

## The relevance of indigenous technology in Curriculum 2005/ RNCS with special reference to the Technology Learning Area

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*In this article it is argued that indigenous technology with its long history cannot be ignored and should be assigned a more prominent place in the Technology Learning Area (TLA) within Curriculum 2005/RNCS Grades R – 9.<sup>2</sup> The argument is based on the findings of a study in which the relevance of indigenous technology in the TLA curriculum was investigated. The findings not only pointed to the long history of indigenous technology, but also evidenced the continued use of such technology among indigenous people, especially in the rural contexts. The findings in the study are suggestive of an enhanced recognition of indigenous technology in the TLA curriculum. Therefore, informed by the findings, the authors pose certain recommendations pertaining to the TLA curriculum. The article has as secondary purpose creation of awareness of, and sensitivity for, the cultural heritage of indigenous people in South Africa and context-specific community needs which can be recognised and addressed in learning areas such as the TLA.*

### Introduction

Indigenous Knowledge Systems (IKS) have always formed part and parcel of traditional communities in South Africa and elsewhere in the world. In South Africa IKS were denied inclusion in the formal school curriculum before the democratic dispensation. This exclusion is most probably attributed to the western attitude of viewing IKS as primitive, uncivilized, and barbaric (Massaquoi, 2001:1). According to Massaquoi (2006:1) "... it is usually assumed that local people have nothing to offer". The suppression of IKS was introduced by the western colonization of South Africa. The pre-democratic governance in South Africa furthered the suppression of IKS through its exclusive educational programmes. It instituted the educational practices that denied school children from indigenous communities the opportunity to learn about their contextualized knowledge and technology.

The then government of national unity came with concerted efforts to end the suppression and distortion of IKS in general. This was done by streamlining the new curriculum principles with the national constitution based on principles of equality. Curriculum 2005 (C2005), with its principles, rationale, critical and specific learning outcomes presented the opportunity for IKS to be considered. However, the question remained as to what extent or depth this had been done. The authors applied their minds to this specific issue and found this consideration rather superficial. (For example, the reference to indigenous technology in C2005's TLA was mostly tentative and vague, as illustrated in the seven TLA specific outcomes.)

The authors further noticed with interest the progressive attempts, from the C2005 to RNCS Grades R – 9, to specifically include indigenous technology in the first assessment standard of the third TLA learning outcome within the RNCS Grades R – 9. The main phrase of this assessment standard: "... how local indigenous cultures have used ..." (DoE, 2002:28), seems to confine indigenous technology to the past. "Have" in the phrase suggestively promotes the engagement of indigenous technology as a subject of the past. Therefore, the research question resulting from this observed vagueness was: Is indigenous technology still relevant for inclusion in the TLA curriculum? If so, how can the TLA curriculum address it fully and more specifically?

### **Aim and significance of the study**

The main aim of the study (a PhD thesis) in broader terms was to determine whether indigenous technology is still relevant for inclusion in the TLA curriculum and, if so, to make certain recommendations not to compromise its inclusion. This aim was realized by pursuing three main objectives:

- An extended literature review was undertaken with a focus on the development of indigenous technology and its usefulness in indigenous community environments.
- An empirical investigation was conducted in which indigenous technology still used by indigenous people in selected districts was observed and photographed, while educators', parents' and elders' views were gathered by means of in-depth interviews and open-ended questionnaires.
- Recommendations were made which included a curriculum model for the development of a relevant TLA curriculum which would recognize indigenous technology fully and more specifically.

The significance of the study lies in the possibility that the appropriate inclusion and recognition of IKS in South African school education can create opportunities of bringing new respect for the culture of the indigenous people. The TLA curriculum provides a most suitable platform in this regard. The recognition of indigenous technology could help to address the context-specific needs (including economic needs) of the learner and the community whose IKS has been suppressed for a long period. In addition, the recommendations intend to provide room for all communities/cultural groupings in the country to enjoy their own indigenous technology. In this respect it is hoped that indigenous technology will ultimately embrace more than a few "add-ons" to the current TLA curriculum. In their search for information from elders in some communities, for example, learners can learn to appreciate their own cultural heritage as well as the knowledge of elders as valuable sources of information. More importantly, it can assist in the removal of barriers between the indigenous and western world-views.

### **Purpose of the article**

As it is impossible to fully cover the scope of the study in one article or to discuss the development of a full curriculum model, only key aspects are highlighted. As such the purpose of the article is two-fold:

1. To present a selection of findings from the literature and the empirical investigation as basis for recommendations regarding possible adaptations to the TLA curriculum.
2. To present the selected findings in such a way that awareness of and respect for the cultural diversity in the country is enhanced.

### **Definition of key terms**

Indigenous Knowledge Systems (IKS), indigenous, knowledge, technology and relevance are the key terms in this article. As such they deserve definition.

IKS refer to "the complex set of knowledge and technologies existing and developed around specific conditions of populations and communities indigenous to a particular geographic area" (National Research Foundation, 2002:1). The idea that the authors hold in line with this definition is that IKS is about knowledge and technologies of blacks who are the former inhabitants of South Africa as a geographic area.

According to Hornby (1998:606), the term indigenous refers to plants, animals or people that naturally belong to a particular place. Indigenous is native people, or people originating

or developing naturally in a particular land, region or environment. To Pollock (1995:21), indigenous is a term used to describe people who are the original inhabitants of a particular geographical area. In this definition the terms "naturally", "native", and "originating" or "original" are very important to clarify "indigenous". These authors built on these views with regard to the understanding of IKS.

Knowledge is regarded as an integrated body of information on a subject concerned (Marais, 1996:213). In a general public domain, it can be argued that knowledge comprises several pieces of information contributed by different persons or even societies. However, knowledge is qualified as indigenous in this article in the context of the main concept, IKS. Serote (1998:2), an established researcher in the field of IKS, sees knowledge as something that is owned by the community in whose customs, practices and traditions it is embedded. Therefore, in the context of this article, knowledge encompasses a body of information that includes customs, practices and traditions of indigenous people. In discussing the topic Indigenous Local Knowledge, Atte (1992:3) defines the term indigenous as implying knowledge that originates and is exclusive to an area without borrowing from or being influenced by knowledge from outside it. The importance of this definition is in the fact that knowledge naturally originates in a particular area or region.

Definitions of technology abound. What is interesting about these is that they have been contributed from different contexts to illustrate that technology is influenced by context. The similarities running through or implied in many of these definitions include skills, knowledge, resources, needs and wants, or problems (Arnoldi, Geary & Hardin, 1996:31; DoE, 1997:84; Tregust & Mather, 1990:53; Waks, 1995:2). As a result, the definitions in literature point to indigenous technology as the use of technological knowledge, skills and resources transmitted by indigenous communities to their young in their cultural contexts to manipulate the environment to meet their needs or wants. Culture (indigenous culture in this case) and context validate the different approaches and understandings of technology. Culture as a concept embraces technology as one of its descriptors (Gumbo, 2000:234).

Hornby (1998:987) describes relevance as being "closely connected with" or "appropriate in the circumstances". In the context of the title, research question and aim of this article, relevance means that indigenous technology is appropriate to the TLA curriculum. Relevance is also one of the principles on which the new curriculum is based especially with regard to context (DoE, 1997:4). In other words, the Department of Education aims to make the curriculum relevant to the learners' contexts.

### **Method of the study**

The literature review in this study laid the basis for a qualitative empirical investigation. The authors deemed the qualitative research paradigm suitable for the study as a data collection approach in a natural setting and bearing the descriptive-narrative nature of the methodology in mind (McMillan & Schumacher, 2001:398-400). One of the authors (JKM, referred to as researcher in the article) was able to collect data in the form of words and/or pictures, and therefore assigned meaning to a particular given phenomenon (Creswell, 1998:14). The data collection methods employed fell within this researcher's view of reality and were based on "a constructivist philosophy that assumes reality as multilayer, interactive, and a shared social experience interpreted by individuals ... understanding the social phenomena from the participant's perspective ... (and showing) context sensitivity" (McMillan & Schumacher, 2001:396). The grounding of the research can therefore be found in a phenomenological approach with

"indigenous technology" as the phenomenon. This approach accepts that there are "multiple realities which are socio-psychological constructions forming an interconnected whole ... with an underlying epistemology that recognises the interdependence of the "knower and the known", as well as the role of values in the mediation and shaping of what is understood (Maykut & Morehouse, 1994:12).

The core values which underpin the study include aspects such as respect (which acknowledges the diversified learner population in the country with their individual backgrounds and needs); social justice (with the inclination of addressing historical inequalities in South Africa); and love and caring (for the teaching profession, for fellow human beings, for the cultural heritage of the nation in general and that of indigenous communities more specifically).

The researcher attempted to understand the points of view of groups of participants regarding indigenous technology. Phenomenology enabled the description of the specific experiences of indigenous people as found in concrete situations and conceptualised by them. According to Leedy (1997:161), "attention to experience and intention to describe experiences are central qualities of phenomenological research". In addition, the researcher had a personal experience of indigenous technology and therefore aimed to heighten his own awareness of the experience while simultaneously examining the experience through the eyes of indigenous people as the main participants in the study.

Temba (Makapanstad-West and Rekopantswe circuits) and Mabopane (Winterveldt-North and Jericho-West circuits) education districts in the eastern region of the North-West Province were targeted for data collection. From these areas the sample of people consulted were purposefully selected, with some reliance on network or "snowball" sampling (McMillan & Schumacher 2001:403). The purpose of employing network sampling was to use, especially, elders as pointers for identifying next informants because it was assumed that they had a good idea which people could supply rich information related to the research question. The sample included four School Management Team (SMT) members, eight educators from various former black rural schools, six indigenous parents and six elders (three males and three females in each group) within the targeted region. Four educators were educators on Intermediate Phase level (Grades 4 – 6 and the other four on Senior Phase level (Grades 7 – 9). The sampled parents were required to have children who were still attending school between Grades 4 and 9. It was hoped that they would provide data on the basis of their experiences with their school-going children. It was also required that these parents be below the age of 45 because the elders were those that were older than this age for purposes of this study.

The educators and subject advisors were given an open-ended questionnaire to complete prior to the interviews. Since most of indigenous parents could read and write either English or their mother-tongue, they were also given questionnaires with open-ended questions to complete. Six elders from various cultures (Tswana, Zulu, and Tsonga) were selected for an interview sample, only because they could not read or write.

In addition to interviews and questionnaires, the researcher also made use of an observation technique, which was enhanced by photographing the technological artefacts after each interview with parents and/or elders.

The trustworthiness and credibility of the study rested on aspects such as the phenomenological approach employed, the prolonged fieldwork, the multi-method strategies of data collection, and (recorded) verbatim accounts used in reporting (McMillan & Schumacher, 2001:407-417). The typicality of the phenomenon focusing on indigenous people provided the

basis for the possible extension of the findings, as well as further research in the field of IKS. Ethical principles were adhered to throughout the study, with openness, consent, and respect for indigenous customs as guiding principles.

### **Evidence of the relevance of indigenous technology from the literature**

The evidence of indigenous technology can be traced from the Stone Age up to its current existence. Man used various methods to shape stones, wood, bone, skin, and iron to make tools for his survival. Stones, for example, were used for hunting and other forms of food manufacturing in agriculture. This could have been the practice in many communities around the world, based in their contexts, e.g. Aborigines in Australia and the Red Indians from the former USA. In this article the authors give an account of indigenous people as understood from the definitions of the key terms above. Indigenous people used stones as weapons either to bring down an animal or to frighten scavengers from a kill abandoned by one of the predatory carnivores. In addition to stone, bone splinters were probably used as spear points and it was an important advance technology for a hunter (Van Aswegen, 1990:8-9). Some other well-planned technological tools were used to till the soil. And, after harvesting, stones were used as grinding machines for corn.

In addition to stone instruments, wood was processed into the technological tools, e.g. as a plough pulled by oxen (Clemens, 1991:11; Corbishley, 1994:14). It may be ridiculous especially in the urban environments to still use a wooden plough in the face of fast modern technology like tractors. However, when the interplay between technology, society, and environment is assessed indigenous technology like this offers a point for agenda. Thus, it is interesting to note that the use of wood as a plough was shown on television (SABC2/Tsonga-Venda News, 28 July 2003) in a report on financial support by the United States to indigenous people for promoting their agricultural production. As part of evidence, this portrays the observation that indigenous technology is not only a thing of the past as it is still appreciated to a larger extent.

The first and third authors grew up in and still have contact with the rural environments where they can witness indigenous technology in practice. Of course, the intensity of the practice diminishes towards the urban environments due to the influence of 'hi-tech'. Wooden mortars and grinding stones were, and are, still used to grind corn. On 11 November 2003, SABC2 News broadcast pictures of women who were using wooden grinding stones to grind peanuts into peanut butter which they sold to the nearby shops. Before the wheeled wagon was used to transport agricultural products, blacks had also been using wooden sledges pulled by oxen as a means of transport to bring the harvested products home (Davies, 1992:6). In order to cook fine corn indigenous people made fire by using a hard stick in a block of softer wood. This method was common to most of African indigenous people before the dawn of the current technology. Wilkinston, Kennedy, Davenport, Owen, King and Merriman (1989:16) concur with Hammond-Tooke (1993:42), who illustrates the South African Swazi men making fire by rubbing dry sticks together. The third author also witnessed this fire-making method while touring the area surrounding the Sudwala caves in 1999.

Wood, bone and iron were important for defence and entertainment. Traditional weapons found today in South Africa suggest that indigenous people had and still have a defence technology of their own. The traditional weapons called assegais and shields displayed during the Zulu functions and marches are still common evidence of the defence technology. During the so-called Scramble for Africa, Europeans gained an advantage in military technology (Shil-

lington, 1989:305). Indigenous people, on the other hand, relied on the defence technology cited above. Combined with the skill to use it, it proved its effectiveness during the battle. For instance, the Zulus defeated the whites who used guns during the battle of Isandlwana in 1879 (Barker, Bell, Duggan, Horler, Le Roux, Maurice, Reynierse & Schafer, 1989:184). For entertainment, indigenous people used various materials such as wood, strings, and skins to make a variety of musical instruments. Harrison (1992:29) portrayed boys playing with self-made wooden bicycles. Indigenous technology is still self-evident in as far as musical instruments are concerned. Common examples include the reed instruments and the African drum.

Technology also expresses itself through art (Custer, 1995:223; Gumbo, 2003:7). No wonder art-effects are what technology produces. Bearing in mind this relational aspect between technology and art, the artistic ability of indigenous people is self-(art)iculate through rock painting, clay-pot making, clothing, and beadwork. Rock paintings and engravings found in South Africa demonstrate the artistic ability and skill of the Stone Age indigenous ancestors (Shillington, 1989:8). According to Elliott (1988:14), Zulu women are known as pot-bakers. They skilfully mixed clay on a flat stone usually used for grinding cereal. The base of the pot was made on top of the item made of grass known as "inkhata" in Zulu. It kept the pot in the correct and stable position while the sides of the pot were being built and made smooth by another flat object. A stone was used to decorate the pot before it was taken for baking in the fire. From the fire the pot emerged either red or brown and was very strong (Elliott, 1988:15). The third author in this article recalls how he and his play-mates used to be fascinated by the skills of grannies on farms around Rooiberg where he grew up. These grannies willingly demonstrated their skill to them, of applying it on the model animals like cows.

African pottery is an indigenous technology that still thrives today. Currently there are many indigenous people who make and sell clay-pots, reed chairs, baskets, and other decorated technological products for a living. The artistic expression of the technology in these products implicates indigenous cultures that produced them. These products flood the open market squares such as in the greater Magaliesburg near Brits. Some of them have even attracted the international market to a point where indigenous sellers can engage in direct export. In addition to rock painting and clay-pot making, the ancestors produced a rich variety of items of clothing made of skin (Andah, 1992:89). Elliott's (1988:12; 18) work includes the portrayal of traditional dresses, which still remain popular during Zulu, Tswana, Swazi, festivals, etc. All these can be viewed and admired on cultural and heritage days.

Discoveries can also be accounted for with regard to the Iron Age. Van Aswegen (1990: 34) notes that archaeologists and historians generally agree that the cattle owners, agriculturalists, hunters and gatherers who came from the north in Limpopo were also the Iron Age people. One of the great innovations of their time was the technology to mine and process iron, copper, and gold. Remains of the iron smelting found from the smelting process are kilns and waste materials (Van Aswegen, 1990:32-34). Thus, there is ample evidence that indigenous people were knowledgeable in the technology for processing iron. A hand-manufactured assegai supports that. The discovery project that the University of Pretoria took part in a few years ago in Mapungubwe in the far north of Limpopo province (University of Pretoria, 2006:1) revealed the making of gold bracelets, animal models, etc. It is from such discovery that the gold-plated rhino model makes such an important heritage aspect.

As can be realized through the consulted literature thus far, indigenous technology bears a historical proven record. It forms part and parcel of indigenous culture. In view of the research question, as stated in this article, it would seem that the literature stance regarding

indigenous technology has crucial implications for the TLA curriculum. This claim is anchored in the findings of the empirical investigation in the next section, which addresses the research question posed.

### **Findings of an investigation into the relevance of indigenous technology**

The investigation undertaken in response to the research question resulted in the findings reported in this section. As set out earlier, the investigation mainly targeted the SMT members, educators, indigenous elders, and parents and relied on data collected by means of open-ended questionnaires, in-depth and informal interviews, and observation. The researcher was able to provide the participants an opportunity to assign meaning to indigenous technology in their own words through this research strategy.

It was found that most SMT members and educators regarded indigenous technology as still important and relevant as illustrated in the following responses:

*"Most of the people in rural areas still rely on indigenous technology."*

*"Indigenous technology is still important nowadays because learners must know their cultural background and how things originated. Through the knowledge of indigenous technology new methods and other technologies can be developed. Learners will understand themselves more fully and will have confidence in themselves. Curriculum 2005 embraces everything from indigenous to modernised technology."*

*"It should be regarded as important and relevant since it provides learners with some of the information they do not know and it is important for learners to know how technology was improved. This will help them understand better and may help them to improvise whatever material in order to solve the problems they may encounter."*

*"... indigenous technology is important in the sense that it links with the modern technology. Indigenous Knowledge is the root of the modern knowledge. Future is the mystery. It cannot be predicted without knowledge of both ..."*

*"... it is important because that is where we show where we come from. It is important that learners should know that people in the olden days did think and develop and not just relaxed if something they made was not of quality, they did improve on it."*

The SMT's response illustrated their awareness of the inclusive principles enshrined in the curriculum. This implies the opportunity that the TLA educators (in this case) should harness and include indigenous technologies in their planning and teaching. It is assumed that by "modern technology" they referred to the current predominant 'hi-tech' or western-dominated technology. Therefore, their responses in this regard suggest that a link between indigenous technology and "modern technology" will most probably enhance the learners' understanding of the concept of technology.

Elliot (1988:6) and Wilkinston *et al.* (1989:31) confirm the SMTs' and educators' view by citing the fact that indigenous people still use the grinding stone and wooden mortars, especially during the making of traditional beer. The literature review above also acknowledged this fact to a larger extent. According to Van Aswegen (1990:7), the fact that indigenous people made tools themselves shows that they are the main custodians of knowledge in indigenous technology. They could not have survived without developing their own technology (Hall, 1996:148). Gumbo (2003:55-57) explored this indigenous technology in the fields of metallurgy, astronomy, architecture and engineering, mathematics, navigation, agricultural sciences, medicine, writing systems and communication. He came to the conclusion that the richness found in it need not be compromised in the school curriculum.

The SMT members identified parents and elders as the main source of knowledge on indigenous technology:

*"Parents can be regarded as the source of information for indigenous technology as it is knowledge acquired from home and the use of home-based materials."*

*"Grandparents can be regarded as the source of information. They have information on indigenous technology, i.e. what they use to solve problems and meet their needs and wants. The information should also be recorded for future use, since it will cease as time goes on."*

These responses affirm the notion that technology cannot be viewed apart from its interactions with society and its values (Wiens, 1996:23). The society partly includes the elders who are skilled in their technological ways to interact with and manipulate the environment. The reviewed literature accounted more on this elderly indigenous community's rich technological know-how.

According to Custer (1995:7), technological artefacts are cultural expressions. Indigenous elders and parents contributed valuable responses in support of the SMT, especially on the relationship between technology and culture. Their responses are related to the importance of indigenous technology in their own cultural contexts (presented in the original mother-tongue, followed by a translated English version, in recognition of and with respect to the respective cultures of the participants):

[Tswana]:

*"... gore ba seke ba timetsa setso ..."* [... to avoid the disappearance of culture ...]

*"Setso sa rona se bothokwa thata mo thutong, le mo ekonoming ya rona. Re ka thaba ge ba ka re busetsa setsong sa rona."* [Our culture is very important in education and in our economy. We can be happy if our culture can be brought back.]

*"Dirisiwa tse di sa ntse di le bothokwa. Ke dilo tse di dirisiwang ka metha, jaaka mafetho, maso go apaya bogobe, le kika le motšhe go setla mabele go dira bupi."* [These utilities are still important. They are the tools used daily to cook. They are being used always, for example, wooden mortars and instruments to grind corn into meal.]

These responses cast light upon the relevance of indigenous technology in the school curriculum. In addition, elders as the senior custodians of this heritage could be useful in augmenting the curriculum through the collaboration that can be forged with them. For instance, Popagano (1987:13) illustrates a female elder demonstrating to learners how to make clay-pots. In this investigation, parents and elders seemed to be willing to help teach learners about indigenous technology at school, as demonstrated in their responses:

[Tswana]:

*"Go botlokwa gore baihuti ba itse ka ga didiriswa tsa setso gonne di neelana ka ngwao ya setso."* [It is important that learners know about indigenous artefacts because they provide cultural roots.]

[Zulu]:

*"Sifisa ingathi abantwana ezikolweni ba nga fundiswa nga le zinto ze sintu. Abantu abadala fanele ba nqede ngo ku fundisa ngale zintu."* [We wish that our children at school be taught these cultural things. Old people must be given a chance to teach these things.]

[Shangaan]:

*"... loko vo swi ngenisa eswikolweni swi nga tsakisa ngopfu. Khale ahi hanya ku nandziha ahi dya mihandzu ya nhova, kutani na mavabyi lawa hi ya vonaka manguva lawa aya nga ri kona."* [... we will be happy if they can be included in our schools. We have been eating some wild



plant roots as medicine, diseases that we experience currently were not there.]

In a follow-up and direct question as to whether they would be willing to help facilitate learning that relates to indigenous technology, the elders and parents responded passionately showing their keenness to do it:

[Tswana]:

"*Jaaka motsadi, nka dira jalo gonne ke tla kopa batsofe kitso eo ba nang le yona.*" [As a parent, I can do that because I shall ask the elders to provide the knowledge that they have.]

"*Nka itumela thata, nka dira jalo fa ke neetswe tshono ka di-cultural days mo sekolong ... nka batla le go tliša le go ruta ka tsona gore baithuti ba di bone, ba di rate ba be ba botse dipotso tse ba ka nnang le tsona.*" [I will be very happy, I do that if I can be afforded the opportunity during cultural days at school ... I will even want to bring and teach about them so that learners can see and love them, and ask questions that they might have.]

"*Le fa rona re sa rutega re ka dumela fa ba ka re laletsa gore re tle go thusa go faana ka kitso e. Le fa bana ba ka tla mo go rona ka dipotso re ka ba araba.*" [Uneducated as we are, we can welcome the invitation to come and share this knowledge. Even if they can come with questions we can be able to answer them.]

[Shangaan]:

"*Mina ndzi tiyimiserile ku pfuna vana loko va ndzi vutisa swivutiso hi ndhavuko wa mina. Ndzi ta hlamula swivutiso hinkwaswo na ku va kombeta hi laha ndhavuko wu nga hi xiswona.*" [I am prepared to answer learners' about my culture. I will answer all questions and even to illustrate that culture.]

The elders and parents illustrated the fact that they possess first-hand information on indigenous technology. The elders provided the following responses to back up their arguments in this regard:

[Tswana]:

"*Ee, re a di dirisa. Dikgomo re di tshwara ka kgole. Kgole ke sedirisiwa sa setso ebile ke letlalo.*" [Yes, we use them. Cows are harnessed by means of skin ropes. A skin rope is a traditional utility and a skin also.]

[Zulu]:

"*Yebo, ngi zisebezisile le zinto ze sintu, nga sebezisa izinto ezi nje nge isinganama. Be si gaba ngaso si ze sefuthe na ngaso. Amadoda nge sintu be ba gcoka amabheshu. E zinye ze zinto ze sintu a za sebeziswa be ku ukhamba — lona be lu sebeziswa nje nge imbinza (ibhodwe).*"

[Yes, I have used these cultural things, I have used things like "*isinganama*" (a type of medicinal plant). We used it for as a laxative and for purposeful vomiting. Traditionally, men wore skin as trousers. We also used clay-pots made by from special mud.]

Indigenous elders were not only the source of knowledge on indigenous technology but also toolmakers (Van Aswegen, 1990:7). The Iron Age-to-present literature review provided reasonable evidence in this regard. In addition, Andah (1992:89) and Elliott (1988:14) assert that indigenous women specialised in clay-pot making and skin clothing. Elliott's (1988:12; 18) work illustrates traditional dresses, which still remain popular at the Zulu festivals. The parents' and elders' responses also illustrated this:

[Tswana]:

"*Dilo tseo re neng re di dirisa, re ne re sa di reke. Dingwe, go tshwana le tshilo le lwala, batsadi ba rona ba ne ba di tsaya kwa dithabeng. Motšhe le kika tseo re neng re setla mabele ka tsona, ba ne ba di betla kwa nageng. Dilo tsoitlhe tse, ba ne ba itirela tsona.*" [All the artefacts we used were not bought. Some of them, like grinding stones, were collected from the

mountains by our parents. They made all these artefacts themselves.]

[Zulu]:

*"Le zinto ze sintu bezenziwa nga bafazi na madoda — Ukhamba be lwenziwa ngabafzi ngo daka (ubumba)."* [Women and men made these traditional artefacts. The clay-pots were made of special mud.]

[Shangaan]:

*"Swilo leswi aswi endla hi mavoko ya hina. Ahi nga xavi nchumu. Maribye yo sila aku langiwa lawa a nga na nkhelelyana ku kota ku sila kahle. Maribye ya kumeka etintshaveni. Vakhalabya ava vatla minkombe na mafetho (Ribudlu). Matshuri na tindyelo aswi tirhisiwa hi va manana, va rhunga na swibelana. Khale vakhalabya ava ambala mazovo lawa ya vitaniwaka tinjovo. Hinkwaswo leswi ava ti endlela swona hi mavoko."* [We made these things with our own hands. We did not buy anything. Rough grinding stones to grind effectively were chosen. These stones were found from the mountains. Old men made wooden mortars and other cooking utensils. Women used wooden mortars and wooden plates, and knitted traditional dresses. Old men used to wear skin clothes. They made all these with their own hands.]

### Concluding remarks and recommendations

We have attempted to illustrate the way in which the relevance of indigenous technology for the TLA curriculum was assessed in the context of the research question in a broader study. The literature as consulted indicates that indigenous technology was and is still evident to a large extent within indigenous communities. As a result, the findings from the study express its implied relevance in the TLA curriculum. However, as said earlier, it would seem that the TLA curriculum only includes it to a very limited extent and in a way that could encourage educators to think cheaply of it in their teaching responsibilities. What then, can be recommended for a more satisfactory acknowledgement of the same?

In the first place, educators' workshops need to address the concept of indigenous technology for awareness and understanding. Then, they should be encouraged to harness the inclusive curriculum principles as a vehicle to acknowledge the reality of indigenous technology. For instance, the essential principle of integration suggests a planning that includes perspectives on indigenous technology. These perspectives could really boost the indigenous learners' understanding of the new technological concepts and processes. In this way a logical understanding of the relationship between the predominant 'hi-tech' and indigenous technology could be forged. To include it only as an introduction, like during the baseline assessment in the lesson, or treat it as a trapped-in-the-past theme (as the above quoted assessment standard suggests) should be discouraged.

The very first specific learning outcome rests upon the design process, which is regarded as the backbone of technology teaching with regard to methodology. Its application offers an opportunity to strike the collaboration between schools and indigenous communities by targeting the technological knowledge, skills and experiences that such contexts can offer to the learner community. The design projects that the educators initiate for learners should be thought out in such a way that they encourage an interaction between learners and indigenous contexts. Context has been captured as an important principle within the new curriculum. An attitude of disregard for a learner's context could possibly be one of the causes of learners' disinterest and passive participation in the teaching and learning situation.

Within the design process, methods such as interviews, observations and any planned strategies that are sensitive to the indigenous community's culture can be considered for captu-

ring the technological richness embedded in such contexts. In a gesture of respect for the oral tradition, a more relaxed and informal communication is recommended for this educational engagement between the researching educators/learners and elders, especially. Learners could be assigned work to record and evaluate the communication, agricultural, engineering, etc. technologies prevalent amongst indigenous communities. Indigenous parents and elders have expressed their willingness to impart their technological experiences to the learners. In this way very meaningful educational engagements are envisaged between the community and school.

As a result the authors recommend the TLA curriculum model that seeks to accommodate both indigenous and western technological perspectives. Such model has a bearing on the learning outcomes. When one considers the transition from C2005 to RNCS Grades R – 9, it could be recommended that the assessment standards (for the three learning outcomes in the current RNCS Grades R – 9), should enable learners to:

- demonstrate an understanding of the inter-relationship between indigenous and western-dominated technologies;
- integrate both indigenous and western-dominated technological knowledge, skills and processes to solve problems in real life situations;
- access, process and use information gathered from a variety of cultural contexts;
- critically evaluate the positive and negative impacts of indigenous and western-dominated technologies on societies and their environments.

The second learning outcome is stated as "the learner will be able to understand and apply relevant technological knowledge ethically and responsibly" (Department of Education, 2004:222). This outcome is more about content in the areas of structures, systems and controls and processing. With regard to structures, for example, learner activities can be extended to learning about the Ndebele's, Zulu's, Swazi's, etc. architectural technologies. They can learn about the technological knowledge and skills centred on these forms of structures.

In the end, the new assessment may not be divorced from the inclusive curriculum principles cited in this article. As a result, educators should make use of the different assessment methods, strategies, and tools to design assessment tasks for the learners, which target the technological knowledge, skills, attitudes and experiences related to their contexts. This impacts upon the learning support materials (LSM) that they could be taught and assessed from. To what extent do they feel represented in these LSMs? Can they identify with them? Do they learn about the technological contributions of their communities? The findings of this study have demonstrated a desire of the indigenous elder and parent community for its children to learn about indigenous technology as part of the TLA curriculum. We should not withhold our children from this rich but waning fountain of knowledge.

## Notes

1. At present the author is an educator at Winterveldt High School in North-West Province. The study was undertaken at the former Vista University, Bloemfontein with the two co-authors as supervisors.
2. The study was undertaken in 2001/2003, the period when the conversion from C2005 to the RNCS in the Compulsory School Phase was taking shape. For this reason the reference to both curricula/formats in the article.

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