

Corpus-based Analysis of Academic Writing Errors by First Year Tanzanian University Students: Cases from UDSM, SUA and TUICO

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Abstract

The study looked into errors committed by first year university students in three universities in Tanzania. While errors can be indicative of a developmental stage in the learning of a second language, formal English language learning in Tanzania culminates at the secondary school level and, for some, at the university level. For many at the University level, a related subject is Communication Skills. As such, one would expect students at this level to learn advanced communication skills. Students' essays were analyzed, errors identified, and discussed. The findings show that, besides errors in writing skills in terms of the mechanics and logic, there were many other types of errors from improperly learnt structures, language transfer, and unclear expression. It is suggested here that something needs to be done regarding the content of curricula and pedagogical processes both in secondary and tertiary education. Since the errors made were from first year university students, they must have had their origin in secondary and primary schools where the students have come from. We are of the view that, when students come to the university, they should be subjected to screening to identify their communication skills problems so as to expose them to relevant remedial classes.

Key words: *errors, language transfer, fuzzy expression, tertiary education*

Introduction

The current study investigated the kind of errors students make when they write essays (a component of writing skills taught in the Communication Skills course in the respective institutions), considering the fact that English is the medium of instruction (MoI) in secondary and tertiary

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education in Tanzania. It involved 450 first year students from three Tanzanian universities, namely University of Dar es Salaam (UDSM), Sokoine University of Agriculture (SUA) and Tumaini University Iringa College (TUICO).

Since mid-1970s, a concern has repeatedly been voiced by both internal and external examiners at UDSM, and the then Faculty of Agriculture, Veterinary Sciences and Forestry (now SUA) over the falling standards of students' English proficiency and the consequent effect on their inability to benefit fully from university studies. To curb this problem, a Communication Skills Unit (CSU) was established at UDSM in 1978. When SUA became a full-fledged university in 1984, a similar unit was established in 1987.

Tumaini University Iringa College (TUICO), like any other institution of higher learning in the country, had to offer a Communication Skills course to address similar concerns, just like the other institutions. The needs that forced these other universities were and still are also relevant to TUICO.

It is now more than 30 years since the CSU was first established at UDSM and more than 20 years since a similar unit was established at SUA. However, the concerns aired in the mid-1970s seem to persist today in spite of many efforts directed towards the alleviation of this problem right from primary school to university level.

Many studies have been conducted on the issue of Language of Instruction (LOI) in Tanzania. Many of these have focused mainly on the debate of which medium of instruction should be adopted as the MoI, mainly between English and Kiswahili. The debate has been raging ever since the publication of the Presidential Commission for Education (1984) (popularly known as the Makweta Commission). The debate has been swaying between these two language extremities without a clear MoI policy in the country. As a result, Tanzania has witnessed mushrooming of '*English medium academies*' right from kindergarten to secondary schools. The impact of these schools is yet to be established as far as English proficiency of the graduates from these academies is concerned when joining tertiary education.

With the powers of globalization, English seems to be winning the debate. However, while the debate is still raging, the reasons for establishing the CSUs at UDSM and SUA many years ago are still very relevant to date. Universities are now receiving students with even poorer proficiency as reported in this study. This calls for another look into the communication skills courses offered in these universities.

Rationale of the Study

In this paper we are showing that error analysis is instrumental in identifying the kinds of errors made, why they are made, and how this knowledge can help improve the teaching of communication skills in institutions of higher learning particularly in contexts where the language of instruction is a second language (L2). In Tanzania in particular, teachers and educators in general know that there are problems with the MoI, but there isn't a study so far that has analyzed errors across universities.

This study systematically addresses the actual errors which students make. The comprehensive appendix of the corpus is our invitation to scholars to pay more attention to the errors and come up with further analysis and help remedy the situation on the ground.

Conceptualising Error Analysis

Studying errors can be done on the basis of two theoretical orientations. One way of doing it is by the use of Contrastive Analysis (CA) theory. This theory is based on behaviourism, which views learning as a habit formation. Behaviourists hold that an already learned habit would have some effect on a newly learnt one (Johnson, 2001:59-60). CA received criticism from the Chomskyans that errors do not result from this simplistic perspective, but rather errors are mental processes. As such, interest in CA decreased by the end of the 1960s. This in fact became the emergence of error analysis, a perspective which considers a wider coverage of errors than the CA (Johnson, 2001:66). Nevertheless, CA is still popular and useful today as it is still true that some kinds of errors result from mother tongue influence.

The second orientation is *error analysis*, which we are adopting in this paper. This can be understood as techniques for systematically identifying and classifying unacceptable forms and meanings by a learner of a second language or a foreign language. These techniques are discernible as a multistage process with a series of activities. Els et al (1984:47) present what is involved in the process as successive steps: *identification of errors, description of errors, explanation of errors, evaluation of errors, and prevention or correction of errors*.

May be we also need to say at this stage what errors are rather than assuming that readers know what errors are. Cherrington (2000:198) distinguishes between mistakes and errors. She says:

“... (mistakes) are performance errors, such as slips of the tongue, ... (whereas true errors) are markers of where the learner is in terms of L2 **COMPETENCE**.”

In this study we are not interested in mistakes because these are usually based on speech, and are of a temporal nature. Additionally, mistakes are not systematic, and therefore can be problematic to study. Mistakes can be caused by states such as tiredness, fear, or drunkenness. Errors on the contrary, are of interest because they indicate mastery of the second language, and are systematic.

It is also important to mention here that the errors we have identified in this paper are not specific to students' academic writing only; they are also observable in their speech. From time to time instructors have to intervene in students' speech both in lectures, seminars, and outside the classroom, trying to help where possible, and sometimes decide to let them go.

An analysis of errors can be both boring and interesting. It can be boring if the message being delivered cannot be understood well by the interlocutor. Sometimes one comes across very fuzzy and strange constructions to the extent of failing to even recognize what has been going in the mind of the writer. At times, however, errors are interesting in many ways. From time to time, as we were reading the essays we would stop and laugh at the way some of the students were trying hard to get their messages across. More importantly, errors carry with them an important value in *course design* and *evaluation* at different levels of education in connection with second or foreign language learning. This is also identified by Myles (2002), who remarks that “Although reading an error-filled text can be tiring and disconcerting, errors can help us identify the cognitive strategies that the learner is using to process information.”

As we teach communication skills in our universities, we must bear in mind the fact that writing skills are nurtured, and should therefore not be regarded as incidental. Communication skills instructors can themselves reflect on what content and how much of it is given to students in relation to what and how much is expected of them in their assessment. Besides, instructors also need to evaluate their pedagogical strategies and see how useful they are and also how such strategies can be improved.

On the part of the students, this kind of analysis should serve as a roadmap which should help them find their own whereabouts in the process. It is a signpost that should tell them “you are here!” with regard to their learning journey.

Methodological Positioning

This is a qualitative study, describing and discussing errors from three universities. The study was conducted in three different universities by involving first year students who are doing communication skills courses. Initially we thought of working on the errors from each university separately, but in the course of identifying the errors it became apparent that this separation is counterproductive. The reason for this is that there were no differences in terms of the errors made between the universities.

In view of this truism we decided to discuss them together. Students across the three universities were given the same essay topic, and were asked to write an essay on it. On marking the essays all the errors committed by each student were recorded and later analyzed and grouped into different categories. We present only some of the errors here for purposes of saving space and practicality.

Findings and Explanation

In this section we are presenting the corpus and provide explanation alongside. In many of the sentences there are multiple types of errors including omission of articles, subject-verb confusion, singular-plural confusion, misspelling, and so forth, as will be apparent in the data. So, for example, within the sentences categorized under vocabulary transfer, there are also spelling errors, tense agreement, and many more.

Generally, the kinds of errors we have identified include improper use of adverbs, pluralizing nouns which are traditionally not to be pluralized, improper use of the *ing*-form of the verb, vocabulary and concept transfer, and spelling errors. The corpus is indicative of the horrendous magnitude of the errors which students in Tanzanian universities make in their academic writing.

Kinds of Errors

The data we are analyzing in this part comprise part of the full corpus which we have appended to the end of the paper. We decided to leave out some data in the discussion because what we want to show can well be explained with what we have. It is important to declare at the onset that our discussion of the errors is in no way exhaustive because there are just too many errors in one sentence. This made the task of discussing each error to be too difficult and unmanageable. In view of this, our discussion is based on errors we have decided to include under subheadings on the basis of the kind of error. This categorization gave us the freedom to leave aside other errors embedded in the same sentence.

We also wish to admit at this juncture that there are some errors which are completely difficult to categorize or account for. Possibly these can be considered as “mistakes”, although this kind of labeling causes uncertainty as to whether our definition of mistakes can also accommodate errors in writing.

Our discussion is based on error categories provided by two scholars: Richards (1971) and Norrish (1983). Richards (1971) identifies four types of errors: *overgeneralization* (learners produce structures which deviate from the accepted structures on the basis of their experiences of other structures in the target language), *ignorance of rule restrictions* (failure to observe the restrictions of existing structures), *incomplete application of rules* (the occurrence of structures whose deviancy represents the degree of development of the rules required to produce acceptable utterances), and *false concepts hypothesized* (faulty comprehension of distinctions in the target language).

Another scholar who also provides categories of errors is Norrish (1983). This one is of the view that errors are caused by at least three factors: *carelessness* (mostly caused by lack of motivation), *first language interference* (takes after the CA tradition, that a habit that has been learned earlier affects what is learnt later), and *translation* (from the mother tongue or other languages learned earlier). What Norrish describes as first language interference is what Johnson (2002:59-60) describes as transfer. He says there are two types of transfer; positive and negative. According to him, *positive transfer* is where the two habits share common aspects, such that knowing one language will help in learning the other, whereas *negative transfer* distorts the learning, and is also called *interference*.

In essence, Richards’ and Norrish’s categories are not very different, except for the Norrish’s first language interference which is typical of CA. This type of error category has also emerged in a work by Arabski (2006:12), which is *language transfer*. Language transfer according to Arabski can be understood as a habit through which “...learners carry over what they already know about their first language to their performance in their new language”.

These categories are very important in the classification of errors in our corpus. All the types identified by these scholars are apparent in our corpus. We have categorized the errors as *language transfer* (under which there are concept transfer and vocabulary transfer), *overgeneralization*, *translation*, and *carelessness*. Under carelessness there are many sub-

types of errors, including improperly learned structures, erroneous vocabulary choice, and fuzzy expressions.

Language Transfer

This is the habit of carrying over features in the first language to the target language. In our corpus we have identified three types of transfer: concept transfer, vocabulary transfer, and direct translation. The differences between these types are not very significant.

Concept Transfer

Language is an expression of a people's total way of life, and people use language to formulate concepts, and configure their own world. It takes concerted effort to be familiar with another community's linguistic repertoire which is also an expression of their culture. This is not to say it is impossible. With motivation and effort, it can be learnt with very minimal errors. Nevertheless, what is apparent in our corpus is something different. What we are presenting in this subsection is a gist of the actual level of failure to learn the cultural concepts presented in a way that would be expected of people who have been exposed to the language for at least 12 years.

- *Then since AIDS spread loudly through out the country but much around the Lake zone and in high population such as Mwanza, Dar es Salaam e.t.c.*
Spread loudly is a bit confusing. It may mean with force (as the Swahili expression "kwa sauti" (literally, with voice but semantically loudly) may be translated as "kwa kasi" or a bit far fetched meaning may be "spreading rapidly".
- *Drug abuse users and much drunk, this lead the human body to stimulate and need to participate in sexual habitual.*

Drug abuse here is transferred from the Kiswahili expression "madawa ya kulevya" which are illicit drugs such as heroin, cocaine etc.

- *This most played by the ladies when you found different areas that those ladies take place for selling their bodies, this may cause the stimulation of the diseases of HIV/AIDS.*

Selling their bodies is transferred from Kiswahili to mean prostitution whereas stimulation of the disease of HIV/AIDS is a transfer for sexual arousal which may lead to contracting the HIV virus.

- *To loose time, others youth says that the preventions of using condoms that you loose time and taken long periods to wear condom.*

To loose time is used to mean to waste time, whereas long periods is used to mean a long time.

- *If your going to utilize this freedom given by the university in improper way, you will be a slave of sex.*

In Kiswahili a person who spends most of their time in search of sexual pleasure from whoever comes their way is nicknamed “mtumwa wa mapenzi”, which literally means a person who has been enslaved by love/sex, but it is a Kiswahili concept. The concept would preferably be explained with the phrase “sex maniac”.

- *...through the governments which fails to give early money (Loans) to the students tends Lacking some needs.*

Here there are two transfers give early money (Loan) and Lacking some needs. There are transferred from the Kiswahili phrase which means money given on time and Lacking some money which is taken straight from the Kiswahili clause “kupungukiwa na mahitaji”- which means to run short of important supplies. This would not be easy for a non-Swahili speaker to understand. This kind of transfer is what is referred to as interference or negative transfer.

Vocabulary Transfer

Vocabulary transfer is a common phenomenon in second and foreign language learning. It is done because, in the course of learning, learners already have a sizeable vocabulary in their own languages. Another reason which Arabski (2006:15-16) provides for transfer of lexical items is the emergence of new political and economical situations, technological developments, and life styles. To add to that, in cases where new significant social events emerge, it is also common that new vocabulary would be conjured up. This is apparent in the following examples from our corpus:

- *But according to the measurement through voluntary measurement or measuring statistics show that in 2007 33 millions of people are living with AIDS.*

Measurement here is used instead of testing/ voluntary testing.

- *HIV/AIDS by long term it refer to the acquired immuno deficiency*
Long term here is used to mean the full form. Long and full may have one word in Kiswahili but not in English in this specific context.
- *To loose time, others youth says that the preventions of using condoms that you loose time and taken long periods to wear condom.*

In Kiswahili, there is one word “poteza” which may mean waste or lose (and not loose). Due to improper learning of the language the writer does not differentiate between waste time, which would be

suitable here, and lose which may mean slightly different things in this specific context.

- *Hence this led to girls looking for men such as Fataakis in order to get money.*

The term Fataki is used to refer to amorous men who would go with any woman whom they see, ranging from school children to adults. It originates from a famous HIV slogan cum jingle in Tanzania.

- *Sometimes people charts and sending the sexual intercourse photograph in the internet.*

The student is translating the physical action of doing sexual intercourse for pornographic photos or pictures. This is also a consequence of lack of the right lexical item to be used in the right place.

- *Foristance now days I heard from mass media (press) that Papa Benedict xvi has allowed the use of condoms.*

Papa is the Kiswahili word for Pope. This is lack of awareness that Papa is a Kiswahili word, and that there is an English word for the word.

Direct Translation

This is direct translation from the mother tongue or from other languages learned earlier. As will be apparent in the corpus, this is not totally different from transfer.

- *Also to make the law which govern the prostitutes who use their bodies in order to get salary.*
- *In Tanzania AIDS was termed to be discovered in 1983.*
- *Thirdly is desire, this is among very serious and uncontrollable problem facing the ones that make to control spreading of HIV/AIDS.*
- *The first case for the presence of HIV/AIDS on the surface, reported early in 1980's.*
- *Many youth get that disease by using corruption for example when a youth need to get employment some institutions have people who need corruption of sexual intercourse*
- *To be aware of chacking filam, video, internate, magazine and other attractions which can contribute the youth to be not aware.*
- *Controversy arise a year later when the United States announces their scientist isolates a retrovirus that he claims is responsible for AIDS.*
- *The possible solution formular the youth to escape the problems occurred early faster to youth is that*
- *And this is reported by a certain grandfather in Bukoba who explained about his son sufering and died with the disease there now AIDS became in country wide*
- *Some of the students are users of drugs abuse*

Spelling Errors

There are many spelling errors in the data. Most of these are due to mother tongue phonological interference. Students who made these mistakes somehow know the pronunciations of the words but they have not made efforts to know how they are spelt.

However, several of these errors result from carelessness. Knowing that this is a second or foreign language, one would be expected to make efforts to learn how to spell the words correctly. Interestingly, some of the spelling mistakes are not just spelling, but the way these words have been spelt suggests that even in the pronunciation there would be significant deviations.

- *Student they brow's (for browse) through internet they watching pornography film.*
- *Government should make the law which may panish (for punish) the people who engaged in prostution (for prostitution).*
- *Most girls they wear short and tite (for tight) clothes which attract boys in doing sexual intercourse*
- *To be aware of chacking (for checking) filam (for film), video, internate (for internet), magazine and other attractions which can contribute the youth to be not aware.*
- *More over (for moreover) due to existance (for existence) of AIDS in high amount*
- *But the most way of solving this problem is by abstraining (for abstaining) from sex.*
- *Religion believes (for beliefs) is also a great problems as some Religion (for religion) believes (for believe) that it is illegal to use condoms*
- *Students should be trustfull (for trustful) in love.*
- *Students should have one partiner (for partner) not more than.*
- *Parnchality (for punctuality) can make the student to know where and what to due (for do) and observe its time and university regulation.*
- *Self displine (for discipline) and motivation also can make the performance of the student to be good.*
- *Every student should stick in his/her intension (for intention) of study and not on unnecessary leissures (for leisure).*
- *Everyone must put into emplementation (for implementation) the statement that "Graduate with A's not with Aids".*

Rule Overgeneralization

Students have overgeneralized rules pertaining to the application of the use of various suffixes such as ...ful, ..er, ..or, ... ness, ...an, and ... ment together with the ..ing form of the verb. This is typical of rule overgeneralization in children's speech. There are a number of these in the essays, and here we identified some of them:

- *It is happiful if all student graduate with A's.*
- *Promisecuting as the major means of spread of HIV/AIDS due to having more than one partner.*
- *And proudness is another reason which cause the youths to get HIV/AIDS.*
- *Also to make the law which govern the prostitutors who use their bodies in order to get salary.*
- *More over, for those graduaters who already has a family and graduate with A's have high ability to control their family.*
- *If a graduator is in marriage, one day in the future his/her family will be single parented.*
- *...since she is not having money to buy luxurian clothes and hair styles she decides to sell herself.*
- *Conducting sexual intercourse by using condoms shows unbelieveness.*
- *Graduate it is means that to cerebrate the final year for completement of your at certain course.*

Ignorance of Rule Restrictions

This is caused by failure to observe the restrictions of existing structures in the target language. This was the most common of all the errors identified. Essentially this ignorance is caused by improper learning possibly due to the reasons that are internal or external to the students. Such errors include errors in the use of adjectives, verb to be, use of past tense, tense agreement, vocabulary choice, use of prepositions and use of articles. We will categorize such errors according to their similarities:

Use of Adjectives

Here the observation is either the adjective is not in agreement with the noun it modifies or the wrong word has been used in the place of an adjective. In many cases nouns which could be changed into adjectives have been used erroneously as adjectives.

- *Difference group are good maner they for through your group it is simple to join with bad group*
- *Religion believes is also a great problems*
- *The fluid can be pass people in variety ways including, having un protected sex.*

- *Another big problem of control this disease is lack of obedient to the law of God which say stop sex before marriage.*
- *Also many student want prestige over other student.*
- *Generally this situation causes the spread of some diseases for example AIDS which is dangerously diseases.*
- *This disease getting into the human body, through sex intercourse, blood transfusion, sharing a sharp instrument,....*
- *That life make people to have more than one partiner and are not faithfully in their marriage.*
- *In Tanzania historical background it seems that 3 first cases was in 1983 at Kagera region at Ndolage Hospital which is in Muleba district by surgeon Nyamulyange: up to 1986 reported from difference regions*
- *At the first HIV/AIDS was identified in Tanzania in 1983*
- *This is because to sharing sexual intercourse between difference people it is high risk to be affected.*

The Use of the Verb to be

Here we are considering the auxiliary *be* as used in conjunction with its associates. There are many instances of errors which are to do with either combining the wrong subject with the wrong form of *be* or the wrong form of *be* in conjunction with the wrong number of object, thus causing concord anomalies.

- *That is occur when student graduate with AIDS*
- *The following are historical background of HIV/AIDS*
- *The disease are mainly caused by different ways example unsafe sexual intercourse*
- *Promiscuity in the society are the very big problem*
- *Graduate it is means that to cerebrate the final year for completment of your at certain course.*
- *Then in 1982 AIDS disease was emerged in European countries and in African countries*
- *This can be occur due to the mob cycology then it can appear read you affected*
- *The Tanzania government was distributed ARVs freely for those people who have HIV/AIDS*
- *The Tanzania government was establish the system of measurement, for those pregnancy mothers in order to help for them when they have Aids.*
- *Historically HIV/AIDS has been first discovered in 1981*
- *For example some can be HIV victims from when they have been born so they spread this disease just to die with others*

- *The virus is caused disease only in people*

The Use of the Present Tense

There are many instances of wrong use of the present tense. We are presenting some of these here:

- *We knows that in high education we are studying in way of doing what we want*
- *Some says that if you conduct sexual intercourse by the use of condoms means you are not believing each other.*
- *Some tribes believes that having many wives is the prestage and shows menhood.*
- *Also I do here that girls says you must be having three men so that if one will distort then you will going on.*
- *Some adults kidnappes youth by the use of money.*
- *Onother is drug abuse this can leads to a number of problem finally can cause the student to get HIV/AID*
- *Hence illiteracy contribute much in minimizing the rate of controlling HIV/AIDS*

Tense Agreement

In this category there were many instances of confused verb forms. They include the following:

- *They died because they didn't discovered it was what kind of disease*
- *The fluid can be pass people in variety ways including, having un protected sex.*
- *Now why these youths contracting the disease?*
- *Apart from that the government has been concentrate much on the manner how to reduce...*
- *The government and others institutions was not provided the education to the higher education students concerning about AIDS.*
- *At first they think the disease is cancer*
- *They have not believe the preachers the word of God*
- *Prostitution, many women and girls in town most probably plays this game of prostitution saying they are in job ...*
- *Hence illiteracy contribute much in minimizing the rate of controlling HIV/AIDS*

The Use of Its

This was either confused for *it is* (it's), *it* or completely wrongly used.

- *From that period the AIDS was spread for another part in Tanzania, example up to 1983 three cases its was reported in Kagera religion*
- *Many youth they have not use condom when they have sex due to the reasons that to use condom is not good and then its not sweet when the action of sex continue.*
- *From that period the AIDS was spread for another part in Tanzania, example up to 1983 three cases its was reported in Kagera religion*
- *As they come in these institutes they meet with different people from different side of the world and every one has its own behaviour*
- *Government must play it's parts by ensuring the counselling management is improving day to day.*

Vocabulary Choice

Vocabulary choice was another area that featured throughout the data:

- *HIV/AIDS is more affective to youth*
- *It was first discovered in chimpanzee and it jumped to human race.*
- *Since the disease transmitted from Uganda through Lager to our country, the person who experienced with the infection the disease in our country was from Bukoba.*
- *Tanzanian government curb the spread of the disease by providing a HIV day 1/12 each year, people get education in that day and the number of HIV/AIDS is reduced.*

The Use of Prepositions

Wrong use of preposition was also a common phenomenon in the corpus:

- *Tanzania government also tries to emphasize on the makes choice to one partner you love so that to avoid the sharing of different partner may causes ease spread of HIV/AIDS*
- *Some of university students they believe that to the stage that have reached what decide in their brain is always right things example the decision of having partiner it may lead into a position of acquiring the HIV/AIDS disease.*
- *And at 1984 HIV/AIDS was began to be testing*
- *At worldwide HIV discovered at America in 1980's.*
- *At East Africa first reported at Uganda in 1981's.*
- *Tanzanian government curb the spread of the disease by providing a HIV day 1/12 each year, people get education in that day and the number of HIV/AIDS is reduced.*
- *The first case were reported at Kagera region*

The Use of Articles

Both definite and indefinite articles were very often wrongly used:

- *At the first HIV/AIDS was identified in Tanzania in 1983*
- *AIDS is the world pandemic but still is protected by either abstaining from sex, using condoms effectively or being faithful and staying with one faithfully partner and even those already infected they can manage to survive for all their life time.*
- *Tanzanian government curb the spread of the disease by providing a HIV day 1/12 each year, people get education in that day and the number of HIV/AIDS is reduced.*

The Use of Resumptive Pronouns

There are also errors related to the use of resumptive pronouns. In the corpus, this is also caused by ignorance of rule restrictions possibly due to improper learning. Examples of these from the essays are also many. They include the following:

- *Most girls they wear short and tite clothes*
- *Most of students from O-level or A-level they have been living there with some rules that rule the.*
- *Some of the students they are loose.*
- *Therefore these investigators they came up with the conclusion....*

Carelessness

Carelessness as explained by Norrish (op. cit.) is caused mostly by lack of motivation. There are at least two categories under this category: unedited words and fuzzy expressions. This is a significant source of the errors we have observed.

Unedited Words

The following are examples of unedited words found in the data:

- *The first part of AID discovered were in Kagera religion and continue to spread more for another parts in Tanzania*
- *Also leaving very far from their partners*
- *Some tribes believes that having many wives is the prestage and shows menhood.*
- *When after that catch a chimpazee he kill an animal from there blood get into cut or wounds to the spread of HIV/AIDS from chimpazee to human being during the late 19th C early 20th C (1915-1941).*

Fuzzy Expressions

These might in a way be caused by the influence of Kiswahili on the language or possibly by other unknown causes. It may also be the case that learners process language in Kiswahili and transfer it into English. From the corpus they include the following:

- *When after that catch a chimpazee he kill an animal from there blood get into cut or wounds to the spread of HIV/AIDS from chimpazee to human being during the late 19thC early 20thC (1915-1941).*
- *Due to the prevention of corruption can reduce the HIV/AIDS.*
- *Since the discovered of HIV/AIDS in 1981 to the reach of 1987 HIV/AIDS was reached all over the world.*
- *But according to the background held above was said that the first man, to be predicted to brought the HIV/AIDS in Tanzania was from Uganda.*
- *By conclusively most collier who is coming from poorer family such kind of people get AIDS/HIV*
- *The most of them (the youths) in the world and in Tanzania they are going to internet or TV to watch ponographic picture instead of other program which are very important to the learning subject to the school, college.*

Other Types of Errors

In addition to these lists, there are other types of errors which we could not provide in lists because of their volume. Some errors are apparent, and could be provided in lists but some are unclassifiable. For example, some of those which we couldn't provide in lists are conceptual issues but some are merely mechanical.

The conceptual errors include the non-use of cohesive devices such as transitional words (*e.g. as such, firstly, as a result etc.*) which would show both the flow of ideas and their logical order. This absence denies the reader the opportunity to see how ideas in the essays unfold and build up a connected whole. Consequently, most of the essays look fragmented and unrelated pile of sentences. We will present at least two paragraphs from one essay to exemplify what we mean here:

“AIDS is the acquired immune deficiency syndrome. Is the inability of body to resist different diseases due to weakening of immunity system.

Poverty is the main cause of spread of disease because few fund or money do not meet some students need thus preshed to have many partners or even conduct prostitution to get

enough money to satisfy their needs. So it is better to give them money accordingly.”

To say the least, the essay from which the above extracts were taken can be regarded as among the “good” ones. It is good because at least communicatively the ideas are accessible, regardless of the many formal errors. Nevertheless, technically, the paragraphs lack the flavour that would have been there had there been some of the ingredients mentioned above. The most important ones are the cohesive devices which would relate the paragraphs. As they are now, each paragraph looks unrelated to one another.

Another apparent error in writing is not addressing the question. Students were asked to write about “Graduating with A’s not AIDS”, but most of the responses were about general issues that lead to HIV/AIDS infections but not specific to matters relating to students in institutions of higher learning. The following is an example of the case in point taken from a paragraph in one of the essays:

Traditional beliefs; this refers to those societies which still believes in some deeds, and at the same time those deeds cause the HIV/AIDS to spread from one person to another. Example is some societies they do female genital mutilation which is illegal and they use the same cutting instruments for both, which simply spread the HIV/AIDS through blood transmission.

Other errors observed are to do with haphazard mixing up of small and capital letters. This has featured in many of the essays. Examples of these include:

Although the Nation of Tanzania works through to Control the Spread of HIV/AIDS among students and communities there are hindrance factors.

Also Traditional beliefs, there are some societies in Tanzania which practise Female genital Mutilation.

There were also errors in noun number (singular and plural). This kind of error was prevalent everywhere in the corpus, and we will not cite them here.

Discussion

We are reminded that errors hold vital clues about the processes of foreign language learning. To start with, we can address the issue of errors in two different but related perspectives. One is the *formalist perspective* which treats language as a code – thus assessed against native speakers' command. The second is the *functionalist approach* which views language on the basis of its communicative function in different specific contexts (Myles, 2002).

While these two perspectives seem to focus on two different values, in a formal educational setting both are valuable. At the university level, both perspectives must go hand-in-hand. Indeed, ideas need to be communicated well both formally and communicatively. The aim is not to produce native-like users of a language, but users who can both understand and be understood correctly.

In the Tanzania's context, students are exposed to English since primary school level all the way to the university. By the time they are exposed to the university level, their exposure is of at least 11 years. This is a reason enough to believe that at the university level students would be proficient enough both formally and functionally but this has not been the case. Theoretically, the length of time of exposure is not an assurance of mastery, but if one is exposed to formal training for this entire time then low levels of mastery should attract attention. This is why we are arguing that the nature of errors we have identified need rethinking as to the effectiveness of the courses our universities offer. The courses being offered in communication skills classes should ideally be remedial of the gaps, but advance further communicative skills of all kinds.

The bad thing about such errors is that they do not only interfere with the students' internal morphological, spelling, and syntactic structure but at times they also affect how readers (and listeners) understand what they communicate. For example, from the essays the following text contains several levels of errors:

The HIV/AIDS in Tanzania was started or began in Kigoma around the year of 1983's and it caused by the businessman who move from Tanzania to another Central African countries.

Leaving aside many grammatical errors from the text above, one is made to believe that the disease started in Kigoma (factual error) as its real origin, which is not the case. Secondly, by saying that it was caused by a businessman who moved from Tanzania to other Central African countries,

one is made to believe that Tanzania is one of the Central African countries, which is not the case again.

Our impression is that the teaching of communication skills does not address actual issues of communication, but it is there to just fill course unit vacuums. Effective communication skills teaching should be based on communication needs of learners, and course outlines should be based on such needs.

Conclusions

An important observation that can be made is that students lack skills, both in writing and in the other skills in general. Many errors in spelling, vocabulary choice, together with language transfer are indicative of serious problems even in other subjects. Nevertheless, as research on second language acquisition suggests (e.g. Flower, 1994), process approaches to writing instruction, which are least known in Tanzania, have the potential to provide learners with useful hands-on learning opportunities. Additionally, such learning opportunities can be interesting, involving, and reflective.

However, imported approaches come with their own challenges. One outright challenge for Tanzanian universities remains to be big numbers of students in communication skills classrooms. For example, it is not uncommon to find a class with 500 to 800 students. Such are not ideal classes for process-based approaches to learning.

It is our strong opinion that the secondary school level is the best avenue for this kind of teaching and learning. In these schools, at least in private secondary schools, the numbers of students are relatively manageable.

The repercussion of not having the right skills in the globalised world can be horrendous. This is more daunting for Tanzanians, particularly with the opening up of the job market accompanying the East African Community. In this kind of integration what matters is what one can do rather than what kinds of certificates one is holding. Language skills are the most immediate indicators of a person's intellectual capacity, even if these may not always be the right indicators.

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Teaching Science through the Mother Tongue: A Case Study of two Schools in Zimbabwe

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Abstract

The significance of the use of mother tongue in teaching science has been defended in several studies. While there is no doubt that there are studies that have revealed some positive effect of the use of mother tongue in teaching science on students' performance and attitudes compared to English, the fact still remains of the need to standardize scientific concepts in mother tongue within that culture, in order for the system to be able to develop an indigenised scientific terminology for school science teaching. Towards this end, therefore, a survey of "O" level students' translation of some perceived difficult scientific concepts into mother tongue was carried out in Zimbabwe. In the main study, a sample of eighty-eight "O" level General Science students in one urban and one rural public school was administered with a Scientific Terminology in the Mother Tongue Questionnaire (STMTQ) that contained forty terminology in General Science. Using frequency and percentages, the findings reveal that a low percentage of the students have local terminology for the scientific concepts while discrepancies also existed in the translation provided by the respondents. Moreover, some concepts that contextually mean different things in science have the same terminology in the Shona language. The linguistic implications of these translations on their acquisition of scientific concepts are discussed in this paper.

Key words: *mother tongue, scientific terminology, acquisition of scientific concepts*

Introduction

One would like to agree with Bruner (1990) who sees language as a cultural tool that shapes human action and social practice. Since science is a human action and socio-cultural practice, it has its own registers. These registers, according to Strevens (1976), are technical and non-technical.

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Agreeing with the fact that science is embedded in every culture, then, there should be registers for the science in that culture. The absence of or discrepancy in or inadequate mastery of language of science in a specific culture needed to organise such systems technologically could be a leading hindrance to exploring and exploiting indigenised resources by the people themselves. Often times, the obvious and common socio-political norms in the government and private sectors of such culture is to call on 'those outside that culture', who have mastered the language of science in their culture, to execute capital intensive technological projects. This consistent and persistent action can be de-motivating and even discourage the prospective scientists and technologists available in that country. To produce just scientists and technologists should not be the main vision of African educational policy but to ensure that those produced have indigenised scientific registers that would move for effective technological transformations using the resources in African culture. Thus, it is not an understatement to say that language is a powerful tool for such development.

Perhaps our present situation with respect to scientific and technological advances can be better explained by what Jayaweera (1986) observes. He posits that the world of sub-Saharan people has been sub-conjugated through language and education and he contends that there must be the development of cultural autonomy towards social responsibility.

Without language of science, we cannot make meaning of the world. According to Bruner (1990), the two ways of making sense of the world are the logico-mathematical and the narrative understanding. These two ways of acquiring scientific knowledge if expressed in foreign language to science learners pose some difficulties. Strevens (1976) enumerated problems of teaching and learning science using foreign language. So far, some Asian countries have made attempts to get out of these problems by maintaining English language and developing their own indigenous languages to become as technical as English (Rwambiwa, 2000). Countries, for example Malaysia, Singapore, and Japan, where mother tongue is used, have positive technological expressions to make and technological products to show the world.

The present indigenised technology in Africa could be an evolvement of the extent to which language of science in that Continent is developed and mastered while maintaining English and French. One can equally say of science teaching in African classrooms where English, their second language, is dominantly used. Students in Africa often make little sense of science curriculum content because of the conceptual language discrepancy between what the concept means in English and what it means in the

learner's mother tongue. Many researchers have responded to the call by Accra Workshop on language use in science classrooms in Africa (CASME, 1975). Such studies reveal positive effects of the use of mother tongue on students' achievement in science (Fafunwa, 1984; Bamgbose, 1994). In fact it has been shown that it is not only the science teachers and students who experience difficulties in using English language in science teaching-learning process, but also the English and Mathematics teachers as well as students (Jaji & Nyagura, 1989; Ayodele, 1988). It should be known that for an average African student, English language is a second language (L2). A deviation from this normal practice should be observed in science classrooms where multilingualism sets in, producing what Bamgbose (1984) termed the "englishes". This could be a result of the interferences that often create barriers for self-internalisation of scientific and technological concepts and restrict meaningful interactions with reading materials, nature and even in science classrooms.

If what Lyle (2000) discovered about how children make meaning in classroom settings is anything to go by, then, are there some science registers that are partially or completely inexistent in sub-Saharan African culture hindering meaning-making? Or do these registers exist in African culture but contextually mean something else? Or rather is there any need to standardise scientific registers in local languages for the purpose of making meaning from school science language? One of the important cultural advantages of a language is its sense of identity. What identities do Africans posse with respect to technology? Adequate command of language would not only help in general discourse of science but would help in the promotion of the application of its conceptual and substantive structures.

For the Anglophone countries in sub-Saharan Africa, another call for the use of mother tongue in teaching science, among others, has been made after two decades of the first call in 1975 (Accra declaration, 1996). African Ministers of Education conference in Accra, Ghana re-emphasised their deep conviction that the promotion and use of the African national languages in formal and non-formal education will ensure a greater efficiency in their learning in and outside school as well as a greater success in the training of human resources and consequently drawing fully on the potentials of African countries for endogenous, ecological, social, and cultural development. In words of Lyle (2000), narrative understanding of science is a key aspect of meaning making.

Some language reflections have been made in educational policies of some sub-Saharan African countries. Following these language policies in some sub-Saharan African countries, there are pieces of evidence indicating the

use of both L2 and L1 in science classrooms (Barnes, Britton & Rosen, 1969). Banes, et al (1969) have revealed that teachers sometimes forgot they were not communicating with the majority of the learners. However, there is a need to ensure for the adequacy, accuracy and precision of the local vocabularies and meanings of scientific terminology used by both teachers and students. While there is a need to develop our language technologically, two major aspects of language communication problems must be borne in mind and addressed urgently: (I) technical problem, that is how accurate are the symbols, logarithms, and the vocabularies translated into indigenous languages by both the students and teachers; and (II) semantic problem, that is how precisely do these translations convey the desired meanings (Rwambiwa, 2000). Moreover, the various studies conducted so far did not examine how much of these registers the learners possessed in their mother tongue before we now talk of its use as currently done in some Zimbabwean schools. The issue that standardised registers of scientific concepts are required is indisputable. It is in this context that these researchers attempted to uncover the adequacy and appropriateness of discrepancy of some scientific terminology that students could translate in their mother tongue and the corresponding meanings conveyed by the vocabularies. A further step would be taken to provide linguistic suggestions to these translations.

This paper explores students' local terminology of some scientific concepts in "O" level school science curriculum and determines the extent to which scientific terminology could be attained in local language. It further explains the possible interferences that could contribute to the students' translations and meanings given to some scientific concepts in local languages and suggests some linguistic local scientific terminology for teachers and students of science for standardisation.

Method

The study employed a simple comparative group survey design, in which a school each of two differentiated settings was randomly selected for the purpose of finding out the amount of vocabulary they possess in their mother tongue.

Sample

There are 10 educational regions in Zimbabwe. Two regions were randomly sampled. These were Mashonaland East and Harare. Harare is purely urban. It was purposively indicated that public schools in Harare and Mashonaland East be listed out for selection. One school was randomly picked for Harare region. The public schools in Mashonaland East were stratified into urban and rural. Only one school was randomly selected from the list of rural schools in the latter. Permission was sought from the

Education Districts of these two regions. One rural school and one urban school were randomly selected from the schools in the two regions because this study involved two systematic procedures of developing the instrumentation. For the pilot study only one hundred and seventy six learners in the two schools participated while for the main study, the entire 45 form IV (“O” level) General Science pupils of Murape Secondary School in Mashonaland East and 43 form IV “O” level General Science pupils of Mount Pleasant High School in Harare, whose mother tongue is Shona, participated in the study. Their ages ranged from 16 – 19 year.

Instrument

Two instruments were used in this study. The first one was named ‘Language Difficulty Questionnaire’ (LDQ) and the second one the ‘Scientific Terminology in the Mother Tongue Questionnaire’ (STMTQ). The LDQ was developed from a close observation of teachers’ lessons for five weeks in each of the two schools. Mondays and Wednesdays were scheduled for classroom observations in Murape High School while Tuesdays and Thursdays were for Mount Pleasant High school. Cassette tape recordings were made of the three different teachers’ lessons in each school for the purpose of extracting terminology recently taught and comparing notes when the learners’ responses to LDQ are gathered. In all six arms participated in the observation and the LDQ. The LDQ, which contained two parts, served as a pilot instrument for developing STMTQ. From the tape recordings, 130 registers were extracted. The six arms of learners (176 learners) were asked at the end of the classroom observations to respond to the LDQ. Part A of five closed items asked for name of school, age, class, mother tongue, and school science subject. Part B consisted of 130 corpus classified as biological, physical, and chemical to which learners were to indicate level of understanding. The subject were to indicate their responses on a 5- point scale (very easy to understand = 1 point; easy to understand = 2 points; not sure = 3 points; difficult to understand = 4 points; and very difficult to understand (of 5 points). It took a maximum of three days to retrieve the LDQ from the students.

After the analysis the STMTQ was developed and contained two parts. Part A requested for the pupils’ bio-data such as name of school, age, class, mother tongue, and parental occupation. Part B contained only one item that asked the students to translate 60 scientific registers, identified as very difficult by the majority and some few ones as very difficult when least expected by the minority, into Shona and define all these in English. The validation of the construct and content of the instrument was carried out by two university physical scientists and one biology secondary school teacher. All the questionnaires were completed and returned immediately in both schools with the assistance of their teachers. The responses of the

students were analysed by descriptive statistics and by means of critical reflection by science and language lecturers. The translations of the scientific concepts were pooled together and linguistic explanations were provided on the translations by the researchers.

Findings

Findings in this section are presented in two manners. The first covered results obtained from pilot study while the second covered report of the main study. The results of the pilot study are as follows:

The frequency and percentages of their responses were computed and are as shown in Table 1.

Table 1: Frequency of Responses and Percentages on Learning Difficult of Scientific Concepts in the Two Schools

| S/N | Items | Very Easy | Easy | Undecided | Difficult | Very difficult |
|-----|--------------|---------------|-----------|-----------|-----------|----------------|
| 1 | Tree | 86 (48.9) | 55(31.25) | 19(10.8) | 11(6.3) | 05(2.8) |
| 2 | Growth | 63(35.8) | 71(40.3) | 08(4.6) | 14(8) | 20(11.4) |
| 3 | Respiration | 23(13.1) | 47(26.7) | 13(7.4) | 72(41) | 21(11.9) |
| 4 | Germination | 28(15.9) | 42(23.9) | 50(28.4) | 29(16.5) | 26(14.8) |
| 5 | Plants | 79(44.9) | 54(30.7) | 16(9.1) | 21(11.9) | 06(3.4) |
| 6 | Seedlings | 23(13.1) | 46(26.1) | 14(8) | 43(24.4) | 50(28.4) |
| 7 | Health | 76(43.1) | 20(11.4) | 48(27.3) | 25(14.2) | 07(4) |
| 8 | Diseases | 85(48.2) | 33(18.8) | 23(13.1) | 33(18.8) | 02(1.1) |
| 9 | Stem | 52(29.6) | 79(44.9) | 10(5.7) | 25(14.2) | 10(5.7) |
| 10 | Insects | 65(36.9) | 17(9.7) | 43(24.4) | 25(14.2) | 26(14.8) |
| 11 | Tissue | 22(12.5) | 41(23.2) | 42(23.9) | 50(28.4) | 21(11.9) |
| 12 | Cell | 38(21.6) | 37(21.0) | 55(31.3) | 22(12.5) | 22(12.5) |
| 13 | Organs | 72(41) | 26(14.8) | 31(17.6) | 29(16.5) | 18(10.2) |
| 14 | Erosion | 13(7.4) | 38(21.6) | 24(13.6) | 77(43.75) | 24(13.6) |
| 15 | Starch | 96(54.6) | 57(32.4) | 05(2.8) | 12(6.8) | 06(3.4) |
| 16 | Pollution | 87(49.4) | 42(23.9) | 09(5.1) | 29(16.5) | 10(5.7) |
| 17 | Mosquito | 103(58.5) | 53(30.1) | 10(5.7) | 06(3.4) | 04(2.3) |
| 18 | Environment | 120(68.2) | 43(24.4) | 05(2.8) | 08(4.6) | -(0) |
| 19 | Surrounding | 86(48.9) | 76(43.2) | 02(1.14) | 11(.6.3) | 01(0.57) |
| 20 | Food | 86(48.9) | 71(40.3) | 12(6.8) | 05(2.8) | -(0) |
| 21 | Hybrid | 24(13.6) | 33(18.8) | 13(7.4) | 66(37.5) | 40(22.7) |
| 22 | Seeds | 41(23.3) | 109(61.9) | 20(11.4) | 04(2.3) | 02(1.1) |
| 23 | Fruits | 19(10.8) | 98(55.7) | 13(7.4) | 27(15.3) | 19(10.8) |
| 24 | Pollination | 110(62.5) | 55(31.3) | 11(6.3) | -(0) | -(0) |
| 25 | Reproduction | 38(21.5) | 26(14.8) | 02(1.1) | 65(36.9) | 45(25.6) |
| 26 | Nectar | 70(39.8) | 65(36.9) | 34(19.3) | 06(3.4) | 01(0.57) |

| S/N | Items | Very Easy | Easy | Undecided | Difficult | Very difficult |
|-----|-----------------|-----------|-----------|-----------|-----------|----------------|
| 27 | Capillary | 75(42.6) | 46(26.1) | 31(17.6) | 14(8) | 10(5.7) |
| 28 | Soil | 136(77.3) | 40(22.7) | -(0) | -(0) | -(0) |
| 29 | Involuntary | 12(6.8) | 38(21.6) | 11(6.3) | 80(45.5) | 35(19.9) |
| 30 | Cash | 148(84.1) | 24(13.6) | 04(2.3) | -(0) | -(0) |
| 31 | Storage | 111(63.1) | 58(33.1) | 07(4) | -(0) | -(0) |
| 32 | Flies | 132(75) | 40(22.7) | 01(0.57) | 02(1.1) | 02(1.1) |
| 33 | Reflex | 57(32.4) | 34(19.3) | 40(22.7) | 36(20.5) | 09(5.1) |
| 34 | Post-natal | 83(47.2) | 53(30.1) | 28(15.9) | 11(6.3) | 01(0.57) |
| 35 | Budding | 126(71.6) | 37(21) | 08(4.6) | 03(1.7) | 02(1.1) |
| 36 | Flooding | 112(63.6) | 51(28.9) | 08(4.6) | 05(2.8) | -(0) |
| 37 | Absorption | 23(3.1) | 29(16.5) | 32(18.2) | 56(31.8) | 36(20.5) |
| 38 | Conservation | 45(25.6) | 87(49.4) | 22(12.5) | 20(11.4) | 02(1.1) |
| 39 | Fertilizers | 86(48.9) | 73(41.5) | 03(1.7) | 11(6.3) | 03(1.7) |
| 40 | Twins | 145(82.4) | 31(17.6) | -(0) | -(0) | -(0) |
| 41 | Variation | 11(6.3) | 28(15.9) | 33(18.8) | 65(36/9) | 39(22.2) |
| 42 | Flower | 120(68.2) | 52(29.6) | -(0) | 04(2.3) | -(0) |
| 43 | Worm | 21(11.9) | 80(45.5) | 43(24.4) | 20(11.4) | 12(6.8) |
| 44 | Pulse | 36(20.5) | 111(63.1) | 19(10.8) | 28(15.9) | 01(0.57) |
| 45 | Vertebrate | 42(23.9) | 64(36.4) | 20(11.4) | 17(9.7) | 33(18.8) |
| 46 | Heat | 160(90.1) | 15(8.5) | 01(0.57) | -(0) | -(0) |
| 47 | Condensation | 48(27.3) | 22(12.5) | 14(7.96) | 71(40.3) | 21(11.9) |
| 48 | Compression | 11(6.3) | 20(11.4) | 26(14.8) | 52(29.6) | 67(38.1) |
| 49 | Gaseous | 41(23.3) | 55(31.3) | 05(2.8) | 52(29.6) | 23(13.1) |
| 50 | Mass | 07(4) | 27(15.3) | 23(13.1) | 42(23.9) | 77(43.8) |
| 51 | Balance | 53(30.1) | 31(17.6) | 02(1.1) | 51(29) | 39(22.2) |
| 52 | Attraction | 61(34.7) | 27(15.3) | 33(18.8) | 45(25.6) | 10(5.7) |
| 53 | Oxygen | 106(60.2) | 38(21.6) | 11(6.3) | 15(8.5) | 06(3.4) |
| 54 | Separation | 115(65.3) | 59(33.5) | 02(1.14) | -(0) | -(0) |
| 55 | Burning | 33(18.8) | 12(6.8) | 34(19.3) | 55(31.3) | 42(23.9) |
| 56 | Solution | 40(22.7) | 56(31.8) | 04(2.3) | 50(28.4) | 26(14.8) |
| 57 | Liquid | 18(10.2) | 111(63.1) | 14(7.96) | 21(11.9) | 11(6.3) |
| 58 | Equilibrium | 11(6.3) | 53(30.1) | 89(50.6) | 22(12.5) | 01(0.57) |
| 59 | Suspension | 62(35.2) | 67(38.1) | 26(14.8) | 15(8.5) | 06(3.4) |
| 60 | Air | 100(56.8) | 65(36.9) | 11(6.3) | -(0) | -(0) |
| 61 | Ore | 05(2.8) | 106(60.2) | 10(5.7) | 34(19.3) | 21(11.9) |
| 62 | Decompose | 23(14.8) | 104(59.0) | 45(25.6) | 03(1.7) | 01(0.57) |
| 63 | Dissociate | 15(8.5) | 87(49.4) | 30(17.1) | 33(18.8) | 11(6.3) |
| 64 | Malleable | 10(5.7) | 56(31.8) | 66(37.5) | 17(9.7) | 27(15.3) |
| 65 | Crystallization | 03(1.7) | 26(14.8) | 45(25.6) | 82(46.6) | 20(11.4) |
| 66 | Temperature | 34(19.3) | 70(39.8) | 51(29.1) | 34(19.3) | 23(13.1) |
| 67 | Mixtures | 98(55.7) | 67(38.1) | -(0) | 01(0.57) | -(0) |
| 68 | Compounds | 101(57.3) | 43(24.4) | 02(1.14) | 09(5.1) | 21(11.9) |
| 69 | Chromatography | 22(12.5) | 30(17.1) | 58(32.9) | 29(32.9) | 37(21) |
| 70 | Iron | 41(23.2) | 53(30.1) | 24(13.6) | 45(25.6) | 13(7.4) |

| S/N | Items | Very Easy | Easy | Undecided | Difficult | Very difficult |
|-----|-----------------|-----------|----------|-----------|-----------|----------------|
| 71 | Copper | 60(34.1) | 49(27.8) | 21(11.9) | 33(18.8) | 13(7.4) |
| 72 | Salts | 109(61.9) | 57(32.4) | 10(5.7) | -(0) | -(0) |
| 73 | Volume | 68(38.6) | 22(12.5) | 82(46.6) | 03(1.7) | 01(0.57) |
| 74 | Collision | 40(22.7) | 56(31.8) | 36(20.5) | 31(17.6) | 13(7.4) |
| 75 | Particles | 22(12.5) | 15(8.5) | 43(24.4) | 67(38.1) | 29(32.9) |
| 76 | Change | 97(55.1) | 57(32.4) | 11(6.3) | 05(2.8) | 06(3.4) |
| 77 | Energy | 52(29.6) | 20(11.4) | 47(26.7) | 35(19.9) | 22(12.5) |
| 78 | Matter | 123(69.9) | 28(15.9) | 12(6.8) | 23(13.1) | -(0) |
| 79 | Reversible | 16(9.1) | 12(6.8) | 57(32.4) | 34(19.3) | 67(38.1) |
| 80 | Acids | 68(38.6) | 56(31.8) | 19(10.8) | 21(11.9) | 12(6.8) |
| 81 | Metals | 05(2.8) | 45(25.6) | 31(17.6) | 62(35.2) | 33(18.8) |
| 82 | Steam | 58(33.1) | 90(51.1) | 07(4) | 12(6.8) | 09(5.1) |
| 83 | Expansion | 34(19.3) | 95(54.1) | 22(12.5) | 20(11.4) | 05(2.8) |
| 84 | Standard | 27(15.3) | 23(13.1) | 45(25.6) | 55(31.3) | 26(14.8) |
| 85 | Ionise | 34(19.3) | 21(11.9) | 89(.50.6) | 18(10.2) | 14(8.1) |
| 86 | Colloids | 51(29.1) | 34(19.3) | 52(29.6) | 16(9.09) | 23(13.1) |
| 87 | Constituents | 32(18.2) | 41(23.3) | 45(25.6) | 25(14.2) | 33(18.8) |
| 88 | Constant | 46(26.1) | 45(25.6) | 30(17.1) | 42(23.9) | 13(7.4) |
| 89 | Point | 87(49.4) | 56(31.8) | 05(2.8) | 23(13.1) | 05(2.8) |
| 90 | Images | 100(56.8) | 45(25.6) | 11(6.3) | 20(11.4) | -(0) |
| 91 | Force | 99(56.3) | 34(19.3) | 06(3.4) | 12(6.8) | 25(14.2) |
| 92 | Friction | 22(12.5) | 22(12.5) | 11(6.3) | 54(30.7) | 67(38.1) |
| 93 | Object | 32(18.2) | 71(40.3) | 29(16.5) | 23(13.1) | 21(11.9) |
| 94 | Gravity | 12(6.8) | 45(25.6) | 06(3.4) | 82(46.6) | 31(17.6) |
| 95 | Heat | 48(27.3) | 20(11.4) | 31(17.6) | 54(30.7) | 23(13.1) |
| 96 | Insulate | 23(13.1) | 19(10.8) | 33(18.8) | 48(27.3) | 53(30.1) |
| 97 | Engine | 07(4.1) | 08(4.6) | 10(5.7) | 51(29.1) | 100(56.8) |
| 98 | Current | 26(14.8) | 21(11.9) | 12(6.8) | 55(31.3) | 62(35.2) |
| 99 | Scale | 30(17.1) | 37(21) | 54(30.7) | 36(20.5) | 19(10.8) |
| 100 | Pressure | 20(11.4) | 33(18.8) | 23(13.1) | 57(32.4) | 43(24.4) |
| 101 | Machine | 40(22.7) | 30(17.1) | 12(6.8) | 41(23.3) | 53(30.1) |
| 102 | Illumination | 06(3.4) | 23(13.1) | 05(2.8) | 70(40) | 72(41) |
| 103 | Density | 63(36.1) | 51(29.1) | 22(12.5) | 23(13.1) | 17(8.1) |
| 104 | Velocity | 59(33.5) | 45(25.6) | 07(4) | 12(6.8) | 53(30.1) |
| 105 | Speed | 52(29.6) | 38(22.1) | 13(7.4) | 23(13.1) | 22(12.5) |
| 106 | Plug | 110(62.5) | 44(25) | 09(5.11) | 10(5.7) | 03(1.7) |
| 107 | Circuit | 28(15.9) | 12(6.8) | 20(11.4) | 71(40.3) | 45(25.6) |
| 108 | Measure | 81(46) | 60(34.1) | 05(2.8) | 23(13.1) | 07(4) |
| 109 | Weight | 30(17.1) | 42(24.1) | 23(13.1) | 45(25.6) | 36(20.5) |
| 110 | Quantity | 56(31.8) | 67(38.1) | 23(13.1) | 16(9.1) | 14(8.1) |
| 111 | Upthrust | 21(11.9) | 25(14.2) | 35(20.1) | 42(23.9) | 53(30.1) |
| 112 | Curve | 99(56.3) | 45(25.6) | 01(0.57) | 12(6.8) | 19(11.1) |
| 113 | Motion | 23(13.1) | 77(44.1) | 19(11.1) | 20(11.4) | 37(21) |
| 114 | Proportionality | 98(56.1) | 45(25.6) | 01(0.57) | 21(11.9) | 11(6.3) |

| S/N | Items | Very Easy | Easy | Undecided | Difficult | Very difficult |
|-----|--------------|-----------|----------|-----------|-----------|----------------|
| 115 | Power | 19(11.1) | 45(25.6) | 02(1.14) | 66(37.5) | 44(25) |
| 116 | Work | 20(11.4) | 23(13.1) | 12(6.8) | 82(46.6) | 39(22.2) |
| 117 | Space | 20(11.4) | 22(12.5) | 40(22.7) | 57(32.4) | 37(21) |
| 118 | Field | 11(6.3) | 23(13.1) | 39(22.2) | 56(31.8) | 47(26.7) |
| 119 | Sound | 23(13.1) | 67(38.1) | 23(13.1) | 51(29.1) | 12(6.8) |
| 120 | Potential | 20(11.4) | 34(19.3) | 35(20.1) | 45(25.6) | 42(24.1) |
| 121 | Pull | 95(54.1) | 44(25) | 21(11.9) | 17(10.1) | 09(5.1) |
| 122 | Kinetic | 49(27.8) | 56(31.8) | 34(19.3) | 22(12.5) | 15(8.5) |
| 123 | Electron | 41(23.3) | 18(10.2) | 24(13.6) | 59(33.5) | 34(19.3) |
| 124 | Humidity | 90(51.1) | 45(25.6) | 22(12.5) | 17(10.1) | 02(1.14) |
| 125 | Shadows | 57(32.4) | 81(46) | 05(2.8) | 21(11.9) | 12(6.8) |
| 126 | Oscillations | 35(20.1) | 15(8.5) | 13(7.4) | 43(24.4) | 70(40.1) |
| 127 | Length | 112(63.6) | 23(13.1) | 01(0.57) | 05(2.8) | 35(20.1) |
| 128 | Solar | 79(45.1) | 76(43.2) | 11(6.3) | 02(1.14) | 08(4.6) |
| 129 | Distance | 82(46.6) | 45(25.6) | 07(4) | 23(13.1) | 19(11.1) |
| 130 | Echo | 30(17.1) | 21(11.9) | 24(13.6) | 42(23.9) | 59(33.5) |

The scientific concepts were categorized as biological, physical and chemical terms. Table 1 shows that about 40 registers were found difficult especially when a respondent was undecided or found it difficult to learn. It was also found that some concepts that are fundamental in General Science were perceived as difficult by some of the respondents. Some of these are food, health, energy, quantity, to mention just a few. Some of these were listed along with the perceived difficult concepts for translation. Out of the sixty registers given, table 2 reveals the percentage of concepts by category that can be translated into Shona by the sample.

Table 2: Percentages of Concepts Available in Shona

| S/N | Available A B C P | | Non-available N A B C P | |
|-------------|-------------------------|----------|--------------------------------|--------|
| Urban (130) | 23(17.7) 11(8.5) | 19(14.6) | 22(16.9) (17.7) 32(24.6) | 23 |
| Rural (150) | 41(27.3) 09(6) | 35(23.3) | 4(2.67) 34(22.7) | 27(18) |

The respondents could not translate twenty of the sixty concepts in the Shona language. These were electron, oscillations, potential, echo, current, gravity, friction, circuit, chromatography, crystallization, particles, organs, capillary, cell, reflex, malleable, pulse, variation, metal and standard. For the forty concepts translated, appropriate translations by pupils are in bold,

while inappropriate words are underlined and suggested alternatives are in italic.

Under measurement, general to all the three categories:

1. Density – **uremu, huremu**
2. Volume – **huremu uremu**, *ufemu, kufuta*
3. Mass – huremu, uremu, huwandu, *kurema*
4. Measure – kurera, kuyera, kupima, **era, yera**, *pima, chipimo*
5. Weight – kurema, uremu, huremu, *simba rekurema*
6. Balance – kuenzana, chikero, sikero, chiyero
7. Quantity – huwandu, uwandu, mwando
8. Distance – **chinhambwe, urefu, hurefu**

Under biological terms:

9. Germination – **kubuda, kumera**
10. Food – **zvekudya, chikafu, chekudya**
11. Absorb – kutora, kumedza, *Sveta*
12. Hybrid – mbeu yakanaka, mbeu, mbeu yapamusoro, mbeu hombe yakanaka masanganiswa
13. Health – **utano, hutano**
14. Respiration – **kufema**
15. Insect – **kapuka, kapukanana, chipukanana, tupukanana**
16. Seedling – mbeswa, mbesa, nhondo
17. Tissue – ganda, makanda, tishu
18. Involuntary – kuita chinhu pasina chinokudzivisa, pasina zvinokukanganisa, *Garukawaita*
19. Erosion – kukukurwa, kueredzwa, gukurahundi, **gukuravhu**
20. Burning – **kubvira, kupisa, kutsva**.
21. Attraction – kutorwa moyo, kuyevedza, kukwezva, gwezvo, hwezvo.
22. Reversible – kuchinjika, kudzorodza, kudzokera, *Kudzoserika sezvazvanga zviri*

Under chemical terms:

23. Solution – **mhinduro**, *surudzo*
24. Liquid – **mvura-mvura**, zvisanganiswa, mvura, mumvura
25. Equilibrium – **kuenzana**, *mangange*
26. Gaseous – hutsi, muutsi, utsi, mweya, mweya-mweya
27. Suspension – kusanyura, kuzorodza, kumiswa, yangararo

Under physical terms:

28. Work – **basa**
29. Energy – simba, *masimba*
30. Sound – kutinhira, mutinhimira, ruzha, maungira, kutinhimira
31. Power – simba, masimba, *shandiso yemasimba*

32. Solve- **gadziridza**, kugadziridza, kunhadzirisa, *nhadzirisa*
33. Engine – muchina, **injini**, **hinjini**
34. Field – **munda**, *nharaunda*, *nzvimbo*
35. Condense – kubatanidza, *kondenzi*
36. Wind – **mhepo**
37. Insulate – chokuvharidzira, kubata, chekuvhara, *putira*
38. Upthrust – kufa chinhu, kuvimbika, chekuvhara, *simudzo*
39. Space – **nzimbo isina chinu**, **nenzvimbo**, *panhu*
40. Compress – kudzvanyirira, kukwiza, kukwizana, kumanikidza, pusha, *dzvanya*

From the analysis in Table 2, it shows that the respondents have difficulty in translating mainly the physical chemistry concepts into Shona. The same translation was given to some scientific concepts that contextually mean different things. Of the 40 concepts attempted only 60 percent were appropriately translated by the pupils.

Recommendations

Our recommendations in this paper are as follows:

- Science should be taught through the medium of indigenous language.
- Scientific terms should be standardised first.
- The corpus should be collected from schools by both science and language specialists, then decide which terms to use for science teaching.
- Where there is no equivalent term in the indigenous language, such terms should be adopted directly from the English words although this should be done sparingly.
- As far as possible, paraphrasing of terms should be avoided during translation, in order not to interfere too much with the syntax of science.
- The coinage of new terms should be given preference ahead of either paraphrasing or adoption.
- The use of indigenous language in science education should be done in phases, starting experimentally at junior high school.
- For further study, an enhanced instrument of interview would be needed for instance discourse on the concepts in order to assess the direction of understanding.

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