

Decolonizing Engineering Education in Nigerian Higher Education



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Abstract: *Manifestation of western views above the culturally accepted standards in the society has been a major topical issue and over the year's African countries have been heavily influenced by western cultures which permeated their religion by the early missionaries and the Trans-Atlantic slave trade that was predominant then. These western influence is prevalent in engineering education and it affects the discipline. Engineering education is important for national development and competitiveness and it is vital in terms of supply of electricity, water, roads, telecommunication, transportation, factories, machineries. This paper explores decolonization as a concept and a panacea to the challenges of engineering education in Nigeria, stressing the need to decolonize the discipline. The research was a theoretical study as it relied on relevant literature to address the topic under consideration. The findings of the study revealed that engineering education in Nigeria is constrained by lots of challenges which include fallen standards, obsolete curriculum, poor funding, inadequate infrastructure which affect the conduct of the discipline. It was also revealed that the engineering legacy the British bequeathed to Nigeria has continued without much change to it and there is therefore a need to decolonize engineering education in Nigeria. There is therefore the need to decolonize the curriculum, the teaching and learning approach, the language. The ministry of education must also coordinate with other engineering bodies to ensure that the curriculum is reviewed to suit the culture of the country.*

Keywords: *Manifestation.*

1. INTRODUCTION

The Nigerian higher education landscape has been continually influenced by the legacies of colonialism, which imposed western values and customs on all sectors, especially education. This situation has led to the need for a response to confronting the domination of the higher education system in Nigeria by Western models. The colonial economy that plagued Africa was aimed at boosting the economies of the colonial or metropolitan powers to the detriment of Africa as a continent. In the grand arrangement, the crux of the matter was how the colonial economy could be leveraged on to the advantage of the colonial masters. (Shokpeka and Nwaokocha, 2009). This is manifested in the vested interest the colonial rulers had in Africa for their personal gains.

Over the years, African countries have been heavily influenced by western cultures which permeated their religion by the early missionaries and the Trans-Atlantic slave trade that was predominant then. The transatlantic slave trade caused the displacement of many Africans from their homes and they were relocated to different parts of the world. The most attendant aftermath of all these influence is colonialism which took place in Africa.

This extended over a long time shaping the existing structure in Africa which saw to the upholding of western values above our local value. The tendency to uphold foreign worldview above the culturally accepted standards in a particular location is one of the crux of colonization. Colonization by the western world was multifaceted and it varied along class, gender, inequality, culture and its elements. To support this opinion, Mignolo (2011) emphasized that racism, sexism, ethnocide, ecocide and genocide were interplay of colonization. Though his opinion might not be apt to describe colonization as a concept, it offers evidences of the consequences of colonization by the westerners in various countries.

The practice of engineering in Nigeria commenced as an offshoot of colonialism. According to Falola and Heaton (2008), engineering activities were ventured into to propagate the objective of colonialism which was aimed at subjugating and governing territories. With this vested interest in mind, road and railway construction, water supply, mining, dredging, housing and mechanical works kick started. This was done to facilitate easy entry and access by the ruling lords. As stated in a UNESCO report (2010), engineering education is defined as a field, discipline, practice and profession that has nexus with development, acquisition and the use of technical, scientific and mathematical knowledge about the understanding, design, development, invention, innovation and the application of materials, machines, structures, systems and processes for designed activities. Engineering education is vital for national development and competitiveness (Luiz *et al*, 2004) and is important in of supply of electricity, water, roads, telecommunication, transportation, factories, machineries etc. This implies that the overall activity of the Nigerian populace is greatly influenced by the practice of engineering education. There are now giant strides at changing the conduct of the profession and in the works of Onwuka (2009), many developing countries are introspecting and making changes to their content so as to produce engineering graduates that will be able to proffer solutions to several challenges faced by the Nigerian populace.

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This has created a need for the decolonization of engineering education in Nigeria, facilitating the restructuring of the system to becoming responsive to the need of the Nigerian people, rather than upholding the legacies of colonialism. To this end, this study will theorise the decolonization of engineering education in Nigeria, presenting a general understanding of the concept, and justifying the adoption of the process. This is to ensure that Nigerian engineering students become grounded with knowledge that is not only viable to the global community, but also relevant to Nigerian society.

III. LITERATURE REVIEW

To make meaning out of decolonization, it is plausible to examine what colonization is. Aderibigbe (2006) argued that colonization is the enthronement of political influence by one powerful nation over a weaker nation. This dimension has in it differences in power play among countries and countries that have the wherewithal are often the colonizers. Colonialism stemmed from greed and avarice which European countries exhibited towards Africa's untapped natural resources (Mapuva and Chari, 2010). As a result of abundance of mineral deposits in Nigeria which ranged from oil, gold, tin, iron ore etc., it caught the attention of the European countries and they became engrossed with the need to have access to these mineral deposits. This led to a relationship between the colonizing power and Africa (Ake, 2008). They controlled the development of economy for their own interest and went along with the expansion of colonial trade. This is manifested in colonial rule which is guided by the colonial policy of colonizing nation (Akpan, 2003). It is a well-known fact that Africa went through a challenging time during colonization, and indigenous people bore the consequences (Mapuva and Chari, 2010:22). Woddis (1970) was of the opinion that colonialism was synonymous with robbery which characterizes the dismal consequence of colonization in Africa.

Colonialism is broad and multifaceted and it manifest in various dimensions. It is not just the political occupation of one nation by another (Kapoor, 2007). It supersedes that. Colonization is the subjugation of individuals or groups by fencing them into a system that represents other foreign values and consequently perpetuating those foreign values. This system that represents other values is manifested in ideologies, culture, education, formal and informal contacts etc. This implies that colonization might not necessarily mean a physical domination but it can be manifested in discourses which is formed around people and then incorporating them into a system where the views of the dominators are upheld and perpetuated in every day parlance. This is also in line with the findings of Fanon (2008) who emphasized that colonial association ensured that the local culture predominant in an area is buried. Although education has been around before colonization in Africa began, Rodney (2009) opined that the colonizers brought some new approaches to it which totally replaced or supplemented the forms of education that has been in existence over time in Africa. This resulted to a change in what's obtainable in the region thereby impinging on the norms and values there. The entrenchment of these

manifestation of colonization became statutes later on that guided the conduct of activities along the educational lines in Africa. With this move garnering traction, other educational facilities of western form were established which upheld western views above our traditional and indigenous values thereby encouraging colonialism and imputing it into the fabric of thinking of learners who attended such schools. This snowballed into avenues to mete out racial supremacy and other forms of social injustices such as class, language, and gender inequality. This necessitates the clamour for decolonization to put an end to all the negative consequences associated with it.

Tamburro (2013) opines that decolonization is a means for getting people to know about the consequences of colonization and causing a change in its oppression. He further argued that including the views of indigenous nonwestern groups in education can help in upholding local values thereby encouraging decolonization. Ngugi (2004) brought in a broader dimension to decolonization by emphasizing that it makes Africans see themselves in relation with others in the global sphere which he referred to as "a quest for relevance". This quest for relevance can be realized by making Africa a center piece in African universities (Ngugi, 2004). Decolonization according to (Mamdani, 1996.) was defined as the process of liberating individuals and society from economic, political and cultural grips of colonization. This definition highlights the dimensions by which colonization have consequences. Colonization affects the economy of any area, the political dynamics and the cultural values prevalent there. Decolonization is a call for an end to white subjugation by male western capitalists with European worldview in higher education (Heleta, 2016). It is noteworthy to bear in mind that this worldview propagated by the whites in such climes over time portends negative consequences for the context obtainable. This European, Western capitalist ideologies influences experiences, epistemology, curriculum, teaching and learning in any country. Colonization works by perpetuation and this views have been propagated over time hence the wide acclaim it has received by people to cause an end to it. The need for decolonization is a call for the survival of people along the lines of their culture and beliefs. The decolonization movement also has a similarity with the African nationalism of 1950s and 60s which resulted in the independence of many African countries and prompted the need to end subjugation of one group by another and the departure of western, European capitalist worldview in local contexts. Mgqwashu (2016) postulates that decolonizing higher education is predicated on knowledge and how the knowledge and curriculum is formed, who becomes the subject of the knowledge and how the knowledge is learnt. In the era of colonization, knowledge has been hugely colonized and this knowledge in the colonial era has been made powerful just because it originated from the whites and by this knowledge, domination and subjugation is entrenched. Mathabe (2006) argues that decolonization is a step at overhauling the path of higher education and this can only be realized by being responsible.

In the same vein, Higgs (2012) maintained that decolonizing higher education in Africa means a decimation of western-centric institution, systems and sigils and standards within the higher education system. This view is not about the physical removal of all western paraphernalia and trademarks but causing a change by teaching and learning. Essop (2016) maintains that decolonization is all about inclusion, recognition and affirmation. With the need to put an end to western capitalist domination, there must be a consequent drive to uphold new values resident in a clime. This can be achieved by upholding African culture and knowledge in universities subjugated by western domination.

This does not necessarily provide a pathway for what to be included in the curriculum and Mqquashu (2015) gave an alternative opinion by stating that decolonization implies exposing students to avenues that will allow them learn more about their culture other than the western culture with which they have been dominated over time. This definition sees the need to have differences in culture within the higher education context. In higher education, Higgs (2012) further reveals that decolonization is about changing the perspectives of Africans and helping them see clearly in relationship with others in the global sphere which was referred to as a 'call for relevance' by Ngugi (2004).

For education in Nigeria, decolonization therefore implies developing a teaching and learning process that is effective and relevant to the life, needs and experiences of Nigerian students. This is in contrast to the continuous adaptation of Western knowledge as the universal knowledge, and the relegation of indigenous knowledge as inferior. The decolonization process for engineering education in Nigeria will therefore not only affect the engineering curriculum, and the teaching and learning process, but also the mind of Nigerian engineering students as they strive to stand out in the world. This study therefore argues that, recognizing the need for a transformation of engineering education in the Nigerian higher education landscape is the first step.

2.1. AN OVERVIEW OF ENGINEERING EDUCATION IN NIGERIA

Engineering in Nigeria evolved as a consequence of colonialism. And the practices were encouraged to advance the objectives of colonialism in Nigeria (Falola & Heaton, 2008). What led to the development of engineering education in Nigeria was the establishment of Yaba College of technology in 1932 as the first higher education in Nigeria (Okojie, 2007). This thereafter kick started the process for entry of higher education into the country. Two monotechnics were created in 1977 which are the Nautical college of Nigeria now Maritime Academy of Nigeria, Oron, and College of Aviation Technology Kaduna. Nigeria had no Federal University of Technology until 1980s when four Federal Universities of Technology were established which are the Federal University of Technology Akure, Federal University of Technology Yola, Federal University of Technology Owerri and Federal University of Technology Minna. According to Okoro (1999) before the British colonized Nigeria, education in Nigeria was majorly vocational and technological in nature. Engineering education is vital for national development in Nigeria and it

is one of the bedrock of the nation. This was revealed by the penchant of the Federal Government of Nigeria in establishing varieties of technical colleges, polytechnics and faculty of engineering in Universities shortly after the independence. The nation acknowledged the importance of engineering education and focused on properly educating its populace. Even though Nigeria was deliberate in its commitment to this sector after independence, engineering education as a discipline suffered neglect amongst other educational fields in Nigeria around mid-19th century (Ojiakor, nd). To become a fully certified engineer in Nigeria today, there are standards to be met. This includes the study of engineering for a five-year period, a minimum number of years of practice which spans four years, then registration and certification by appropriate bodies, such as the Council for the Regulation of Engineering in Nigeria (COREN), and the Nigerian Society of Engineers). Following the post independent era, engineering education thrived well in the country and the educational performance was attributed to be achieved by the teachers having knowledge of the industry (Moja, 2000). This could not be sustained as in recent time, it has been observed that the standards of engineering education in Nigeria has dwindled and this became a menace to the industry in Nigeria (Idris and Rajuddin, 2012). With the decline in standards of engineering education, it led to a chasm between the labour markets and the graduates in Nigeria. When the necessary knowledge falls and declines, learners will not be appositely given the skills necessary to thrive outside the school environment and this creates issues after graduation. With variety of giant strides made in information technology and development processes brought about by innovation in engineering education, this has not been the situation in engineering education in Nigeria (Jaraiedi and Rittz, 1994; Ajimotokan, 2010). This implies that the discipline has been ostracized from current realities along technological lines and this portends doom for the nation's engineering sector. When a nation suffers a decline in technical abilities brought about by deficitism in its practice of engineering, its overall development and advancement is adversely affected. Engineering education in Nigeria is plagued by various challenges which will be discussed in this study. On the forefront of these challenges is the use of an outdated and irrelevant curriculum, followed by the exclusion of Nigerian talents due to the medium of instruction. From the works of (Moja, 2000; Teferra et al, 2004; Taiwo, 1980), other challenges identified include, the lack of basic infrastructures and relevant learning facilities, non-supportive academic and nonacademic staffs, the use of outdated technology, and poor leadership ability. These all impinge negatively on the practice of engineering education in Nigeria as it makes the practice more difficult. .

2.2. FACILITATING THE DECOLONIZATION OF ENGINEERING EDUCATION IN NIGERIAN HIGHER EDUCATION

With the British colonialism, the mind of the average Nigerian student has been patterned to think of indigenous knowledge as inferior, and Western knowledge as superior.

The practice of engineering education has therefore been dominated by western influence, and the consciousness is still ingrained in academics as their teachings cannot be culturally relevant to happenings in the country. This has caused Nigerians to uphold western technologies which inadvertently led to the poor development of its own local technologies. There is a plethora of indigenous technology developed in Nigeria to suit our context but the fact that the mind is shaped along western lines makes us see such as irrelevant to the nation. Notable among these technologies are cars produced in Nigeria by INNOSON motors which has not received wide acclaim because people see western technologies as king at the detriment of our own.

The motorcade of government agencies is filled with Mercedes Benz automobiles which is a German product and Toyota which is a Japanese product. This aversion for our local product is manifested in various climes along engineering education and there is a need for decolonization in order to eradicate western consciousness from our fabric of thinking. There are also cellphones produced in Nigeria but our affinity with western technology has made us see ours in bad light hence the neglect and poor development of such ventures. These are critical areas that need urgent attention, and foundational solutions point at the decolonization of engineering education in Nigeria. Notable among the need to decolonize engineering education in Nigeria is the use of an obsolete curriculum. As implied by Grumet (1981), higher education curriculum is described as past, present, and future stories, told to students. If this is the case, then whose stories are told in engineering departments of Nigerian higher education institutions/Following the legacy bequeathed to Nigeria from the colonial masters which shaped the practice of engineering education in Nigeria, few changes have been made to the curriculum to factor in current realities. In the work of Onwuka (2009), he argued that engineering education in Nigeria is said to be obsolete and there is a need to reshape it. The educational discussions at these institutions are hegemonic in nature, and therefore require decolonization. This can only be achieved by having an overhaul that takes away western approach to the practice and encourage indigenization of engineering education in Nigeria. Though various notable associations have made efforts at achieving this, their efforts have not caused any significant improvement in the state of engineering education in Nigeria. The curriculum utilized by engineering institutions in Nigeria today needs to be responsive to the needs of the Nigerian people. Fomunyan & Teferra(2017) supports this view as they insist that a responsive curriculum is one that is student-learning, and context centered so that it can be responsive to local situations. Indigenous knowledge systems should not be sidelined or discarded, but rather integrated into the engineering education curriculum. They further insist that 'rethinking the curriculum as an active conceptual force, which does not have fixity or closeness, relates it to the imminent potential of freeing the student from all entanglements of the colonial.'Curriculum determines the learning experience and it is important in any discipline, is a mirror and product of the society which can ultimately influence the society. Curriculum must not be static as it must factor in changes happening per time for it to be effective. It is noteworthy to bear in mind that the world is experiencing changes at unprecedented levels and this must be taken into consideration at all time with necessary

strategies put in place to meet up. Therefore, it is vital in any attempt at curriculum development to reflect current societal issues so as to proffer solutions to them. Engineering education curriculum must therefore be innovative and has to be linked with current happenings in the country. This therefore necessitates decolonization of engineering education to be relevant to the situation of Nigeria. The engineering curriculum in Nigeria is static and in the works of (Adedokun, 2011), it has become obsolete and this is because there is a gap between the institution in providing the necessary skills to graduates that will be able effect a change in the society in the long run. The current engineering curriculum has also been described as out of touch with what's obtainable in the industry (Kofoworola, 2003). This implies that the discipline cannot cope with current happenings along the global sphere of events. There is also a general aversion for people to adopt changes in the engineering curriculum which is common globally (R. Graham, 2012). Change is a difficult process and people are often scared of what will happen if changes are made to existing structures. There is a setback in engineering education in Nigeria as a result of obsolete curricula (Onwuka, 2009) and there is a need for it to be reshaped so as to meet the current needs of Nigeria. To ensure decolonization in Nigeria, there must be a change in engineering education curriculum so that the curriculum can respond promptly to local issues in the country. Also, with the British colonialism, the educational context was not made local. A situation where local context could not be factored into the teaching learning mix will result to disconnect between what's learnt and the outcome. With the inability of the education that continued after colonialism to suit local context, it results in incongruity between teaching and learning which makes it difficult for the profession to address local challenges that plagues the country. There is a need for decolonization to ensure that the education in Nigeria is contextually relevant. this is supported by Castagno and Brayboy (2008) who opined that context matters in education. For one, the language of instruction in most institutions is skewed towards the use of English Language, which was introduced to favour the colonialists. English language has been the *lingua franca* of Nigeria and all educational activities are carried out in English language. This has not been a good stimulant for proper education as the language of instruction seems alien to the educational context in Nigeria hence, the need to decolonize the language of instruction. Engineering education has been tainted as herculean and requires a conscious, concerted effort at understanding it. An attempt to teach engineering education in the local language prevalent in an area will encourage better learning experience and also increase reception to the discipline. This is in line with the argument of Ngugi (2004), which stated that knowledge is buried in language and culture and culture is manifested through language. This implies that to encourage decolonization, there must be a change in the language of instruction. Nigeria is home to a plethora of local languages, but their exclusion from the teaching and learning process is an inhibiting factor. There is an urgent need to decolonize the linguistic spaces and practices in these institutions so as to help students gain epistemological access.

Engineering students should be taught in languages that does not barricade them culturally, rather than force the default 'English language' idea on them, thus destroying every form of exclusion and disfranchization of Nigerian engineering students. There is a need to decolonize engineering education in Nigeria in a bid to ensure that the country rank with other nations on indices of development. It is important to note that information technology, innovation and technological ideas are becoming a common scene globally as a result of innovation in engineering but unfortunately, Nigeria has taken a back seat in line with these innovations. According to (Jaraiedi et al, 1994; Ajimotokan, 2010) there has not been major improvement in engineering education in Nigeria and the same old method is still in existence today. The lecturing style that has been over time is still prevalent now and attitude to the discipline has not changed. Fomunyan (2013) defines pedagogy as the art and science of how teaching and learning is conducted, or how it unfolds, and how students have a grasp of what is being taught. Pedagogical practices therefore include the approach and manner in which teaching and learning takes place, the diverse ways through which content is delivered to students and what students can comprehend from the teaching and learning process. Teaching and learning methods must also be decolonized in Nigeria because it has not kept pace with current happenings. Teaching and learning has been the same since the colonial era and the methods also affect engineering education in Nigeria. Teaching according to (Zuofa and Olori, 2015) is the transference of knowledge in a systematic, interactive, organized and purposive manner which must cause a significant change in the ability of the students to learn (Tebabal and Kahssay, 2011). This implies that teaching doesn't just take place haphazardly without an objective in mind which is to cause a change in the leaning pattern of the students which subsequently results to improvement in them and make them better output that will contribute to the society at large. Teaching is intentional, decisive and well-coordinated to meet the learning needs of students. The teaching learning dynamic in Nigeria is also characterized by a system where the lecturer sees himself as an overlord that must be served and this complex prevents interaction between the lecturer and students that might produce meaningful learning. This also must be decolonized in a bid to have an unbiased freedom for students to interact freely with their lecturers on issues that pertains to their learning. This is in line with the findings of McGregor (2012) who opined that decolonization is a change in consciousness made possible by constant interaction between the lecturers and students and the outcome of their interaction which is knowledge. As opined in the works of (Adekola, 2008; Nzeneri, 2008; Zuofa, 2001) the most common teaching methods are the lecture approach, discussion method, project method, simulation method and problem solving method. Amongst all these, the lecture method is the most common and it is otherwise referred to as the "talk chalk method" where the teacher simply explains and seldom writes on the board for the students to grasp the learning content. This learning method might not be effective for engineering education as (Teferra *et al*, 2004) argued when he stated that majority of engineering students have visual, sensing, inductive and creative abilities whereas the teaching of the discipline is often passive, abstract, auditory, deductive and sequential which shows a disconnect between

the teaching learning complex and hence, lackluster performance in engineering students. An attempt at providing visual, sensual, graphical structures will improve the teaching of engineering education in Nigeria. The teaching pattern in Nigeria is more theoretical based which does not give room for practical's and creating a balance between theory and practice will ensure an equilibrium which constitute decolonization.

IV. FINDINGS AND DISCUSSION

This study exposes the need for decolonization of engineering education in Nigerian higher education, and getting rid of colonial mentalities or European centered views about Africa in general. In Nigeria, there are still elements of colonization in engineering education as a discipline and this makes it alien to current realities. This is manifested in the conduct, context, curriculum, language, teaching and learning of engineering education in Nigeria. There is therefore a vital need for the decolonization of engineering education in Nigeria. Fanon (2008) positions decolonization as chaotic, and unclear process or break from a colonial condition that is already over determined by the violence of the colonizer. Regaining independence at the intellectual level on the platform of chaos would be to destroy it hegemonic principles, ways of thinking and language of conduct. Ngugi (2004) adds that marginalized cultures and languages have the duty and responsibility of making themselves not only visible in their languages but also to challenge and shake up that view of languages in theory and practice especially since language is the basis for sustainable development. This study also reveals that decolonization is not necessarily a geographical displacement, but one that is fenced in discourses. To this end, Fanon (2007) argues that decolonizing the mind is the first step, to decolonizing the entire system and engineering education in this case is where to begin since it is at this level that students develop critical consciousness about life's realities, what needs to be changed and what should be maintained. When the mind is decolonized, it shapes the discourses along engineering education. There is a need to integrate decolonization into the thinking fabric of Nigerians so as to give credence to the culture. This is supported by the findings of Fanon (2007) and Tuck and Yang (2012), who maintained that decolonisation in higher education centers on the cultivation of critical consciousness, to allow conscientisation which will help people to know about settler colonialism, and make efforts at appreciating decolonization of engineering education in Nigeria higher education.

V. CONCLUSION AND RECOMMENDATION

This article has considered decolonization of engineering education in Nigerian higher education and provides evidence for the need for decolonization of engineering education in Nigeria. Colonialism has had a hold on the entire educational pattern in Nigeria and this ranged from the conduct, the context the practice, the language etc.

This study focuses on engineering education in the Nigerian higher education system, revealing its drawbacks and the need to for a complete overhaul of its dynamics. To this end, decolonization is apt at ensuring that local relevance is infused into the teaching and learning mix utilized in these higher education institutions.. Decolonizing engineering education in Nigeria therefore is of utmost importance to the teachers and students in order to create good learning experience that will make them better graduates, and proffer solution to the ills of the nation.

Decolonization is therefore vital in shaping the conduct of engineering education, the context and the language of practice so as to address problems that are indigent to the nation. This will ensure that future engineering graduates will be saddled with the right learning experience and skills that will make them successful and contribute to national development. The study therefore recommended an overhaul in the conduct of the discipline, factoring in local approaches to issues along engineering education line in Nigeria. There is therefore the need to decolonize the curriculum, the teaching and learning approach, the language, and above all the mind of every engineering higher education student.. The ministry of education must also coordinate with other engineering bodies to ensure that the curriculum is reviewed to become relevant to the needs of the Nigerian people.

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