

LEARNING THE SCIENCES IN THE IGBO LANGUAGE

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This article focuses on the use of the Igbo language in the teaching and learning of integrated science (biology, chemistry and physics) at the junior secondary school level. The corpus comprising students' tape-recorded responses to questions on integrated science is analysed by applying the Chomskian psycholinguistics method to demonstrate linguistic competence (Chomsky 1974:14). This method was also exploited by Mehler and Noizet (1974:15-22) in describing the speaker's psycholinguistic model with the objective of testing linguistic competence by analysing performance in real situations. The Igbo language has no inherent linguistic deficiency making it inadequate for learning the sciences. The national objectives on scientific and technological development could be best achieved through an effective national policy making English and Nigerian national languages the media of instruction at all levels of education. The United States is ahead by conferring on Hausa, Igbo and Yoruba the status of official languages at JFK airport.

Cet exposé insiste sur l'emploi de l'igbo dans l'apprentissage des sciences pendant les trois premières années du collège d'enseignement général. Le corpus comprenant les réponses des étudiants aux questions sur les sciences, enregistrées sur bande magnétique, est analysé par la méthode psycholinguistique. Cette méthode Chomskienne (Chomsky 1974:14) vise à démontrer la compétence linguistique. Elle est exploitée par Mehler et Noizet (1974:15-22) pour décrire un modèle linguistique du locuteur, vérifier la compétence en analysant la performance dans les situations réelles. L'Igbo n'a pas de carence le rendant inadéquat pour l'apprentissage des sciences. Les objectifs nationaux de développement techno-scientifique seraient réalisables moyennant une politique efficace de l'emploi de l'anglais et des langues nationales à tous les niveaux de l'enseignement. Les Etats-Unis devance le Nigeria en conférant le statut de langues officielles à l'haoussa, à l'igbo et au yorouba.

0. INTRODUCTION

A solid foundation in science and mathematics is indispensable for the development of modern technology. Language is crucial to the learning process. Students' performance in the sciences, is, therefore, to a high degree dependent on their mastery of the medium in which science and mathematics are taught at the three levels of the nation's educational system: primary, secondary and tertiary. Learning science and mathematics in a foreign language poses additional problems to the learner, who must first of all master the language of instruction in order to understand the subject. Time spent in learning clearly outweighs the rate of understanding. Consequently Dakin (1968:12) posits that no foreign language is as efficient as the mother tongue in the transmission of knowledge, and no policy on the language of education can afford to disregard this fact without serious consequences to the psychological and academic achievements of the students. In Nigeria, it is argued that students' poor academic performance and aversion for the sciences are partly due to their mediocre knowledge of the English language.

On achieving political independence in the early sixties, many African and third-world nations erroneously thought that economic, scientific and technological development would be accelerated by the continued use of the language of their erstwhile colonial masters as the privileged medium of instruction. After over a century of using English in education, Nigeria still imports basic technology not only from the Western world but also from China and India. Until quite recently, Indian nationals controlled

the teaching of science and mathematics in most of Nigeria's secondary and tertiary institutions of learning. Among Third-world nations, the rapid, systematic, scientific and technological development of India derived from her pragmatic leaders, the foremost of whom was M. K. Gandhi. Gandhi, commenting on the Indian Government Report of the Secondary School Education Commission as quoted in Dakin (1968:21), realised early enough the inherent disadvantages of developing science and technology relying on a foreign medium of instruction—the English language. As a solution, the use of Indian languages in education became inevitable. By 1972, practically all college level instruction was to be given in one of the fourteen regional languages. The current phenomenal industrialization of China, India and Japan have conclusively shattered the myth that English, French and German are the only languages suitable for teaching and learning of the sciences which facilitate scientific and technological development.

It is often argued that European languages are preferred to African languages in the study of the sciences because African languages lack scientific precision and hardly express notions and concepts with the mathematical accuracy required of a language of scientific inquiry. The proven syntactic, morphological and semantic characteristics of some European languages, though important in themselves, are not the monopoly of these languages. Poth (1979:21) has conclusively shown that by applying the science of linguistics, there is no human language which within its dynamics, is incapable of adapting to new realities, and of expressing any human experience whenever it is required to do so. A part of Einstein's works has been translated into Wolof, and the translator had no serious problem expounding the theory of the relativity of time and space.

The thrust of this article is on the use of the Igbo language in the teaching and learning of integrated science (biology, chemistry and physics) at junior secondary school (JSS) level in Anambra State, with conclusions drawn from a performance test. In the course of this work, the author applied the parameters developed by Gougenheim and Rivenc (1961:94–98) and Dubois (1966:103-104) for the preparation of scientific vocabulary and the problems associated with the development of scientific and technical vocabulary respectively.

The corpus, composed of tape-recorded answers given by the participating students, are analysed by the psycholinguistic method. The results show that there is nothing linguistically inherent in the Igbo language to render it unsuitable for the teaching and learning of the sciences and mathematics.

1. EXPERIMENT

The preceding example of expressing scientific notions in Wolof—an African language spoken in Guinea, Senegal and other African countries—demonstrates the falsity of the claim that African languages are not suited for the transmission of scientific and technical concepts. In the same vein, this work will provide further basis for the assessment of the Igbo language as an effective scientific medium. The fourth volume of the *Recommendations of the Igbo Standardization Committee*, a publication of the Society for the Promotion of Igbo Language and Culture (SPILC), is specifically

devoted to scientific and technical terms in Igbo. The author henceforth refers to the book as SPILC 4 (1982:31–49).

However, there is a need to validate the psychological reality of this terminology, because mere availability of scientific vocabulary in Igbo is no guarantee of its correct usage in actual speech or writing. To conclude otherwise is tantamount to erroneously equating knowledge of a language with accumulation of its vocabulary.

The practical work for this article, as shown in Ezeani 1986:150–190, was done in five selected secondary schools in urban and rural communities in Anambra State. The participants comprised two hundred junior secondary school (JSS II) students in integrated science (biology, chemistry and physics) classes. All the students were of Anambra State origin, having an average age of 14 years. Prior to this experiment, the students were taught integrated science lessons in English. In order to correlate the effects of the language spoken at home and performance in school work, each student was required to indicate the language(s) spoken at home, if different from the medium of instruction. One hundred and ninety-eight or 99% of the students indicated that they spoke Igbo at home, while one or 0.5% of the students used English at home. One student provided no information.

The participating students were required to answer orally and strictly in Igbo, five questions on integrated science, in sixty minutes. The questions, and students' responses which were simultaneously tape-recorded and then transcribed into working language, are presented in §2 below.

2. CORPUS

<i>Questions / Subjects</i>	<i>Responses / Level of language used by the students</i>	<i>Acceptable level of language in Igbo</i>
BIOLOGY		
1. Weputa ọdị iche atọ dị n'etiti ihe dị ndụ na nke adighi ndụ.	Nke mbụ <i>movement</i> nke ndị oyibo na akpọ <i>movement</i>, out ha si-aga ije. Dị ka... madu kịta a...	Ihe atọ dị iche n'etiti ihe dị ndụ na ihe adighi I bu ndị a: ekumume, ngaghari na akumkpuru.
CHEMISTRY		
2. Kowaa ofu ihe ndị ahụ na-eme mgbe etinyere nnu nri n'ime mmiri magharja	Mgbe I tinyere nnu n'imemiri gbarughaa ya a bja nnu agaa ọdu n'ike miri	E tinye nnu nri n'ime mmiri gbarughaa, nnu ede rie ya na mmiri aburu otu.

PHYSICS

<p>3. Kowaa ihe ndi ahụ na-eme mgbe a kpọlere bọlụ abụọ ha otu na aro n'elu tebulu ka ha jiri otu ụkwụ ọsọ gakwuru onwe ha...</p>	<p>Ihe nke a na-akowara anyi bu dika I weta ball abụọ kịtaa, I kpọree ya n'elu tebul, I ya ama na o bu force ka ha ga-eji metukorisi onwe ha onu...</p>	<p>A kpọree bọlụ abụọ, jirikwa otu ụkwụ ọsọ n'elu tebulu, ha zukota, ha akwusi, n'ihi na umu (ike) ha abụọ ha. Ugbua ha ga-eji nwayo gaa azu nke gosiri na umu ha ebelatala...</p>
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Table 1. Corpus of questions and responses

3. ANALYSIS OF CORPUS

In answering the questions the students were expected to encounter problems expressing scientific notions and concepts in the Igbo language. The most outstanding problem was the students' inability to effectively use Igbo as the only medium of expressing scientific notions and concepts required. This problem could have been avoided if the students were taught the sciences and mathematics in the Igbo language. In such a situation, the use of English terms would have been minimal. The participants' mediocre performance did not result from the so-called inadequacy of Igbo terminology, because transcription of their responses showed a tendency to use English words in cases where Igbo terms were available and could have been conveniently used.

A summary of such instances involving recourse to English or pidgin-English terms is presented in (1) below.

(1) English or pidgin-English expressions for which Igbo terms are available

for example	n'ima atụ
force	ike, ụma
cassava	akpu, mgbaduga
movement	ngaghari
reproduction	akumkpuru
rice	osikapa (Hausa: shinkafa)
living	dị ndu, nwere ndu
a laikia	imasị
e chenjie	igbanwo
testie	ile
mixkoro	igwako

4. PSYCHOLOGICAL PROBLEM

Viewed from a sustained tendency to "validate" Igbo terms with English expressions, the students gave the impression of having a psychological problem transmitting scientific notions and concepts in the Igbo language. Even in cases where they used suitable Igbo expressions, some of the students quickly "corrected" themselves by resorting to incessant code-switching and circumlocution. This psychological beha-

viour of the students tended to imply that they considered Igbo as being inferior to English in expressing scientific notions and concepts. Some examples are given in (2).

- (2)
- | | |
|---|-------------|
| a. <i>ngaghari</i> , nke ndi oyibo na-akpo | movement |
| b. <i>ekumume</i> , nke ndi oyibo na-akpo | respiration |
| respiration, which the English call respiration | |
| c. <i>akpu</i> , nke ndi oyibo na-akpo | cassava |
| cassava, which the English call cassava | |

5. BORROWED WORDS

It was particularly difficult for the students to select and use words from English or other languages which have formed part of Igbo terminology. Some of this transferable vocabulary is shown in the data in (3).

(3) Transferable Vocabulary

<i>English</i>	<i>Igbo</i>
electricity	eletriki
beaker	bika
carbon dioxide	kabon
kilogram	kilo
litre	lita
metre	mita

The students were also unable to express the different forms of energy such as mechanical, chemical nuclear and solar energy, because they lack practice in the use of these terms in the Igbo language. The students' level was also an important hindering factor.

On the other hand, the author is of the opinion that these foreign words and notions are dormant in Igbo because the language is not used in teaching and learning the sciences. Furthermore, the method of transmitting knowledge in traditional African society contributed largely to retarding the creation and dissemination of scientific vocabulary.

6. IMPEDIMENTS TO DISSEMINATION OF SCIENTIFIC VOCABULARY IN THE IGBO LANGUAGE

In most parts of the African continent, native artisans and doctors practised their professions in secret. The nature of these professions and terminology used in practice is still shrouded in secrecy. Dike (1974:1-104) clearly illustrates some of the negative tendencies whereby among the Igbo, only Awka indigenes excelled in smithing. They successfully monopolized the trade by developing secret codes aimed at denying others any knowledge of the trade. This retrogressive attitude seriously impeded wider propagation and development of scientific vocabulary in Igbo, more so, because some forms of traditional technology provided the basis for modernization.

Again, one of the factors which hinders the expansion and popularisation of abstract notions in Igbo—for example, forms of energy (mechanical, chemical, nuclear,

solar)—is the absence of a concerted and sustainable policy of incorporating notions into language. Thirdly, the development of Igbo into a modern language of science is hampered by the fact that Igbo is not used in areas where innovations brought about by cultural contact, such as systems of administration, industrial fabrications, business and education, are put into practice. Since the world experiences rapid and constant technological evolution, any language which fails to keep pace with these inescapable trends in modernization is susceptible to atrophy.

It is to the greatest advantage of European languages that they have over the years developed registers of science and technology, because the philosophy upon which the models for teaching and learning were based demanded that conceptual operations be integrated with the vocabulary and syntax of the language of intellectual procedures. The Igbo language is yet to be endowed with similar linguistic and philosophical models for academic pursuits.

In spite of the deficiency discussed above, the abundance of frequency vocabulary places Igbo at a significant linguistic advantage. For example, none of the verbs required to state the notions or concepts for answering the questions in the experiment above was lacking. It is necessary to underscore the fact that Igbo has terms which are essential for scientific reasoning such as: **na mbu**, firstly; **tupu**, before; **e mechaa**, after; **udoli**, simultaneously; **n'ih**, **maka na**, because. These words are important because in teaching and learning the sciences the use of these grammatical words which ensure the progression of a logical process is inevitable. A research scientist must use these terms to describe the succession of the scientific procedure thus: one does this first... or simultaneously... because... if one does not do it, it will... because of...

7. CONCLUSION

This article has explored the ways and means of learning the sciences in the Igbo language. The problems which teachers and students encounter in expressing scientific notions and concepts in Igbo are not inherent in the language. On the contrary, the students who participated in the reported experiment, grappled with the fundamental problem, which derives mainly from their lack of practice in using the Igbo language for the expression of scientific and technical concepts. Performance of secondary school students in this area can be enhanced by teaching basic sciences to primary school pupils in Igbo.

The early stages of the child's formal education represent the most auspicious period for developing original and sustainable interest in science and mathematics. A national policy on a medium of instruction which subjects students to grappling with the frustrating and unrewarding experience of having to master English as a prerequisite to a profitable learning experience, conspires to dampen students' interest in the sciences right at the prime stages of their formal education.

In view of the low academic achievement associated with learning the sciences in English, this article posits that the national objectives on science and technology could best be attained by the use of Nigerian languages as well as English in education, from the primary through university levels of formal education.

Bilingualism is inevitable in developing nations like Nigeria which stands encouraged by the recent report by Oketunbi (2001) to the effect that Hausa, Igbo and

Yoruba have become official languages at JFK airport in the United States of America. The present status accorded Nigerian languages will help break the barrier which impeded their effective dissemination and use in the nation's crucial quest for the development of science and technology.

REFERENCES

- Chomsky, N. 1974. *Aspects de la théorie syntaxique*. Paris: Editions du Seuil.
- Dakin, J et al., eds. 1968. *Language in education: The problem in Commonwealth Africa and the Indo-Pakistan sub-continent*. London: Oxford University Press.
- Dike, A. 1974. "The resilience of Igbo culture: A case of Awka town". Ph.D. dissertation. Michigan State University.
- Dubois, J. 1966. *Les problèmes du vocabulaire technique*. *Cahiers de Lexicologie* 9.2:103–112.
- Ezeani, E. O. 1986. *Igbo as a language of instruction in secondary school: A study of the situation in Anambra State*". Ph.D. thesis. University of Sherbrooke.
- Gougenheim, G. and P. Rivenc. 1961. *La préparation du vocabulaire technique*. *Cahiers de Lexicologie* 3:94–98.
- India, Government of. 1956. *Report of the Secondary School Education Commission*. In Dakin et al. (eds.), 20ff.
- Mehler, J. and G. Noizet. 1974. *Vers un modèle psycholinguistique du locuteur*. In *Textes pour une psycholinguistique*. Paris: Mouton.
- Oketunbi, T. 2001. *Hausa, Igbo, Yoruba become official languages at JFK Airport*. *The Guardian (Nigeria)*, Thursday, February 8, 29.
- Poth, J. 1979. *National languages and the training of teachers*. *Unesco* 32, 1–150.
- Society for the Promotion of Igbo Language and Culture. 1982. *Recommendations of the Igbo Standardization Committee*. *SPILC* 4:31–49. Onitsha: Varsity Industrial Press.