing from my cultural perspective and from my understanding of who we (Mozambicans) are; from my understanding of why and how we can have a Mozambican science classroom in our setting; and, from my understanding of the desirable contribution of science education to our cultural well being. My aim in this paper is to show that the inclusion of local-indigenous knowledge in our curriculum is one way of addressing, in a culturally inclusive manner, the above questions.

I have used auto/ethnography research methods to understand myself as both an individual and a professional science educator. The study reflects the development of my values and attitudes in my life and profession, and how I have reinforced, changed and developed new values during this research (Watts, 2007). Thus, the study reflects my individual journey in life, as well as the struggles that exist in Mozambican society because of the dialectical relationship (Roth, 2005) that exists between me and Mozambican society and the world at large.

**Key words:** science education, arts-based research, cultural perspective, local-indigenous knowledge, Essentialism, Non-essentialism, curriculum, inclusive, auto/biographical, individual, professional science educator, development, values, attitudes, dialectical.

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<sup>1</sup> I prefer to be called by surname. It gives me my African identity (I think) while my first name reminds me that I have been colonized.

## **Introduction**

*Ours is essentially a tragic age, so we refuse to take it tragically. The cataclysm has happened, we among the ruins, we start to build up little habitats, to have little hopes. It is rather hard work: there is no smooth road to the future: but we go round, or scramble over the obstacles. We've got to live, no matter how many skies have fallen.* (Lawrence quoted in Bilton et al., 2002)

Our aim in this paper is to discuss ‘What should and should not be taught in science classrooms in Mozambique? Who should decide?’ The first author is an African science teacher educator from Mozambique and the second author is his mentor in postgraduate studies (Masters and Doctoral degrees). This paper, based on arts-based doctoral research (Barone & Eisner, 1997), reflects successively on: how Mozambicans are educated, arguments for local-indigenous knowledge, definitions of indigenous science, a search for local-indigenous knowledge, advantages of including local-indigenous knowledge in the science classroom, and implications for an African science teacher education.

I have used auto/ethnography research methods to understand myself as both an individual and a professional science educator. The study reflects the development of my values and attitudes in my life and profession, and how I have reinforced, changed and developed new values during this research (Watts, 2007). Thus, the study reflects my individual journey in life, as well as the struggles that exist in Mozambican society because of the dialectical relationship (Roth, 2005) that exists between me and Mozambican society and the world at large.

## **Education in Mozambique**

Five years ago I was very sure how to respond to the questions: ‘What should and should not be taught in science classrooms in Mozambique? and Who should decide?’ This certainty was one of the outcomes of my enculturation in science education. I was trained as a science ‘transmitter’ who understood science as impersonal, arising from the myths of “cold reason, language as a conduit and hard control” (Taylor, 1996, pp. 163, 165). From this perspective, science is not connected to

any culture and students should find their ways of making the same successful enculturation into science as did their teachers. These ways include memorization, Fatima's<sup>2</sup> rule (Aikenhead & Jegede, 1999) and the ability of living in two separate worlds inside and outside of the science classroom.

The world inside of the traditional science classroom is characterised by a Universalist view of science, based on three assumptions: (1) reality is independent of humans' views about it; (2) this reality is always structured in the same way everywhere; and (3) the structure of reality can be, at least, partially grasped. This view claims that many phenomena can be explained, predicted, and controlled without bias: "the character of the natural world is unrelated to human interests, culture, race or sex. Ultimately, the concept is judged by the object, not the other way around" (Stanley & Brickhouse, 2000 p. 37).

I started my postgraduate studies holding a Universalist view of science, hence at that time it was clear to me that scientific concepts and laws are what should be taught in the science classroom. This view has been modified recently and I am still in the process of building a new view. At my current stage, I see scientific knowledge as part of what should be taught in the Mozambican science classroom, however, as we argue in this paper, it should be enriched by indigenous and other forms of knowledge.

I wonder if I will succeed. After five years I cannot tell in one sentence 'what should be taught in the science classroom' and 'who should decide'. What I can tell now is that all Mozambicans should participate in science teaching with their knowledge and problems. Knowing that it is not possible to teach everything at the same time makes me feel uncomfortable having a question that is still not answered.

The education system of Mozambique that I went through and became part of as a teacher and teacher educator was not specifically designed for me; the way that I was educated was the usual way at that time, with few exceptions. My aim in this paper is to argue that local-indigenous knowledge is part of what should be taught in the Mozambican science classroom. I am using the expression *local-indigenous knowledge* for two reasons. First, the terms *local* and *indigenous* are ambiguous but their combination conveys the meaning that I am referring to. The term *indigenous* evokes in

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<sup>2</sup> Fatima's rules are a set of strategies to hide that the learning process failed.

me the pain that Mozambicans went through during the colonial era; I understood it as a discriminatory term. Sometimes, though, ‘indigenous’ is used in a way that agrees with my understanding; it is widely used, so I cannot afford to exclude it from my vocabulary. The term ‘local’, even as a metaphor, is barely acceptable. For example, when understood as place, the incongruence is how can a place be an owner of knowledge? If it is understood as people who live in that place the difficulty is to accept that all people in that place think in the same way. Hence, if expressions such as ‘Western knowledge’, ‘African knowledge’ or ‘local knowledge’ are imposed they serve the interests of only a few. Second, when I use the term ‘local-indigenous knowledge’, I understand it to refer to the African culture that exists in Mozambique.

My difficulties with the expression, ‘local knowledge’ also carry through to the term ‘Western Science’. The term ‘Western science’ incorporates an essentialist view of science which affirms that science belongs only to the West and to every single Western person.

Essentialism (Semali & Kincheloe, 1999) is a set of fixed characteristics that tries to distinguish and categorize people. This notion was established by cultural anthropologists in an effort to name and categorize indigeneity. Essentialism, or *essentialist authenticity*, was an attempt to solve the problem of ‘racial’ or ‘ethnic’ expressions, which failed to place people in a specific category. Essentialism is a new racism; “racism based on ideas of cultural difference rather than on claims to biological superiority” (Bilton et al., 2002, p.178).

Have I said ‘People’? According to essentialism there are indigenous and non-indigenous. As I am not happy with being placed in the indigenous category I see ‘people’ instead of indigenous and non-indigenous. Would I feel differently if I were classified as non-indigenous? I do not know, but I know some non-indigenous people who are not happy with this discrimination. I cannot go further in this article with the notion of ‘indigeneity’. My intention is just to offer my understanding of the term for the reader.

My dissatisfaction with an essentialist understanding of ‘Western Science’, has led me, in this article, to use the term ‘World Modern Science’. My main argument for this is that although World Modern Science seemingly began in the West its development and our current scientific beliefs and practices are due to the participation of men and women from all cultures. This is the unique science that has been taught as

school science in Mozambique. Although I am pleased that World Modern Science continues to be taught, as I argue below, it should be taught in parallel with local-indigenous knowledge.

The term, 'World Modern Science', promotes a non-essentialist perception of science. According to this view science belongs to anyone who has made the effort to be enculturated into this discourse community. Non-essentialism is a counter essentialist theory.

### ***Arguments for Local-Indigenous Knowledge in Mozambique***

The main reason for exploring local-indigenous knowledge in Mozambique is that although this knowledge can be seen as Mozambican, its characteristics are not included in the science classroom. In Mozambique, a common and over-used explanation for this gap is that we (Mozambicans) have been colonised for nearly 500 years. I am questioning if, after 30 years of independence, this is still the only reason.

We have been teaching World Modern Science from a multicultural perspective, which elicits whatever exists in a specific culture that can help to establish the way of thinking of World Modern Science. The weakness of this procedure is to promote World Modern Science, not as result of women and men working from all over the world but as belonging exclusively to the West. However, many of the concepts included in World Modern Science were developed in non-Western societies (Semali & Kincheloe, 1999; Verma, 2004). The procedure of promoting World Modern Science as a non-cultural artefact ignores or rejects ideas that cannot be readily incorporated into World Modern Science. Furthermore, because attention is directed to teaching World Modern Science, there is no investment in developing strategies for local-indigenous knowledge.

If World Modern Science was taught from a multiscience perspective, the concern would be to promote both World Modern Science and local knowledge. By doing so, a multiscience perspective would help students to discover why their culture is important. The main challenge in this perspective of teaching, in Mozambique, is that teachers, students and schools are embedded in a multicultural society that has been coerced by the colonial power to cultivate prejudices among its own ethnic groups.

Hence, each of the participants in the educational process needs to acknowledge these biases and move towards a critical perspective (Gomez, 1991).

A critical perspective will allow each Mozambican to build his/her own identity, accept other identities, analyse inequities that exist in each ethnic group and among ethnic groups, and aim not to construct a fixed (essentialist) identity for each ethnic group but instead to have an evolving identity that assumes all the characteristics of the various ethnic groups existing in Mozambique. In the science classroom guided by a multicultural perspective, according to Dimidjian (cited by Gomez, 1991) the goal is,

*not only to teach children about other groups or countries. It is also to help children become accustomed to the idea that there are many lifestyles, languages, cultures, and points of view. The purpose of multicultural curriculum is to attach positive feelings to multicultural experiences so that each child will feel included and valued, and will feel friendly and respectful toward people from other ethnic and cultural groups. (p. 4)*

Thus, a multicultural perspective rejects the idea of viewing World Modern Science as above culture. In my earlier Masters degree, I argued that one way of helping students to acquire a multicultural perspective and consequently cross borders between cultures inside and outside of Mozambique is the use of 'Free-hand' experiments<sup>3</sup>. I also envisioned that Free-hand experiments allow students to participate and contribute to in the common wealth of their society. Such an approach helps to refract the teaching-learning process through the lifeworld perspectives of students, in accordance with the following sentiments of McGuiness, Roth and Gimer (2002).

*As we change our participation, we learn. But as we change our participation, the world we experience also changes. Learning is therefore, constituted by changing participation in a changing world. This therefore, also changes how we might look at teaching. Teaching no longer is the transfer of information but has to be conceptualised in terms of opportunities we can set up that afford students possibilities to change their participation in a changing world. (p. 44)*

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<sup>3</sup> Free-hand experiments are simple experiments in science classroom that involve everyday materials, locally available materials and low cost materials. These characteristics made me think that Free-hand experiments has the potential to be relevant for students in their lives and represent an attractive alternative methods of teaching-learning

Teaching science in a multicultural perspective is a question of social justice. There are similarities and differences among African and non-African societies. My aim is to characterise these similarities and differences in a way that I can feel accepted in a community as a human being while, at the same time, preserving my cultural identity. So far, the notions of indigenous knowledge and World Modern Science that I hold make me feel like an indigenous person who is different in nature from Westerners. My doubts are legitimised by science educators who ask “is science an exclusive invention of Europeans, or have scientific ways of thinking and viable bodies of science knowledge also emerged in other cultures?” (Snively & Corsiglia, 2001 p. 8). I argue that teaching of science in Mozambique and elsewhere will be complete only when it incorporates local-indigenous science.

### ***Definition of Local-Indigenous Knowledge***

Some of the terms used by Aikenhead (1997) to describe Indigenous science are thematic, survival-oriented, holistic, empirical, rational, contextualised, specific, communal, ideological, spiritual, inclusive, cooperative, coexistent, personal and peaceful. It is the knowledge shared by a specific cultural group and held by enough people that allows comprehension among them. Indigenous knowledge, however, is independent of any particular person or subgroup. Indigenous knowledge is related to what local people know and do, and it shows the experience accumulated by local communities. From this perspective, all of us are members of indigenous science communities, the practices and knowledge of which are sometimes called ‘ethnoscience’ (McKinley, 2005; Ogawa, 1995; Semali, 1999; Snively & Corsiglia, 2001).

This perspective contrasts with the view that indigeneity and indigenous knowledge are related to the primitive, the wild and the natural. My standpoint is that all of us in a given location are (un)consciously interacting with a given environment using indigenous knowledge that shapes our lives. Indigenous knowledge is characterised by cultural beliefs and history. This understanding of indigenous knowledge leads me to conclude that, in Mozambique, we have many overlapping indigenous knowledge systems the promotion of which is a challenge to our imagination.

Indigenous knowledge or ethnoscience is locally hegemonic and is transmitted within the culture through daily activities (Ogawa, 1995). Consequently, the introduction of Mozambican culture (local knowledge) should be made by analysing in the science classroom our daily societal activities. I am thinking of activities that include, for example, water use, cooking and health. These analyses can be made using Multiscience as a ‘counter-hegemony’ to World Modern Science. ‘Multiscience’ means to teach more than one science in the science classroom.

This view of indigenous knowledge is new to me. Previously, I saw indigenous knowledge as that which distinguished Blacks and Whites in the colonial context of Mozambique: science and not science, and industrial and non-industrialised countries. Previously therefore, I argued that, in Mozambique, it does not make sense to talk about indigenous knowledge, because all of us are Black or belong to the same non-industrialised country.

## **Searching for Local-Indigenous Knowledge**

### **How I started**

*I (Cupane) arrived in Perth, experiencing for the first time a 10 hour flight. I was picked up by someone at the Airport and drove straight away to the office of the AUSAID boss Bora, probably from Asia. She was a big woman. I was concerned if she could understand me. In my country we use Portuguese as the language for communication and instruction.*

*Bora took my colleague and me to the bank to open an account then she said ‘Let’s set up a programme for you guys to find out about this place. But, first of all how did you sleep?’*

*My colleague and I said, ‘We just got off the plane. We just arrived from Africa’. Bora apologized, saying she didn’t know. We should rest and see her the following day. So she found someone to help us find accommodation. It was a young man. His first question was ‘where do you want to stay guys?’ I thought that it was an impolite question. How could he expect me to choose a place when I had just arrived? Then he added ‘If you don’t know, it is not a problem’, I am allowed to show you three places and then you have to decide which one you want. Fortunately, the first one was okay for us.*

*After settling myself in my room I went outside to confirm the location of the shops and other facilities near by. On the street there was no one. It was silent. No cars ... no one. ‘What’s happening?’ I asked myself. I couldn’t move. After a few minutes I saw a car but still no one in the street! How safe am I here? On my way from the Airport to Bora’s office I noticed that no one was in the street but I thought “maybe people are in offices; so later I will see them walking on their way home”. I started to think that this was a ‘ghost city’ with beautiful houses, cars and clean roads, but no one to enjoy it. Some months later until today, my best way of characterising Perth, at least, the areas where I have been living is to call it a ‘desert’, meaning absence of people.*



*Six months later, after a bridging course, I was in Peter's office.*

*Peter – I am sure we will have an interesting Master's degree programme. It is good that you are here. Your presence will help me to learn about you and your country and people.*

*I felt that it is a warm welcome. My presence was seen immediately as useful. I mumbled 'thankyou'.*

*Peter – I think we need to use your experience of teaching as basis for your research project. What do you think?*

*I thought Peter had the capacity of reading my mind because what I wanted was to improve my skills of teaching. I was amazed. I couldn't, again express myself.*

*Cupane – I agree. I think it is good idea.*

*Peter – OK. Can you write for me one or two pages explaining why you want to do a Masters degree and relating this desire with your experience of teaching, using the 'I' voice, as I am interested in your opinion. Do you think that you can do it?*

*Cupane – Yep, yep*

*Peter – When can you give me the two pages? Let's say next week. Is it OK for you?*

*Cupane – Of course.*

My further encounter and classes with Peter were always aimed at awakening my awareness about the hegemony of World Modern Science in the Mozambican science classroom. Peter used to say 'I would like you to make an informed decision about your research methodology, be it quantitative or qualitative. I will support you in whatever decision you take but it should be clear for yourself why you have made that choice.' My final decision was taken when I encountered Palmer's (1998) questions.

The question we most commonly ask is the "what" question – what subjects shall we teach? When the conversation goes a bit deeper, we ask the "how" question – what methods and techniques are required to teach well? Occasionally, when it goes deeper still, we ask the "why" question – for what purpose and to what ends do we teach? But seldom, if ever, do we ask the "who" question – who is the self that teaches? How does the quality of my selfhood form – or deform – the way I relate to my students, my subject, my colleagues, my world? How can educational institutions sustain and deepen the selfhood from which good teaching comes? (p. 4)

At this stage, I decided to search for 'who am I?', which led me to 'what should be taught in Mozambique?' and 'who should decide?', which are the questions that I address in this paper.

## **How I have searched for local-indigenous knowledge**

My research background was not adequate for providing me with a method for including critical perspectives on the teaching-learning process (Ellis & Bochner, 2000) in Mozambique. However, by the stage when my research questions seemed clear I became familiar with more research methods from Peter's Research Project classes and I decided to use Auto/ethnography. By adopting a narrative approach to self-inquiry, I was able to reflect critically on my own teaching practice, especially its cultural sensitivity, and I could envision myself teaching in an idealistic culture-sensitive curriculum in Mozambique.

The value of critical autoethnography is in its verisimilitude and ironic validity (Geelan, in press; Lather & Smithies, 1997; Richardson & St. Pierre, 2005). Ironic validity means that stories represent, in various ways, the lived situation, showing both the advantages and limitations of each situation. In this process, negative and positive evidence confirming the claims made by the researcher are sought and this is what (ironically) gives more value to the research (Lather & Smithies, 1997; Richardson & St. Pierre, 2005). Verisimilitude is indicated by the extent to which the listener accepts the story as realistic without questioning its credibility (Lather & Smithies, 1997; Richardson & St. Pierre, 2005). Another dimension that gives value to critical autoethnography is its 'pedagogical thoughtfulness'. A good critical autoethnography creates the reader's passion to act (Ellis, 1997; Taylor & Settlemaier, 2003).

The writer's critical reflexivity and vulnerability are two other dimensions suggested by Tierney (2000) to judge the quality of critical autoethnography. Critical reflexivity, according to Mezirow (1991), is linked to an emancipatory interest as it questions accepted codes of conduct that determine an individual's intrinsic and extrinsic reactions and interactions among people. It allows writers to expose themselves, and therefore becomes more understandable for the readers, avoiding narcissism or self indulgence. Vulnerability is the condition of achieving decolonization (Hamza, 2004). It allows the writer to show beliefs, uncertainties and emotions, and by doing so, engages the reader in the search for better ways of living.

## **Generating and analysing data**

Critical autoethnography is an autobiographical genre of writing. It is research that displays multiple aspects of individual awareness about the author's cultural

embeddness (Ellis & Bochner, 2000). The main advantage of this method is to let the researcher act sometimes as a researcher and other times as a participant (Luitel & Taylor, 2005, Apr; Song & Taylor, 2005). Critical autoethnography allows me to focus on my and others' experiences of teaching and learning without moving my study to the field of *ethnography*. Others' experiences of teaching and learning that I have selected do not pretend to represent a particular social group or given culture (Bilton et al., 2002) but what they share in common is that their stories were similar to mine. In this way I collected stories that inspired me to describe our education system and to imagine potential perspectives of its development. One colleague whose story I have used is nicknamed 'Januario', a rural young Mozambican student whom I met a couple of years ago at the Agriculture College at rural Boane (IAB). As his results were above average he was invited to be a teacher, and he accepted. Two years after starting to teach he sat exams to be admitted to the Pedagogical University and succeeded on his first attempt. Now, he has finished his Bachelor Degree and is still working as a teacher at the IAB. Like the majority of Mozambicans he was born in the countryside. This means he likely did not have running water, shops to buy things, and other facilities that are available in the city. Januario's story gives an example of local-indigenous knowledge that can be taught in Mozambican science classrooms.

*For example, in the theme of how to preserve the environment we are saying it is not recommended to cut the trees, which is in accordance with the attitude of Machangana and Maronga in relation to 'Canhoeiro'. They do not cut this kind of trees. This can help them to learn about themselves. (Januario, face b; tape counter from 100 – 111)*

It is good to consider the local practices that occur in Mozambique, because that procedure can help to avoid opposing essentialist identities among tribes. Januario's story is also an appeal to teach using local-indigenous knowledge, and raises an interesting question: Do we need to explain this knowledge in the same way that scientific knowledge is explained?

## ***Advantages of Including Local-Indigenous Knowledge in the Science Classroom***

### **My understanding of being an educator**

The search for answers to questions that are guiding my research has also contributed to my understanding of my praxis as a Mozambican science teacher educator and physics teacher. This understanding can be framed by epistemological and ontological concepts. An epistemology (Corporation, 2006a; Halsall, 1999; Matthew, 2006) tries to answer the question: how do you know what you know? It focuses on the significance of knowledge (source, nature, and limits) and the methods of obtaining the same knowledge. There are many theories based on the perception of epistemology: Empiricism, Idealism, Naïve realism, Phenomenalism, Pragmatism, Rationalism, Representationalism, Reliabilism, Relativism, Skepticism, Contextualism, and Invariantism. My understanding is that these theories are not exclusive of each other but can be viewed as faces of any figure with 12 sides or more. It is my opinion that the theories mentioned above are firmly connected and only when integrated can explain as fully as possible the knowledge possessed by human beings.

My stance is that local-indigenous knowledge should be brought to the science classroom and viewed under an integrated perspective of existing epistemological theories that can be expanded if necessary. Integrated epistemology allows students to learn about the complementarity of different epistemologies within science and cultures. This can activate individual agency to focus on and explore local epistemology (Taylor & Willison, 2002).

Ontology (Corporation, 2006b; Matthew, 2006) is the study of the nature of existence, reality, and substance in which the main focus is to determine what exists. Ontology determines ones' own view of 'reality' and consequently one's stance in this world. There are four main ontological approaches: realism, empiricism, positivism, and postmodernism. My previous experience of learning and teaching science in Mozambique excluded a postmodernist ontology which allows individuals to focus on their subjectivities. In Mozambique in the science classroom the inclusion of a postmodernist ontology would enable students to focus on their own life-world experiences and thus assist them to develop their local communities.

I started my walk towards answering the questions ‘what should be taught in the Mozambican science classroom?’ and ‘who should decide?’ with the adoption of ‘free-hand experiments’, an issue that I had reflected on in my Masters Degree (Cupane, 2003). Free-hand experiments are ‘simple’ experiments that use everyday or locally available materials and involve low cost. They have great potential for allowing alternatives to traditional methods of teaching.

Today I realise that I had previously used these experiments to bring students’ socio-cultural contexts into my teaching of World Modern Science. My message was that this approach represented a way to include our culture in the teaching/learning process. Now, I realise that this potentiality could not be realised, primarily because the curriculum framework was dedicated to teaching only World Modern Science. Probably this explains why my student – teachers did not change their traditional teacher-centred ways of teaching even after being exposed to free-hand experiments. For them, free-hand experiments represented a difficult way of doing what has been done traditionally; that is, transmitting official scientific knowledge.

### **Perspectives of teaching local-indigenous knowledge**

In Mozambique, the science classroom is a multicultural place formed by students from various ethnic groups. This is a potential advantage because the science class is an ideal situation for participants to learn about the many local-indigenous knowledges that exist throughout in Mozambique. A key condition for this to happen is that school programs should allow teachers to include ethnoscience in the classroom. I view the teaching of local-indigenous knowledge as a condition of succeeding in the teaching and learning of World Modern Science since teaching and learning World Modern Science involves ‘border crossing’ (Aikenhead, 2001). By teaching local-indigenous knowledge we will be giving students ‘one of the territories’ needed to make a sustainable two-way cultural border crossing.

In a Multiscience setting, acculturation and assimilation occur at the same time. In the global village it is not possible to choose between either enculturation or assimilation. At present in Mozambique, however, we are teaching neither to preserve the local culture nor to create scientists. Instead, our education system should nurture

scientists as well as make students proud of their own local culture. This is the goal of Multiscience in the science classroom.

I see three advantages to adopting Multiscience teaching. The first is that Multiscience teaching can change the focus of teachers' and students' activities. The decision of where to concentrate should be taken by teachers, students and curriculum designers, answering questions of "When? Where? Why? How? and To what extent?" The second advantage is that local and individual interests can be served. The third advantage is that Multiscience teaching can contribute to global understanding. However, change per se will not solve our problems. Change is just one factor and the second factor is the commitment of all participants to achieve the desired objectives.

Multiscience comprises both the teaching of science and teaching about science, the latter being called 'Metascience'. In the teaching of World Modern Science and local-indigenous knowledge in Multiscience education, the content and limitations of both sciences will be included. Multiscience is, perhaps, one of the conditions for achieving education for global understanding.

### **National cultural identity**

The 'divide and conquer' methods used by the colonial Portuguese power constitute one of the reasons for Mozambicans knowing little about their own ethnic group and nearly nothing about the ethnic groups to which they do not belong; hence, the widespread lack of consciousness about our national cultural identity.

Creating a consciousness about our national identity is a complex and passionate issue for me. One dimension of the complexity comes from the way in which the political borders were imposed on the country. These borders connected people who before were separated previously and separated people who had been together. This demarcation of our country was imposed by a colonial power. The Berlin Conference (1884-1885) did not respect cultural borders among people. The borders among countries, at least in the African context, likely corresponded to the location of natural resources. However, the problems created by those artificial borders in Mozambique cannot only be blamed on the colonial power, because everywhere we have artificial borders (Touval, 1966). The different ethnic groups existent in today's Mozambique,

even if they are living together by chance, should continue to develop harmonious ways of co-existence.

One of the difficulties arising from the colonial era is that Mozambicans were prohibited from developing their African identity, as tribes and as a nation. Hence, it is not easy to elicit which African or non-African education, beliefs, myths and interactions determine who I am, and who 'we' are. The challenge for Mozambicans is to develop a tribal cultural identity, a national cultural identity, and a world cultural identity, all at the same time. My question as a science teacher educator is, to what extent can 'science teaching' help in the formation of different Mozambican identities?

The formation of identity is related to what, how, why and who we are teaching in the science classroom. My experience of learning and teaching science, combined with this understanding of our national cultural identity, is that we cannot prescribe the way of teaching science for every single school in Mozambique. Even for schools situated in the same area, we cannot prescribe, because we do not know about the heterogeneity of people living there. However, the government should set up criteria for what is needed for students to be considered to have completed a certain grade or course.

### ***In Closing***

What should and should not be taught in science classrooms in Mozambique? Who should decide? These questions are contextualised by a Mozambican history of being colonised for 500 years and subsequently being independent for nearly 30 years. The response provided in this paper to those questions is that there is no **one** knowledge to be taught in the science classroom but that all systems of knowledge are equally important. Hence this knowledge should be made available to students. Students will learn those systems of knowledge according to their capacities and interest in a knowledge system that includes local-indigenous knowledge in the science classroom.

Local-indigenous knowledge will awaken teachers' and students' consciousness about themselves, their colleagues and the hegemonic forces that have been driving their lives. Local-indigenous knowledge has the potential to solve, in an inclusive way, the problem of worshipping World Modern Science, as happened with me.

My reflections are based on auto/biographical research methods. I have drawn these conclusions based on my own lived experience of being a citizen, a science

teacher and a science teacher educator in Mozambique; hence, ‘transferability’ of these conclusions will depend on the reader’s perception of how they are applicable in their own setting.

We have argued in this paper that local-indigenous knowledge should be included in Mozambique based on how Mozambicans are educated, our understanding of local-indigenous peoples and the advantages of including local-indigenous knowledge in the science classroom. The introduction of local culture in the education process can serve different purposes. First, including local culture in the teaching process can be seen as emancipation for the individual and society, because students are more likely to pay attention to their own place in their culture and to eventually improve their standard of living. Second, including local culture in the teaching process can foster Multiscience education so that Mozambicans become more aware of the multicultural characteristics of their country, expand their horizons beyond the borders of their country, allow two-way cultural border crossings among different ethnic groups and ethnosciences, and better understand World Modern Science.

The introduction of local culture can work as a counter hegemony to World Modern Science. Including local culture in the teaching process can improve students’ science agency (motivation). By incorporating local culture into science education, students will be helped to discontinue living in two separate worlds, as happened to me and many of my fellow students. At school, we used ‘strange’ concepts to explain the physical world which, if not entirely useless in our everyday lives, did not have much apparent applicability. For this, we had to memorise many concepts and formulas. A focus on local-indigenous knowledge can be a powerful tool for today’s Mozambican students to learn about the usefulness of science in their everyday lives.



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