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The Narrative of Development Discourse: Readings from the KNUST Experience

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Abstract:
There is a growing concern over the function of education in Ghana. While some believe education is to train the mind, others believe it is supposed to train the hand. There is yet a third group that also believes education should train both mind and hand. Whether education is supposed to train the head or the hand, there is a consensus that the main purpose of education is for national development. This paper takes a closer look at the concept of development vis-à-vis tertiary education of science and technology, using Kwame Nkrumah University of Science and Technology as a case study. This study is therefore a contribution to the institution's attempt to shift "Pedagogical Stances Towards National Development"[1].The paper has recourse to qualitative apparatus of research and using discourse analysis and development theories, it investigates the link between science/technology and the study of culture or anthropology and its method of research, ethnography. Using the Agric Junction traffic light at KNUST as an example of development discourse, the paper demonstrates the insufficient link between science/technology and culture/ethnography as exemplified in the relationship between the construction of the traffic light by the Physics Department, KNUST, and the needs of the users of the traffic light. This investigation reveals that collaboration between the exact and social sciences could enhance the effectiveness of re-engineering to meet the needs of the society. The paper therefore calls for the kind of technical/technology education that concentrates a lot more on the socio-cultural needs of the beneficiary communities by introducing the relevant study of culture in the science and technology departments. This, in the view of the paper, will help a technological institution like KNUST to increase its capacity in accelerating the process of development in the country.

Keywords: Narrative, discourse, anthropology, development, science and technology, education

1. Introduction

At first blush, the word "development" looks so familiar and simple. Development theorists and practitioners believe in the contrary and tell us trying to understand it is a huge semantic and professional challenge (Escobar, 1995; Eldelman and Haugerud, 2005; Leys, 2005). They always want to play it safe by telling us that you cannot understand the real meaning of the word "development" until you place it in a context. For the purpose of this paper, we are talking about development in terms of education and, here, we go to Marc Eldelman and Angelique Haugerud (2005; 1) who see development as any phenomenon that connotes "improvements in well-being, living standards, and opportunities. It may also refer to historical processes of commodification, industrialization, modernization, or globalization. Interestingly, even though Ghanaians see the definition of education from so many angles, Bernardin Senadze (2012: 724) whose persuasion it is that the "role of education in improving welfare and alleviating poverty in Ghana" provides the right context of the meaning of education in Ghana for this paper. This definition is absolutely in consonance with David Devins Reina Ferrandez Tauno Kekale, (2015) who defines education as a work-based learning, a process of teaching and learning emphasizing university education that facilitates recognition, acquisition and application of knowledge and skills for the purposes of outcomes needed by the learner, the employer and the university (see also Naydler, 1996; Levenburg and Schwarz, 2008; Wride, 2015).

Clearly, if a country is keen on development, an attentive eye should definitely be cast in the direction of education. In Ghana, the idea is to combine policies, plans and strategies to come to this realization, and this requires a "long term manpower and development policy linked to a clear-cut economic policy with credible labour statistics to help education system design definitive programmes with job market readiness (Education Sector Performance Report, 2010; see also Baah-Boateng, 2004; Ghana Statistical Service, 2005a, 2005b; MOE, 2007). This responsibility finds a very easy accommodation with technical vocational education (TVET) which sees to "a range of learning experiences that occur in a wide variety of settings and is focused on developing skills needed for certain occupations in the labour market" (King, 1993; UNESCO-UNEVOL, 2006). Indeed, in addition to what is said above, it is an aphorism that in this modern world, it is science and technology which provides the best platform for learning experiences aimed at skills development for nation building. Science in this context therefore is seen as "a body of systematic knowledge about nature and the universe" (Krishna, 2014: 133-134)and technology is seen as "how things are done or made" to solve problems (Chaharbaghi and Willis, 2000; 394) and it does so by providing skills in solving those problems. By implication, science and technology or

technoscience[1]is using a body of systematic knowledge to solve a problem. Kwame Nkrumah University of Science and Technology (KNUST) is the leading science and technology or technoscience institution in Ghana and fits exactly into this kind of education. It sounds more convenient that it constitutes the focus our study. Indeed, for the purpose of using techoscience to influence the economic behavior of Ghanaians, KNUST, being the leading technoscience institution in the county has been singled out for a "special financial dispensation in terms of provision of laboratory/studio equipment or facilities etc. to enhance quality teaching and learning" (Education Sector Performance Report, 2010; 68). Again, for the purpose of preparing skills and manpower for the Ghanaian market, all the new universities – University of Allied Sciences, Ho, University of Development Studies, Tamale, University of Mines and Technology, Tarkwa and University of Energy and Natural Resources, Sunyani – are predominantly science oriented. So important is the idea of science leading the way to development in Ghana that the "implementation of the official government policy on Ghana's technological and industrial planning policy at the educational level was for the nation to achieve a ratio of 60:40 sciences to humanities manpower base by the year 2020" (Education Sector Performance Report, 2010; 10).

This notion of technoscience considered to be the sole agent for development is even popular among post graduate students in Ghana. A story by a friend of mine in the History Department of University of Cape Coast, Ghana, called Professor Kwame Kwarteng makes interesting reading. He said he had scholarship from the government of Ghana for his PhD in the UK and the Scholarship Secretariat in Ghana organized a meeting for all post graduate scholarship holders. He continued that one of the scholarship holders from the sciences complained bitterly as to why the secretariat should entertain students from departments like history. The gentleman, according to Professor Kwame Kwarteng, went on to describe such a move as a waste of resources. Obviously, the gentleman who was complaining strongly believed that the humanities had no role to play in national development.

That the humanities are irrelevant to national development is a notion well embedded in the kind of education Ghana has. There is a wrong perception among certain educated Ghanaians that the humanities are about the lives of the people; just an academic investigation of the culture of the people, what they do, how they do it, the records of what they do and the philosophy behind them. This group of people concludes that the humanities are only a mental exercise but "do not put food on the table". In this paper, we will not deal with the humanities in general – history, philosophy, religion, sociology and so forth. Our concentration is on the Ghanaian culture both as a way of life and as a discipline, "that complex whole" (Tylor, 1881) which includes the "patterns of behavior by people and the distinctive artifacts...values, beliefs, norms…" (Ahmed, 1998), that discipline called anthropology.

A careful look at this wrong notion that the Ghanaian culture (as part of humanities) is not very necessary in education or national development can be traced from the kind of education inherited from the colonial masters. This is the kind of education that is completely book-based; all teaching and learning activities are based on what we read from books, both in the sciences and the humanities. Indeed, this phenomenon is even more prevalent in the sciences. These books are written in foreign cultures – UK, USA, France, Germany, and so forth. The Ghanaian sense of literacy therefore is foreign based. Brian Street (2015 [1999]: 10) however asserts that "illiteracy and literacy are treated as two terms in a complete binary system, you are either one or you are the other". From such a definition, Brian considers literacy or even education as ethnocentric because "the kinds of conceptions of literacy were actually derived from developers' and academics' own society" and this is a nineteenth century fixed notion of culture, culture described or defined in a reified sense (Brian, 1999: 6). Brian (2015 [1999]: 11) goes straight to the point, warning that "the ways in which people address reading and writing are themselves rooted in conceptions of knowledge, identity, being". He thus concludes by equating the model of literacy to that of the culture (Brian, 1999: 11). Literacy, as seen from this perspective, is always contested, both in its meanings and practices, hence particular versions of it are always "ideological" in the sense that these meanings and practices are always rooted in a particular world view and there is always a tendency on the culture which is promoting the literacy in question to dominate and marginalize others (Besnier and Street, 1994; Gee, 1991). Simply put, the literacy system of Ghana imposes a foreign culture on Ghanaians and this has serious consequences on its local culture. Students are taught to creatively think so far as this foreign culture will allow them to. Students are taught to build upon what is done in foreign cultures. Serious questions come up here. In such a situation, how does the Ghanaian education interface with the environment? How do Ghanaians start with what they have before they move to foreign ideas and concepts? And even if they are using foreign concepts, how do they localize these concepts?

What makes matters worse is that the culture or the tradition of the people is not only seen as irrelevant in education and, for that matter, in development, but it is also seen by certain academics, including a very large proportion of academics and development practitioners in Ghana, as subversive to development. The culture or the tradition, from the perspective of these critics, is "linked to a psychological or cultural disposition that is in some sense backward and prevents people from embracing modernity" (Crewe and Harrison, 2005: 232). Once again, culture and development are thrown into the same basket of a binary system. They are seen as opposing each other, a mutually exclusive system, just like the Biblical image of light and darkness that cannot co-exist. Culture therefore constitutes stasis on one hand and education or development constitutes the agent of change. The anti-culture critics therefore conclude that culture and development can simply not be bedfellows. We are given the example of the case of Malawi "where apparently belief in witchcraft is so strong that small-scale farmers, including fish farmers dare not produce more than their peers for fear of being bewitched (ICLARM/GTZ, 1991). Of course, this belief is not new to the Ghanaian cultural environment. These critics go on to cite examples of the use of an indigenous language in teaching in Ghana that has been a bone of contention. While some minority of academics see it as a good starting point for learning, the majority are afraid of its alleged negative influence

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[1] The term "technoscience" is a combination of technology and science and since the institutions we are dealing with find the two inseparable, the paper finds it more expedient to put them together as found here.

on learning especially in the learning of English language and even though it is now restricted to basic one to basic four, you still have a lot of educated Ghanaians resisting the idea. We can also not run away from the fact that cultural affiliations within the context of tribalism in Ghanaian politics are clearly counter-productive. We must also indicate that some traditions are perceived as natural and any other intervention is seen as disrupting the natural way of life. A typical example is that the Ghanaian farmer sees the cutlass as more natural than the combine harvester and, putting the price of a combine harvester aside, the Ghanaian farmer will still opt for the cutlass because it appears so natural in his hands. Holding it or putting it on his shoulder, greeting neighbors, being greeted, being seen in the village with the cutlass and being counted among the industrious ones are all part of his psyche and he cannot give it up for anything. Therefore, in spite of the multiple benefits of the use of the combine harvester, he still prefers the cutlass. In the same vein, research is needed to investigate the psyche of villagers who would jettison newly built markets for their dirty and apparently decrepit ones. We have numerous examples of such cases that showcase the culture as fighting against development. Obviously, the Ghanaian culture, in the context above, appears to be counter-productive and demonstrates a serious knowledge gap. It is therefore "natural to argue that it is the role of the promoters of technology to assist in filling the technology gap" (Crewe and Harrison, 2005: 233). This barrier by culture to development has also been documented elsewhere, especially among development practitioners. An FAO Chief Technical Adviser commenting on factors that hold back people from development in the Third World emphatically notes among others, "let's be realistic – culture and tradition to a large extent" (Hulscher, 1997: 12). Another FAO study speaking in terms of people who are more amenable to modernization uses a rather veiled sarcasm, "differentiation is taking place between people of more modern orientation, with more education and/or ambition, and those with less (Hayward, 1987: 3). Clearly, culture, whether we see it in terms of it as an academic discipline or a practice, is a no-go area not in the Ghana alone. So far, we have seen culture in a very bad light, highly antithetical to development just like Plato saw poetry in the *Republic 10.* But the question is: is it all doom and gloom for culture in education or development? Can culture, its study or practice, not, in any way, help in development?

 Brian Street (2005 [1999: 6) however cautions us that culture, as indicated earlier on, could be a hindrance or a fuel to development, contingent on the definition you give to it. Some critics have also sounded the alarm bell about the way culture is perceived in development, arguing that considering culture and development/education as a binary system is misleading (Crewe and Harrison, 2005: 234). They are concerned about the problem of over generalizing here, as if to tell the doctor to do away with the knife because a criminal has used it to kill.The reason is that anti-culture critics see culture and development/education as polarities with no mid-way. Such a position ignores the complexity in development theorization and practice. Surely, we can think culture in a scientific manner or think science or technology in a cultural manner. In other words, to what extent is science dependent on social needs and to what extent are social needs dependent on science? Clearly, these two considerations have been missing in the development mix in Ghana. Crewe and Harrison (2005: 233) are very unambiguous in this clamorous debate that if we fail to recognize the important role culture plays in development, we risk paying the social cost. A major cost is that lack or inadequate encounter with the socio-cultural realities of the environment in any educational programme "creates vagueness no matter how theoretically competent the writer" (Borneman and Hammoudi, 2009: 18; see also McGranaham, 2014: 30). And this is exactly the case of the Ghana educational sector and Atta-Quason minces no words criticizing the perceived disconnect between educational programmes and the socio-economic realities, saying, "the Educational Sector operates on the assumption of an education system with a structure and content which reflects the socio-economic environment and the manpower needs even when such needs have not been assessed" (Atta-Quayson, 2007, quoted in MOE, 2009a; 47). The needs being referred to here is Afro-centric culturally dependent and not Eurocentric ones as experienced in the content of Ghanaian education and since we are talking about science and technical education, we might put our emphasis there. And due to the fact that Eurocentric content of education is made to operate in Afrocentric environment, there is a kind of mismatch between the skills the Ghanaian education produces and the needs of the people or the Ghanaian job market. Of course, it must be said here that KNUST produces a lot of technical and professional manpower for the country; there is no doubt about that. But the institution is not indemnified against the ogre of graduate unemployment that is gradually creeping into the tertiary education system. The ogre of graduate unemployment is due to the fact that the institutions are not fully integrated into the communities' development strategies. (Atta-Quayson, 2007). Any development discourse in the country therefore cannot be complete without talking about the relationship between the education, especially science education believed to be the road to development, and the environment.

This paper deals with the role of anthropology in development discourse, having as its main target of inquiry the influence of technoscience on culture. In fact, contrary to common belief that science has little to do with culture, the analysis presents culture and science as two related areas of study to an extent that sometimes it is difficult to determine which is influencing the other. For the purpose of this study, we investigate the traffic light that is locally built by the Department of Physics, KNUST, to see the extent to which exact science can influence development and the extent to which social science, anthropology to be precise, can complement this development to make the objective of technoscience complete. Of course, there are so many sides to anthropology but, in this paper, the basis of our analysis is mainly on language. The role of language in development studies is not new; some anthropologists have highlighted its role in development on the basis that "it is through language and discourse that social reality inevitably comes into being" (Escobar, 1977: 501).The questions that automatically come up and that serves as the thrust for this research are the following. What role does language in culture play in programmes of science and technology institutions like KNUST? How do such programmes provide scientific conceptual tools for students to think culturally? How do such programmes provide cultural conceptual tools for the students to think scientifically? The study relies on ethnography – participant observation, various types of interview, keeping a diary, transcription, analysis and so forth – a qualitative approach that relies on discourse analysis to investigate structures that produce development.With regards to theoretical framework, it must be noted that an interdisciplinary domain like development discourse calls for many theories from different fields of study but for the purpose of this study, we draw mostly on the conceptual

metaphor theory which posits that metaphor is "understanding one conceptual domain in terms of another conceptual domain" (Kovecses, 2000: 4). Conceptual theory makes it clear that the source domain, "from which we draw metaphorical expressions to understand another conceptual domain" (Kovecses, 2000: 4) is concrete, the physical, what in this study we refer to as the object of or material manifestation of development, and the target domain, the abstract or the nonphysical (Kovecses, 2000: 4), what in this study we refer to as the culture. Our main focus will be on how development producers are able to express objects or material manifestations of development in terms of the local culture. Again, Michael Silvertein and Greg Urban's theory of extextualization, "the process of rendering a given instance of discourse a text, detachable from its local context" will help us to describe the scientist's or the technologist's ability to effect the concept of *shifting,* a manipulation of frames of reference that allows the engineer to be present in what he creates.We start the discussion looking at the relationship between anthropology and development and move on to investigate why it is necessary to introduce anthropology in technoscience education.

2. Discussion

2.1. Anthropology and Development
Anthropology, "our investigations of myriad ways that human beings collectively organize, understand and live in the world" (McGranaham, 2014) as an academic enterprise thrown into the same basket with development has rather a very skeptical beginning. The association between applied anthropology and the colonial masters of Africa and other colonized colonies all over the world are properly documented. In Africa, the ethnographical enquiries of Northcote Thomas in the Ibo and Timne regions in Nigeria from 1913 to 1914, also Meek (1937) in Nigeria and Rattray (1923, 1929) in Ghana as anthropologists coming from "advanced" cultures and working on "backward" cultures raise eyebrows among academic anthropologists like Branislav Malinowski. The mention of anthropology in development issues therefore sometimes produces a jarring note in the melody of development theorists and practitioners. But again, using this historical accident of the development of anthropology is not enough to dismiss all the other good effect it can be put to for, as stated earlier, the fact that a criminal has killed someone with a knife does not necessarily mean the doctor should not use it for surgical purposes. Of late, anthropology has been a huge welcome in development practices as exemplified in the following development narratives. June Nash's involvement in development as an anthropologist in the Chiapas region of South Mexico, revealing tensions central to the understanding of issues at stake and helping to bring about a change from resistance to development is well documented (Escobar, 1997). Ribeiro, analysed why prevailing strategies and economic calculations for development in the Amazon region in Brazil did not work and this ethnography helped to shape the destiny of the people in that region (Ribeiro and Little, 1996). Stacy Pigg is known for her ethnography in Nepal which revealed how the people negotiated new concept of modernity and how this helped shaped local worlds (Pigs, 1995a, 1995b, 1996). The list is unremitting. Our call for anthropological approach to science education is therefore not unusual for, as indicated earlier, if we have to find research methods and systems of analysis that can construct both the epistemology, ontology and phenomenology, as suggested by the Goethean pedagogy (Holdrege, 2005; Lehrs, 2013), of the needs of our target consumer in an ever changing world, then we seriously need to pay attention to the work of the anthropologist who can engage in development discourse as in the examples given above. Of course, the skeptic would raise the question that the examples of ethnography by anthropologist given above are not in the educational setting. The quick response to this question is that the educational setting or institutions are where the epistemics of development are theorized, studied and practicalized (Escobar, 1995). The ethnography carried out by the anthropologists of development is even more important to science and technical education as we have in KNUST and our persuasion is premised on the fact that science and technology institutions like KNUST develop skills that produce objects or material manifestation of culture, of development. The point is that as technoscience produces these objects or material manifestation of development, they produce culture as well (Escobar, 1995). Here, we must differentiate between the anthropologist of development who provides "radical critique, and distancing from the development establishment" (Escobar, 1997: 498, quoted in Eldelman and Haugerud, 2005: 40), thus analyzing the structures that produce development, from the development anthropologist, who is a planner himself, implementing or evaluating programmes of change (Escobar, 1997; quoted in Eldelman and Haugerud, 2005: 40). Our concentration in this paper is on the anthropologist of development whose area of study and theorization has development discourse as its main focus. And as indicated earlier, development discourse is here referred to as the role of language in culture in development studies with regards to the use of symbolic communication in all areas of development studies and theories. Let us examine this role of language within the context of the influence of technology on culture.

2.2. The Influence of Technology on Culture
Technology and culture are bedfellows, a reality, as indicated earlier, that seems not to have any special treatment in the apex of development discourses, especially in Africa and in Ghana, in particular. This part of the paper presents a different view; that technology is a combination of the exact sciences and social sciences, anthropology to be precise, and that technology influences culture through the anthropological concept of mediation. Anthropologically, Martin Hiedegger, the German philosopher to have spoken most authoritatively on technology and culture, posits two definitions for what we call technology. The first is that "technology is a means to an end (Hiedegger, 1977: 287) and the second is that "technology is a human activity" (Hiedegger, 1977: 287) and both definitions are of prime importance to all the analysis in this paper, whether we are talking about technoscience in terms of its influence on culture or vice versa. The teleology of technoscience, whether as a means to an end or as a human activity, puts a huge premium on cultural mediation.

Let us start our analysis by briefly investigating the meaning of mediation in this discourse. Mediation as a concept floods the landscape of media studies but can be used in other disciplines as well and Bruno Latour is quick to give a definition that resonates

better with the nature of development discourse we are having, especially in the area of technoscience. He puts forward two definitions, on one hand a materialistic definition and on the other a moralistic one. In contributing to the debate of the question concerning technology by Hiedegger, Latour argues that when we say the "gun kills", the gun is an active agent in killing but when the National Riffle Association of America says, "People kill people; not guns", the gun is only a neutral agent that carries the will of the carrier. In both examples, he explains, there is mediation and that in the case where "gun kills", the gun itself is the actant and mediates the action of killing on its own behalf. He calls this type of mediation the materialistic one because there is no human will there. In the second example, he handles the anthropological concept of mediation with striking insight. The gun is only an instrument that mediates the will of the carrier, a moralistic mediation[2], because it empowers him to a great extent. Wielding it in the hand, you can give orders and people will obey you. You can even decide to terminate somebody's life with it. Latour concludes that you "are different with the gun in the hand" (Latour, 1994: 33) and that with the gun in your hand, you have changed as a social being; you are in a position that makes you different from people who are not carrying it. He attributes this new social position to the gun in your hand and therefore the gun as an instrument can change not only your behavior but can construct your identity andmake you have your desires. The gun therefore mediates your identity and desires. The gun as a mediation is an instrument, a technology or a means to an end (Hiedegger, 1977: 287). The question now is: to what extent can I use this mediation, this technology to influence behavior in solving a problem? We will use one of the two traffic lights locally produced by the Department of Physics, KNUST, for the purpose of this study.

2.3. KNUST Traffic Lights
The two traffic lights were locally produced by students in the Department of Physics as part of students' project work. They are both located at the locality in the university called Faculty, where most of the departments and their lecture halls are found. There is thus both human and vehicular traffic. One is stationed at the intersection at Destiny Hall, the building that houses Distance Education Learning program (IDL) and the other, which constitutes the focus of our study, is at the intersection at Agric Junction, just a few meters away from the first one. They share almost all the characteristics of a modern traffic light: the frame is green in colour; it has red, amber and green lights and the lights alternatively take their turns like what we have in all traffic lights. The traffic light under discussion now is the one at Agric Junction, an intersection of roads coming from the Conti Roundabout to Ayeduase, a peri-urban community situated close to the university on the east and another road coming from the Faculty to the Department of Agriculture's farms. This is obviously a very busy intersection: it is used by a large population of students who cannot afford daily shuttle bus fairs and have to rely on walking in and out of the Faculty. It is also used by *trotro* and taxi drivers plying the route from Donyina, Appiadu, Emena, Boadi, Kotei and Ayeduase to Kumasi business area, Adum and Kejetia, through Tek Junction. Again, it is used by university workers and lecturers and a cross section of the academic community in the university, the professors right down to teaching assistants. Almost all the lecturers are motorists. A few of the teaching assistants use cars.
This part of the study is to demonstrate how culture, the target of enquiry of anthropologists, combines with engineering or re-engineering to control human behavior. The leader of the team which re-engineered the traffic light under discussion, states among other objectives for undertaking this project, "We put the amber to save the dilemma of those who are coming. Then also we put the green light for the pedestrian. The green shows that human beings could walk."[3] Clearly they put features in the traffic light for the purpose of anticipating a particular kind of human behavior.
Now let us observe human behavior vis-à-vis the operation of the traffic light.It is Tuesday, April, 2015, at this traffic light, 7:30 am; a typical rush hour: students are rushing for lectures, workers are also rushing to work in town and the *trotro*[4] and taxi drivers are also making business out of the rush. The red light facing the Ayeduase-Conti Roundabout road comes on and there is a long traffic climbing up the hill from the Ayeduase side of the road and we equally have a long vehicular traffic from the Conti-Roundabout. Students and workers alike are getting down from taxis and *trotros* from the Conti-Roundabout. On the other side where the passengers are getting down, that is, on the same road, now leading to the Conti-Roundabout, the drivers have managed to squeeze a small portion of the road and turned it into a parking lot. There the *trotros'* mates and taxi drivers are screaming, "Tek, Tek, Tek"[5], "Romanye, Romanye, Romanye"[6] or "Kejetia-Adum, Kejetia-Adum, Kejetia-Adum". While the red light facing the Conti-Roundabout is still on, the motorists using the Faculty road to the one leading to the Agric farms are smoothly filing past. Some also turn to the road leading to the Conti-Roundabout and others turn to the road leading to Ayeduase. The pedestrians are peacefully filing past, mostly heading towards the Faculty. All this is happening as if both pedestrians and motorists are reading from the same script and, even though the traffic light may not be perfect, all the activities there are well rehearsed to a smooth transition from one section of the intersection to the other. There is no campus security person guiding, shepherding or ordering anybody to follow any particular route or do anything and yet pedestrians and motorists are going about their business, each following his own track, without any restriction. The green light for the Conti-Roundabout-Ayeduase road comes on and the traffic smoothly and peacefully resumes movement, on the right to Ayeduase and on the left to Conti-Roundabout. While this is going on, the motorists on both sides from the

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[2] From this categorization of materialist and moralistic forms of mediation, Latour works out the categories of goals; moralistic and selfish ones that will be used further on in the discussion.
[3]Interview with Dr. Tamakloe in his office at the Department of Physics, KNUST. 29/09/15.
[4] This is the name given to local mini bus that shuttles from one location to another within the city.
[5] This is a short form for the main KNUST'S Junction that gives you access to the university
[6] This is an adulterated pronunciation of "Roman", a short form for Roman Hill, a major commercial area in the city of Kumasi.

Faculty and from the Agric farms wait patiently. I could even spot a lady motorist on the road from the Agric farm in front of her steering wheel continuously nodding down the head to the rhythm of a popular gospel tune; not bothered by the time she is "stuck" in traffic. I must add that what undermines this otherwise perfect crossing at the Agric Junction traffic light was the traffic jam on the Ayeduase-Conti road which was the result of careless parking on the part of drivers right after the traffic light.

But wait a minute; is this seemingly smooth crossing not the usual scene we have at all traffic lights all over the world? What makes the traffic light at Agric Junction so unique that makes it deserving of this academic enquiry, especially when we are talking about technoscience and its relationship to human behavior? To answer these questions, we will look at the traffic light scene from five perspectives and in all these instances, we will examine how the traffic light constructs a "transition from reckless to disciplined drivers" (Latour, 1994: 38).

First, we will make a general observation about the goals of the motorists. Second, we look at the traffic light scene from the point of view of the motorist. Third, we will examine the perspective of the observer or the pedestrian in the traffic light scene. Fourth, we will investigate the position of the traffic light as a "communicator" in all these and finally, we will interrogate the position of the engineers who constructed the traffic light.

Let us examine the goals of the motorists. Drawing from Bruno Latour's description of speed dumps that force drivers to slow down on campus (Latour, 1994: 38), we categorize the goals of the drivers at the Agric Junction traffic light into two: selfish and moralistic. Every driver or motorist has his own interest when he reaches a junction, whether there is traffic light or not. Some, in an attempt not to "waste" time, would like to please themselves by moving past the junction or the intersection as quickly as possible regardless of other road users. They care very little about the safety of other road users. This is a selfish goal. Kinsley Appiah, a *trotro* driver who operates from Ayeduase and Kotei to Adum, passing through this intersection strongly and frankly declares his selfish goals:

- I would never be disposed towards waiting and once I am using the main road, I will never give way to the vehicle going the Faculty road because should there be any accident, the other driver would be held responsible. I will crash into the car of the other driver and pretend my breaks failed me and meanwhile the reality is that there is nothing wrong with my break. You see, we all know what is good but we will not do it. It may also be that I am only managing my break, so once you come close, I crash into you and demand repairs for my car.[7]

Indeed, as pointed out by Dr. Ruben Tamakloe, "The first culprits were the lecturers. They get there and they feel the other cars were there to stop for them to cross"[8] Others may be equally in a hurry but may like to consider the safety of other road users like pedestrians and other motorists. They may be in a hurry but are concerned about other people. They therefore have a moralistic goal in using the road.

The perspective of the pedestrian or the observer could even be more interesting. They may not be aware of the goals of the motorists. But, the pedestrian/observer status presents its own selfish goal as well; they care very little about the time concern of the motorists. At the end of the day, whether they are passive to the motorists' goals or not, the most important concern of the pedestrians or the observers is that there is safety and he/she can reach his destination, just like the motorist. Clearly, the motorists and the pedestrians at the Agric Junction seem to intersect in interest: reaching their destination. This interest is realized by the presence of the traffic light. The traffic light has not only acted as an intermediary or played an interventionist role as seen in Latour's definition, mediating both internal and external conflicts of motorists and traffic directors. It has also mediated the desires of both the pedestrians and motorists: to reach their destination. Perhaps the most intriguing role of the traffic light at the Agric Junction is that of mediating a human action and for us to understand fully this role, we have to take a closer look at the traffic light itself.

Again, in mediating human action, the traffic light influences the behavior of the motorists at the Agric Junction by acting like a "living social organism" (Roberge, 1983: 134). To be able to see how the traffic light influences the behavior of both the motorists and the pedestrians at the Agric Junction, we need to go back just some months before the traffic light was installed. There was a campus security guard who would act as a campus guard cum traffic director. In his dirty green attire, he was seen directing traffic, sometimes quarrelling with motorists who would flout his instructions. Be it as it may, he was able to communicate well to motorist so there were no internal or external conflicts, as described above, especially the ones that occasioned him to confront and quarrel with drivers for not following his instructions. In fact, there were times he could be seen visibly tired and would take a seat under a tree near the crossroad and allow the motorists to "do their own thing". Then about a month ago, the traffic light was installed. It is supposed to perform the same function as that of the campus security guard who doubled as traffic director. Even though a machine, the traffic light is now a metaphor of the traffic director, that is, we see it in terms of the campus security guard (Lakoff and Johnson, 1980; Lakoff, 1982; Goatly, 1997; Gibbs and Steen, 1999) who was playing the role of a traffic director. And it is now acting like a human being, a medium that was created by man but, in turn, influencing the behavior of man, thus throwing more light on what Gaston Roberge (1983: 134) posits with regards to mediation that, "you cannot separate man from his media environment, for there is a reciprocal link of causality between them both.". Indeed, Bruno Latour (1994: 53) even goes further to assert that humans, "from millions of years, have extended their social relations to other actants with which, with whom, they have swapped many properties, and with which, with whom, they form *collectives*." And even though the traffic light is a machine, it is an actant, what according to Bruno Latuor (1994, 39), semioticians refer to as the enunciator (machine) which replaces the enunciator (human being) and which can communicate to human beings and mediate the desire of its creator, another human being.

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[7]Interview with Kinsley Appiah, a trotro driver who plies the Ayeduase – Tek Junction road, Emena-Boadi fitting shop. 17/09/15.
[8]Interview with Dr. Tamakloe of the Department of Physics, KNUST. 29/09/15.

And semiotics has a very significant role to play in designing the traffic light. There are a whole lot of complex web of meaning-making going on between different people, present and absent and between human beings and objects (of communication). This is seen from the point of view of the engineer, the traffic light, the security man and the policeman. All these meaning-making processes in the traffic light help to construct smooth transition of selfish goals of individual drivers to a group of selfless and disciplined ones.

Now let us have a closer look at the persona who is not present in substance but present in essence: Dr. Ruben Tamakloe (and his team). Their objective or desire was to solve problems associated with both human and vehicular traffic at the intersection. Dr. Ruben Tamakloe intimates, "The first thing is to actually ensure the safety of the students and then the cars; when they get to the intersection, they are in dilemma whether to cross or not to cross"[9]. How were they going to make a machine to mediate this objective or desire? If they were going to do that, they needed to have a machine that could influence the behavior of the motorists and the pedestrians to co-ordinate in such a manner that there would be safety for road users at the crossroad. Granted that the traffic light was invented by somebody else and they were only copying what somebody had done. Of course, J. P. Knight, who invented the traffic light in the UK, London, 1868, had to address these questions too. No wonder the first person to develop the electric traffic light, Lester Wire, was a policeman in Salt Lake City, Utah, US. Dr. Tamakloe and the students, had to put themselves in Wire's position and answer those questions as well because when the Physics Department in KNUST was making this particular traffic light, it had every opportunity to modify the machine to suit the needs of the university and its environs and this included the communicational status of the machine. This is what Latour (1994: 39) refers to as "linguistic metaphor", when one-man object is acting in terms of what another man has done. He refers to the process in this "linguistic metaphor" as *shifting*, a concept he borrows from semioticians (Latour, 1994: 39). Latour continues in his submission by giving example to what *shifting* is by saying, "If I say to you, for instance, 'Let us imagine ourselves in the campus engineers' shoes when they decide to install the speed dumps", 'I transport you to not only into another space and time but translate you to another actor. I shift you out of the scene you presently occupy.'" He uses this concept to describe how the engineer is shifted from the point of spatial, temporal and "actorial" scenes they occupy. The students have been shifted into the place of the original engineers. However, with the process of *shifting*, the reality of the original engineer also shifts in the sense that certain variables present in the original engineering has to change. For example, the traffic light normally allots specific time for movement (green light), for waiting (red light) and for caution (yellow light). This distribution of time is a local imperative and this is where the student engineer becomes most relevant. Dr. Ruben Tamakloe, the leader of the team revealed, "new innovations [sic] are coming in, that is, few other factors that will make it different from other traffic lights in town. So we put up the one at the Shuttle Station (Destiny Hall) that has some other functions."[10] They keep on changing certain features of the traffic light to make it more responsive to the environment.

Clearly, in addition to the above, those who built the traffic light needed to have a clear ontological and epistemological considerations of the intersection, the motorists and the pedestrians to be able to inscribe the requisite programme of action for the machine, giving to it all the meaning-making mechanisms to be able to communicate with motorists at Agric Junction, KNUST, and not motorists at Salt Lake City, Utah or at a railway crossing in London, where it was originally meant to operate. The considerations cited above would allow a clearer insight into the principles that govern the social behavior of the users of the traffic light at the Agric Junction and this takes us back to the theory of *shifting*. The theory of *shifting* perhaps allows more manipulations than just allowing engineering and re-engineering of the traffic light. It also allows the engineer to be transported into another space and time; he is shifted from one scene, the office or the workshop, to the Agric Junction, located by the roadside, without leaving his office. What the engineer does is to inscribe all that the traffic director, in this case the campus guard cum traffic director, does in the machine (traffic light) and by the roadside at the Agric Junction "now resides a new actant" (Latour, 1994: 39). The theory of shifting affords the engineer the power of bi-location, simultaneously occupying two frames of references (Latour, 1994: 39; see also Irvine, 1996; 131-159; Hanks, 1996; 160-200), that "I am here *and* elsewhere, that I am myself *and* someone else, but an action long past, of an actor, long disappeared, is still active here" (Latour, 1994: 40). Thus we have a whole complex web of *shifting* in this context: the engineer stands in for or is the campus guard cum traffic director and the traffic light takes over this role from the campus guard, allowing the permanent co-presence of the absentee engineer and the present road users who constitute the target of his objectives. The traffic light is therefore the engineer and the campus guard at the same time. All these de-centered or detached persons (the engineer and the campus guard) entextualized in the traffic light, that is, removed from their original context and placed in the context of the traffic light (Urban, 1996: 21), combine to control the behavior of the target users to construct a smooth crossing of the traffic light at the Agric Junction.

There is the presence of a third persona that makes the narrative of this development discourse even more intriguing: the policeman. As indicated earlier, there were occasions I had been at the traffic light in question observing the behavior of the motorist and on each occasion, I was amazed at the rate at which they complied with the direction of the traffic light. I tried to interact with some of the motorists, especially the *trotro* and taxi drivers who stopped there to pick passengers just to find out why they were so law-abiding. They always appeared so busy and would not pay attention to me so I followed some up to their garages, where they carry on with their usual maintenance. Kinsley Appiah, a trotro driver who plies the Ayeduase-Tek Junction road was even more comfortable with traffic light than the presence of the campus guard because in his own words:

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[9]Interview with Dr. Ruben Tamakloe of the Physics Department, KNUST. 29/09/15.
[10]Interview with Dr. Tamakloe of the Physics Department, KNUST. 29/09/15.

- The traffic light behaves as if there is a policeman there, I mean physically. It has the power of the police and as the Akans say where there is power, there is no contestation. As for the light, when you jump the red light, you may not know who is in the next vehicle. The person may be a policeman, a soldier or any person who can take you to task.[11]

Almost all the drivers I interviewed presented the same opinion. This is what another driver, Kweku Darteh, here known as TD, a taxi driver, had to say to the interviewer, PA, to confirm what Kinsley Appiah said earlier:

- PA. Somebody told me that the traffic light is considered by drivers to have a policeman inside it. How far is that true?
- TD. Yes, because you can get arrested. For example, if you jump the red light of Maxima, the police will arrest you.[12]

This is one area the research tools of anthropology or its related studies like the apparatgeist theory in communication studies can unearth certain social meanings to help perfect the engineer's program of action. This "spirit in the machine" or the power behind the machine needs further explanation.The Akan's definition of power, according to the Akan proverb given by Kingsley Appiah, is absolutist, omniscient and ever present, the mere symbol of which still represents absolute power[13]. In town, it is the policeman who directs traffic and he possess the power to arrest you for traffic offences. The traffic light at the Agric Junction is not a policeman but for the fact that it is directing traffic takes on the role of the police and therefore it is imbued with the power of the police. The traffic light is a symbolical power of the police and even though a symbol, it plays the real role of the police and maintains law and order. Thus the traffic light controls the behavior of its users to ensure smooth flow of traffic. Of course, there will be deviants but, on the whole, drivers obey the traffic light.

Again the concept of "linguistic metaphor" has to be considered in engineering or re-engineering the traffic light. The engineers in making the traffic light act like a human being have to place prominence on the part that can communicate and, in this instance, it is clear the part of the body to be mediated is the eye just like the leg is mediated by the car and the hand is mediated by the pay loader. Colours are of essence here and the again the culture of the people cannot be ignored. Interestingly, the colours selected for the purpose of communication seem to have universal relevance in all cultures. The red signifies danger and that communicates to the road users to stop, the green which signifies growth also symbolically indicates movement to the road users and the yellow may have various connotations in various cultures but quite clearly it is a midway between red and green and therefore indicates transition to the road users. By this shareable quality programmed in the traffic light, we have a complete communicational chain, the engineer being the absentee sender, the traffic light being the medium and the road users being the destination. The traffic light, through the shift concept becomes the enunciator, using the language of colour to communicate to the enunciatees, the road users. This process makes it possible for the engineering or the re-engineering of the traffic light in mediating the objective of the engineer to effect fluid traffic at the Agric Junction. The free flow of traffic is testified by drivers who describe the effect of its absence as chaotic. Kwame Danteh, the taxi driver, complains "The place was chaotic, the slight inattention could result in crashing into another driver's car."[14] Here again, Kingsley Appiah testifies that:

- When it was not there, drivers could cross regardless of whichever vehicle that could be coming or going. Sometimes it was even very dangerous because before you were aware there was a vehicle right in front of you. If you failed your break, there could easily be an accident.[15]

These scenes are completely opposite to the traffic scene when the traffic light was installed. The drivers are full of praise. Kingsley Appiah again is very happy with the traffic light at the Agric Junction, saying, "Now with the traffic light in place, it is very clear which traffic should move and which traffic should wait so even if you have faulty break, you can manage the traffic till you get to fitting shop." Other drivers' opinion were summarized in Kwame Danteh's observation that, "Now that we have a traffic light there, things are smooth now and one can now stop for the other to pass."[16] Another driver also intimated that the time spent under the traffic light is "negligible because the light gives us the opportunity of first come first serve… and we drivers like it that way."[17] Again, the communicative ability of the traffic light controls the behavior of its users and that promotes a smooth crossing there.

From the discussion so far, it can be said without any shred of doubt that the Physics Department which built this traffic light has, as stated above succeeded in constructing a "transition from reckless to disciplined drivers" (Latour, 1994: 38). And this paper sees the initiative of the Physics Department as highly commendable. First, the initiative of a university in a Third World country to produce something on its own could easily occupy headlines in newspapers not only in Africa but in the West as well. Second, the determination to see the project through is unimaginable. Indeed, KNUST also comes in for praise for mobilizing funds for the project. We must add that when the funds are not forthcoming in the manner needed, the leader himself sometimes has to dip into his pocket.[18]The significance of the role of the university and the leader of the team is the desire to build a machine that will be in synch with the needs of the environment, a notion that is often not paid attention to in Ghanaian education.

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[11] Interview with Kingsley Appiah, a trotro driver who passes through that intersection, Emena-Boadi fitting shop. 17/09/15.

[12] Interview with Kweku Dartey, Emena vulcanizer's shop. 19/09/15. This is separated from the main paragraph for emphasis.

[13] In Ghana, symbols representing power like the chief's palanquin, his throne, the symbols of the traditional priest like the whiskers are as equally powerful as the chief or the traditional priest. According to the driver, this tradition value is entextualised in the traffic light.

[14] Interview with Kwame Danteh, Emena vulcanizer's shop. 19/09/15

[15] Interview with Kingsley Appiah, a trotro driver at Emena-Boadi fitting shop. 17/09/15

[16] Interview with Kwame Danteh, a taxi driver, Emena vulcanizer's shop. 19/09/15

[17] Interview with KD,a taxi driver, Emena Station, 16/09/15

[18]Interview with Dr. Tamakloe of the Physics Department, KNUST. 29/09/15.

Quite clearly, the Physics Department, KNUST, is still adding features to enhance the performance of the traffic light. This is also an admission that the traffic light has not reached a perfect stage. This is where we need to examine the methodology used in collecting data for such a project and according to the team they used the quantitative traffic survey in which "some students do some counting from the Administration to where the Examination Hall (also known as the Destiny Hall) is and then the Agric Junction, we look at students crossing from Paa Joe to Ayeduase and the same thing applies to the cars because the number of cars is huge."[19] While the paper commends the Physics Department for using such a quantitative methodology which provides data with regards to frequency, volume of cars and the number of students who patronize the traffic lights, we must also admit that this methodology certainly does not take care of what goes on in the mind of the road users, which cannot be quantified or put on the scale to be measured. The team when asked of this omission believed that the omission was the area of psychology and it must be carried out by experts in psychology[20]. This is where ethnography is needed to unpack the ontological and epistemological density of target users of the traffic light for purposes of disinterring subterraneous meanings needed to inform the program of action of the engineers. This, it is believed, will go a long way to help perfect the operation of the traffic lights. This gap in the methodology used by the builders of the traffic lights, which could have otherwise enhanced the concept of mediation as earlier discussed, became evident when interviews and participant observations were conducted.

Listening to users of the traffic light, one gets to know that a lot could be done to make the project of the traffic light a very successful one. And of course, the Physics Department that built the machine admits that there is still more to be done make it perfect. There are still inefficiencies. Kinsley Appiah, one of the drivers I interviewed, pointed out one of these inefficiencies:

- When the light shines, the light from the traffic light is weak and that makes it difficult for the drivers to read the traffic light. I would suggest they increase the intensity of the light like what we have in town so that the drivers can always see which light is on.[21]

This was confirmed by other drivers. This problem is a challenge to drivers and even though they manage to follow the traffic light, the engineers could enhance the machine's influence on the driver's behavior by increasing the intensity of the light as suggested by the drivers. The users also indicated that bringing order at the traffic light went beyond making drivers stop and move. Kweku Danteh, one of the drivers I met had this suggestion:

- I personally believe there ought to be a policeman there like the police in Anloga Junction because without them, some motorists can ignore the red light when no one is around. It is possible in the process, there could be an onrushing car and this could result in an accident.[22]

It is true that the traffic light acts as symbol of power but there is always an exception to rules and bringing a police man there could make, to a large extent, the traffic light fool proof in its function. The users even go beyond the physical presence of the traffic light and make observations that suggest that the construction of the traffic light is an interdepartmental one, calling on the services of the Department of Road Maintenance on campus to collaborate with the Physics Department. This is the observation of Kwabena Owusu, a pedestrian:

- Is it also not possible to create a bigger parking space so that the students can have enough space when trying to board the *trotro*? In this case, the drivers will be made to pick the students in a particular place alone and will not pick the students by the roadside and create undue traffic jam.[23]

The users even go to the extent of suggesting a separate traffic light for pedestrians. Another *trotro* driver, Kwasi Opare, is concerned about the safety of the students who constitute the pedestrian population of the intersection and had this suggestion, "The Agric Junction is normally the first stop for the students when they close lectures so the place is bristling with students and that makes the place very congested.... I believe if we could have a traffic light for the students, the traffic could be regulated better"[24]. Some of the drivers are even recommending a separate traffic light for the parking lot and Kinsley Appiah was very emphatic on this:

- Having a traffic light that could regulate the *trotros* could be fantastic. When the small space we call parking lot is congested, some drivers disregard this and will still stop on the road and in the process, block it. This situation can still create traffic jam even when the green light turns on. The light will be on but no car can pass by because one *trotro* driver has blocked the road. [25]

Clearly, all these observations are made by the users of the traffic light which may not be observations from the "experts". There is one fact about their observations: they go beyond the objectives of the engineer: turning the selfish goals of the individual driver to a moralistic one. Even though the engineer's objective is achieved in this context and that though there seems to be a smooth transition at the intersection, evidence from the participants indicate that the goal of instilling order at the Agric Junction is not fully achieved. While the drivers are following the direction of the traffic light, some drivers stop right under the traffic light picking passengers, thus causing traffic jam and confusion at the traffic light. This is because the scientist, who is the engineer, did not collaborate with the ethnographer or the anthropologist who is well equipped for such an investigation which could disinter all these needs of the users.

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[19]Interview with Dr. Tamakloe of the Physics Department, KNUST. 29/09/15.
[20]Interview with Dr. Tamakloe of the Physics Department, KNUST. 29/09/15.
[21]Interview with Kinsley Appiah, a *trotro* driver, Emena-Boadi fitting shop. 17/09/15
[22] Interview with Kweku Danteh, a taxi driver, Emena vulcanizer's shop. 19/09/15
[23] Interview with Kwabena Owusu, a pedestrian, Agric Junction, KNUST. 15/0915
[24]Interview with Kweku Opare, Emena Station, 16/09/15
[25]Interview with Kingsley Appiah, Emana-Boadi Fitting Shop, 17/09/15

These needs could be factored into the design of the traffic light. Such a design that would incorporate all the needs of the users might not be unique, but it would have certainly brought complete order at the Agric Junction intersection. In this context, the concept of mediation could only work partially; it could only work so far as the objective of the engineer could go. The traffic light fails to mediate other needs of the road users, who are the target of the engineer, at that particular point.

The kind of education the scientist or the engineer has in KNUST is excellent when it comes to issues of exact or physical science. But does science as intra-disciplinary study satisfy the society's needs? In a developing country like Ghana, the question of science mediating the interest of the rural and urban poor is paramount because poverty is the biggest problems staring at the country in the face. Again, how does the scientist from this institution respond to the challenging needs of the society, needs that are far more sophisticated and complex in nature than what the classroom presents? The question is how does this type of education conflate science and the arts, especially ethnography, for the maximum benefit of education? For example, how does the scientist or the engineer design a program of action inscribed in a machine or a technology that can mediate the culture to make "bukyia", the hearth, a modern one. In other words, how does my grandmother in the village, brought up to use the traditional hearth, and who considers the traditional hearth as the most "natural" way of preparing fire and finds the use of gas very unaccommodating appreciate a modern form of the hearth? From the theory of mediation however, it should be possible for the scientist in this institution to build a technology that will modernize the hearth, that is, taking the traditional hearth out of the original context considered to be raw and crude and placing the same cultural script of the hearth into a more modern context that will add aesthetics, style and efficiency. With that spiritual attachment to the hearth, my grandmother might find it easier to use the new version of her old hearth. The same can said of local "technologies" like the kenkey preparation by the women in Yamoransah, Ghana, unique all over the world. And if a Ghanaian scientist does not design a technology to modernize the preparation of kenkey, which is indigenous to the Ghanaian, who else is going to do that for him? In the olden days, when there was no electricity, our fathers would put water in what we call the heating bucket and the water would get hot for bathing. Can we find a way of modernizing this? The heating bucket is, of course, less expensive and very environmentally friendly and so, if for nothing at all, these two benefits make the project of developing it to meet modern needs a very viable one and worthy of attention. This same concept of environmental friendliness and cost benefit requires that our scientists revisit the traditional drinking cooler, the "bobo" light (the lamp), the "foonoo" (the kiln), the cutlass, and the list goes unremitting, and develop the necessary innovations, unique to the local environment. How do we develop technology in the practice of Agriculture in areas like sowing, harvesting, weeding, marketing and so forth that will be more friendly to our farmers, the kind that will take away the drudgery of traditional farming and yet does not, to a large extent, put the farmer out of skelt with his culture? In order words, can Ghanaian scientists develop a technology that can mediate the economic interest of local farmers? If our technical education can go that far, Ghanaians will definitely have a real technological cultural revolution. This revolution is what is needed to present Ghana the launching pad for a modern development. For some of us, this technologically cultural revolution is very possible if technical education starts to consider giving the study of ethnography or anthropology its proper place in the study of technoscience.

3. Recommendations
- The Education Sector Performance Report (2010: 10) is quite frank that "there is no research investigating how effectively the skills acquired are being translated into jobs on the labour market". There is the need for the technologist and the anthropologist to collaborate on matters of skills acquired in TVET to enable their findings and inventions to meet the needs of the society.
- The concept of the 60:40 sciences to humanities ratio has been found to be unscientific (Government of Ghana, 2007: 42). The humanities should be seen more as collaborating with technology than disrupting it.
- There is the need to establish an anthropology department in KNUST and part of the objectives of the department will be to collaborate with the Science, Technology and Planning departments in recommending ideas for policy-making in the country. The department of Anthropology could also specialize in consumption, science and technology anthropology to facilitate the visibility and marketing of the work of the scientists.
- The university should also consider ethnography in all the science departments to help the content of the syllabuses to be properly tailored towards the needs of the environment.

4. Conclusion
No one doubts the efforts successive Ghanaian governments have put into making education a development oriented one. There is, however, not enough to show in terms of national development, especially when it comes to science, vocation and technology. Strategies put in place to achieve the above are not working very well. First, Education Sector Performance Report, 2010, seriously takes issue with the disconnect between the skills created by these technical and vocational institutions and the job market. Second, "there is lack of analysis of labour market and economic needs to make the curriculum much more relevant" (Education Sector Performance Report, 2010: 8). Finally, the attempt "to make education in Ghana influence economic behavior has collapsed (Education Sector Performance Report, 2010: 14). There seems to be a common denominator in all the problems stated above: lack of the requisite research and analytical tools to investigate the ontological and phenomenological paradigms of the job market which emanates from the needs of the society. The Ghanaian science and technical education or TVET produce skills but, quite clearly, it takes more than skill to be able to translate these skills into job opportunities. These skills must be properly informed by the ontological and the teleological realities of the Ghanaian job market and we must bear in mind the Ghanaian job market is very fluid and the Eurocentric content of the books read in Ghana may not necessarily cater for the *sui generis* of the Ghanaian job market

because these books were written for a different culture and different market. Again, most of these books are relevant for a particular period of time and do not satisfy the fluidity or the labile nature of the Ghanaian job market. Quite frankly, the demand for the appropriate skills from the institutions problematizes how knowledge is generated and constructed for local use, especially in the area of skill development. Indeed, "rather than encourage continued separation of the analytical tracks, we need intellectual hybrids; adventurous combinations of culture, economy, discourse, power, institutions and history" (Eldelman and Haugerud, 2005: 1)It is against this background that the introduction of the study of the relevant type of anthropology which possesses these research and analytical tools for the ontological, epistemological and phenomenological realities, as recommended by Goethean pedagogy (Holdrege, 2005a; Lehrs, 2013), of the subject under study is recommended in these institutions for the simple reason that "development questions lie at the discipline's theoretical and ethnographic core" (Eldelman and Haugerud, 2005: 1).Let's remember that Heidegger's assertion that "technology is a means to an end" (Hiedegger, 1977: 287) or the road to development is always true and we can achieve it if the approach to science and technology education in Ghana moves away from a purely intra-disciplinary approach and gestures towards an inter- and multi-disciplinary, a more holistic one.

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