

TERMINOLOGY DEVELOPMENT THROUGH TRANSLANGUAGING AS AN INTELLECTUALISATION STRATEGY FOR AFRICAN LANGUAGES IN ANDRAGOGIC CONTEXTS

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Article Info	Abstract
Article History Received: January 2024 Revised: May 2024 Published: July 2024	<i>Terminology has been identified as one of the impediments towards the intellectualisation and the subsequent use of African languages as languages of teaching and learning in specialised fields of knowledge. Although some terminologies have so far been compiled for specialised fields of knowledge, they seem not to be receiving acceptance in the functional spaces particularly the andragogic and pedagogic contexts. The central argument of the paper is that terminology needs to be created through the use of African languages in the process of teaching and learning in andragogic spaces instead of creating them through intuition, translation or knowledge of language. The communicative theory of terminology is used in the paper to argue for the adoption of specialised subject fields terminologies that are created in functional spaces. A sample of terms selected from isiNdebele and isiZulu that have so far been created for use in physics were used to critique the strategies that were adopted in their compilation. Terms for use in teaching and learning need not to be prescribed to the users but they should be harvested from functional academic spaces and then compiled for the writing of books and use in the classroom. A systematic way where the end users are involved in the process of term creation for specialised subject fields needs to be adopted.</i>
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INTRODUCTION

The absence of the use of African languages in teaching and learning at university and other academic spaces has been blamed on lack of terminologies in specialised academic disciplines. The intellectualisation of African languages includes a significant focus on terminology development. Despite being a topic discussed in academic circles, the process has yet to be realised or implemented. Bamgbose (2011) observed that African languages are regarded as having low status because their terminologies are not adequately developed to facilitate the sustainable communication of knowledge in various fields of knowledge. The lack of terminologies in African languages hinders the use of these languages in specialised fields of knowledge (Huyssteen, 1997; Nhongo & Tshotsho, 2020). Bamgbose (2015) argues that it cannot be possible for African languages to be used in the teaching of science if there is no terminology already worked out to be used in such academic contexts. Khumalo and Nkomo (2022, p. 135) argue that “the use of African languages as academic languages in the country’s universities, remains handicapped by terminological problems”. African languages terminology development for specialised subject fields have been reported to be taking place but on the contrary, these terms have not been reported to be functional in the academic spaces. Dlodlo (1999) developed a few Nguni terms for use in physics while Madzimbamuto (2012) also came up with some Shona medical terms. Khumalo and Nkomo (2022, p. 145) note that the UKZN

has managed to compile two specialised field dictionaries, “namely the *Illustrated Glossary of Southern African Architectural Terms* (2016) and *A Glossary of Law Terms* (2018), with an isiZulu dictionary of linguistic terms currently at an advanced stage”. African languages terminologies databases for specialised subject fields have also been created at the University of KwaZulu Natal and by the South African Centre for Digital Language Resources (SADiLaR) based at the North-West University. Although all these efforts have been made to intellectualise the South African official languages, their use in the specialised academic fields is yet to be confirmed. Failure to use the terms that have so far been compiled for different specialised subject fields can be attributed to the manner in which these terms are created. The paper argues that terminologies need to be created through language use in various fields of knowledge and not through manufacturing or engineering terminologies in language laboratories or in other corners that promote a prescriptive paradigm. The arguments advanced in this paper are in agreement with Bamgbose’s (2011) view that the use of African languages as languages of teaching and learning (LoTL) in unaccustomed domains should not wait for these languages to be intellectualised first.

Addressing the challenges linked to incorporating specialised subject field terminologies into academic contexts requires a thorough examination of the term creation processes. This is important because the failure to adopt African languages as Languages of Teaching and Learning (LoTL) is attributed to a lack of terminologies. However, with some terminologies now available, the continued absence of implementation necessitates an examination of the process through which terms are created. One would argue that students need to be involved in the generation of terms and that this process should happen simultaneously with learning. If the process is to happen simultaneously then translanguaging would be inevitable since the learners would be operating in a bilingual or multilingual andragogic environment.

Translanguaging would be inevitable because each student uses an African language as first language (L1) and English as their second language (L2) where the L2 has for a long time dominated as the main LoTL. The reading material is also currently available in English language. The prevailing linguistic environment entails that the use of African languages as instructional languages would call for translanguaging. It is therefore indisputable that the terminologies that are to be used in these andragogic environments are those that are associated with translanguaging in their production. Avoiding transliteration as a term creation strategy and attempting to enforce purist and prescriptivism strategies in term creation has hindered the utilisation of African languages as LoTL in specialised subject fields within andragogic spaces. Kaschula and Maseko (2014: 11) point out that “at this point in our history the intellectualisation of African languages is an imperative if we are to develop the education system appropriately”. African languages need to be used alongside English in andragogic spaces of specialised subject fields.

Intellectualisation of African Languages, Terminology Development and Translanguaging

The intellectualisation of African languages entails developing them so that they can be used to communicate information in specialised fields of knowledge. As societies transition, “Language comes to terms with social metamorphosis, finding new words to comprehend these realities” (Prah, 2017). The transition of societies call for the expansion of the terminology base of the languages and this calls for their intellectualization. According to Sibayan (1999, p. 229), an intellectualised language is one “which can be used for educating a person in any field of knowledge from kindergarten to the university and beyond”. According to Liddicoat and Bryant (2002, p. 1), “intellectualisation of a language involves the development of new linguistic resources for discussing and disseminating conceptual material at high levels of abstraction”.

Khumalo (2017, p. 252) says intellectualisation is “a carefully planned process of hastening the cultivation and growth of indigenous African languages so that they effectively function in all higher domains as languages of teaching and learning, research, science and technology”. An intellectualised language will be able to handle all communication at different levels of academic disciplines (Alexander, 2007). Prah (2017, p. 218) points out that “The development of discipline-specific terminology is crucial to the intellectualisation of a language”. Liddicoat and Bryant (2002) are of the view that the key component in the intellectualisation of a language is the development of academic discourse at different levels of education. The intellectualisation of African languages calls for development of terminologies that can be used in specialised fields of knowledge.

Languages are intellectualised so that they can be able to fulfil other functions that they have previously not performed. Intellectualisation of a language is developing its corpus from its current state to a level where it is used as language of scholarly discourse (Gonzalez, 1998). Liddicoat and Bryant (2002, p. 1) are of the view that “intellectualisation of a language involves the development of new linguistic resources for discussing and disseminating conceptual material at high levels of abstraction”. According to Khumalo (2017: 252), “intellectualisation entails a carefully planned process of hastening the cultivation and growth of indigenous African languages so that they effectively function in all higher domains as languages of teaching and learning, research, science and technology”. Dlamini (2023: 225) is of the view that “The intellectualization of a language means the advancement, upliftment, and enrichment of a language, enabling it for use in different domains as a language of research, science and technology, and teaching and learning”. This means that intellectualisation of language is developing its terminology with the objective of expanding its usage to a variety of fields of knowledge and domains.

The paper draws part of its ideas from Nalasco (2009) who notes that we will never be able to develop our languages for higher thinking unless we begin basic literacy and education in them. Prah (2017, p. 217) laments that “The first condition for the intellectualisation of a language is that it must have a literate social base”. It is not a matter of first intellectualising a language before using it, but we can only intellectualise a language by using it (Bamgbose, 2011). The central argument advanced in this paper is that African languages should be intellectualised through use in those fields for which they are to be developed. Given that the most noble method of intellectualisation involves practical application, it is prudent to investigate how translanguaging can serve as the optimal strategy in the development of terminology. Translanguaging evolved as a pedagogic strategy (Too, 2023) that “make visible the complexity of language exchanges among people with different histories” (Makoe, 2018, p. 17). It refers to the combination of two or more languages in a systematic way within the same language practice (Cenoz & Gorter, 2020). Terminology development through translanguaging calls for the inclusion of coexisting languages in the term creation process which then calls for transliteration. Transliteration, according to Yuming (2015, p. 231), “maps the letters of the source script to letters pronounced in the target script”. Mntintsilana and Morris (1988, p. 111) observe that “In most cases foreign loanwords are Africanized by transliteration, i.e. by changing their phonological and morphological structure to accord with African language structures”. Transliteration is a process of changing the word so that it fits to the phonological and morphological habits of an adopting language after adopting the term referring from the source language. Transliteration as a concept of translanguaging can be an important term creation strategy because this intellectualisation process is taking place in a multilingual andragogic context. Apart from literacy, intellectualisation depends on a number of other enabling conditions for storage and retrieval of language resources and these according to him include “print, audio, visual, the World Wide Web, digital storage, etc” (Prah, 2017, p. 217-18). The paper argues for the compilation of corpora for various subject fields that are created

through term harvesting in translanguaging classes. It should be noted that the process of developing terminology, particularly for specialised subject fields, is a complex and arduous one, which has to be carefully and competently managed (Khumalo 2016; Prah, 2017). Prah (2017) says that grammar books, dictionaries and glossaries play a pivotal role in the intellectualisation of languages. However, the important issue will be about addressing the source documents where terms are harvested.

Prah (2017) argues that many of the African languages are dialectical variations and to succeed in their intellectualisation, harmonisation of orthographies of these variants is crucial. The view by Prah (2017) is that if these structurally related African languages are to be regarded as autonomous then their intellectualisation will be difficult. Dlodlo (1999) seems to be sharing the same view with Prah and that is the reason why he developed physics terms for Nguni without being specific on the exact language that he was focusing on although they are more inclined to isiNdebele. They are classified as Nguni languages because of their mutual intelligibility and these include isiZulu, isiXhosa, siSwati, isiNdebele of South Africa, isiNdebele of Zimbabwe and Ngoni spoken in parts of Tanzania and Malawi. However, while the view by Prah (2017) is important, this paper embraces the creation of discipline specific terms in multilingual andragogic settings through translanguaging where the coexisting languages including those that are not mutually intelligible are all treated as important resources to the final products.

The term intellectualisation when referring to African languages has been contested in some academic circles. This is because of the view that African languages have always been intellectualised until the discriminatory colonial language policies interfered with the intellectualising process. Before the African languages were marginalised in academic spaces, it can be argued that their terminologies were able to adequately communicate everything that existed in their speech communities. This entails that before the interference with African languages and at the same time limiting their functionality to lower order domains, these languages were at that time fully intellectualised because they could handle all communication in all spheres of life in their speech communities. Khumalo and Nkomo (2022, p. 137) argue that “in the precolonial context with a stable African epistemological order, African languages would undoubtedly serve their speakers optimally in all their intellectual activities”. The de-intellectualisation of African languages began during the colonial era when their functionality became restricted from academic, economic, scientific and other formal contexts. Khumalo and Nkomo (2022, p. 136) note that “Without a strong literary history, African languages were relegated to the domestic lives of their speakers and peripheries of the new socio-economic, cultural and political order”. The marginalisation of African languages in academic spaces which stemmed from colonial language policies further coupled with new developments that were created through concepts that came with colonialism created a huge gap between African languages and the ex-colonial languages. This created lack of confidence in African languages as they were erroneously regarded as naturally inadequate and deficient of modern terminologies. Their potential to develop was also mystified on the grounds that they were incapable of expanding in their lexical inventory. Kaschula and Nkomo (2019) argue that because of colonisation, the African languages were de-intellectualised and now there is need for them to be re-intellectualised so that they are able to handle the new intellectual order. The implication is that the expansion of African languages terminologies in scientific, technological, economic and other formal contexts became stagnant. One can argue that the African languages only became inefficient after colonialism because they were now expected to carry the burden of communicating foreign concepts that were alien to them.

Terminology development is key in the intellectualisation of African languages and comes in various ways that include lexicography, translation, writing of books for content subjects, language use in teaching and learning, language use in specialised contexts, and the

production of artistic works and journalism. Chabata (2013), Nkomo and Wababa (2013), Prinsloo and Zondi (2020) and Khumalo and Nkomo (2022) identify lexicography as key in the intellectualisation of African languages. Chabata (2013) proposes the compilation of dictionaries as a way of expanding terminologies in African languages so that they can be usable in all domains of life. According to Alberts (2022, p. 1), in South Africa, “The current national government requires dictionaries in all official languages for proper communication in languages the citizens understand best, i.e. their respective mother tongues”. This is because “Lexicography is a major linguistic cornerstone, and should not be neglected” (Emejulu, 2003: 195). Khumalo and Nkomo (2022) argue that lexicography and terminology development play a pivotal role in the intellectualisation of a language. Khumalo and Nkomo (2022) point out that practical lexicography is crucial in the intellectualisation of African languages. Khumalo and Nkomo (2022, p. 133) note that:

the limited availability of specialised texts in African languages hampers the development and deployment of advanced electronic corpora and its applications to improve the execution of terminological and lexicographical tasks, while also enhancing the quality of the products.

Although specialised dictionary compilation can be an effective way of intellectualising an African language, the challenge is that in order to compile a proper and acceptable dictionary that is reflective of the language used in practical academic contexts, a corpus has to be utilised. A specialised corpus can only be compiled when a language has been used in a specific context whether in written or oral form or both. But in circumstances where a language has not been used in these contexts, it becomes impossible to come up with a corpus.

Apart from dictionary making, Dlamini (2023) and Kaschula and Maseko (2014) identify translation as one of the methods of intellectualisation of African languages. Translators, interpreters, writers and church leaders also play an important part in the intellectualisation of African languages through term creation (Kaschula & Maseko, 2014, p. 13). Dlamini (2023) analysed 12 doctoral dissertation abstracts that were translated from English to isiZulu submitted to the University of KwaZulu Natal (UKZN). The idea was to evaluate the use of translation as an intellectualisation strategy. Dlamini (2023) argued that there are numerous intricacies in the translation of discipline-specific academic texts especially when it is between languages that belong to different language families. Similarly, Mambambo (2023) also argued that translation contributes significantly to the intellectualisation of African languages. Mambambo (2023) was arguing from his own experience of translating Ngugi Wa Thiong'o's *Decolonising the Mind* into ChiShona. However, translation as way of intellectualising an African language is problematic in the sense that the translator of learning material will use his or her own knowledge and understanding of concepts and language used for which the final product may not be accepted by the end user. Alexander (2007) notes that creative writing and journalism also aid to the intellectualisation of African languages. Whilst the contribution towards intellectualisation through the production of artistic works and journalism is appreciated from a general perspective, this paper advocates for the intellectualisation of African languages through term harvesting in the special fields of knowledge. This means that terms created through translation, journalism and the production of artistic works can be harvested for the creation of corpora and as a result aiding to the intellectualisation of African languages. Since specialised lexicography, terminology development, translation, language policy and the actual usage of African languages have been identified as the key pillars of intellectualisation, the chapter will evaluate progress in intellectualisation through evaluation of these parameters as variables.

While all the other strategies for intellectualisation of African languages are acknowledged and appreciated, this paper is interested in instructional spaces in higher learning as platforms for intellectualisation of African languages. The paper argues that translanguaging as a communication strategy in ESL classrooms is important for terminology development for specialised fields of knowledge. It is also argued that African languages can only be intellectualised if they are functioning in these academic contexts instead of waiting for terminologies to be developed first. The process of intellectualisation of African languages needs to take place simultaneously with the usage of language.

Theoretical Framework

Terminology development through translanguaging emphasizes on the communicative approach and therefore the communicative theory of terminology (CTT) is suitable for this paper. The CTT is adopted because of its emphasis on three aspects that include the cognitive component, linguistic component and the sociocommunicative component. According to Aguado de Cea (2007) and Faber and Lopez Rodriguez (2012), Cabre's CTT has multidimensional units which are, a cognitive component, a linguistic component, and a sociocommunicative component. The cognitive component 'includes the place these phraseological units occupy in a conceptual structure, the relations they show in the conceptual map and the way they are used to transmit knowledge' (Aguado de Cea, 2007). The linguistic component includes "grammatical combinations of word classes, their variations and semantic categories they represent" (Aguado de Cea, 2007, p. 187). The sociocommunicative component "reflects the pragmatic features: subject field, users, situation, purpose, etc of specialised communication" (Aguado de Cea, 2007, p.187).

Cabre (2003) proposes that CTT should also be referred to as the 'Theory of Doors' because of the three components of the theory which should be viewed as doors. Cabre says that a terminological unit can be accessed from three dimensions; the cognitive dimension, linguistic dimension and communicative dimension. Each of these dimensions should be viewed as a door although one's choice of a door does not reject other doors. These three dimensions, especially the communicative and the cognitive are critical here because a term should be able to communicate an idea and should have the quality of enabling mastering and understanding. The CTT is relevant in that it recognises translanguaging as the practice that allows bi/multilinguals to converse freely between named languages with the goal of meeting their communicative needs (Canagarajah, 2011). When multilinguals converse freely between languages, the creation of terms that are mutually understood becomes inevitable. In this case the learners will be shuttling between English, their L1, and an African language, which in this study is a Nguni language.

RESEARCH METHOD

The paper adopts a qualitative design through the assessment of a sample of specialised subject fields terms that have so far been compiled in Nguni languages, that include isiZulu and isiNdebele. The isiZulu being studied is spoken in South Africa while isiNdebele is spoken in Zimbabwe. It is important to note that there is another Nguni language called isiNdebele that is spoken in South Africa. It is also crucial to make it clear that these two languages differ culturally and historically although, linguistically, they share a higher level of mutual intelligibility. Because the paper is looking at intellectualisation of African languages through translanguaging in andragogic spaces, the terminologies being assessed are those that were drawn from three sources, that is, for isiNdebele from an article by Dlodlo (1999) and for

isiZulu from van Dyk (2022) on the South African Centre for Digital Language Resources website and from ZULU Vocabulary (2018), which is an online community.

A critique of the existing specialised field terminologies in isiNdebele and isiZulu will mainly be focussing on the strategies used in their creation. The strategies used in the creation of these terms is envisaged as having influence on the possible cognitive impact, their usability, familiarity and acceptability. Major interest is on terms that are created through translanguaging and their embedded cognitive enhancement is juxtaposed with those that are created through other strategies.

RESEARCH FINDINGS AND DISCUSSION

Research Findings

The attempts to intellectualise African languages through terminology development have been growing with Dlodlo being one of those researchers that made initial attempts to come up with specialised subject field terms in 1999. In proposing physics terms, Dlodlo (1999, p. 324) argued that:

Borrowing directly from European languages, by phonetic transcription [transliteration] ...should be avoided since such borrowed words do not convey any meaning initially and such a method produces clumsy-sounding Nguni science words ...Furthermore, the internal structure of the English language is so different from that of any African language in syntax, word structure, vocabulary, and sound systems that a phonetic transcription should be discouraged if a useful scientific vocabulary is to be created. The best route is to create new words from and give scientific meaning to both new and existing Nguni vocabulary.

Dlodlo (1999) says that avoiding transliteration in term creation would produce words that students are familiar with from their everyday experiences. Dlodlo (1999) is advocating for an approach where terms for all concepts in science should relate to those that students already know. That might be too difficult to achieve because it means that the bulk of terms would be created around a single concept. It also takes away creativity and the ability of students to learn new concepts and as a result they may not advance cognitively. Avoiding translanguaging is more like ignoring the common communication practices that have become the natural order with learners who are exposed to bilingual and multilingual learning environments in African educational contexts. Below are some examples of Ndebele physics terms that Dlodlo (1999) proposes together with the original English version and the possible terms that can be created through transliteration.

Table 1
Ndebele physics terms

English version	Dlodlo's (1999) suggestion	Transliteration/ Translanguaging
Oxygen	<i>Impiliso</i> (that which sustains life)	<i>ioksijini</i>
Hydrogen	<i>Isomanzi</i> (that which makes water)	<i>ihayidirojeni</i>
Carbon dioxide	<i>Isontuthwini</i> (that which is in smoke)	<i>ikhabhonidayoksayidi</i>
Nitrogen	<i>Isihitshi</i> (that which suffocates)	<i>inayithirojeni</i>
Photosynthesis	<i>Ingxhubelanga</i> (the putting together by the sun)	<i>ifothonithesisi</i>
Carbohydrate	<i>Ingxhutshwalanga</i> (that which has been put together by the sun)	<i>ikhabhohayidirethi</i>
Chlorophyll	<i>Uhlazana</i> (the green of plants or grass)	<i>ikirolofili</i>
Compound	<i>Inhlanganiswa</i> (from <i>hlanganisa</i> = put together)	<i>Ikhompawundi/ Inhlanganiswa</i>
Force	Udli (use power)	<i>Ifosi/ udli</i>

English version	Dlodlo's (1999) suggestion	Transliteration/ Translanguaging
Particle	<i>Uhlanjana</i> (very small grain)	<i>Iphatekili/ uhlanjana</i>
System	<i>Uhlelo</i> (a program, an arrangement, a set)	<i>Isistimu/ uhlelo</i>
Energy	<i>Isidlakela</i> (ability to use force)	<i>Ieneji/ amandla</i>
State	<i>Isimo</i> (the way things are or look)	<i>isimo</i>
Sum	<i>Isihlanganiswa</i> (that which is a result of adding)	<i>inhlanganiswa</i>
Exchange	<i>Kwabelana</i> (distribute that which one has to the other)	<i>untshitshwano</i>
Positive (work)	<i>Eya phambili</i> (going forward)	<i>Iphozethivu/ eyengezayo</i>
Negative (work)	<i>Eya emuva</i> (going backward)	<i>Inegethivu/ ephungulayo</i>
Thermodynamics	<i>Isidlakhoza/ unyakazokhoza</i> (heat energy/ heat motion)	<i>ithemodayinamiki</i>
Heat	<i>Ikhoza</i> (heat)	<i>isikhudumezi</i>
Equation	<i>Isilinganisa</i> (that which equates)	<i>iikhwezhini</i>
Numbers	<i>Iminwe</i> (fingers)	<i>inombolo</i>
Gas	<i>Umoyana</i> (part of air)	<i>igesi</i>
Piston	<i>Isivimbonduku</i> (a stick with a stopper head)	<i>iphistini</i>
Displace	<i>Gudulka</i> (move out a little)	<i>susa</i>
Molecule	<i>Imolenkulu</i> (big spot)	<i>imolekulu</i>
Atom	<i>Imolencane/ iyathomu</i> (small spot)	<i>iathomu</i>

To circumvent transliteration, Dlodlo's terms exhibit semantic and structural flaws, deviating from the conventional descriptive approach to adopt a prescriptive one. The irony in Dlodlo's terms lies in the fact that even the explanations he provides in the English language differ significantly from the original terms, potentially causing confusion for the learner. For example, Dlodlo (1999) says that a piston is a stick with a stopper head which distorts the whole idea of a piston. A stick normally is composed of wood material, but an engine piston is not made of wood. For numbers, Dlodlo says 'fingers', yet he is referring to numbers as in digits. One then wonders why fingers of a hand are equated to numbers. For 'exchange', Dlodlo gives the Ndebele equivalent as to 'distribute that which one has to the other', and this means sharing and not exchange. For one with knowledge of isiNdebele, the equivalent that is given by Dlodlo means sharing and not exchanging. The above examples are just a few illustrations because this problem is common in Dlodlo's terms and is peculiar to many of them.

Another observation made from Dlodlo's terms is that some already existing terms for concepts that are also known in ordinary speech are replaced by complex and unfamiliar words. Dlodlo (1999) seems to be shunning the already known ones because they were created through transliteration and is instead opting for the more complex ones that cannot be understood easily. In everyday speech, people always say 'iphistini' and not 'isivimbonduku' for piston. They always say 'inombolo' and not 'iminwe' for number. In ordinary everyday speech we hear of 'igesi' and not 'umoyana' for gas, 'itshinsthi' for change which translates to 'untshintshwano' for 'exchange' and they use 'ioksijini' for 'oxygen' and not 'impiliso'. These are some but just a few examples that indicate that Dlodlo (1999) sees translanguaging as a bad strategy towards the creation of terms. The quest to avoid translanguaging results in shunning terms that are already in use and known by the language users and opting for the ones that would otherwise render the terminographer a prescriptivist. This is because one who creates such terms risks the temptation of using his or her own intuition in the process running away from harvesting terms from their functional space.

The terms that are created through the terminographer's knowledge of language or intuition are at the risk of becoming complicated and susceptible to cognitive hostility. One would correctly argue that the physics terms by Dlodlo (1999) are even more complex than the English equivalents. Some of the examples of such a scenario include 'isivimbonduku' for 'piston' which is created through the combination of two words 'isivimbo' (lid/cap) and 'induku' (knobkerrie). There is no clear association between Dlodlo's term and the concept 'piston' and one may wonder why he chose to come up with a new term when isiNdebele speakers are already using 'iphistini' for this concept. Dlodlo (1999) proposes 'isomanzi' for 'hydrogen' which becomes complicated because of the quest to try and make Ndebele terms have a clue to the concept to what is being referred to. 'Amanzi' in isiNdebele is water, and because when hydrogen combines with oxygen the result is water, then Dlodlo decides to refer to Hydrogen as 'isomanzi' (one that bears water). This is the case with terms like 'ingxhubelanga' and 'ingxutshwalanga' for 'photosynthesis' and 'carbohydrate' respectively. The tendency to try and come up with self-explanatory terms by Dlodlo result in awkwardness in these words and as a result they become even become cognitively cumbersome for the learners. This may result in the learners struggling to grasp the terms before they learn about the concepts that are signified by these words. What needs to be borne in mind is that these are specialised subject field terms and it is not always the case that they should give a clue to what they are referring to. It is ideal to have self-explanatory terms but such cannot be applied to all words as that may lead to redundancy in the language. The specialised subject field terms are not used in everyday general conversations in English but are only used in these academic disciplines and it does not follow that a first language speaker of English would automatically understand some of these words.

One set of isiZulu physical science terms were gathered from an online community group called ZULU Vocabulary. These terms were posted on the Facebook page of this online community on 31 July 2018 and are displayed on the table below.

Table 2
Physican Science Terms

Physical science term	Zulu version
Atom	<i>Ichwe</i>
Nucleus	<i>Indweni</i>
Proton	<i>Inelesi</i>
Neutron	<i>Intunge</i>
Electron	<i>Inxelesi</i>
Molecule	<i>Ichembe</i>
Charge	<i>Umlelesa</i>
Matter	<i>Impahla</i>
Element	<i>Inhlwa</i>
States of matter	<i>Izimo zempahla</i>
Solid	<i>Enqumile</i>
Liquid	<i>Eluketshezi</i>
Gas	<i>Eluhowo</i>
Plasma	<i>Enyazani</i>
Force	<i>Umnyondo</i>
Gravity	<i>Unyanta</i>
Electromagnetic	<i>Umhonyazi</i>
Nuclear	<i>Umnyondeni</i>

Source: ZULU Vocabulary, 31 July 2018

A closer examination of isiZulu physics terms presented in the table above demonstrate that they are excessively complex. What is also interesting is that there are some terms that

appear on the above list and also on Dlodlo's proposed terms but they are all different despite the mutually intelligibility that exists between isiZulu and isiNdebele. The terms for atom, molecule, gas and force are available in both lists by Dlodlo (1999) and ZULU Vocabulary (2018) but are all different. Similar to Dlodlo, Zulu vocabulary deliberately avoids transliteration. Consequently, learners must commence by studying these terms before attempting to comprehend and apply the associated concepts. When looking at both lists, one question that we need to ask ourselves is, 'why do we need the terms in African languages?' One needs to understand that the whole idea is neither to dislodge the English language nor to create a linguistic war but to afford all coexisting languages functionality in any linguistic ecology and particularly in academic spaces.

There are other terms that have been created more recently and stored online, specifically by the South African Centre for Digital Language Resources (SADiLaR). The following table contains a few scientific terms that were taken from van Dyk (2022) on the SADiLaR database of Generic Multilingual Academic Wordlists with Definitions in isiZulu and English.

Table 3
Scientific Terms in English

Scientific terms in English	Isizulu equivalent
Oxygen	<i>i-oksijini</i>
Atom	<i>Othomu</i>
Electron	<i>Elekhtroni</i>
Energy	<i>Amandla</i>
Molecule	<i>Imolekhule</i>
Fluid	<i>Uketshezi</i>
Scientific	<i>Isayensi</i>
Technology	<i>Itheknoloji</i>

Source: van Dyk on SADiLaR website (2022)

The table above demonstrates that most of the physics terms on the SADiLaR website were created through transliteration. This strategy is significant as it acknowledges the coexistence of isiZulu with English and aligns with the prevailing and widely accepted trend in term creation. It is an undoubtable fact that the terms that are created through transliteration, which is a product of translanguaging can be easily understood because a learner can even shuttle between isiZulu, where available, and English and still have mutual understanding of the content. These concepts come into isiZulu via the English language and that is a fact that cannot be downplayed.

One other interesting observation from van Dyk (2022) list is that he does not try to create new terms where some concepts are already represented in isiZulu. The terms '*isayensi*' and '*uketshezi*' for 'scientific' and 'fluid' respectively are already in use in isiZulu in referring to these concepts and van Dyk (2022) does not ignore that. However, while van Dyk (2022) is using the term '*uketshezi*' for 'fluid', ZULU Vocabulary (2018) is using it for liquid. This is not a significant difference because 'liquid' and 'fluid' mean the same concept, they are near synonyms.

Discussion

Transliteration as a term creation strategy is a product of translanguaging although this strategy became common before translanguaging entered the discourse of language practice. Transliteration has become the most common and widely acceptable term creation strategy in African languages (Nhongo & Tshotsho, 2020). This strategy acknowledges the coexistence of languages, particularly where English is used as a second but dominant instructional language.

Some terminographers, especially novice ones have always avoided transliteration when creating terms because of trying to remain pure in the language and come up with self-explanatory terms. By remaining pure in the language and avoiding the influence of the source language which is normally English, the terms that emerge would become even more complicated and lack cognitive appeal as a result fail to be accepted by the language users. Dlodlo's terms and those from ZULU Vocabulary are evidence of complex physics terms as a result of trying to remain pure in the language and avoid influence of English which is the source language. Terms that are created in this manner require learners to familiarize themselves with them before attempting to internalise the concepts that these terms represent. Cabre (2003) rightly says that terminology development should emphasise on the cognitive, communicative and linguistic dimensions. These three dimensions resonate well with transliteration as a term creation strategy which emanates from translanguaging because the emphasis is on the communicative aspect of the term. The whole idea about translanguaging is to facilitate mutually understood communication in bilingual or multilingual contexts.

The other challenge with the terms presented above especially those by Dlodlo (1999) is where the terminographer tries to make the terms self-explanatory. The terms become even more complex and unnecessarily long and ambiguous in the process of trying to make them self-explanatory. Where learners in andragogic and pedagogic contexts are already familiar with some terms due to exposure in a bilingual environment there is no need to make terms self-explanatory as translanguaging can take care of that. The linguistic reality of coexistence of languages in academic spaces need not to be downplayed in terminology development. There is need also to understand that terms that are used in specialised subject fields in English language are not part of general everyday speech and therefore there is no need to make equivalents of such terms self-explanatory in African languages.

The misconception that orthographies cannot transform is another hindrance that militates against realistic terminologies in African languages. Because translanguaging does not consider linguistic boundaries, sounds from coexisting languages find their way into those of one another's system in a language ecology. Canagarajah (2011, p. 40) says that translanguaging is "the ability of multilingual speakers to shuttle between languages, treating the diverse languages that form their repertoire as an integrated system". This means that as learners are in the process of shuttling between English and an African in specialised fields of knowledge, terms are also created. When terms are created through translanguaging there is need for flexibility and transformation of orthographies and the accommodation of new sounds in the developing language. In the isiNdebele and isiZulu current orthographies, there is absence of the graphemes 'ks' and 'dr' for example, but terms like 'ioksijini' and 'ihayidrojinini' will emerge as a result of translanguaging. However, purism will render these terms irrelevant in isiNdebele and isiZulu because of the absence of the identified graphemes in these two languages. There is need therefore for treating language orthographies as if they are natural entities of languages for the success of terminology development for specialised subject fields in African languages.

The andragogic spaces are important spaces for term creation because this is where we find learners who have advanced in terms of cognitive processes and have had longer experience with knowledge as compared to those in primary and secondary schools. The learners at institutions of higher learning have been encountering these terms specialised subject fields in the English language and it is imperative to imagine that they have at one time talked about them, have done mental processes about them and they have written about them in their first languages at one time in their lives. This makes them good candidates for engaging in the creation of terminologies for these specialised subject fields in their first languages. This is why Prah (2017: 223) argues "As the pinnacle of the education system, higher educational institutions should take the lead in enabling the intellectualisation of African languages". For

terms to emerge there is need for these African languages to be used in teaching and learning of specialised subject fields at institutions of higher learning. The African languages need to be considered as valuable resources that can be used to facilitate effective learning and grasping of concepts. In a linguistic ecology, where languages coexist there should be no categorisation of languages where others are a preserve for academic discourse and others are for engaging in informal conversations. Once African languages are used in academic discourses in specialised fields of knowledge, terminologies will emerge.

CONCLUSION

A descriptive approach is necessary in the development of African languages terminologies for specialised fields of knowledge. The general trend shows that transliteration is the most common and natural strategy for terminology development in bilingual and multilingual communicative environments where translanguaging is not suppressed. Terms that emerge naturally in the process of communication become the most accepted and cognitively friendly as compared to those that come through prescriptivism and purism. However, transliteration needs to be applied in cases where there is no term that already exist for a particular concept as overreliance on this strategy may result in African languages becoming appendages of the English language. A more robust strategy in the development of African languages terminologies for specialised subject fields would be to use these languages in teaching and learning, the writing of assignments and other research work, and the writing of textbooks even before there are agreed upon terminologies. Terms that emerge need then to be harvested through corpus compilation. The most preferred terms would then become visible through the frequency of occurrence in the corpus. Those that occur most frequently can then be adopted in teaching and learning and also be further used in the compilation of textbooks, glossaries, specialised dictionaries and other reading materials.

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