

The Role Of Indigenous Knowledge Systems In Addressing The Problem Of Declining Enrolments In Design And Technology

Michael Gaotlhobogwe
University of Botswana
gaotlhobogwe@mopipi.ub.bw

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Abstract

Enrolment numbers in Design and Technology and other technology related subjects are reported to be declining in Botswana and in other countries of Africa. Design and Technology enrolment in Botswana junior secondary schools have declined by up to 6% per year over 10 years, while in Kenya enrolment in Art and Design has gone down to as low as one student in a year stream in some schools. In Swaziland female enrolment in Design and Technology dropped from 200 to 25 in 2011. Research has indicated that while a decline in enrolment numbers cannot be attributed to lack of resources alone, this is a major factor that should be accorded much research attention, at least in the African continent. Africa is endowed with indigenous materials and technologies that could relieve curriculum systems in the continent the burden of too much reliance on western systems of production that require modern materials, tools and equipment. This paper explores the role of Indigenous Knowledge Systems (IKS) in addressing the problem of declining enrolments in Design and Technology. Two examples of the same product (an indigenous design and a western design) are compared in terms of resource needs in making the products. It is concluded that the western design is far more capital intensive in terms of resources needed to make the product and therefore costly for African economies.

Introduction

The paper argues that current Design and Technology and other technology related subjects in Botswana, Kenya, and Swaziland were founded on the culture, history, and philosophies of Euro-Western thought and are therefore indigenous to Western culture and its institutions (Chilisa, 2012). As a result, sustenance of resource needs for these subjects in these countries is proving difficult. While the decline in uptake of Design and technology cannot be attributed to lack of resources alone, Gaotlhobogwe (2012: 15) indicated that lack of resources play a major role in influencing students against the subject. The concept of resources in educational terms is not very restrictive as it includes anything that can be used as an educational tool. However, in the context of this paper, resources refer to the following: materials used in the actualization of products; tools and other electronic and mechanical equipment used to manipulate materials when actualizing products.

Design and Technology in Botswana

In the 1980s the Ministry of Education in Botswana, now known as the Ministry of Education and Skill Development (MoSD) instituted a consultancy to review the technical subjects' curriculum to bring Botswana in line with international thinking in the field of technology education. This consultancy, led by Robert Fox (The Fox Report, 1988) recommended the introduction of Design and Technology modelled around the UK's Design and Technology. Following this recommendation, in 1990, design and technology was gradually introduced in schools, phasing out the old traditional craft-based technical subjects. Technical subjects were generally relegated to a position of least choice, to be taken by students who were not performing well academically. Moalosi (1999) observed that, before 1990, it was a common misconception that if a student was academically weak they might perform well in technical subjects. Technical subjects tended to be studied by boys only and were dominated by teacher-centred methods of teaching, which did not offer opportunities for critical thinking, ingenuity and creativity.

Critical thinking, ingenuity and creativity are some of the intellectually challenging key aspects of a well-developed design and technology provision and are considered important life skills. The government of Botswana supported this initiative in terms of training teachers and providing the necessary resources for the subject. However, as observed in the literature (Barlex, 2007; Keirl, 2007; Kumar, 2002) technological developments constantly transformed the face of Design and Technology. Computerization and globalization influenced nations towards post-industrialization.

According Levin and Kojukhov (2008) modern life or high-tech technologies are the basis of post-industrialization and so consistent resource allocation is required to keep up with the demands of technology. The education system failed to respond to these new demands, Evaluation reports (Republic of Botswana, 2004; 2009) noted the comprehensiveness of Design and Technology content and the lack of time to complete the syllabus within the given time but failed to report on how this impacted upon resources as well. One of these reports however, noted that teachers reported acute shortage of equipment for technology including power tools, hand tools and models for concretizing concepts in Mechanisms and Electronics and Electricity (Republic of Botswana, 2004: 70).

Art and Design in Kenya

A distinguishing feature of education in Kenya and the rest of Africa is that through western adaptations, models were integrated with little delineation between the liberal and vocational fields and this resulted in heavily academic oriented western models. These academic oriented western models came under strong criticism for failing to prepare students for productive life after school.

In response, the government of Kenya expanded technical and vocational education as an integral part of general school curriculum and art and design was one of the subjects offered. According to Lauglo and Maclean, 2005 as quoted in Wagah, Indoshi, and Agak (2009) the rationale for introducing Art and Design in Kenya was to educate and develop the whole person, and to provide equality of opportunity by catering for a wide range of talents. Like in many countries of Africa the introduction of Art and Design as a vocational subject in Kenya met challenges some of which were attitude problems.

Wagah et al (2009:449) reports that certain forms of Art and Design products were regarded as fetish due to Christian beliefs which regarded certain performances and presentations as a form of idolatry and incantation. Mapara (2009:139) makes the same observation that imperial conquests were not only largely military but were also meant to purge the colonies of what were referred to as heathen and backward practices.

Due to cost implications the popularization of Art and Design has not materialized to date because parents are expected to pay for consumables. A study on *Factors that determine students' and teachers' attitude towards Art and Design curriculum* in Kenya (Indoshi, Wagah, and Agak, 2010) observed that schools lacked materials, equipment, and facilities.

Design and Technology in Swaziland

As British colony, Swaziland adopted the Cambridge O' level curriculum from Britain and this curriculum existed in Swaziland until 2006 when Cambridge stopped O' levels. Within the O' level curriculum were practical subjects such as: Agriculture, Home Economics, Business Studies, Technical Drawing, Woodwork and Metalwork. The technical subject of Technical Drawing, Woodwork and Metalwork experienced problems of declining numbers throughout the years. This decline in numbers was attributed to a number of factors, including: lack of a clear philosophy for the subjects; lack of clear, well defined career progression route; and lack of higher degrees in local tertiary institutions.

In 2006 Swaziland then adopted the International General Certificate of Secondary Education (IGCSE) curriculum that came about with subjects like design and technology. This was a paradigm shift from the technical subjects. The introduction of IGCSE brought a lot of changes in terms of subject content and teaching methodology. The new curriculum was divided into three components namely: graphics; resistant material; and systems and control. Soon after that Swaziland started developing its own curriculum to be known as Swaziland General Certificate of Secondary Education (SWAGCSE) that would conform to local technologies.

Within the SWAGCSE, Design and Technology is an elective subject and falls into the technical field of study which include Accounting, Business Studies, Geography and Information and Communication Technology. It is viewed as an answer to fulfil the government's desire to give pupils opportunities to develop essential skills that include:

- Problem solving skills
- Technological awareness and applications
- Critical thinking skills

To achieve the above, there was need for change in terms of philosophy, content, approach and teaching methods. However, to date there has not been any great change in terms of classroom settings and facilities, teaching and learning activities compared to the traditional technical subjects. As a result the decline of numbers in Technical subjects experienced before the introduction of Design and Technology continues.

Linking IKS with Design and Technology

To appreciate fully and understand the concept of linking IKS with lack of resources in Design and Technology and other technology related subjects in Botswana and in other countries of Africa one has to have a full understanding of the concept of IKS.

According to Mapara (2009) "Indigenous knowledge systems are a body of knowledge, or bodies of knowledge of the indigenous people of particular geographical areas that they have survived on for a very long time" (p.140). IKS is an emerging field which is also known as Indigenous Ways of Knowing (IWK) and Ethno-Science. Mapara (2009) observes that "this area has captured the attention and respect of international scholars but also gained the support and recognition of the United Nations (UN)" (p. 139). According to DeWalt (1994), "arguments for greater attention of IKS are based on the need to:

- Create more appropriate and environmentally friendly technologies;
- Empower people to have greater control on their own destinies;
- Create technologies that would have more just socioeconomic implications" (p.123)

Africa is endowed with indigenous materials and technologies that could relieve Design and Technology related curriculum systems in the continent the burden of too much reliance on western systems of production that require modern materials, tools and equipment. According to Moalosi, Popovic, and Hickling-Hudson (2010:175) "Current design approaches within Botswana's Design

and Technology with their standards, rules and guidelines, fall short with respect to issues relating to the cultural context” (p. 175). It is not surprising that current design approaches fall short with respect to issues relating to the cultural context because our Design and Technology curricula were founded on the culture, history, and philosophies of Euro-Western thought and are therefore indigenous to Western culture and its institutions. Some characteristic of IKS that can be explored in the quest to solving the problem of declining enrolments in Design and Technology are summarized as follows:

1. IKS conforms to high labour and low capital demands. Lack of resources for Design and technology comes as a result of high capital demands of modern life or high-tech technologies that form the basis of post-industrialization.
2. IKS are dynamic and have diverse adaptive strategies for use at times of stress (e.g. insufficient funds). Some IKS do not die because, as Moalosi et al (2010) put it, “no matter how people try, it is impossible for them to divest themselves of their own culture, but foreign culture dies easily in times of stress”
3. IKS are locally appropriate and dependent on locally available resources.
4. Integration with social institutions is easy.
5. IKS are flexible with considerable potential for entrepreneurial abilities.

The following example illustrates the potential of linking IKS with Design and Technology in addressing the problem of lack of resources which impact upon enrolments in the subject. In this example, two examples of the same products are compared. Wooden coasters contained in a wooden container (Indigenous design) and glass coasters in a glass/aluminium stand (Western design) are compared in terms of resource needs in making the products.



The wooden coasters and container were hand crafted using a couple of chisels, sandpaper, and some wax polish. This product was bought at a local Botswana craft market for a price of P100 / €10. On the other hand the glass coasters and stand were made from glass and aluminium, involving processes that demands expensive equipment such as CNC Lathe, glass cutting and etching equipment. This product was bought at an upmarket shop in the City of Cardiff, U.K. for a price of £35 / P350. The glass coasters and stand though expensive in terms of materials and equipment is not durable; out of the six original coasters, four have been broken and only two remain. One of the four aluminium holders has snapped from the glass base.

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Conclusion

Recognizing the value and role of IKS is an important first step in addressing problems experienced in Botswana, Kenya, Swaziland and other African nations as a result of adopting western models of Design and Technology related curricula. Scientific/Western knowledge systems are not only capital intensive and expensive to African economies but they disconnect people from who they really are. As a result of this indoctrination that Scientific/Western knowledge systems are superior to IKS, African systems including education are always playing the catch-up game with Western systems.

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