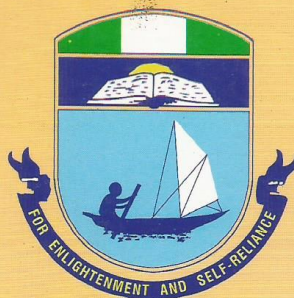


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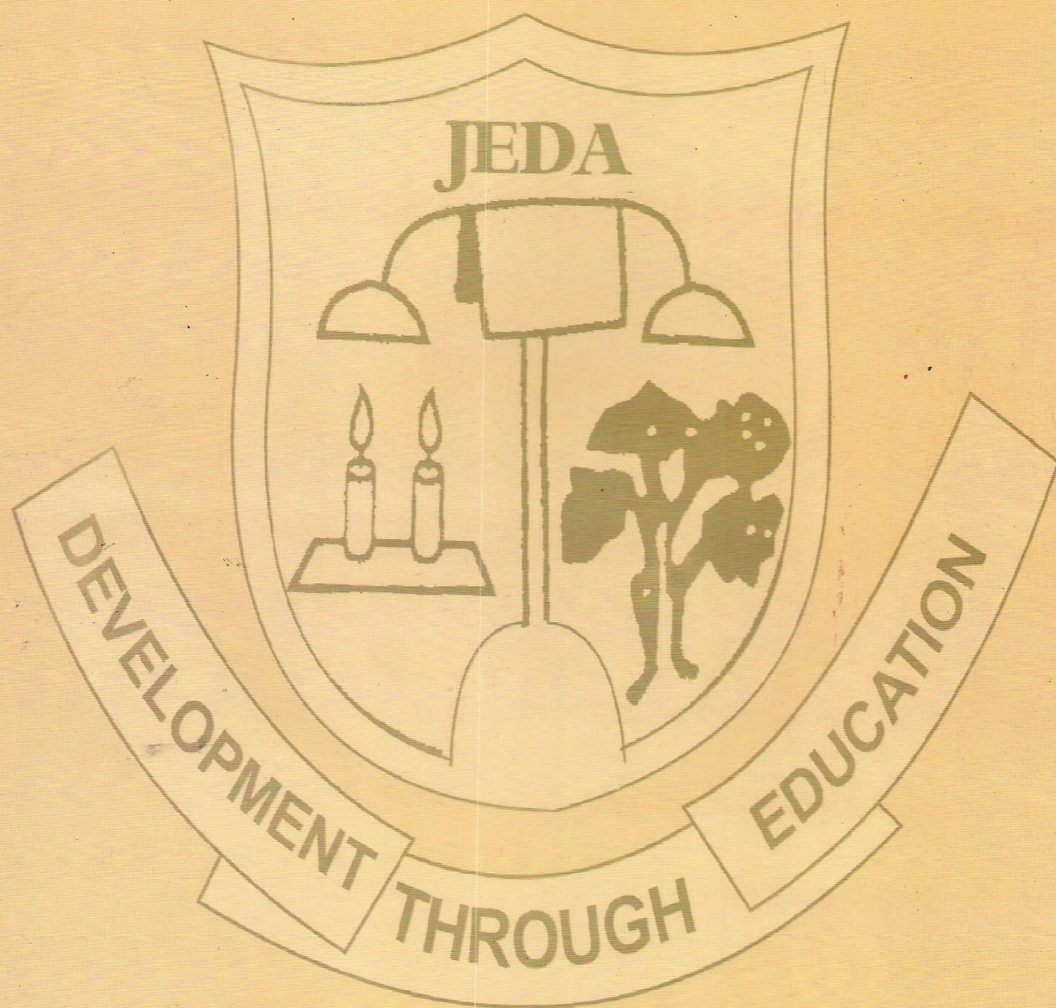


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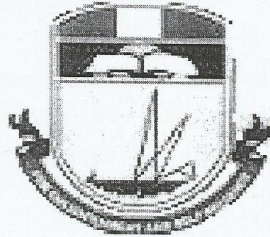


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**FACILITATING TECHNOLOGY TRANSFER FOR SUSTAINABLE DEVELOPMENT
THROUGH INDIGENOUS-LANGUAGE-MEDIUM EDUCATION IN NIGERIA: A
SYNTHESIS OF RESEARCH FINDINGS**

By

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Abstract

The paper bemoans the poor knowledge about climate change, socio-economic and technological bankruptcy as well as lack of sustainable development that characterize the 21st century Nigerian society, a situation that is blamed on the disconnect from the technology-rich and truly empowering traditional education that can be carried on in Nigerian indigenous languages, with special focus on the Yoruba language. It also debunks the argument that technology related subjects cannot be successfully taught or learnt in Nigerian languages. It rather proves from extant literature that technology transfer has eluded Nigeria so far because students are taught in a borrowed language that they have not been able to master adequately. It then advocates the promotion of indigenous-language-medium education, citing the scientific and technological exploits so far made by some world countries through indigenous-language-medium education as well as the phenomenal success of the popular Ife Six-Year Yoruba programme, the beneficiaries of which were proved to excel their colleagues, not only in science and technology courses but also the English Language.

Keywords: climate change; globalisation; translation-induced errors; Yoruba; development

Introduction

Climate change has been a topical issue globally and at the local levels for quite some time now. Literally, the term as well as its synonym "global warming" (Building Nigeria's Response to Climate Change, 2008) may suggest the harmless ideas of mere inconsistency in the climate and the absence of cold respectively. But literature is full of its negative connotations. Climate change is said to be responsible for seasonal cycles' disruption, adverse effects on the ecosystems; and agriculture, water needs and supply, and food production, sea-level rise with its attendant consequences that include fiercer weather, increased frequency and intensity of storms, floods, hurricanes, droughts, increased frequency of fires, poverty, malnutrition and series of health and socio-economic consequences. Climate change is thus an enemy that must be seriously combated (European Commission, 2011).

Knowledge is a key to meaningful and efficient coping strategies for climate change and its attendant challenges and preventing its sometimes devastating consequences. This is corroborated by Odey's (2008) assertion that a low level of public awareness in respect of the causes and impacts of climate change on ecosystems, human health and welfare and economy is one of the barriers militating against adequate management of climate change. This should not be too surprising because a borrowed language (English), in which most teachers as well as their students are deficient, is the medium through which environmental topics are taught in most Nigerian schools. Our print and electronic media outfits that take care of the enlightenment of the general public employ significantly more of the English language than the indigenous languages of their locations (Okedara, 1997; Owolabi, 2006). This is without prejudice to the fact many so-called literate and English-addicted Nigerians are victims of Limited English Proficiency while more Nigerians cannot even speak English at all. Thus the human activities that precipitate climate change continue unabated, whereas climate change could have been avoided through wise interaction with the cosmos (<http://www.gcric.org/gwcc/part1.html>, retrieved on 12th July, 2011).

Also of tremendous significance is technology transfer variously described as the transfer of scientific findings like medication, educational tools, electronic devices, health equipment, and so on (Chukwu and Toni-Duruaku, 2011). Kostanek (2009) goes on to emphasise that it is not restricted to the transfer of tangible equipment but also science, research, technical and scientific know-how. Among the various definitions of technology transfer reviewed by Kostanek (2009) is that by Robert Krull (1990) as "a process by which existing is transferred or transformed to fulfill the user's needs.

Method

The current study is a review of literature on the prospects and challenges of employing indigenous-language-medium education to facilitate technology transfer and sustainable development in Nigeria. The literature reviewed is, however, not limited to Nigeria but includes reports of the roles indigenous languages have played in placing nations of other continents on the world map of technologically developed nations. Inferences are then drawn from the discoveries made from literature. This is based on the logical conclusion that if technological advancement was experienced in the period preceding contact with the English Language, if there are nations that have excelled technologically while upholding their indigenous languages as media of instruction, then it will be safe to assert that Nigerian languages can be expected to be effective media of sustainable development through meaningful technology transfer. If literature proves otherwise, then one can reasonably conclude that indigenous-language-medium education cannot effectively facilitate technology transfer for sustainable development.

Sustainable Development

Sustainable development is described as that which meets present needs and is loaded with potentials to facilitate future prospects (DEPweb, 2001). It is said to cover social, economic, and environmental aspects of life comprising household needs, industrial and agricultural growth, and efficient use of labour, equity, participation, empowerment, cultural preservation, biodiversity, natural resources, carrying capacity, ecosystem integrity, clean air and water. In this regard, Adeniyi and Bello (2006) too observe that such development, in addition to economic factors, must include unity, education, mass participation in government, activities, maintaining law. While a single sustainable developmental experience does not need to cover all these aspects, it must have potentials for continuity and growth. Japan, Indonesia, Malaysia and Singapore are examples of nations that have been acknowledged to have attained sustainable development in terms of wealth creation through science and technology as a result of revolutionized education systems and policies on indigenous languages (Tarugarira, 2009).

Technology and Climate Knowledge in African Traditional Education System

It is erroneously believed that technology is synonymous to and an exclusive characteristic of western culture (Tarugarira, 2009). But according to Thater-Braan (2007),

Indigenous peoples across the globe have developed technologies since pre-history. Tools for building, measuring, carving, hunting, holding, preserving food, making clothing, for communicating across distances, ceremonial objects and regalia for communicating with the spiritual realm through song, dance and ritual, objects to entertain and stimulate, implements that employ sound and wind, gauges for travel and navigation, methods for the transport of goods and materials, instruments for making art and music, for compounding medicines, for cultivation and gathering, for the holding and passing of information and on and on, all emerging in response to the myriad needs of a dynamic community.

It is noteworthy that the above is also descriptive of Africa in general and Nigeria in particular. This means Nigeria has technology to transfer to other nations of the world and can also receive from any other country. In fact, the African traditional education system, with its pragmatic nature, is technology-laden.

Onukaogu (n.d.) testifies that the Nok Terra Cotta that held sway for a long time originated from Northern Nigeria. As far back as 15th Century AD, Prince Henry the Navigator found that textile materials produced in the Benin kingdom were comparable to and even better than what the Portuguese were searching for in the Far East. The other indigenous technologies described as high by Onukaogu (n.d.) are the iron and metal foundries in Akwa in the Bight of Biafara and the famous Benin brass wares and Ife bronze heads, all these of Nigerian origin. African indigenous technological development resulted in the construction of the pyramids of Egypt and the Great Zimbabwe stone walls in the pre-colonial dispensation. Cottons from the Guinea Coast were found to be stronger than the Manchester cottons. The velvet-like fabric from the old kingdom of Congo and a superior brand of red leather from West and North Africa prove that African communities definitely have technologies acquired from the ancient times that can be exported abroad (Tarugarira, 2009). But, as observed by Nkomo (2008), white lexicographers were bent on portraying Africans and their languages as barbaric and void of civilization.

Making a Case for Indigenous-Language-Medium Education to Combat Climate Change and Facilitate Technology Transfer

Thater-Braan (2007) made a salient point by stating that particular ecologies give rise to definite languages and that indigenous languages rise from the land and the elements are process- based. Nkomo (2008) too recognises this truth and goes on to attribute the wrong portrayal of Africans as void of technology to the failure of missionary lexicographers to adequately capture the essence of some indigenous civilization concepts in the course of compiling their dictionary items.

Technology transfer can be facilitated when local images and symbols that people can connect with are employed (Chukwu and Toni-Duruaku, 2011). Tarugarira (2009) thus warns that remarkable self-propelled development in Africa will remain impossible as long as foreign languages are dominantly used for school instruction in African schools. Thater-Braan (2007) identifies language and culture, among others, as important sources of differences that must be overcome before technology transfer can be successfully effected. We are faced with the challenge of globalisation and our indigenous languages should be part of the rapidly expanding technological environment (Ngubane, 2003).

Thater-Braan (2007: 23) thus asserts that "if it is to be sustainable, the way in which a technology enters a native community must reflect and animate the principles, values, and philosophies of indigenous learning processes and world view." Ibiyemi (2011) reports that Nigeria's NigComSat-1 satellite, launched into the geostationary orbit in 2007, was the first African communications satellite. But it failed in 2008. The NigeriaSat2 observation satellite to be launched soon is, however, being built by Nigerian engineers. This is a step towards successful technology transfer. An unfortunate twist to this development of successful technology transfer, however, is in the abandoning of the move by the Centre for Satellite Technology Development, CSTD, of NASRDA to collaborate with Nigerian universities through a project code named SPIRE, (Satellite to Promote Instructional and Research Experiment). This was a project that would have helped indigenize technology.

African Ministers of Environment (AMCEN) too acknowledge that information on climate change is often full of technical jargon that needs translating into everyday terms if ordinary people are to understand and use it (<http://www.specialclimatechangeunit-nigeria.org/>). But this could be rightly extended to ensure that the everyday terms are in the beneficiaries' most mastered languages, the languages of their everyday experiences. The information would thus be both well understood and relevant to the recipients' unique needs. A basis for improving on the received technology naturally easily would then have been put in place. The technology, though "borrowed" would then have been indigenized. Indigenous technology "are in proper relationship with the community, the tools function correctly in the community ecology, and support the community's future" (Thater-Braan, 2007:15), "sustain, restore and maintain balance and are appropriate to place, ecology, and community" (p.16). Reisman, Capar and Aktas (2006) emphasize the significant roles of technology transfer to developments in various aspects of Turkey's national life from the 1300 Ottoman Empire period to the era of the present-day Turkey Republic.

Technology transfer, in this study, refers to both giving out and taking in of material and non-material aspects of technological culture. The more of advanced technology the country is able to adequately adopt or adapt, the better her global outlook. The more the volume of technology the nation is able to give out to other

nations, the more her relevance in the comity of nations. This means whether the technology transfer is from or to Nigeria, it will be laden with potentials for global relevance.

Human resources are crucial both to the development and to the application of technology (Barton, 2007). Kostanek (2009) too asserts that the human element is the most important factor in innovation diffusion and adoption, considering extant literature including Joe Toole of FHWA's reminder that "Technology transfer is much more about people than it is about technology" (7). This being the case, the technology to be transferred must be well mastered by the personnel involved. And the required degree of mastery is most unlikely without the learning content being indigenous to the personnel being prepared.

Barton's (2007) advocacy for enough communication can be best actualized if all linguistic barriers are eliminated. It is then that the university scientists can understand local industry's need and the industry can know what technologies are being developed that might be useful. This can be achieved through the medium of the language in which the participants are most proficient. One should not lose sight of the fact that in spite of most Nigerians' inordinate desire to Anglicize themselves; they are still victims of the Limited English Proficiency (LEP) syndrome.

Barton (2007) expressed the possibility of the efforts at technology transfer through the present university system contributing more to academia than to industry. The plausible explanation for this is the fact that the benefits of the technological know-hows are preserved exclusively in a language that is foreign to the vast majority of the prospective users as a result of little or no understanding of the "sacred" language. This can be explained with Kostanek's (2009) assertion that transfer of knowledge and ultimately its understanding will be unlikely in the absence of pre-existing mental models. Thus the supposed transfer is reduced to a meaningless imitation. This is the fate that befalls technology borrowed from Europe and other developed nations into Nigeria. English, which is usually the medium of training, is poorly mastered by most Nigerians. So, mastery of the transferred technology is inhibited. Adegbiya's (2004) observation that only about 20% Nigerians are proficient in English is a clear pointer to the reasons facts on environmental issues, sustainable development, technological advancement and transfer are accessible to that minute percentage of the population. It should be noted that it is not all members of the small sub-population that will utilize the knowledge, thus further widening the gap between Nigeria and technological advancement conceived in the Western way.

In Tacunan, a small *barangay* in Mindinao, media projects started in 1992 to impart knowledge from agricultural research from all over the world to farmers on health and farming issues. The obvious benefits of the ventures reported include eradication of banana pests and solution of the rhinoceros beetle problem that had plagued their coconut trees for quite some time (Dagron, 2001). A knowledge increase from 55% to 92% and actual use of recommended practices from 46 % to 68% respectively was observed (Coldevin, 2000, cited in Chapman, Blench, Kranjac-Berisavljevic' and Zakariah, 2003). The secret of the success is attributable to the translation of research findings literally as well as figuratively into local languages with the accents that the intended beneficiaries can relate to and identify with. Japan, Malaysia, China, Singapore, Korea, etc are developing fast because they codify their scientific and technological discoveries in their indigenous national languages (Chukwu and Toni-Duruaku, 2011). Adeosun (2008) thus posits that if Nigerian government could take a bold step like that of Japan, there would be an appreciable development.

Okongwu (2011) identifies failure to fully internalize seemingly transferred technology to enable it blossom and grow to create similar new technologies on its own as one of the factors militating against enduring technological development in Nigeria. This position can be buttressed with Uwaifo's (2010) assertion

that the factors militating against adequate actualization of the current technical education curricula in Nigeria include the facts that:

- i) They are based on a foreign model which has evolved under ideal conditions (staff, equipment, infrastructure, training opportunities, etc.) that are not easily duplicated in developing countries.
- ii) There is usually a shortage of highly competent indigenous teaching and support staff with sufficiently wide practical experience of technology.

An indigenous-language-medium technical education system can be a very effective solution as it will facilitate situating the subject-matters under consideration in the peculiarities of each community. The teachings will no longer be abstract but be within the scope of experience of the learners. This is unlike situations in which teachers at times teach concepts that they themselves have no first-hand experience, thus relying on what they have "learnt" by rote. Take for example a situation in which a Nigerian teacher who has never been to Europe or America teaches a scientific concept related to the characteristics of the snow. Such a teacher will be forced to rely on second-hand information because snow is alien to Nigeria.

The teaching of such concepts will therefore be superficial and non-beneficial. The problem of shortage of highly competent staff too will be solved as more people are enabled to receive more culturally relevant knowledge of technology in a language of their normal day-to-day living. Uwaifo (2010) thus observes that the difference between developed, developing and undeveloped countries rests on the ability of the developed countries to convert scientific ideas to useable technology while the developing and underdeveloped countries are yet to effectively do so.

Revisiting the Arguments against Indigenous Languages in Technological Fields

Skeptics of the use of indigenous languages, especially Nigerian languages, for the teaching and learning as well as general propagation of scientific and technological concepts have variously given reasons for their skepticism or total unbelief and antagonism. Some of the reasons are examined in the following paragraphs.

Need to Prepare for Global Competition

The fear that Nigerians may not be able to measure up at the international level, legitimate as this may appear, has been proved baseless by the Science Teachers' Association of Nigeria (STAN)'s report on the Second International Science Study that reveals Japanese primary school children taught with their indigenous language coming first while Nigerian pupils taught with the English language took the last position. It is noteworthy that the countries of the world that qualify for the honour of being tagged technologically advanced are those that hold their indigenous languages in high esteem and thus teach all subjects with such languages. But those that try to approach science and technology on the strength of languages in which they are strugglers do not make any comparably significant progress in science and technology. They are mere consumers of products of science and technology.

The result of the widely-reported *Ifè Six-Year Yoruba Project* too goes a long way to prove that science and technology can be best taught in indigenous languages. It was an experiment in which, an experimental group was taught all school subjects, except English Language as a school subject, with Yoruba language throughout the six years of primary education while the control group was taught all school subjects through the medium of English language from the end of the third year in the primary school. Years later, the ones in the experimental group taught in Yoruba throughout were found to prove more resourceful, demonstrate greater manipulative ability, manual dexterity and mechanical comprehension than their counterparts from the

English language-medium classes (Olanrewaju, 2000). The experimental group had only one challenge: grasp the essence of the learning content. But the control group had two: grapple with the linguistic contents as well as struggle to master the subject-matters.

Skeptics and critics of the popular Ife Six-Year Yoruba Project can be better educated by the incontrovertible assertion by Mazrui (2002) that no country has ascended a first rank technologically and economic power by excessive dependence on foreign languages. This is backed up with the observation that Japan's rise to dazzling industrial heights is due to "scientificating" the Japanese language and making it the medium of its own industrialization.

Fear of Translation-Induced Errors and Inadequacies

There is also the skepticism about the possibility of generating adequate vocabulary items in indigenous languages to represent scientific and technological concepts since English has come to be recognized as the language of science and technology. But Owolabi (2006) reports that approximately 13,190 technical terms had been translated into Yoruba. Kolawole (1996) expresses the optimism that with adequate consultation with and involvement of the local people that are supposed to be the end-users of the terms, more appropriate and user-friendly terms will still emerge.

Fear of Isolation from the Global Community

The fear has been severally expressed in different quarters that since English is the language of globalization, any attempt to promote Nigeria's indigenous languages will spell the alienation of the country from the global community and that our products will not gain acceptance in the international community as a result of the linguistic disadvantage. Okediran and Olatunji (2010), however, assert that once our products are judged relevant to global needs and standards like in those of the developed countries of the world, the global community will be compelled to reckon with us, our products (technology), and even our languages. After all, the ever-increasing spread of the acceptance of technologies from English-speaking countries is one of the factors responsible for the spread of the language and consequently the people's global relevance.

Conclusion

The literature reviewed reveals that the Nigeria of the pre-contact with the west was full of undeniable technological advancements that have been denigrated and abandoned to pursue badly borrowed and sometimes incompatible science and technology. Also, the nations of the world that have risen to enviable technological heights are those that employ their indigenous languages for the teaching and learning of scientific concepts and practices. Those that purchase technological products while struggling to master the imitation of technology through foreign languages remain at the lowest rung of the ladder of technology.

It can thus be reasonably concluded that technology can be transferred adequately and profitably to the Nigerian community if the media of the Nigerian indigenous languages are employed. The problem arising from climate change and other inimical factors can then be expected to be fully overcome and posterity can be rightly expected to enjoy many benefits. Our indigenous technology can also be developed and the same indigenous language media employed in conducting further research into it and teaching it to students as well as propagating it generally to non-students. As we develop our indigenous technology up to global standards, we can be assured that sustainable development and global relevance will not continue to elude us.

Recommendations

1. The policy on the place of indigenous language in the Nigerian education system needs to be reviewed to grant a better status to the indigenous languages.
2. The policy should be implemented to the letter to ensure the achievement of set goals.
3. The Ife Six-Year Yoruba project should be replicated in various communities and more levels of education in Nigeria to test its relevance to the present-day Nigeria.
4. Local craftsmen need to be involved in the practical aspects of teachings in technology courses in Nigerian schools so that culturally relevant discoveries and inputs may be enjoyed.

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