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University of Cape Coast

UNIVERSITY OF CAPE COAST

AN INTERROGATION OF THE DESIGN AND DEVELOPMENT OF A
RELEVANT CURRICULUM FOR GHANA'S POLYTECHNIC HND
PROGRAMMES: KEY STAKEHOLDER'S PERSPECTIVES



BY

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This thesis submitted to the Institute for Educational Planning and Administration,
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Education Studies, University of Cape Coast, in partial fulfilment
of the requirements for award of Doctor of Philosophy degree in
Qualitative Research

JANUARY 2018

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DECLARATION

Candidate's Declaration

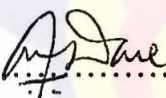
I hereby declare that this thesis is the results of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

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Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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ABSTRACT

Bridging the gap between academic knowledge and the transformational needs of the society is the core concern of the tertiary TVET (Kelly, 2009; Maclean, 2007). As a first measure to assure relevance, the collaboration of key stakeholder was recommended for the design and development of the curriculum for HND level programmes in Ghana's polytechnics (URC, 1991). Yet, the relevance of the sector's curriculum has remained a major concern, because of its volatility and contextualization in the needs it seeks to address (Varghese, 2009). This study therefore sought to explore the design and development of a relevant curriculum for Ghana's HND programmes; using the HND Electrical and Mechanical Engineering programmes as cases in point. Through the hermeneutic-phenomenological approach, interview and documentary analysis data were gathered from a variety of stakeholders. In all, a total of 17 participants and four focus groups were sampled for the study. The major finding from the study was that, the type of collaboration employed to design and develop the HND curriculum eludes convergence; a critical element in the attainment of relevance. Some major consequences of this situation have, thus, been non-consensus in the need(s), content of knowledge and pedagogic strategies the HND level employs, and the disassociation of some stakeholders from the HND curriculum. It is therefore recommended that the convergence of representatives of stakeholders at the stages of need(s) definition and generation of strategies to adopt should be considered in all the key stages of the curriculum process, if relevance of the curriculum is sought for.

KEY WORDS

Technical and Vocational Education and Training

Polytechnic/ Tertiary TVET

Curriculum

Process of Curriculum Design and Development

Stakeholders in Curriculum Design and Development

Relevant Curriculum



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DEDICATION

To the memory of my father, Mr Paul Kwesi Mills and my mother, Mrs Elizabeth Araba Mills



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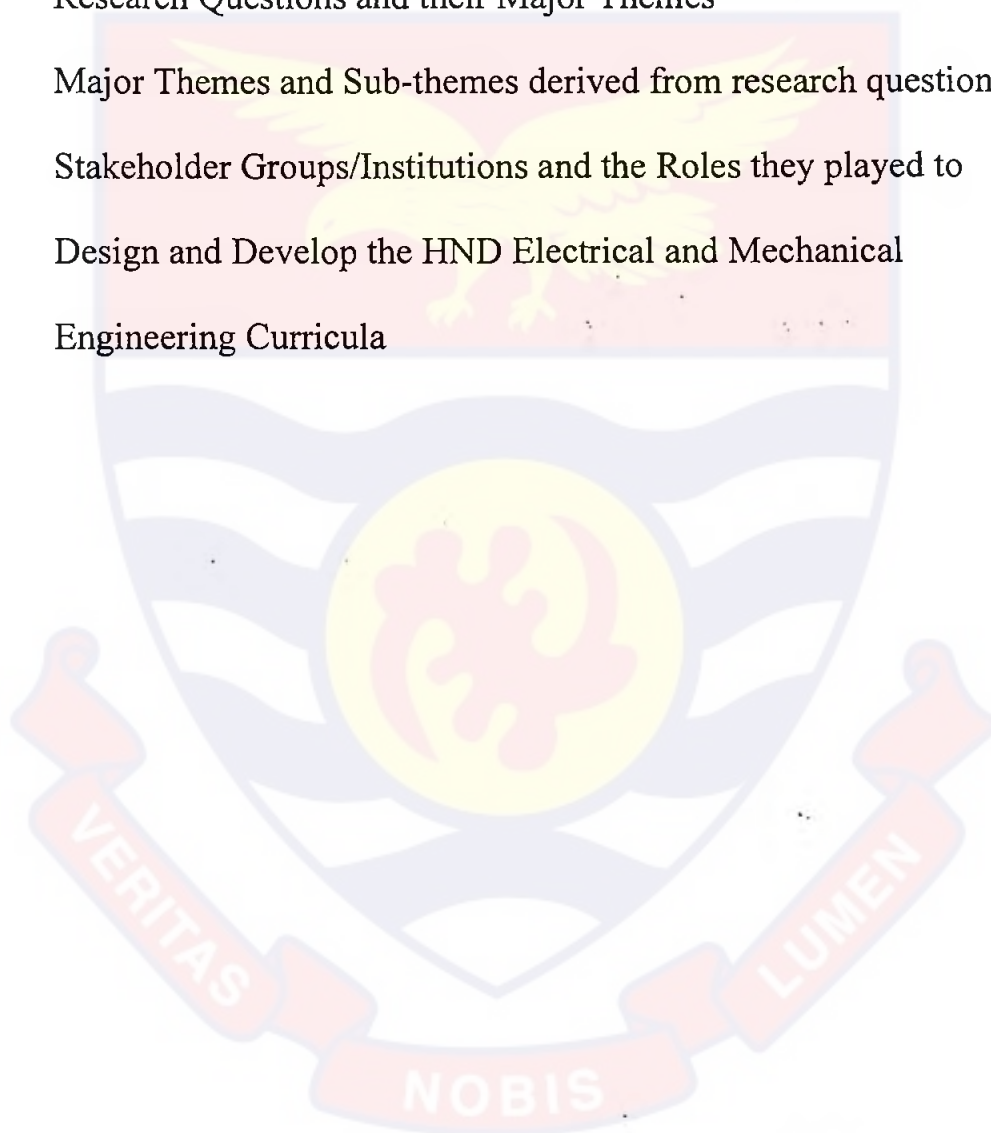
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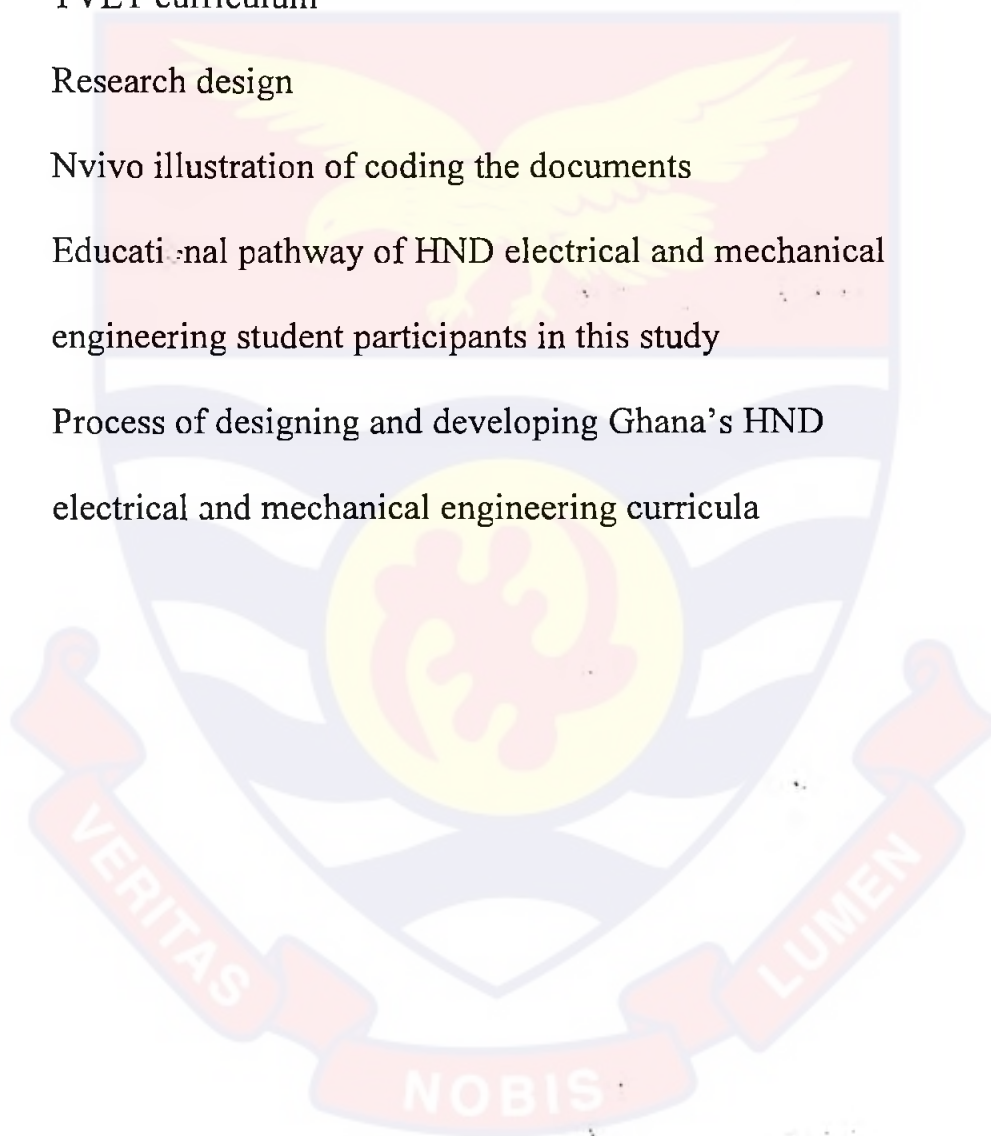
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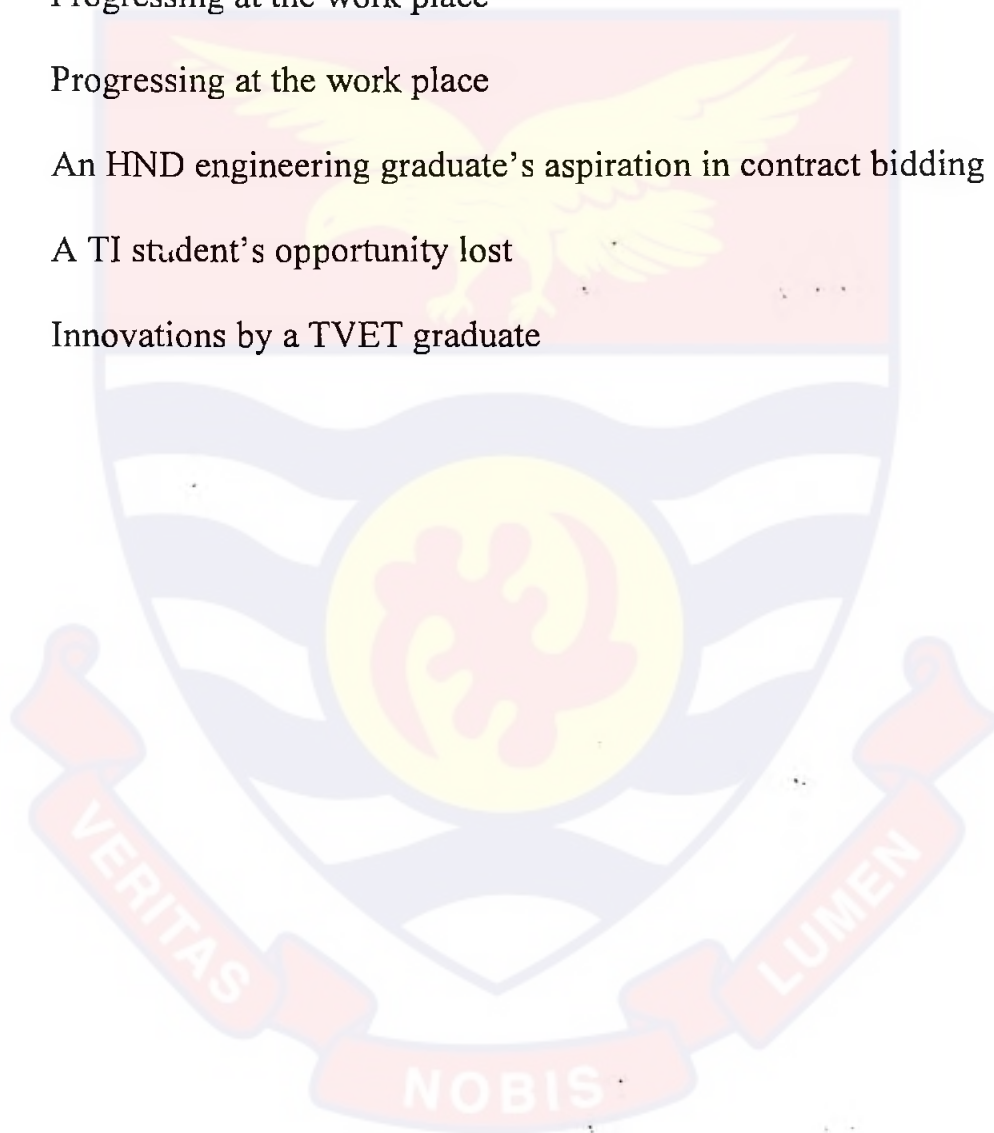
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LIST OF ABBREVIATIONS

- APQN - Asia Pacific Quality Network
- BTS - Brevets de Techniciens Superieurs
- CBT - Competency Based Curriculum
- CEMAC - Communitate Economique et Monataire de L' Afrique Centrale
- CNAA - Council for National Academic Awards
- COTVET - Council for Technical and Vocational Education and Training
- CSOs - Civil Society Organisations
- DUT - University Technology Institutes
- GATS - General Agreement on Trade in Services
- GPRS - Ghana Poverty Reduction Strategy
- JHS – Junior High School
- JSS – Junior Secondary School
- HND - Higher National Diploma
- IEPA - Educational Planning and Administration
- IMF - International Monetary Fund
- ILO - International Labour Organisation
- JICA - Japanese International Cooperation Agency
- NEPAD - New Partnership for Africa's development
- NCHE- National Council for Higher Education
- NCTE - National Council for Tertiary Education
- NAB - National Accreditation Board
- NABPTEX - National Board for Professional and Technician Examination
- NPT - Education and Training Capacity
- SDGs - Sustainable Development Goals

SHS – Senior High School

SSS – Senior Secondary School

STS – Secondary Technical School

TI – Technical Institute

TVET - Technical and Vocational Education and Training

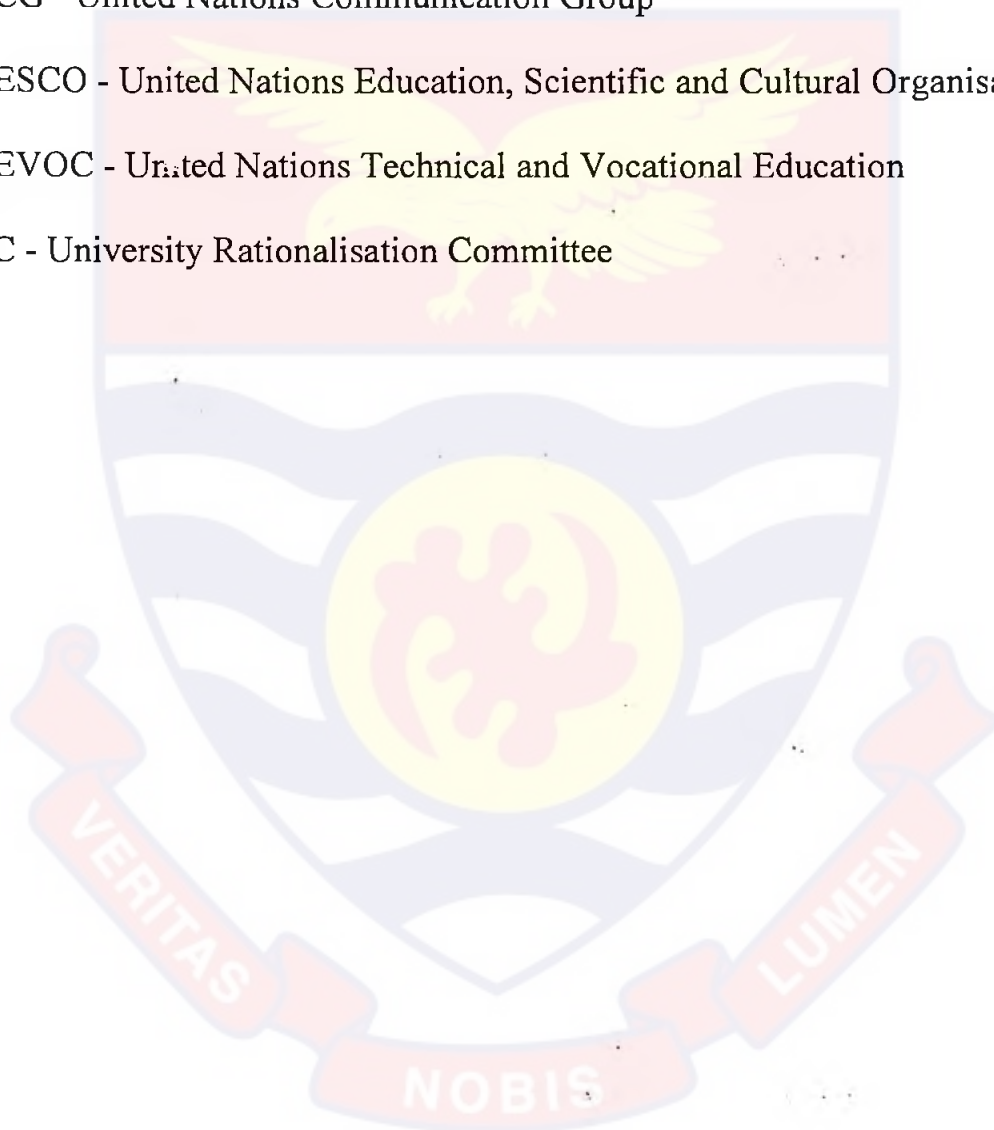
UN - United Nations

UNCG - United Nations Communication Group

UNESCO - United Nations Education, Scientific and Cultural Organisation

UNEVOC - United Nations Technical and Vocational Education

URC - University Rationalisation Committee



“If a higher education curriculum is a set of intentions and activities intended to advance human learning to a high level such that it is adequate to the challenges facing human society, then...the student experience will not be all that it might be unless detailed attention is given to the curriculum.”

(Barnette & Coate, 2007; pp 7-8)



CHAPTER ONE

INTRODUCTION

Technical and vocational education and training is at the core of any successful education for development agenda

(UNESCO-UNEVOC, 2012; p.10)

As part of speeches made to commemorate the 10th anniversary of the United Nations Technical and Vocational Education (UNEVOC) unit, Rupert Maclean, the first director of UNEVOC, emphasized, in the excerpt of his statement above, the critical role of technical and vocational education and training (TVET) in the development of the society. TVET generally, seeks to enhance the capacity of learners through the access and application of existing knowledge in science and technology; provide the leverage to acquire relevant skills that the labour market needs; establish a closer relationship with the productive sectors of the economy and; accelerate and sustain development in the society (Bloom, Canning & Chan, 2005; King & Palmer, 2010; UNESCO-UNEVOC, 2012). These perceived benefits of TVET underpin Mouzakitis (2010) conviction that TVET is the most effective instrument to meet the demands of globalization.

Unlike the conventional university, Maclean (2007) and Park (2005) assert that TVET at the tertiary level presents society with a diversified, yet highly skilled labour that can accelerate development in various ways. The relevance of the tertiary TVET sector has however been questioned because of the challenge of possessing a curriculum that is considered relevant at all times to address the “upheavals” that characterize technology in social development. The TVET curriculum is said to be relevant, in so far as it is responsive to the

needs of existing technologies of the society (International Labour Organisation [ILO], 2010; Maclean, Jagannathan & Sarvi, 2013; Park, 2005). Yet, mismatches have continued to be identified between the TVET curriculum and the needs of most societies (King & Martin, 2002; Santiago, Tremblay, Basri & Arnal, 2008; Varghese, 2009).

In spite of the mismatch that has been identified with the tertiary TVET, the anticipated benefits of the sector have continued to inform society's pursuance of its programmes. In Ghana, TVET was initially introduced into basic education by the missionary and colonial administration (Graham, 1971). Tertiary TVET programmes however emerged with the upgrading of the polytechnics to tertiary status in 1992 to develop Higher National Diploma (HND) level programmes (Akyeampong, 2007). In 2007, the Polytechnic Act, 745, 2007 extended the mandate of the polytechnics to offer degree and post-degree tertiary TVET programmes (Ministry of Education [MoE], 2014). Currently, Technical University Act, 922, 2016 has converted most of the polytechnics to technical universities in order to execute the intentions of Polytechnic Act, 745, 2007 under a new name. According to MoE (2014), HND level programmes have however continued to dominate the activities of the polytechnics.

The research reported in this thesis is situated in the context of Ghana's polytechnic (HND) Electrical and Mechanical Engineering programmes. The study interrogates the process of designing and developing relevant curricula for HND Electrical and Mechanical Engineering programmes, in order to explore the mismatches that have been identified to characterize the sector. The study commences with an exploration into key stakeholders' experiences

and perspectives on what constitutes a relevant curriculum for Ghana's polytechnic HND Engineering programmes, before interrogating the process followed in the design and development of what is construed as a relevant tertiary TVET curriculum for the sector. This introductory chapter of the thesis focuses on the rationale of the study, the research problem, the purpose and questions meant to guide the study. The chapter also contains overviews of the conceptual framework and the methodology employed in the study.

Rationale for the Study

General Rationale

The importance of education to the development of society in general is indisputable, but TVET is considered to offer even more benefits to the development of the society through its combination of general education with knowledge and skills in technologies and the sciences, as well as life-long learning skills (Mouzakitis, 2010; UNESCO-UNEVOC, 2012). In other words, TVET facilitates development in any society that aspires to progress, since it is able to draw on information from the two traditions of grammar/academic knowledge and skills, and hands-on-training to address social needs.

The introduction of TVET at the tertiary level assumed a global scale from the 1960s onwards. However, the tertiary TVET has exhibited less homogeneity in structure and content because societies tend to adopt models that suit their individual context. For instance, whereas some European nations like France and Germany have TVET colleges (*polytechnics*) and TVET universities to parallel their academic tertiary education (Kirchberger, 2008; Pratt, 1997) Asian countries like China and Japan have preferred incorporated

systems where both academic and TVET programmes and courses are offered in their universities, following the conviction that a combined academic and TVET system held more benefits for their society (Di Gropello, Tandon & Shahid, 2012). In Africa, nations like Senegal, Cameroon and Zambia operate unitary systems where sub-degree polytechnic institutions are linked to universities for higher level studies and easier progression; whilst nations like Kenya, Malawi, Ghana and Tanzania operate a strict binary system where their polytechnics and universities have had distinctive mandates (Ng'ethe, Subotzky & Afeti, 2008).

In spite of the contextualized structure and content, the tertiary TVET has failed to result in the same benefits for every society. For instance, unlike most African countries, where the sector's benefits are yet to be realized, most Asian nations like Japan, Hong Kong, China, South Korea have been noted for their mastery in science and technical education in engineering; science-based learning in general education; and a dynamic research and development sector which links higher education programmes to innovative firms (Di Gropello et al., 2012; Maclean, 2007; Ng'ethe et al., 2008). Consequently, the tertiary TVET sector in most Asian societies is so well patronized that Kirchberger (2008) reports a 50% to 60% enrolment ratio among Asian tertiary students.

The relevance of the sector's curriculum to the society has remained a topical issue since Philip Foster's study in 1965 (cited in King & Martin, 2002). Between the 1960s and 1970s, the emergence of TVET had assumed a global scale and newly independent nations in Africa had begun to propagate policies with the conviction that TVET in formal education could accelerate development more than the conventional grammar system of education

(Maclean, 2007). The pursuance of the latter failed to bring about any significant change in the African society, as unemployment plagued the youth and the industry grew at a slow pace (King & Martin, 2002). It was this trend that caused Foster to conduct his *Vocational School Fallacy* study in some Ghanaian schools.

Among others, Foster's study revealed that very little evidence established linkages between types of education and the development of the society and that the mere introduction of TVET into the public education sector did less to inform students' job aspirations and interest in schooling than the realities on the ground (King & Martin, 2002). After Foster's study, other studies like Antoninis' work in Egypt (2001), King and Martin's study in Ghana (2002), and Oketch's study across a number of African countries (2007) also confirmed the failure to establish linkages between the TVET curriculum and the needs of the society.

Despite the absence of concrete linkages between TVET and the needs of the society in the African context, the sudden and steady development of most nations in Asia and the West have been associated with the availability of high-skilled labour in TVET and the academics (King & Palmer, 2010; Tilak, 2002). Apart from interrogating the linkage between TVET and the needs of the society, studies into TVET have largely focused on the performance of the sector at the pre-tertiary levels (Apple, 2004; Hubball & Gold, 2007; Heynemann, 1986; King & McGrath, 2012; King & Palmer, 2010). Inasmuch as TVET has given different results to different societies, it is generally agreed that TVET, especially at the tertiary sector holds the key to economic growth and technological advancement (King & McGrath, 2012;

King & Palmer, 2010; Mouzakitis, 2010; Tilak, 2002). The curriculum of the tertiary TVET can therefore not be ignored, since it is the pivot around which the objectives of the sector are realized (Barnett & Coate, 2005; Marsh & Willis, 2007). Apart from the general rationale is the contextual dimension of the rationale, since the contextualization of a phenomenon in research is crucial in understanding issues and the dynamics that characterize a particular context.

Contextual Rationale

The contextual rationale to undertake this study was generally fanned by the irreconcilable differences between Ghana government and its development partners' documented visions and reports on the development of the TVET sector and the discourses that have been emphasizing the inability of the nation's polytechnic graduates to meet the needs of the society. According to MoE (2014), the polytechnics are mandated to offer TVET programmes to complement the conventional university's academic programmes. However, the relevance of TVET knowledge and skills acquired in Ghana's polytechnics HND level programmes, has from inception, remained a topical issue. Moreover, of all the programme offerings in the polytechnics, the impact of the Mechanical and Electrical Engineering programmes on social development has been of most interest to stakeholders because of the synergy the two programmes possess in powering and advancing the industrial aspirations of Ghana.

Since independence, Ghana's education reforms, e.g., those of 1974, 1987 and 2007 have, among others, sought to industrialize the country by enhancing the employability of her youth through the development of the

TVET sector (Akyeampong, 2002; 2007). Subsequently, the emergence of the polytechnics as tertiary institutions in 1992 saw the introduction of TVET into the tertiary education sector. The tertiary polytechnics were introduced with the intention of having more highly-skilled labour in the industry and commercial sectors (Aidoo-Taylor, 2009). A 60%:40% bias for science and TVET programmes by year 2020 has thus been projected for the nation's tertiary education sector (Ghana Poverty Reduction Strategy [GPRS], 2003; 2006; 2009; ESP, 2003; 2006; 2007; 2008; 2009; 2010). In effect, whereas the universities are to attain a 40%:60% students' enrolment ratios toward academic programmes, the polytechnics are to attain a 20%:80% students' enrolment ratio for tertiary TVET programmes (Akyeampong, 2007; Effah, 2010; ESP, 2010).

As the purveyor of technology and a labour-saving device that shapes home life, workplaces and infrastructural facilities, the Ghanaian engineer has been expected to address social challenges, particularly in the areas of power and manufacturing, since these have been identified as the bedrock of development in every sense (GPRS, 2006; 2009; Siczkar, 2008). Mechanical and Electrical Engineering, according to Meline (2006) and Siczkar (2008), are fundamental to social development; for, whereas the electrical engineer facilitates the generation and the supply of power, the mechanical engineer addresses basic challenges that require technological innovations for resolution. The impact of the engineering programmes in polytechnics in Ghana is however yet to be felt, as the nation (i) continues to grapple with perennial fluctuations and black-outs following the 1983 and 1984 droughts (ii) fails to expand its industrial base for economic growth and; (iii) continues

to rely on foreign expertise in her burgeoning industries (Obeng, Evers, Akuffo, Braimah & Brew-Hammond, 2008). It is against this background that the Mechanical and Electrical Engineering programmes were preferred as cases of exploration in this study.

Personal Rationale

My personal experiences as a member of the teaching staff in one of Ghana's polytechnics also goaded me on to conduct the study. Based on the knowledge that the polytechnics and universities are both tertiary institutions with different orientations, I had assumed that students access educational provisions based on interest and merit (Maclean, 2007). This assumption was however challenged following my employment in a Ghanaian polytechnic institution. My first teaching allocation was to the School of Engineering, where it was common to find students gather and chat during breaks. I often overheard students talk about their classmates who had abandoned their programmes at the polytechnic and enrolled in programmes in the universities.

This attitude of most polytechnic students caused me to wonder, especially when I compared their situation to my exit from the secondary level and my experience at the university. After my exit from the secondary level, I had failed to gain admissions to pursue HND fashion on two consecutive times, because of my failure to possess a background in Fine Art although I had good grades in Clothing and Textiles at the General Certificates of Education, Ordinary Level. My third year of waiting however saw me gain admission into the university to pursue an Arts degree programme in Education. My pursuance of an HND programme at the time was fundamentally based on interest; a trait, which seems to be absent in most

HND engineering students. My interest in the polytechnics was based on the conviction that the university and the polytechnics present different types of skills and knowledge, although the polytechnic graduate had a more ready market. Also, I had assumed that both the university and the polytechnics are tertiary institutions that develop similar theoretical foundations, thus their admission of students from the secondary level.

Most students' attitude towards the generic courses, like Liberal Studies, however, caused me to wonder about the capabilities from the secondary level to grasp the content of knowledge of the programmes they offer. For example, it is common to hear mutterings like "*Madam, aha nye university ooo*", meaning "Madam, this is not the university" or "*Madam, yenye English students wo aha ooo!*" meaning "We're not students of English" during lectures in one of the generic courses I teach in the polytechnic. This seeming aversion to grammar/academic content of knowledge by the polytechnic students caused me to wonder what a relevant polytechnic curriculum for these students should be and how such a curriculum is designed and developed.

My concern was probably due to my background as an educational planner who is interested in the quality of educational provisions. Gudmund Hernes, former director of IIEP, best expresses my stance when he said, "... the concern of the educational planner is two-fold... to reach a better understanding of the validity of education in its own empirically observed specific dimensions and to help in defining appropriate strategies for change" (cited in Woodhall, 2004; p. 6). As the pivot around which the success of every educational provision is realized, the curriculum becomes the point of

scrutiny if graduates from an education programme are considered to be under-performing (Barnett & Coate, 2005; Marsh & Willis, 2007).

The relevance of the polytechnic curriculum to the job market becomes critical if a holistic understanding is to be gained from how different stakeholders construe relevance in the polytechnic (tertiary TVET) curriculum. At the personal level, in addition to giving voice to students' experiences, this exploratory study also aimed to give me insight into research in curriculum design and development at the tertiary education sector.

Statement of the Problem

From the foregoing, the relevance of the tertiary TVET curriculum is not just a global phenomenon, but also, a major concern for stakeholders in Ghana's polytechnic HND sector (Afeti, 2003; NCTE, 2001; Owusu-Agyeman & Oosterkamp, 2009). Mr. Eric Opoku (Joy news, May, 1st, 2011), a former Deputy Regional Minister of the Eastern Region of Ghana has, for instance intimated that the irrelevance of the polytechnic curriculum has made it difficult for the sector's graduates to fit into the productive sectors of the economy and has subsequently been the cause of continuous importation of technical expertise. Findings from a tracer study involving HND Electrical and Mechanical Engineering graduates revealed that 90% of the participants indicated that they had to undertake further training after their HND programmes to enhance their employability before their employment (National Board for Professional and Technician Examination [NABPTEX] (2010). Both Mr. Opoku and NABPTEX's tracer study suggest that there are jobs or potential for employment, but the lack of the requisite background limits the HND graduate from accessing the jobs.

Professor Ivan Addae-Mensah (Daily Graphic, November, 4th, 2008), a renowned educationist, however opined that the un-employability of the polytechnic graduate has nothing to do with the quality of education offered in the polytechnics, but rather, the absence of the right jobs to absorb them. This contradicts the assertion in the preceding paragraph that the HND graduate lacked the requisite background for employment. A study by the Government of Ghana and the Japanese International Cooperation Agency (JICA) in 2006 had however identified outdated curriculum at the nation's TVET sector, including the HND level (cited in Owusu-Agyeman & Oosterkamp, 2009). There is obviously a lack of consensus among different stakeholder representations on the appropriateness of the HND graduate's background for employment.

According to Aidoo-Taylor (2009), Ghana's polytechnics have however experienced several interventions to enhance its curriculum. Such efforts include, the Netherlands Programme for Institutional Strengthening of Post-secondary Education and Training Capacity [NPT], the University of Twente, Netherlands and the Institute of Educational Planning and Administration (IEPA), University of Cape Coast collaborated programme that organized a series of training for staff of Ghana's polytechnic institutions on Competency Based Training (CBT); and upgraded the staff of IEPA to design and develop master's degree programmes for staff of TVET institutions (Kouwenhoven, Oduro & Nsiah-Gyabaah, 2009). Moreover, the University Rationalisation Committee's Report (URC) (1991), the document that informed the upgrading of the polytechnics to tertiary institutions had linked HND curriculum to gaps in Ghana's economy through the development of hands-on training

programmes at the middle manpower level; and a collaborative curricular design and development to ascertain the relevance of the curriculum to its key stakeholders (URC, 1991).

The assertions and findings of studies presented in this section of the chapter, however questions the relevance of the HND level programmes to its key stakeholders and the contributions these stakeholder groups made to design and develop the sector's curriculum. According to Gee (1999), assertions are also discourses that should not be taken as mere conjectures, but as pointers for explorations. Studies on curriculum design and development for Ghana's polytechnics have mainly focused on practices within polytechnic institutions. Among these studies are, Bakah's (2011) "Teacher professional development through collaborative curriculum design in Ghana's polytechnics"; Eakah, Voogt & Pieters' (2012) "Curriculum reform and teacher's training needs: the case of higher education in Ghana"; and Akomaning's (2012) "Improving Students Internship through Collaborative Curriculum Design in Ghanaian Polytechnics". Little is therefore known of the process employed at the national level to design and develop the HND curriculum. The present study therefore sought to explore stakeholders' perspectives on a relevant HND curriculum, using Mechanical and Electrical Engineering programmes as cases in point, through the process that was employed at the national level to design and develop the current curricula.

Purpose of the Study

The main purposes of the study were to understand; (1) what key stakeholders construed as a relevant curriculum for Ghana's Polytechnic HND Engineering programmes, and (2) the process employed at the national level to

design and develop the current curricula in use. To this end, particular attention was given to understanding the rationale behind the introduction of Ghana's HND Electrical and Mechanical Engineering curriculum and the reasons underlining different stakeholder groups' expressions of relevance on the HND Electrical and Mechanical Engineering curriculum. This first dimension of the purpose of the study thus sought to establish the underlining perspectives of stakeholder groups and their positions in their contributions towards the design and development of the two programmes of concern.

The second purpose of the study sought to explore the stages in the process employed in designing and developing the HND Mechanical and Electrical Engineering curricula at the national level, the roles individual stakeholders played in the various stages, and the challenges that confronted or continue to confront stakeholders in their contributions to the HND curriculum. In other words, the second purpose of the study therefore sought to chronicle the activities of different stakeholders and the challenges which confronted or continues to confront them in their roles. These purposes of the study ultimately sought to inform a more systematic approach to curriculum design and development that can enhance the overall relevance of the curricula used in Ghana's polytechnic HND Electrical and Mechanical Engineering programmes.

Research Questions

To achieve the purpose presented on p. 13, the following research questions were formulated to guide the study:

1. What do key stakeholders of Ghana's polytechnics construe as relevant polytechnic education? In particular:

- a. What interpretations do stakeholders give to the purposes of establishing Ghana's polytechnics HND programmes?
 - b. What do key stakeholders connote as a relevant HND Mechanical and Electrical Engineering curricula for Ghana's polytechnics?
2. What process was followed in designing and developing the HND Mechanical and Electrical Engineering curricula in Ghana's polytechnics?
- In particular:
- a. What roles did key stakeholders play in the process of designing and developing the HND Mechanical and Electrical Engineering curricula in Ghana's polytechnics?
 - b. What challenges confronted key stakeholders in the process of designing and developing the current polytechnic HND Mechanical and Electrical Engineering curricula?
3. How, in the opinion of stakeholders, can the process of curriculum design and development for Ghana's polytechnic HND Mechanical and Electrical Engineering programmes be improved to enhance the relevance of the designed curricula used by these two programmes?

Delimitations

The intention to interrogate stakeholders' perspectives on the design and development of a relevant curriculum for Ghana's polytechnic HND programmes required the definition of decisions which were considered most appropriate to conduct. These decisions are presented in this section of the chapter in relation to literature search and methodology. First, the need to explore perspectives and experiences in relation to curriculum design and development culminated in drawing on theories that could best facilitate the

task ahead. Thus, in order to commence the study, it was considered critical to understand how individuals arrive at expressions of relevance for the tertiary TVET curriculum. It therefore became necessary to explore the concept of relevance, the nature of the tertiary TVET and a socially deliberated process of designing the curriculum. It was against this background that, the study reviewed literature on concept of relevance; the nature of the tertiary TVET, which thrives on the concept of development for social change and educational philosophies that are socially oriented; and deliberated curriculum design and development process model.

Methodologically, the intention to explore stakeholders' perspectives from their experiences in a curricular phenomenon informed the choice of hermeneutic phenomenology to underpin the sampling, methods and data analysis and interpretation. In terms of sampling, its nature and size were determined by the nature of the tertiary TVET and the methodological implications of hermeneutic phenomenology. As implied in its nature, the tertiary TVET is social-developmentally intended to influence the lives of individuals with different backgrounds. Thus, the tertiary TVET draws on different stakeholders to include the providers and beneficiaries of the service. However, the in-depth nature of hermeneutic/phenomenology which facilitates the gathering of an over-whelming amount of data even from one person in a short period, informed the choice of stakeholders who contributed to the design of the curricula of interest and stakeholders who benefit directly from the intended curricula (Creswell, 2008; Marshall, Cardon, Poddar & Fontenot, 2013).

It was against this background that, polytechnic lecturers and students; government supervisory agencies over the polytechnics, the professional body and academics from the university were selected as the categories of stakeholders to contribute to the study. To ease the management of data, one representative from each category of stakeholder institutions was generally sampled; although, some conditions on the field slightly altered the final size of the sample (Expatriated on p. 102). In the case of polytechnic students, in so far as they do not participate in the design of the HND curriculum, their selection was because of their experience with the delivered curriculum and application of the knowledge and skills acquired to the field. The need to tap from an extensive experience thus informed the selection of final year students who had undertaken their 6-month industrial attachment on the belief that they would be able to relate the content of the curriculum to the field of work.

Overview of Theoretical Framework

Expressions of relevance in curriculum are fundamentally premised on the harmonization between stages in the planned, enacted and assessed curriculum (Darby-Hobbs, 2011; Lavrenko, 2003). In other words, relevance is established in the congruence between set objectives (needs), planned activities and the output gained to address identified needs. Relevance is based on a context that is both objective and subjective. The determination of the totality of elements in the context is, however, challenged by accessing the subjective aspect of man which can be known only when expressed (Webb, 1976; Hirst, 1986). Expressions of relevance can therefore be problematic even when there is consistency (Webb, 1976). It is against this background that Griesdorf (2003) recommended exploration of either the relationships of

meanings emanating from choices made from alternative elements or the “why’s” behind users “acceptance” or “rejection” in a phenomenon. The concept of relevance therefore offered the frame to explore relationships in meanings in perspectives in order to understand expressions of relevance surrounding Ghana’s polytechnic HND curriculum.

For a systematic account of stakeholders’ perspectives, the study adapted Walker’s Naturalistic or Deliberative Approach to explore the process employed to design and develop the curricula in use for Ghana’s polytechnic HND Electrical and Mechanical Engineering programmes. Walker’s Naturalistic model is based on his ideals about deliberation which seek to address differences in opinions as interested parties are permitted to converge, express differences and forge a resolution that is “... solidly grounded in something approaching truth” (Walker, 2003; p. 226). Walker’s model resonates with the nature of the tertiary TVET curriculum, which suggests a socially deliberated model, where representations of different stakeholder groups seek to design a curriculum to address their varying interests. A chaotic sense is implied in the involvement of different stakeholders whose interests are potentially contending, particularly where each seek to be addressed by the curriculum. Deliberation therefore becomes imminent, if stakeholders seek to plan and enact a curriculum that is relevant to the society. For a well deliberated curriculum, Walker identifies the three stages of platform, deliberation and design in his model (Marsh & Willis, 2007).

The platform stage in Walker’s model provides for initial convergence to declare perceptions and opinions to the task at hand, prior to the actual curricular work. Deliberation marks the actual curricular work that focuses on

the problem to identify and the generation of alternative solutions to address identified needs, design refers to the documentation of decisions made at the deliberation stage. The design stage is considered not to be useful for the purposes of this study, since the concerns of the present study is not about documentation but covers the perspectives and experiences of stakeholders towards the design at the national level and realization of the curriculum at the school level (Marsh & Willis, 2007). In line with John (2011) and Marsh and Willis' (2007) argument that the curriculum cycle is considered complete only after a satisfactory expression has been gained from relevant stakeholder, a "development" stage is thus, appended to Walker's model to enable explorations into the work of curriculum planners beyond the design stage.

In terms of methods, this study assumes a retrospective turn since Walker's observation of an on-going curricular design activity cannot be replicated (Marsh & Willis, 2007). Participants' opinions and perspectives on their experiences during their contributions to the designing and the on-going development of the curriculum for HND Mechanical and Electrical Engineering programmes in Ghana's polytechnics are therefore relied upon.

Overview of Methodology

Methodologically, this study employs the hermeneutic phenomenology paradigm, which asserts that reality is local, multiple, and co-constructed from both the researcher and the participant's experiences (Warnke, 2003; Laverly, 2003). Data are therefore gathered from participants of different stakeholder institutions and groups using the face-to-face and focus-group interview methods and the documentary analysis method. The selection of stakeholder institutions and groups is basically informed by virtue of their contributions to

the design and development of the polytechnic HND curriculum. To ease the management of data from the different sources, the Nvivo software is used to code and categorise the data; whilst Attride-Stirling's (2001) thematic network approach is employed to thematise the coded data to ease analysis and interpretation. To produce an account that is trustworthy, principles of reflexivity and ethics are kept in view. Also, triangulation of data and the participants' voices are used to authenticate information as well as to enhance robustness in the study.

Definition of Terms

Technical and Vocational Education and Training (TVET)

Technical and Vocational Education and Training (TVET), according to UNESCO and ILO are the “aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupants in various sectors of economic and social life” (UNESCO & ILO, 2001). In addition to technical knowledge and aptitude, TVET currently stresses on the “softer” skills like communication, negotiation and teamwork (UNESCO-UNEVOC, 2006). The contemporary TVET therefore does not adhere to the dichotomy of perceiving the traditional grammar/academic knowledge as intellectual and TVET as manual work, as a merger of the two traditions are pursued insofar as it offers a comprehensive resolution to address some needs in the society.

Polytechnic/ Tertiary TVET

From the two Greek words of “*poli*”, (many) and “*tekhnikos*” (arts), the term “polytechnic” is among the names employed by societies to refer to

institutions that offer TVET programmes at the higher education level. Polytechnic education seeks to lead students “...to acquire the practical skills, know-how and understanding ... necessary for employment in a particular occupation, trade or group of occupations” (Atchoarena & Delluc, 2002; p. 18). In sum, the tertiary TVET seeks to practicalise the academic content of knowledge of the conventional universities, through the development of a range of skills, attitudes and knowledge relating to occupations, lifelong learning and a preparation for responsible citizenship (Chakroun, 2013, p. 2).

Due to differences in societal needs, different models of the tertiary TVET have been developed. For instance, whereas the British and the Finnish developed different higher levels of tertiary TVET programmes in their “polytechnics”, the Germans and the French have the *Fachhochschulen* and the *Brevets de Techniciens Supérieurs (BTS)*, sometimes referred to as polytechnics, as responsible for providing tertiary TVET programmes below the first degree level and; technology universities for degree up to the doctorate level (Gendron, 2009; Pratt, Kekale, Maassen, Papp, Perellon & Uitti, 2004). In this study, the term “polytechnic” is used to refer to the tertiary TVET in general.

Curriculum

Curriculum, as a term connotes different things for different people. Conventionally, the term curriculum was defined in relation to subjects or disciplines which were taught in schools. The United Kingdom’s National Curriculum, for instance defined curriculum as those “... ‘permanent’ subjects as grammar, reading, logic, rhetoric, mathematics, and the greatest books of the Western World that best embody essential knowledge” (cited in

Marsh & Willis, 2007; p. 9). In more recent terms, the term curriculum has been used variedly to connote a product, a process or praxis, depending on the perspective of the author. Barnett and Coate (2005), Kelly (2009) and Walker (2003), for instance use the term curriculum to refer to all or any of the activities that culminate in the drafting and operationalization of plans made for an educational provision.

Process of Curriculum Design and Development

For the purposes of this study, the process of curriculum design and development refers to all the activities that are undertaken to plan and operationalize the curriculum (Barnett & Coate, 2005; Walker, 2003; Diamond, 2008). Between the state and the school, there are different levels of designing and developing the curriculum, and these include, macro (system, society, country); meso (school, institution, and programme); micro (classroom) and nario (individual, personal) (Van den Akker, cited in Akomaning, 2012 & Bowe, Ball & Gold, 1992). In this study, the focus is at both the macro and micro levels.

Stakeholders in Curriculum Design and Development

The term “stakeholders” refers to any group or individual who can affect or is affected by activities undertaken in an organisation (Freeman, cited in Friedman & Miles, 2006). The concept “stakeholders” denotes the structure, the image and the organisation of an institution or the constellation of cooperative and competitive interests of individuals or groups that are tagged as stakeholders. Donaldson and Preston (cited in Friedman & Miles, 2006), therefore refer to the term stakeholders as “descriptive” since it fundamentally describes “what a corporation is”. Three categories of stakeholders can be

identified in (i) institutions providing some form of services; (ii) the bodies or the institutions which create an enabling environment for other stakeholder institutions to operate; and (iii) the beneficiaries of the services accessed. The idea of stakeholders therefore suggests an interdependent relationship between institutions and their clients. As the activities of institutions are geared towards the interest, needs and viewpoints of their clients, these clients conversely patronize the services of the first category of stakeholders to sustain their operations. Thus, the term “stakeholders” in this study refers to the policy making and service provider institutions and the client.

Evan and Freeman (1993) identified corporate legitimacy and fiduciary legitimacy as two main principles that guide the relationship between the various categories of stakeholders. Corporate legitimacy refers to the position that, in as much as institutions work to the benefit of their stakeholder clients, representatives of these clients should be permitted to participate in decisions that are related to their welfare. The fiduciary principle, on the other hand positions the stakeholder institution as fiduciaries, where management assumes a paternalistic role in addressing presumed needs of stakeholders. Comparatively, the stakeholder clients participate less in the fiduciary than in the corporate legitimacy system.

However, Freeman argued that regardless of which system is in force, stakeholder recourse which enable stakeholder clients to assess and hold institutions and directors responsible for failures in the services provided should be enforced (cited in, Friedman & Miles, 2006). These three categories of stakeholder groups are featured in this study as the institutions that participate in the design and development of Ghana’s polytechnic curriculum;

the polytechnic institutions and polytechnic graduates and students whose lives are shaped by the services provided by the polytechnics through the enacted curriculum.

Relevant Curriculum

According to Marsh and Willis (2007)., education is always provided in response to specific need(s) which is often captured in educational objectives Newton, cited in Darby-Hobbs (2011), therefore, asserts that relevant education “requires a relationship in the presence of some need, aspiration or expectation” (p.1). These needs are varied and, for the tertiary TVET sector, needs are usually geared towards social development through the education of the individual, as elaborated in Chapter Two. “Relevance” in the curriculum, as used in this study is specific to the tertiary TVET sector.

Organization of the Study

In all, the research is presented in seven chapters. Chapter One focuses on the general background to the topic. The chapter thus presents the gap the study seeks to address, the rationale; purpose; research problem and overviews of the subsequent chapters. Chapter Two, presents the theories that have been drawn upon to underpin the study, and include the concept of “relevance” and development, philosophical theories of behaviourism and constructivism, and Walker’s Naturalistic or Deliberative approach to curriculum design and development. The chapter concludes with a graphic illustration of the relationship between the theories and concepts drawn upon to inform the theoretical framework used in the study.

Chapter Three looks at the methodology for the study, and this covers paradigm, the design, and the reflexive and ethical principles adhered to in this

work. Issues of trustworthiness are also addressed in Chapter Three in order to establish the credibility, transferability, dependability and confirmability of the findings of the study. The chapter concludes with the profiling of the study sites and participants who contributed to the study. Chapter Four focuses on the context within which Ghana's tertiary TVET emerged in the polytechnics and the intentions that established the sector. The historical context of the tertiary polytechnic is thus discussed before attending to the structure of the HND level programmes and the nature of students who seek admission into the HND Mechanical and Electrical Engineering programmes. The chapter then continues with the various stakeholder groups and institutions that contribute to the design and development of the HND Engineering curriculum. Study sites and participants' profile concludes the chapter.

Chapter Five presents the findings of the study in relation to the two major research objectives of; (i) connotations of a relevant HND Mechanical and Electrical Engineering curriculum; and (ii) process followed to design and develop the curriculum for the HND Mechanical and Electrical Engineering programmes. Chapter Six discusses the findings of the study by themes derived from patterns identified from the findings related connotations of relevant HND curriculum and the process employed to design and develop the HND Mechanical and Electrical Engineering programmes is yet to be reviewed by 2018. Chapter Seven present conclusions reached from exploring the study's concerns and some implications and recommendations for further studies to enhance the relevance of the polytechnic curriculum.

CHAPTER TWO

LITERATURE REVIEW

CONTEXTUALISING AND CONCEPTUALISING THE DESIGN AND DEVELOPMENT OF A RELEVANT TERTIARY TVET CURRICULUM

Engineering programmes... have been required for some years to evaluate their outputs in response to the standards set by other external agencies...

(Barnette & Coate, 2005; p.29)

In relation to Barnette and Coate's (2005) statement above, Chapter One has indicated that in the estimation of some stakeholders, Ghana's polytechnic HND Engineering graduates have failed to live up to expectations as a result of the irrelevance of the curriculum. This chapter explores the emergence of the tertiary TVET, within which the higher level skills in engineering finds its space. This is to establish the sector's peculiarities from the conventional higher education programs. These peculiarities eventually informed the choice of theories that culminated in the framework used to interrogate the concerns of the study. The chapter commences with the concept of relevance, before proceeding to the emergence of the tertiary TVET sector, and the theories that informed the framework of the study.

Concept of "Relevance"

According to Piaget (cited in Hirst, 1986; Giora, 1997; Medin, Coley, Storms & Hayes, 2003), "relevance" is a layered notion which includes a generative process and a criterion for measuring or evaluating a phenomenon that takes cognizance of the inter-play between different elements. From its philosophical background, "relevance" has been explored, especially in the

cognitive sciences to resolve communication problems (Griesdorf, 2000; 2003; Spink, Griesdorf & Bateman, 1998). The fundamental features of “relevance” in communication as Morrow and Greespan (cited in Giora, 1997) outline constitutes:

- (1) The interplay between a set of propositions and a discourse topic;
- (2) Information which is worth the hearer’s attention;
- (3) The usefulness with regard to the conversational goals and;
- (4) The comprehension which is achieved at various interplay between perspectives, topics and focus.

The features of relevance as outlined above reveal that relevance is established from the congruence between set objectives (needs) and activities undertaken to address the needs to be addressed. It is in the light of this that Piaget, building on the works of Schutz and Dewey (cited in Hirst, 1986), established a bridge between meaning and implication by interpreting “relevance” as “... a condition that is used to distinguish a genuine implication between antecedent and consequence” (p. 2). The “problem of relevance”, Schutz and Dewey (cited in Webb, 1976) also revealed, however becomes central to the activities of men, since activities of men are generically purposeful and motivated.

The interplay between elements that makes up the context one is situated greatly determines what is construed as relevant or not. According to Hirst (1986), context in relevance comprises of elements that can be categorized into the objective and the subjective, since man is born into both the physical and the cultural world. The objective aspect of context refers to elements which are external and physical to the individual in relation to the

phenomenon under consideration; whilst, the subjective aspect of context refers to the interest of man which is founded on knowledge, skills and habits which are acquired over a period of time (Webb, 1976). Schutz, cited in Webb (1976), thus describes the interest of man as the sedimentation of experiences which motivates an individual to focus on some elements whilst ignoring others. Context in relevance is therefore constituted by either utilising all the elements in one terrain, where both selected and non-selected elements co-exist or are utilised or, a set of selected elements from different terrains or sources that are used to define a phenomenon or problem (Giora, 1997; Hirst, 1986; Medin et al., 2003). In either form of context, the expected outcome is the fit or the suitability gained from the individual elements' ability to attain an expected end.

The objective is, however, supposed to impose itself on the subjective, when the interest of man culminates in a selection that informs expression of relevance (Webb, 1976). Volition thus becomes an inevitable factor in one's interest to experience or not to experience the objective, as selectivity, which is discriminatory, becomes inherent in intentions to attend to or ignore some objects (Wilson & Sperber, 2002). It is against this background that Dewey (cited in Sperber & Wilson, 1995), refers to the interest of man as "the selective interest". Changes in context especially in relation to subjectivity, is susceptible to inconsistencies in the consciousness of man since humans naturally fail to live in a "state of constant animation" as the objective world presents man's consciousness with numerous and unstructured possibilities (James, cited in Webb, 1976). The consciousness of man, James asserted, is characterized by a series of "perchings" and "flights". Changes eventually

become imminent in subjectivity, as selection is constantly made of knowledge and experiences to fund one's interest to attend or ignore certain elements; it is however difficult to determine which aspect of interest influences which opinion (Sperber & Wilson, 1995).

Assessing Relevance

Different strategies to assess relevance have been proffered by Greisdorf (2000), Hirst (1986) and Lavrenko's (2003) generative process, which considers "relevance" to be the resolution and evaluation of problems associated with the effectiveness of inputs into a system. Greisdorf, Hirst and Lavrenko might have applied their process to information technology, yet the principle therein is imperative to assess other concerns for relevance. As a quantifiable notion, relevance is used as a criterion "...to quantify a phenomenon which emanates from user's judgment on the relationship; utility; importance, degree of match, fit, proximity; appropriateness, closeness, pertinence, need; question; statement; description of research; treatment etc..." (Griesdorf, 2003; p. 2). In this case, relevance connotes a criterion for measurement when it is employed to express output in relation to expectations. In relation to processes, Giora (1997) asserted that, if relevance is to be assessed, then the proportional amount of contextual effects should be evaluated in terms of the processing efforts employed to achieve expected effects. Consequently, the greater the contextual effects, or the smaller or less challenging the processing effort, the greater "relevance" is claimed to have been achieved. In spite of conveying statistical connotations, Taube (cited in Greisdorf, 2003) indicated that relevance is expressed in the binary terms of either being "relevant" or "irrelevant" because of its intuitiveness to the

psychological predicate that underpins one's acceptance or rejection of a relationship.

From the discussion, the three key elements that facilitate the determination of relevance are needs, process developed to address needs and output generated. It however behooves on one to determine what is relevant as not and justifying the position. To explore relevance, Griesdorf (2003) therefore recommended focus on relationships of meanings emanating from choices made from alternative elements or the “why’s” behind users “acceptance” or “rejection” of a phenomenon. Figure 1 below does not only cover the main components of the concept of relevance, but also illustrates the connections among the different components.

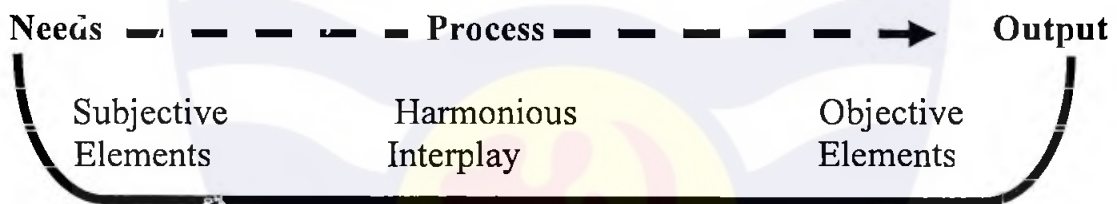


Figure 1: Interplay between the components of relevance.

Source: Author's construct, after contributions to the concept of relevance by Giora (1997), Griesdorf (2000), Griesdorf (2003), Hirst (1986), Lavrenko (2003), Medin et al. (2003), Sperber and Wilson (2002) and Webb (1976).

Figure 1 reveals a process that appears to be on a continuum, where the defined needs and the process employed determine the output. In order to attain the expected output, Figure 1 illustrates the harmonious interplay between elements constituted in components of relevance. A change in any of the elements in a context, Webb (1976) stressed, culminates in the re-definition of the problem to inform the requisite decisions to be made in the process of attaining relevance.

Emerging Issues

From the discussion on the concept of relevance, the following issues emerge:

- (1) Relevance is expressed from a harmonious interplay between elements constituted in a context.
- (2) Relevance is preceded by a clearly defined problem to underpin the formulation of strategies that are capable of attaining expected outcomes to warrant the positive expression of relevance.
- (3) A change in the constituents of elements within a context necessarily requires the alteration to the definition of a problem and the processes required to address the identified problem.
- (4) Of all the elements, the discriminatory nature of interest positions the subjective to be more susceptible to change.
- (5) Interest presents an overwhelming challenge to expressions of relevance as some subjective elements may fail to be attracted by some objective elements.
- (6) Lack of interest does not necessarily connote the non-existence of some objective elements, but may be due to other factors like ignorance, resource availability and traditions.

Relating the concept of relevance to stakeholders' perspectives on the relevance of the tertiary TVET curriculum, expressions of relevance require that one considers the harmonious interplay of all the elements constituted in the context of interest. The clarity in the definition of needs and the appropriateness of strategies generated to address needs must subsequently be assessed. The subjective nature of interest in elements like knowledge,

traditions, ignorance and availability of resources, must also be attended to as these may not only result in biased perspectives, but also, fund contradictory and multi-dimensions in expressions of relevance. It is in light of this that the consensus of stakeholders on the need to be addressed and indicators of performance are also explored in the study. The subsequent presentation of this chapter thus presents the elements that have generally undergirded the design and development of a tertiary TVET curriculum to warrant the expression of relevance.

The Tertiary TVET

Emergence of the Tertiary TVET

The skill-training tradition of TVET has its roots in the training indigenous societies offered their young ones for adult life (Wyatt III, 2009). In Africa, Mbiti (1999) and Okrah (2003), for instance, asserted that vocationalism constituted a major aspect of the training societies offered to the young to prepare them for adult life. African children, particularly the male child, understudied adults who were vocationally equipped in crafts like goldsmithing, blacksmithing, farming, fishing and hunting (Okrah, 2003). After puberty, Sackey (2006) explained, which sometimes culminated in the performance of some rites, one was required to take up domestic, social and economic responsibilities and vocationalised training was considered an enabler for an effective adult-life.

The formal TVET system has its root in the medieval European practice of apprenticeship where workmen's guilds, mainly from the lower and working classes, were organized to set standards for craft and skilled labour (Dawson, 2005; European Centre for the Development of Vocational Training

[CEDEFOP], 2004). Following the emergence of the Industrial Revolution in the 18th century, most European societies began to develop and introduce hands-on skill training as TVET subjects into the educational systems provided for the working and lower classes of Europe and the colonies (Graham, 1971; Wyatt III, 2009). However, the provision of TVET remained at the basic level until the 20th century's changing nature of the state necessitated its introduction into the higher education level (Atchoarena, 2009; Maclean, 2007).

In Africa, TVET in the formal system of education was introduced by the missionary forces and continued by the colonial masters from the 19th century (Graham, 1971). The development of TVET however remained at the pre-tertiary levels, where, in Ghana, for instance, it was mainly incorporated into the curriculum of basic education and specialty in trade schools until the upgrading of the polytechnics to tertiary status in 1992 (King & Palmer, 2010; McWilliam & Kwamena-Poh, 1975; Akyeampong, 2007). From the 1990s, most African countries began to develop tertiary TVET programmes in order to possess a highly skilled diversified labour force to bring about industrialization (Ng'ethe et al., 2008). African tradition and the introduction of TVET into the formal education reveal that, economic growth or change has always been associated with TVET.

Changing Economies and Higher Education

The shrinking of the Welfare State in favour of the Competition State in the West around the 20th century caused societies to demand a more explicit link between tertiary education and the needs of society, particularly in relation to industry (Atchoarena, 2009; Maclean, 2007; Olssen & Peters,

2005). Consequently, governments ceased to control domestic economies as markets began to dictate the patterns of economies; the terms of reference in the Competition State, thus, ceased to be the “ends in themselves” to become the “means” by which competition in the global market is enabled (Maclean, 2007). This Competition State was characterized by unprecedented evolution in technology to the extent that a commensurable adaptability in skill and knowledge was emphasized, thus the emergence of the knowledge-based economy era (Cissen & Peters, 2005).

Knowledge-based economy has been conceptualized in the four variants of neo-liberal, neo-corporatist, neo-statist and neo-communitarian (Haughton & Counsell 2003). In neo-liberalism, which pertains to the Anglo-American societies, market forces are permitted to control the marketization or commercialization of university research, entrepreneurial universities and academic capitalism as government’s involvement in the provision of higher education is reduced (Gilbert, 2002; Kahangwa, 2013). Advocates of neo-liberalism seek for a de-regulatory state, where the market regulates itself: the state thus ceases to be a producer (Bresser-Pereira, 2009). From the premise that competition constitutes part of human nature, the neo-liberalist education, seeks among others, to be modeled on the business world’s mechanistic and behaviourist views of learning that culminates in competitive results (Hursh, 2006).

In the neo-corporatist model, which has its root in Finland and Australia, the state seeks to reform public service with corporate managerialist strategies (Kahangwa, 2013; Lingard, 1993). The fundamental objective is to bring together strategic public policy responsibilities and sensitivity to business

needs (Crouch, Finegold & Sako, 1999). Human capital theory and corporate managerialism are immanent in the neo-corporatist model, as humans are considered "... as objects, to whom the value of education and training can be added to benefit both the individual and the state (Fusarelli, 2004). The underpinning assumption is thus, "... human knowledge and skill form a kind of capital which can be invested and from which economic benefits for both the individual and the society are expected" (Lingard, 1993; p. 30).

Education in neo-corporatist becomes a micro-economic reform tool, where the views of various stakeholders are integrated in the provision and control of higher education, but not necessarily de-regulating the market (Kahangwa, 2013). Neo-corporatist education is also characterised by testing, accountability, privatisation and competition (Fusarelli, 2004). Public institutions, Fusarelli assert, consequently consider their mission as a moral absolute than economic; yet, subject output to cost/benefit calculus. Neo-corporatist education creates economically, socially, and racially stratified communities as market-based incentives produce winners and losers with the students emerging the product of the winning or losing (Henry, 2001).

In neo-statist, however the state strategically plans and directs the expansion of higher education through the sponsoring of the economic system that permits the economy to conform to market rules (Crouch, et al, 1999; Lingard, 1993). With emphasis on government intervention and state building to restructure the economy, the neo-statist state organizes knowledge production and networks to facilitate collective appropriation and redistribution of benefits (Iankova, 2002). The state therefore manages tensions between intellectual commons and property (Kahangwa, 2013). The

neo-communitarian state on the other hand, permits the provision of tertiary education by non-governmental organizations that work for public interest, in addition to state and market-led contributions (Lingard, 1993).

The neo-communitarian state on the other hand, fundamentally seeks for social cohesion, and permits the provision of tertiary education by non-governmental organizations that work for public interest, in addition to state and market-led contributions (Haughton & Counsell, 2003; Kahangwa, 2013). These four approaches are not considered as mutually exclusive, as societies may practice a merger (Haughton & Counsell, 2003). For example, America adopts neoliberalism at the national level, but applies neo-communitarianism in its welfare scheme for the unemployed (Cummings, 2001; Etzioni, 2006).

Regardless of the model adopted, Staron, Jasinski and Weatherley, indicate that the knowledge era is generally "... characterized by impermanence, turbulence, multiple and competing agendas and priorities, diversity in ideologies, ambiguity, multiple roles, irritations, uncertainty and contradictions and a great amount of energy and creativity..." (cited in Maclean, 2007: pp. 3- 4). A knowledge economy thus thrives on ideas rather than physical abilities and on the application of technology rather than the transformation of raw materials or the exploitation of cheap labour (Park, 2005).

The nature of the Competition State thus provided a compelling rationale, especially at the policy level to demand a greater link between tertiary education and vocations as diversified talents and skills for employment began to be emphasized (Powell & Snellman, 2004). The conventional tertiary education sector, dominated by the university and its

academic programmes was, however, challenged in its “...responsibility ...to be accountable for products that are relevant, effective and of demonstrable quality; and to provide society with the full range of benefits ...” (Romer, cited in Diamond, 2008; p. x). The focus of the “service” (TVET) tradition, that is, to serve societies, ultimately made it the preferred choice in the society (Diamond, 2008). It was against this background that the tertiary TVET emerged from the 1960’s onwards to address the practical aspects of tertiary knowledge that the conventional university had failed to address (Maclean, 2007). The relevance of the TVET sector is thus realized in its ability to draw on knowledge and skills from across the service and the grammar/academic traditions to resolve social problems (Kelly, 2009). The need of the individual society however dictates the model to adopt.

In Ghana, the urgency to link the educational system, especially at the tertiary level, to the society was triggered by the economic crises of the 1970s and 1980s (Akyeampong, 2007). For accelerated development, Ghana has thus expressed intentions to develop tertiary educational programmes in light of the demands of the society, especially, the industry (Bawakyillenuo, Akoto, Ahiadeke, Aryeetey, & Agbe, 2013). It is against this background that Ghana begun to adopt a rationalist approach to policy-making, where national committee or commission, drawn from a wide range of stakeholder organizations or institutions study and recommend revisions to situations that warrant changes (Working Group on Educational Sector Analysis, cited in Nudzor, 2014). Hence, a rationalist neo-liberalist approach has generally underpinned Ghana’s tertiary education discourse, with some examples in the 1992 Tertiary Education Reform that saw the upgrade of the polytechnics to

tertiary institutions; cost-sharing of tertiary education; and de-regulation and privatization of tertiary education (Nordensvard, 2013; Nudzor, 2014).

Ideologies, other than those that had strictly characterized the conventional university and the TVET tradition respectively, thus, emerged to underpin the tertiary TVET curriculum. Apart from the philosophies that underpin education, the link between the concept of development and education became more pronounced from the 1960s when education began to be considered as an instrument for economic growth (Unterhalter, 2009). The next section looks at ideologies from the concept of development and philosophies of education that have dominated the tertiary TVET sector. This section seeks to facilitate an understanding of the ideological context within which Ghana's tertiary TVET HND polytechnic Electrical and Mechanical Engineering programmes operates.

Concept of Development in the Tertiary TVET

The concept of development is a notion that expresses competing ideological, theoretical and practical views of human well-being and agency (Sant'Ana, 2003). According to Alkire and Deneulin (2009) and Sant'Ana (2008), the focus, the form, the measurement and the process of achieving development has not been homogenous, since "development" means different things to different societies. The United Nation's Development Programme's (UNDP) concept of "human development" in the 1990s was, however, the first concept that drew on earlier notions of development to construct a more holistic and relevant concept of development for human societies in general (Alkire, 2010; Sant'Ana, 2008). The discussions following this section present the different developmental approaches that have informed education in its

diverse provisions. This is to highlight the key tenets of the various approaches to development and their implications for relevance in the design and development of the tertiary TVET curriculum.

Traditional Approaches to the Concept of Development

Conventionally, the dominant view of development utilized per capita Gross National Product (GNP) or Gross Domestic Product (GDP) as the measure of a country's development (Sant'Ana, 2008). Economic growth was used as a proxy for development due to the notion that the growth of the economy produced and freed resources that could benefit the whole society either by market-driven effects or by state-driven social policies (Edewor, 2014). Consequently, policies that led to growth were considered pro-developmental and inherently good as individual states sought to produce wealth that were considered to attain the measure of growth aspired for (Alkire, 2010). The conventional view of development advanced by Sant'Ana observed, can therefore be likened to the use of income as a proxy for utility in economies, where utility refers to the individual's mental state of satisfaction following a specified activity that sought to address specific needs or desires.

Wealth-based notions of development are, however, limited by; (i) the concealment of disparities of wealth within societies when per capita income is over-emphasized; and (ii) the elusiveness of some 'good', particularly in the cultural sense, when quantitative methods are employed (Sant'Ana, 2008). Such limitations suggest that income cannot be the sole indicator for development. Over time, income ceased to be considered the only means of obtaining utility, although it continued to be the preferred indicator of growth since it is comparatively measurable in terms of quantifying effect on

economies (Alkire, 2010). The failures of the growth-based policies like the Structural Adjustment Programmes of the multi-national bodies like the World Bank and the IMF for some heavily indebted less developed countries in the 1980s however caused the need to consider other developmental approaches (Sant'Ana, 2008). The human capital, sustainable development and capability approach are the approaches that have generally dominated the TVET sector (Tikly, 2013).

The Human Capital Approach

From the traditional growth-based orientation in development, the human capital approach emerged as the dominant paradigm in the West until the 1990s (Unterhalter, 2009). Two pioneers of this approach, Schultz and Becker (cited in Savvides & Stengos, 2009), assert that the human factor in production impacts more on economic growth than the mere presence of accumulated physical capital. Thus, educating labour with the requisite skills for industrial purpose begun to be considered the surest means to increase yields in production to subsequently lead to improvement in the general growth and development of societies (Unterhalter, 2008).

Education in the human capital approach is therefore conceived as an instrument for economic growth (Alkire & Deneulin, 2009). The success of the Human Capital Approach, is based on decisions informed by research in rates of returns on different types of education and gaps in the labour front (Unterhalter, 2009). Unterhalter adds, aid in monitoring and directing of the productivity of the labour force, as well as the economy's capacity to grow.

Contemporary Approaches to Development in TVET

Sustainable Development

In the 1980s, sustainable development emerged as a more morally-based concept that sought to develop “a human-centred response to globalisation based on principles of environmental, economic and social sustainability” (Tikly, 2013, p.14). Building on UNESCO’s Man and the Biosphere Programme of 1971, sustainable development asserts that development should aim at meeting “the needs of the present without compromising the ability of future generations to meet their own needs” (Redclift, 2005, p. 213). Hulse (2007) also, defines sustainable development as the intent that implies that, “a process or activity will progress prudently and efficiently, with economic and benign use of resources; and that it will be unlikely to inflict insult or injury to the health and welfare of humans... the ecologies...in which they exist” (p. 2). The concept of “sustainable development”, Redclift and Tikly claim, became the first global articulated concern and effort to address the environmental aspects of development after its first use in 1987s Brundtland Commission’s Report.

Sustainable Development is however challenged, especially in establishing what its exact constituents are, due to the fact that “needs” is a problematic notion that constitutes different things for different societies; thus, lacking a universal and timeless definition (Hulse, 2007). It is against this background that Brand (2012) and Tikly (2013) ascribe the words, “oxymoron” and “vague” to the concept of sustainable development. Prominent among the areas that the concept of sustainable development is challenged, include; the determination of resource requirement of future

generations in order to inform the amount and type of resources that the present generation can assess or require to meet their needs without compromising the needs of future generations; and a society's definition of its "needs" does not only exclude that of others, but is usually oblivious to the effect of choices made on other societies. In addition, the diversified interests of different groupings in the society also challenge the attainment of sustainable development (Redclift, 2005).

This lack of a roadmap in determining and attaining sustainable development, Tikly (2013) and UNESCO/UNEVOC (2006) asserted, renders the approach to be susceptible to top-down prescriptive process. Hulse (2007) however proffered changes in human attitude and behaviour at the personal, community and workplace levels if sustainable development is to be achieved. These behaviours, are usually reflective of taken for granted patterns of everyday behaviour or commitments, which ultimately increases the long-term risks of sustaining other people's livelihoods (Redclift, 2005). Lifelong-learning and Greening Economies are two prominent strategies that have gained some prominence in the concept of sustainable development (Fien & Guevara, 2013; Lewis, 2009; Maclean, 2007). Currently some Western and Asian-Pacific nations have adopted life-based learning and greening economies than the general concept of sustainable development, because of the definite focus these two present to the society (Redclift, 2005).

Life-long learning or life-based learning is reflexive, self-facilitated and adaptive in utilizing appropriate strategies for individual task (MacLean, 2007). At the educational level, life-based learning requires personal responsibility for learning through the provision of rich learning environments

that seek to equip the individual with skills for self-studying and ability to define and resolve problems without supervision (Longworth, 2003). Life-based learning therefore becomes an ideal model for performance, growth and opportunity where learning is beneficial to the individual, organizations and the society at large. Current discourses surrounding the TVET sector argue for life-based learning that focuses on developing not only skills or capabilities, but also the totality of the person (Lewis, 2009; Staron, et al., cited in Maclean, 2007). Dominant among the models underpinning life-long learning has been the Competency Based Training/Learning or Education.

Competency generally refers to the possession of certain attributes like skills; knowledge and understanding; sets of values, beliefs and attitudes which leads to effective managerial performance in a given context (Cheetham et al., cited in Prins, Nadolski, Berlanga, Drachsler, Hummel & Koper, 2008; Woodhall & Winstanley cited in Kouwenhoven, 2003). To this end, competence is; context-bound; indivisible (where knowledge, skills and attitudes are integrated); subject to change; connected to activities and tasks and; require learning and development processes (Biemans, Nieuwenhuis, Poell, Mulder & Wesselink, 2004). An essential aspect of competency is one's capability to choose the right attribute at the right time after some reflections (Kouwenhoven, 2003).

Greening economy from another vein, seeks to improve "... human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (Fien & Guevara, 2013; p. 256). By application, greening economy seeks to reduce carbon emissions, whilst focusing on the social and efficient use of resource (Brand, 2012). Fien and Guevara (2012)

thus expatiate that greening economy seeks to; (1) have widespread respect for, and costing of ecosystem services to reflect a policy of living-off the interest on natural capital; (2) not to borrow our share from future generations; (3) de-materialize agricultural and industrial processes to drastically reduce energy; (4) restrict the rate of resource depletion; (5) reduce pollution and waste through the efficient use of energy; (6) mitigate carbon dioxide emissions into the atmosphere to address human-induced contributions to global warming; and (7) insist on social equity and inclusion through clean and decent jobs.

For educational purposes, greening economy simply, aims to equip workers and workplaces with the requisite competences to work with an environmental consciousness that enables an assessment of the impact of their actions on the environment prior to and during the process of working (Brand, 2012). By extension, the concept of sustainable development and its variants generally relies on reflexivity and critical in its operationalization.

Capability Approach

The Capabilities Approach, which was advanced by Amartya Sen in the 1990s hinges on the “... idea of opportunity to achieve valuable combinations of human functionings- what a person is able to do or be” (Sen, 2005, p. 153). Drawing from both classical and contemporary schools of liberalism like Aristotle’s “Classical Political Economy”; Adam Smith’s “necessities and living conditions”; Marx’s “human freedom and emancipation” and; Rawls’ “theory of justice”, the capability approach argues that inasmuch as the attainment of wealth and self-fulfillment are important for human development, they are not ends in themselves; rather, their significance lies in

the extent to which people are effectively able to do and to be in their utilization of these wealth and happiness (Sen, cited in Robeyns, 2003; Tikly, 2013). Robeyns therefore asserted that, “well-being and development should be discussed in terms of people’s capabilities to function, that is, on their effective opportunities to undertake actions and activities that they want to engage in and be whom they want to be” (2003; p. 6). According to Clark (2006) and Robeyns (2003), functionings are the use a person makes of the commodities at his or her disposal, and these commodities include access to food and shelter, access to school and work, being literate, healthy, respected and a member of a fraternity or group.

The capability approach, therefore, “resists an over-concentration on means (such as incomes and primary goods)” and focuses on “the parametric variability in the relationship between the means and the actual approach ...” (Sen, 2005; pp. 153-154). Robeyns (2003), Tikly (2013) and Unterhalter (2008) therefore describe the capability approach as a broad moral and normative framework or tool to conceptualize and evaluate phenomena like well-being, poverty, and other social arrangements. In other words, inasmuch as freedom to achieve well-being is of primary importance, understanding people’s capabilities, that is their real opportunities to do and be what they have reason to value is equally important to determine people’s freedom to achieve well-being.

Unlike earlier approaches to development, the capability approach expatiates on elements that underpin both extrinsic and intrinsic satisfaction of the individual in deriving societal functioning. This satisfaction of the individual, otherwise referred to as effective freedoms, is derived from

accessing the commodities like health care, education and recreational facilities (Fukuda-Parr, 2003). Access to these commodities are 'developmental' since they permit individuals to lead longer, freer and more fruitful lives, as well as promoting productivity and economic growth (Sen, 2005). To this end, Nussbaum (2012), a former student of Sen, generated 10 "basic capabilities" that she considered to be "...central requirements of a life with dignity" (p. 7). Sen however, objected to a canonical listing such as Nussbaum's, and rather advocated for public dialoguing to derive the capability listings for individual contexts, since relativity in weights and importance of different elements maybe lost in a universally applied listing (Fukuda-Parr, 2003; Sen, 2005).

Nussbaum (2003) rebutted Sen's position with the argument that her basic capability is not canonical in implementation, but basic to the more advanced capabilities that individual contexts may identify and add. To explain, Nussbaum (2012) cited examples like the right to advertise can culminate in the display of signs like "No Blacks here" and; conjugal rights can be construed to include forced sex in marriage, a list of universal rights in the 10 basic capabilities will render some freedoms that are central to man to be universally accessed. Both Nussbaum (2012) and Sen (2005) concur that the determination of capabilities should not be subjected to the "... whims and caprice or to the dictates of cultural traditions" (Nussbaum, 2003, p. 47).

Of the freedoms, Sen identifies education as crucial to wellbeing because of its intrinsic importance and its ability to enable an individual to function as desired (cited in Walker, 2006). Education in the capability approach thus fulfills the three major roles of:

- (1) Instrumental in society in that, public debate and dialogue about social and political arrangements is fostered through literacy;
- (2) Empowering; such that, one's capacity to participate in decision-making processes at the household, community or national level is facilitated; and
- (3) Redistributive; in enabling the disadvantaged, marginalized and excluded groups to be organized in a political sense to make a case for the redistributive effects, since such groups, without education, are usually challenged in accessing centres of power (Sen, cited in Tikly, 2013)

The drive and the purpose of educational provision in the capability approach consequently assume a social justice position as education becomes more of a right than a privilege (Unterhalter, 2009). Individuals in the society, depending on their interest, are therefore provided with a variety of pathways to pursue. Resource allocation to students, for example, ceases to be as important as the ability of each individual to convert what is available into valued capabilities (Walker, 2006). Generally, the Liberal underpinning of the Capability Approach has rendered the approach to be interdisciplinary in its application (Robeyns, 2003).

Ghana's educational system and the developmental approaches

The human capital approach has generally dominated Ghana's education system. From the World Bank's Structural Adjustment Programmes for developing countries that Ghana signed unto in the 1980s, the nation's education sector, especially the tertiary educational policies have continued to be framed as the surest means to attain economic growth (Bloom et al., 2005;

Nordensvard, 2013). According to Bawakyillenuo et al., (2013), Ghana's policy documents like her, Medium-Term National Development Policy Framework 2010-2013; Ghana Shared Growth and Development Agenda; and the Ministry of Finance and Economic Planning seek to link her tertiary educational systems to the needs of the industry for accelerated development. It is against this background, Bawakyillenuo et al., add, that the National Council for Tertiary Education (NCTE) ranks tertiary institutions based on the relevance of their programmes to national development and income generation.

In addition to the adaptation of the principles of the human capital approach, Ghana has also sought to implement sustainable development principles after signing unto the United Nations (UN) Conference on Environment and Development (UNCED), 1992; UN Millennium Declaration, 2000 and the New Partnership for Africa's development (NEPAD), 2001 (cited in Winkle, Spalding-Fecher, Mwakasonda & Davidson, 2002; Republic of Ghana, 2012). Currently, Ghana is a signatory to the sustainable development goals (SDGs), also known as the Global Goals, of 2016- 2030 (United Nations Communication Group (UNCG) in Ghana & Civil Society Organizations (CSOs) Platform on SDGs, 2017). Whereas, NEPAD is the African Union's version of sustainable development, which sought among others, to eradicate poverty, promote sustainable growth and development, and integrate Africa into the world economy; the SDG is at the UN level, and it seeks among other things, to reduce inequalities, break cycle of poverty, foster tolerance, attain gender equality, and empower people to live healthier lives

and attain productive livelihoods (Lal, 2017; UNCG et al., 2017; Winkle et al., 2002).

Currently, Ghana is aligning her policies to achieve the SDGs; but, education has been made a goal, as well as a means to attaining all the other SDG goals (Bawakyillenuo et al., 2013; UNCG et al., 2017). At the tertiary education level, the measures to attain the SDGs, include, improved access and quality of education; inclusiveness; promoting TVET; encouraging private participation in resourcing educational institutions, especially TVET; bridging the digital divide to foster innovation and entrepreneurship; learning of ICT; interconnectedness and indivisibility of policies; making national and local institutions accountable to stakeholders; multi-stakeholder participation; and participating in dialogue sessions (Lal, 2017; UNCG et al., 2017; Winkle et al., 2002)

Emerging issues on the concept of development for the tertiary TVET curriculum

The discussion on the concept of development reveals that the tenet of each developmental approach seeks to address some specific needs, although there may be overlaps in the tenets espoused. In terms of needs, whereas the conventional approaches prioritize wealth creation; sustainable development has the environment in which the individual lives as its major concern; whilst capability approach prioritizes the wellbeing and what the individual considers as capabilities to function (Fukuda-Parr, 2003; Redclift, 2005; Sant'Ana, 2008; Sen, 2005; Nussbaum, 2003; 2012). Different developmental approaches are therefore available for societies to adopt, depending on their defined needs.

The tenets of the developmental approaches also reveal some over-laps in their concerns. For instance, both sustainable development and capability approach seek to empower the individual; ease access to resources; and facilitate inclusiveness and participation (Fukuda-Parr, 2003; Redclift, 2005; Sen, 2005; Nussbaum, 2012). Also, education is perceived as an enabler of all the approaches to development; whilst the individual (human being) is considered as an agent in the process of attaining development (Unterhalter, 2009). The case of Ghana also shows that different developmental approaches can be employed within a context, as the needs of the society dictates, although one approach may emerge dominant (Bawakyillenuo et al., 2013; UNCG et al., 2017; Nordensvard, 2013; Winkle et al., 2002).

Educational Philosophies Underpinning the Tertiary TVET

Generally, behaviourism and constructivism are the main educational philosophies on which educational provisions are founded. Conventionally, behaviourism guided educational practices until constructivism emerged and paved way for more contemporary educational theories that seek to merge the behaviourist and constructivist traditions. The next section of the chapter presents these dominant educational philosophies and highlights their usefulness to the tertiary TVET sector.

Behaviourism

Behaviourism emerged in America in the 1920s-1960s era of mass education and industrialization (Dietrich & List, 2012). According to Dietrich and List, behaviourism holds that, preferences, beliefs and other mental shades in social-scientific theories are nothing but constructs that describe students' behavioural dispositions. In the behaviourist tradition, what can be observed

and measured becomes the foundation for scientific inquiry, while ideas, mental construct and emotions count as explanatory factors that are related to human actions (Neergaard, Tanggaard, Kruegar & Robinson, 2012). Learning in behaviourism, therefore, aims to change behaviour as one reacts or operates in relation to environmental stimuli (Neergaard, et al., 2012; Schubert, Schubert, Thomas & Carroll, 2002). Learning in behaviourism is demonstrable and has "... a mechanistic view of the world in which man is a reactive, passive robot that responds predictably and unthinkingly to stimulation" (Burns, 2002; p. 117).

The student in the behaviourist setting is subjected to reproduction of knowledge, rote learning and quantitative and multiple-choice assessment as performance objectives which provide structure for lesson plans and criterion referencing to measure task (Neergaard, et al. 2012; Schubert, et al., 2002; Popham, 2008). Little room is thus offered for reflection and critical attitude as the behaviourist embraces a mechanistic view of learning that renders the student to be passive, whilst the teacher acts as the repository of knowledge. Behaviourism, therefore relies heavily on the processes of the natural sciences where steps are strictly adhered to in the identification of problems and the search for resolutions (Gibbon, cited in Kouwenhoven, 2003 & Maclean, 2007). Knowledge in the conventional university, Kouwenhoven and Maclean asserted, thus emphasizes timelessness and universality in theory over practice, within the 'ivory tower' approach to search for the truth.

Constructivism

Constructivism, from another vein, emerged with the assertion that learners construct their own knowledge from their experiences (Doolittle &

Camp, 1999). With roots in philosophy and psychology, Doolittle and Camp claimed that, constructivism thrives on an epistemology that stresses on subjectivism and relativism as reality becomes what is only known through experience that culminates in a unique fact for each individual. Meaningful learning, therefore occurs when a learner actively makes sense of reality by conceptualizing knowledge gained- that is the creation of knowledge built on a coherent system, structure, or principle- and tested on retention and transfer (Meyer, 2003). Doolittle and Camp (1999) subsequently pointed out that unlike behaviourism, constructivism acknowledges (i) the activeness of the learner in his/her personal creation of knowledge; (ii) the importance of experience in the process of creating knowledge; and (iii) variations in the degree of validity of knowledge created, since reality is relative to individuals.

From the behaviourist and constructivist traditions emerged other variants of educational philosophies to include Meyer's cognitive, social and radical constructivism and Toohey's traditional or discipline-based approaches; performance or system-based approach; cognitive approach; personal relevance or experiential approach and; socially critical philosophies (Scott, 2004; Peach, 2010). In Toohey's discipline-based approach, the design and the content of the curriculum are determined by the structure of knowledge and modes of inquiry in the discipline, where objectivism which hardly considers students' (societies') interest or needs; breadth in the selection of content for the curriculum and; timelessness and universality in knowledge acquired are prioritized (Kouwenhoven, 2003; Maclean, 2007; Peach, 2010). The content and design of the curriculum in the performance or system-based approach is based on research findings from related professional

practice. This seeks to dictate skills, knowledge and factors that are considered critical to the effective performance of the graduate especially on the field; thus theory is taught to inform practice (Peach, 2010).

In contrast to the discipline and performance or system-based approaches, Toohey's (cited in Peach, 2010) cognitive approach seeks to develop the intellectual ability of students in order to enable them to become deep thinkers and problem solvers. Knowledge in the cognitive approach is therefore perceived to be personally and socially constructed from interactive small groups. Peach notes that Toohey's experiential or personal relevance approach, on the other hand, is premised on the notion that learning must, through experiences, be of significance to the learner. Students are therefore permitted, based on their interests, to determine within specified boundaries the content of their curriculum.

The educator's role in the experiential approach thus includes guiding the student to reflect on their individual, social and professional needs; identifying and selecting the knowledge and skills that are associated with the intended profession; and leading the student to several real-life experiences or situated learning. The last on Toohey's taxonomy as espoused by Peach (2010) is the socially critical approach, which is rooted in critical theory that aims to expose those covert values that influence and shape societies and institutions, and also to challenge student's views and preconceptions. A socially critical y-shaped curriculum, as its name suggests, intends "to develop a critical consciousness in students so that they become aware of the present ills of our society and are motivated to alleviate them" (Peach, 2010; p. 454).

Behaviourism and Constructivism in TVET

TVET provision has mainly been dominated by the behaviourist tradition (Ebert, 2009; Marquis, 2016; Stevenson, 2003). TVET has however continued to be challenged in terms of developing, adapting or redesigning strategies to address the changing needs of the worker and the society (Marquis, 2016; Rojewski, 2009). From this vein, advocates like Singh and Athavale (2008) argue that constructivism is best placed to deliver the content of knowledge in TVET more comprehensively than behaviourism. Constructivism for TVET can however be challenged by the requisite more intensive planning and support to curricular content, preparedness of teachers to new knowledge, and the availability of resources (Ebert, 2009).

Others like Ebert (2009), Rojewski (2009), and Marquis (2016) however argue for a combined behaviourist and constructivist theory since they best complement each other to offer a more comprehensive foundation. Ebert (2009) and Marquis (2016), for instance, indicate that the higher order of thinking, problem solving and collaborative work skills required of the modern and future workforce is addressed by both the behaviourist and constructivist traditions. According to Sutton (cited in Ebert, 2009), whereas behaviourism has, for instance, facilitated, among others, the development of important instructional technologies like instructional software and computer-assisted instruction to organise and guide knowledge delivery and assessment; drill and practice tutorials; and memorization; constructivism, basically seeks to develop interactive problem-based environment in which the student actively explores and generates resolutions. Drill and practice tutorials and memorization in behaviourism are, for instance crucial to the development of

higher-level thinking and problem-based learning in constructivism (Ebert, 2009).

Moreover, TVET is not only concerned with job-skill acquisition (Marquis, 2016; Rojewski, 2009). According to Green, (cited in Marquis, 2016), in response to criticisms against the general attitude of workers in the USA, the USA Secretary’s Commission on Achieving Necessary Skills published that, everyone in the workforce should possess the range of skills listed in Table 1.

Table 1: Requisite Skills for Employment

Basic skills	Thinking skills	Personal qualities
Reading	Creative thinking	Responsibility
Writing	Decision making	Self-esteem
Mathematics	Problem solving	Sociability
Listening	Knowing how to learn	Self-management
Speaking	Reasoning	Integrity/honesty

Source: Green (cited in Marquis, 2016; p. 4).

Thus, regardless of the traditions underpinning educational provisions, students, the future workforce, are expected to be equipped with the list of skills in Table 1.

In Ghana, several documents like, GoG (2002), Ministry of Education [MoE] (2014), and NCTE (1998; 2014), have reported that the tertiary polytechnics have been dominated by the behaviourist tradition since inception. According to the Report of the Technical Committee on Conversion of the Polytechnics in Ghana to Technical Universities (MoE, 2014),

Polytechnic education emphasises the application of knowledge rather than the search for new knowledge. The thrust of polytechnic training is, therefore, on the acquisition of the relevant skills required to perform specific professional tasks without ignoring the underlying theoretical knowledge necessary for a proper understanding of the tasks to be performed (p.3)

The quote confirms that much attention has been given to the acquisition of skills for employment. These reports also indicate that from inception, Ghana's polytechnics have continued in the behaviourist tradition when advancing societies have adopted hybrid traditions that can cater for their different needs.

Summary of theories underpinning the tertiary TVET curriculum

From the presentations, the factors that led to the development of the tertiary TVET challenge the strict adherence to either one approach to development and educational philosophy (Bawakyillenuo et al., 2013; Marquis, 2016; Nordensvard, 2013; Peach, 2010; Stevenson, 2003; UNCG et al., 2017; Walker, 2006; Winkle et al., 2002). This is because the diversity in social needs requires the drawing on of principles and knowledge from across the concept of development and philosophies of education to enable a holistic resolution to problems identified. It is against this background that Toohey combines different approaches in his socially underpinning educational models that seek to equip students with skills for industrial performance, as well as deep thinking and intellectually engaging abilities to identify and resolve various social problems.

Apparently, the outcome of each educational philosophical approach is social-developmentally implied; thus, finding its associations in the dominant developmental approaches in the TVET sector. For instance, whereas the performance or system-based approach resonates with the growth-based approaches that seek to train labour for increased productivity, the cognitive approach resonates with tenets of contemporary developmental approaches like Sustainable Development and Capability approaches that draw heavily on critical thinking and reflexivity for effectiveness. A merger of the philosophies is therefore an imperative if the multi-faceted nature of social needs is intended to be addressed. The next presentations of this section cover the three crucial issues of quality assurance, cost implications and funding, and social traditions that have influenced the development of the tertiary TVET.

Quality and Harmonization

The inclusion of services, which includes educational provisions, to the operations of General Agreement on Trade in Services (GATS) of the World Trade Organisation in 1995 gave impetus to the formation of assurance systems in higher education worldwide to address issues of quality and harmonization (Materu, 2007; Tilak, 2002; Varghese, 2009). The International Network for Quality Assurance Agencies in Higher Education (INQAAHE) had been established in 1991; within which are regional block systems like the Bologna and the Copenhagen Process of Europe and the Asia Pacific Quality Network (APQN) for Asian and Pacific nations and the Association of African Universities' (AAU) Quality Assurance. The focus of these blocks has been to make higher education more compatible, comparable and competitive, as well as harmonizing qualifications across member states through the promotion and

the sharing of knowledge and experiences, and influencing policy reviews (Santiago, et al., 2008).

In Africa, the Association of African Universities' (AAU) Quality Assurance block advocates for and convenes leaders, policymakers and development partners in tertiary institutions in the continent on issues of quality assurance (Materu, 2007). The roles of AAU thus include: supporting member institutions to develop strong internal quality assurance mechanisms; supporting existing and emerging quality assurance or accreditation agencies to develop capable external evaluation and monitoring systems within national higher education institutions; forming a body of self-evaluators and peer reviewers; and implementing a regional framework to recognize studies, certificate, diplomas, degree and other academic qualifications across higher education institutions in Africa (Hayward, 2006; Materu, 2007).

The introduction of quality assurance into the tertiary education sector is rooted, among others, in the need to ascertain quality in the increasing access and cost to higher education; and harmonization of qualifications (Lingenfelter, 2012). The emergence of the tertiary TVET led to increasing access and cost to higher education; academic standards became a concern, especially where governments ceased to be the sole financier of education, as student/parents and industries began to share in the cost of training (Hayward, 2006; Lingenfelter, 2012; Santiago, et al., 2008). Quality assurance practices therefore became imperatives to ascertain that standards, especially of the industry, are ensured, and to sustain the high in-flows of monies from the various sponsors (Hayward, 2006; Materu, 2007).

In terms of harmonization, the tertiary TVET had been challenged in reconciling the different qualifications and contextualized knowledge and skills that had characterized the sector (Ng'ethe et al., 2008). A harmonized qualifications framework between the tertiary TVET and the conventional university has generally been resisted in different societies, due to the perceived dichotomies between the two traditions (Pratt et al., 2004). According to Pratt et al., Prior to the emergence of the tertiary TVET, the university had developed a widely recognized qualifications scheme that the tertiary TVET has not been permitted to employ in most societies.

In Finland, for example, the universities vehemently opposed the adoption of the “Masters” qualifications by the polytechnics; although these polytechnics had long adopted lesser traditional qualifications like “certificate” and “Bachelor” degree before 1992 (Pratt et al., 2004). A similar instance can be cited of Ghana following the establishment of her first science and technological university. According to Ajayi, Lameck, Goma and Ampah (1996), the premiere University of Ghana, Legon and its graduates had the monopoly of controlling the affairs of the nation; as such, they resisted the use of the conventional university’s qualification framework by the University of Science and Technology (UST) at its inception. Ajayi et al. explained that, the qualifications of the initial first-degree cohorts were not recognized; these first cohorts were rather classified as high school graduates in terms of placement and salary at the workplace until the presidency intervened.

The quality assurance agencies at the various levels have therefore sought to assess and accredit institutions and their programmes; monitor the performance of institutions accredited; and advise government on quality

issues (Hayward, 2006). Quality assurance practices in Africa have, however largely remained within individual nations than at the regional block, spite of the AAU's efforts; the *Communitate Economique et Monataire de L'Afrique centrale* (CEMAC) of central Africa, for instance, does not have a policy for harmonization and standardization of tertiary education qualifications among member states (Materu, 2007). At the higher education institution level, some of the quality assurance practices have continued to include, the screening of candidates for admission; staff recruitment and promotion procedures; curriculum reviews; teaching and learning facilities; evaluation of research; policy development and management mechanisms; students evaluation of staff; engaging external examiners for end-semester examinations; tracer studies and; academic reviews and audits (Hayward, 2006; Materu, 2007).

Cost Implications and funding of the Tertiary TVET

Psacharopoulos (cited in Oketch, 2007), posited that, the cost of operating a TVET system is three times the amount spent on academic programmes. The higher cost implied in operationalizing the tertiary TVET curriculum is because of the different settings and the requisite resources to deliver its multi-disciplinary content of knowledge and skills (Eraut, 2004; Varghese & Puttmann, 2011). However, African countries have been challenged in funding the TVET sector, especially, as a result of most governments' and their development partners' reducing support to the sector (Maclean, 2007).

At inception, the TVET sector had attracted 40% of the World Bank's first monetary support to education in the 1960s (Tikly, 2013). This World Bank huge support was preceded by the full display of the USA's

technological prowess in World War II, which caused President Truman to invite the rest of the world to experience the new revolution in education (TVET), when he said “I believe we should make available ... the benefits of our store of technical knowledge in order to help them [*the world*] realize their aspirations for better life” (King & Palmer, 2010, p.71). Emerging studies of the 1960s, prominent among which were Friedman, Becker and Mincer’s Cost Benefit Analysis (Bloom et al., 2005), and Foster’s *The Vocational School Fallacy*, however questioned the benefit of TVET and tertiary education to the society.

Whereas, Cost Benefit Analysts asserted that, less benefit is accrued to the tertiary level of education than at the basic level, Foster’s study suggested that neither academic nor TVET had been proved to directly develop societies. With tertiary education being perceived as an expensive that largely benefited the wealthy and privileged and TVET as an inefficient public service, convictions over the benefits of TVET and the tertiary began to be disputed as governments and her development partners like the World Bank began to rethink their commitment to the tertiary TVET sector (Bloom et al., 2005). The economic crises of the 1970s and 1980s in less developed nations, confirmed the convictions of the advocates of cost benefit analysis which consequently lead to the introduction of cost-sharing measures (Lingenfelter, 2012; Oketch, 2007). In spite of the challenge of funding, the tertiary TVET experienced a phenomenal increase in students’ enrolment to the point that between 1970 and 2007 alone, the global student enrolment for the sector saw an increase from 28.1 million to 150 million (Lingenfelter, 2012; Loo, n.d; Varghese & Puttmann, 2011).

In Ghana, the government ceased to be the sole financier of tertiary education following the 1970s and 1980s economic crises; advocacy for the Cost Benefit Analysis theories and disputed significance of TVET to social development (Akyeampong, 2007; Owusu-Agyeman, 2006). Aidoo-Taylor (2009), however argued that, in reality, the Ghana government's capacity to fund education was more challenged by fiscal issues and educational access policies than convictions from emerging studies. Regardless of the reasons, allocations to the tertiary education and the TVET sectors reduced drastically, as the government of Ghana continued to allocate less than 12% of the total recurrent education budget to the tertiary education sector (Atchoarena et al., 2002; Girdwood, 1999; Owusu-Agyeman, 2006; UNESCO, 2004). Comparatively, the polytechnic sector has been the worst hit, as the combined budgetary allocations from the tertiary and TVET education sectors has continued to constitute one percent (1%) of Ghana's total education spending (Akyeampong, 2007; World Bank, 1995).

Trends in government's budgetary allocation by levels of education from 2004 to 2009, for example revealed that whereas, basic education had between 51% to 52%; the tertiary education had 21% to 20.6%; whilst TVET attracted between 1.01% to 1.8% (Republic of Ghana, 2010). In terms of unit spending per head, government's spending trend on tertiary students revealed that in 1990 when \$2100 was allocated to the university student, \$168 was given to the polytechnic student; in 1998, when \$74 went to the polytechnic student, \$900 was allocated to the university student; then in 2005 when \$1000 was allocated to the polytechnic student, \$2500 was paid on each university

student (Nyarko, 2011). Clearly, as compared to the university, funding to Ghana's polytechnics has remained unimpressive.

Traditions Driving the Tertiary TVET Curriculum

Socially, Kirchberger (2008) identifies two main attitudinal traditions that underpin the provision of the tertiary TVET in different societies, which are: 1) Strongly structured and considered as key to training system; and 2) socially discredited. The German and the USA TVET systems are typical examples of the first category, where sociological and civic undertones characterize the pragmatic forms of education these nations developed following their independence in the 18th and 19th century (Lewis, 2009). In order to industrialize and develop their societies, German and American TVET systems have been oriented towards social ideologies that unite propositional and practical knowledge through practical experiences (Benavot, 1983; Kirchberger, 2008; Lewis, 2009). Based on Christopher Winch's liberal educational thoughts, German TVET, for example considers work to be central to social development, thus the holistic development of the individual, especially in relation to social values, laws, moral, religion and the state, is pursued (Lewis, 2009).

Similarly, USA TVET also relates academic subjects with the progression of societies to the extent that Dewey and Snedden (cited in Lewis, 2009), argued for schools that reflect movement in society at large as students gain industrial intelligence. In effect, Dewey cited in Lewis, urged that the TVET students must challenge the status quo by critically assessing problems in societies prior to any effort to improve the society. In the Orient, the success of industrialized nations like Japan, China and Korea have also been attributed

to the incorporation of TVET and academic programmes into their tertiary education system, of which research constitutes a major component (Di Gropello et al., 2012; Santiago et al., 2008).

The TVET discrediting societies “...are antagonists who do not see work as the basis of anything ennobling, and on that count cannot see a place for vocationalism in the curriculum; for episteme, not *techne* should underpin schooling” (Lewis, 2009; p. 558). The British and Finnish present two typical cases for Kirchberger’s (2008) second category. These two nations have continued to couch their TVET policies as education for the less in the society (Pratt, 1997; Pratt et al., 2004; Wolker, 2004). In Britain, for instance, the polytechnics were the alternative tertiary education for the working and lower classes Pratt (1997). The British, however, converted most of their polytechnics into universities in 1992, when it became obvious that the Binary system (university and polytechnic system) was perpetuating social stratification (Pratt, 1997). These 1992 British universities continued with their vision as before, by developing significant relationship with successes at the workplace and tertiary education and, widening the criteria for admissions to include qualifications the universities would not consider for admission (Barnett & Coate, 2005; Pratt, 1997). The British, according to Maclean (2007) and Pratt (1997), have however continued to consider it more reasonable to invest in the development of general and personal transferable skills than specific employable skills of the former polytechnic institutions.

In the case of Africa, Ng’ethe, et al. (2008) report that most nations have continued to perceive TVET as the education for the less academically inclined. In a study of seven African countries, Oketch (2007) observed that

for over 20 years TVET has been perceived as inferior to general education, due to its continued framing as a tool to enhance the employability of the under-privileged and the academically disinclined in the society. This negative attitude of Africans towards TVET has been associated with the colonial legacy of subjecting the African to do the manual work that the European detests (Graham, 1971). In contrast to the contemporary African's aversion to TVET, tradition had had it that vocationalism constituted a major component of skills to transit from childhood to adulthood (Mbiti, 1999). According to Mbiti, graduation from the indigenous informal system of education was marked by puberty rites that also marked the society's recognition and acceptance of the young adult as one that has acquired the necessary vocational skills, values and emotional foundation for a successful adult life. Male children, in particular were presented with tools and capital of the trade they had trained in, in order to establish themselves economically (Okrah, 2003; Sackey, 2006).

The eras of slavery and the colonization of the Africans by the Europeans witnessed the use of manual work as not only a means to compel the African to do the bidding of the European, but also to abase the African as among the least in a class-based society. For instance, prior to the introduction of the first British colonial educational policy in 1839, Sir Buxton, the then Minister of education for the British colonies urged the missionaries to replicate in the colonies the education offered to the working and lower classes in Britain by making "... the 'plough' and 'spade' go together ..." (Graham, 1971; p. 590). This statement was offered to support the introduction of TVET subjects into the existing missionary grammar-based education offered to the

Africans. The manner, in which TVET was introduced to the African by the European, consequently altered the African's perception about TVET negatively to the extent that the educated Africans developed an aversion to "this low class-based" education. For instance, Graham (1971) and King (2009) asserted that the elites who led the struggle for independence insisted on the pursuit of the same kind of education as their European elites, so as not to frustrate aspirations of social and political equality with their former colonizers.

Currently, Lewis (2009) blames the stereotyping of TVET in less developed countries on the multi-lateral agencies and their officers who have continued to assume a hardened epistemological stance against the subject and informed decision to advance monetary support to the sector. With a heavy reliance on support from development partners for their educational systems, most African nations have permitted the dominance of the ideological inputs of these multi-lateral agencies, to which they tie their support to the sector (Powell, cited in Lewis).

The stereotyping of the TVET sector also pertains to the Ghanaian context, as her polytechnics have been subjected to perceptual issues from inception (NCTE, 2001; 2014). According to NCTE (2014), the discourse surrounding the relevance of Ghana's polytechnic curriculum, for instance, had been due to the non-clarity in the understanding of the role and the nature of the polytechnics by many, including the polytechnic staff and students. During the first few years of the polytechnics, agitations had centred among others, around the recognition of the Higher National Diploma (HND) through access to avenues for academic progression and appropriate placement of

polytechnic graduates in the Public Service (NCTE, 1998; 2014). Currently, the agitations have subsided, yet, MoE (2002) and NCTE (2014) report that, some individuals in decision-making positions still cannot appreciate the philosophy and orientation of polytechnics education; thus, treating the polytechnics as junior universities. Stevenson cited in Education International (2009), actually observes that;

wherever one looks, ... the vocational is at the bottom of a hierarchy of knowledge... a stream of learning available to the “lower achiever”, it is governed in a paternalistic way with highly circumscribed degrees of freedom over content and process, it is legitimated solely in industrial and other utilitarian terms, rather than in the connections among different kinds of meaning making, and it is preserved for occupations of lower status (2009; p. 5).

In sum, regardless of the introduction of quality assurance strategies to address issues of quality, funding, and harmonization, the negative attitude toward TVET has remained a global phenomenon in spite of its apparent benefits in societies like Germany, USA and Japan (Di Gropello et al., 2012).

The Nature of the Tertiary TVET Curriculum

As discussed in the preceding paragraphs of this chapter, the tertiary TVET seeks to be responsive to the needs of the society by bridging the gap between the academic and the TVET traditions. Consequently, a multi-stakeholder participation; contextually-based defined needs; flexibility in students' admissions and; multi-disciplinarity in content of knowledge; resourcing and; quality assurance practices that seek to ascertain standards in the operations of the sector are implied in the tertiary TVET curriculum

(Eraut, 2004; Maclean, 2007; Rojewski, 2009; Stevenson, 2003). This section of the chapter highlights on these key features of the TVET curriculum, in order to know some of the features to explore in the design and development of Ghana's HND Electrical and Mechanical Engineering curriculum.

Multi-Stakeholder Participation

The representation of stakeholders from different groups in the design and development of the tertiary TVET curriculum culminates in the diversion from the "Ivory tower" approach of the university tradition (Maclean, 2007). Prominent among the work of multi-stakeholders in curriculum design and development include; the definition of social needs which are considered critical to the development of the society; and designing and developing a curriculum plan requisite to address identified needs (Marsh & Willis, 2007).

Context-Based Needs and Content of Knowledge for the Tertiary TVET

Unlike the university's academic freedom that permit individual teachers to determine the content of knowledge they intend to pursue for their students, the vocational curriculum planned, managed and controlled in order to ascertain the delivery of its content in sequence and to satisfy standards (Bowers, 2006). The TVET curriculum has therefore been "... prescriptive and imposed, fixed and outside the classroom..." (Bowers, 2006, p. 12); whilst the focus of TVET on market forces has rendered its programmes to aim at the popularity market, whilst little attention is given to critical and analytical skills "... that are needed to stand a student in good stead in the real world" (Manga, cited in Bowers, p.13).

Currently, the tertiary TVET curriculum seeks to be responsive to some identified need in its context of application, if it seeks to be relevant (Darby-

Hobbs, 2011; Peach, 2010). Different needs underpin the provision of the tertiary TVET in different societies; thus, the differences in the developmental approach or approaches adopted by societies (Mouzakitis, 2010). For instance, whereas the wealth-based approaches dwell on developing skills for wealth creation, Sustainable Development and the Capability Approaches seek to sustain human lives through environmental consciousness and the advancement of individual well-being, respectively (Savvides & Stengos, 2009; Unterhaider, 2009; Walker, 2006). For a more comprehensive resolution to the society's needs, a combination of developmental approaches has been recommended by Marquis (2016), Stevenson (2003) and Winkle et al. (2002).

Preferred developmental approach or approaches ultimately informs the choice of educational philosophy to adopt; thus, multiple-developmental approaches imply multi-disciplines from across the educational traditions (Ebert, 2009; Rojewski, 2009; Stevenson, 2003; Walker, 2006). It is in light of this that Chakroun (2013) and Peach (2010) argue that no vocationally relevant curriculum strictly adheres to one education philosophy, as consideration is given to different aspects to include the economic, the historical, the social and other disciplines in order to cover the breadth and depth of the objective of a study. It is against such instances that Peach (2010) drew from Young's critical vocationalism and Toohey's socially critical, cognitive and experiential approaches to develop a theory that is intellectually rigorous, vocationally oriented and socially responsive. The tertiary TVET curriculum that seeks to be relevant to the needs of the society must therefore possess a combined developmental and educational philosophical approach.

Delivery of the Content of Knowledge and Assessment

In terms of knowledge, Eraut (2004) outlines that vocational and professional education (TVET) draws on (i) theoretical knowledge; (ii) methodological knowledge; (iii) practical skills and techniques; (iv) generic skills; and (v) general knowledge about the occupation in question. Knowledge in the tertiary TVET is therefore gained from different settings, using different strategies of delivery and assessment. Each approach or ideology has its requisite resources, approaches and settings for the acquisition of knowledge. For instance, whereas growth-based approaches use constructivism to acquire skills in different settings like workshops and shop floors, life-long learning in sustainable development requires the acquisition of cognitive skills and disciplines whilst one is on campus in order to develop self-studying and researching skills without supervision (Unterhalter, 2000; MacLean, 2007).

Flexibility in Students' Admissions' Criteria

In terms of educational background, Lingenfelter (2012), Pratt (1997) and Wolker (2004) observe that whereas the university often relies on secondary level qualifications, such as A Level, as the measure of ability and diligence for admissions, the tertiary TVET accepts students with varied educational qualifications. This diversity in the educational qualifications of applicants into the tertiary TVET, Pratt (1997) indicated, has however been perceived to reflect in the quality of education offered in the sector; thus, the diminishing academic status of the tertiary TVET. To debunk this perception, Pratt cited Tinkler's 15-year study on Electrical Engineering Degree in British polytechnics which established a weak correlation between the entry

qualifications and the performance of students. In other words, Tinkler (cited in Pratt) proved that the difference between students' educational backgrounds have little value as predictors of performance in terminal examinations.

In the case of Ghana, students with comparatively weaker grades and varied educational backgrounds than that of the universities are admitted into HND polytechnic engineering programmes (Dawson, 2005; MoE, 2003). With regards to students from the SSS/STS streams, whereas the universities admit students with passes in the three (3) core subjects and three (3) elective subjects, the polytechnics admits students with credit passes in the three (3) core subjects of Mathematics, English and Science and two (2) elective subjects for her HND programmes (NCTE, 2010). In terms of aggregate score, a student with 24, that is grade D (4) in selected core and elective subjects, should gain admissions into the university; yet, stiff competition has caused the tightening of the cut-off points for admissions (MoE, 2003). Science related programmes, the MoE cites as an example, have a cut-off aggregate of 12 for admissions, which implies an average grade of B (2) in all six (6) subjects. In effect, the SSS/STS student in the polytechnic does not gain admission only on less subject combinations, but also on a less aggregate score than the student in the university.

From 2011, students from the Technical Institute (TI) stream began to be admitted into polytechnic HND programme based on successful passes in the core subjects of mathematics, science and English and Technical and vocational oriented subjects (Association of Principals of Technical and Vocational Institutes (2011). Prior to 2011, TI students could gain admissions into polytechnic HND programmes having passed a one-year access course

that was initially available to SSS/SHS students whose grades were too weak to admission into any tertiary institution (Dawson, 2005; NCTE, 2013). Just like the British and Finnish context, NCTE admission's requirement into Ghana's HND polytechnics considers a wide range of qualifications from applicants.

Diversity in Pathways

In order not to inconvenience the working classes the tertiary TVET is generally characterized by a diversity of pathways. According to Pratt (1997), the British polytechnics, for instance, had such flexibility that they offered both regular and part-time programmes that utilized modules to enable individuals with different needs access higher education at their convenience. Students could also select and combine courses that resonate with their different backgrounds and needs and to cover different levels at a flexible pace. Figure 2 illustrates the nature of the tertiary TVET as informed by its social developmental inclination and its implications for the sector's curriculum.

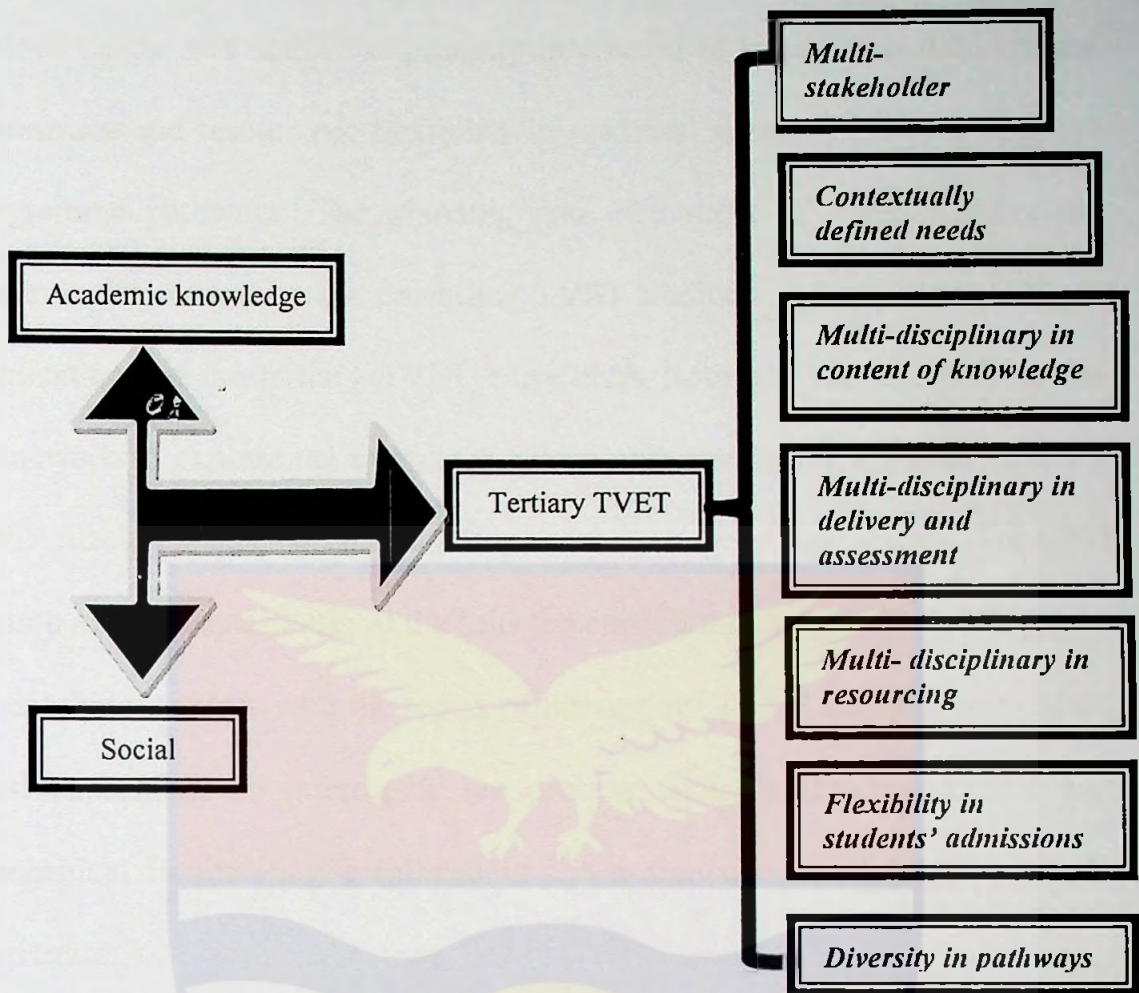


Figure 2: Nature of the tertiary TVET and its implication for its curriculum and development.

Source: Author's construct, after contributions to the nature of the tertiary TVET and its implications for curriculum design and development by Atchoarena (2009); Diamond (2008); Dietrich & List (2012); Doolittle & Camp (1998); Kouwenhoven (2003); Lewis (2009); Maclean (2007); Meyer (2003); Olssen & Peters (2005); Peach (2010); Powell & Snellman (2004); Sant'Ana (2008)

As shown in Figure 2, the tertiary TVET seeks to bridge the gap between academic knowledge and the needs of the society. Consequently, the sector's curriculum is undergirded by a myriad of ideologies and approaches that resonate with social needs. The fundamental features of a tertiary TVET curriculum therefore constitute a multi-stakeholder involvement; contextually

defined needs; and multi-disciplinarity in content of knowledge, delivery and assessment and resourcing; flexibility in students' admissions and alternative programme pathways. The planning and enactment of these features are however determined by the prevailing TVET tradition in each society. These implications of the tertiary TVET curriculum informed the selection of the framework to explore the curricular design and development model Ghana's HND Electrical and Mechanical Engineering programmes adopts. The next section of the chapter looks at the selected curriculum design and development model that resonates with the tenets of the tertiary TVET and was considered most appropriate to interrogate the process Ghana's HND Electrical and Mechanical Engineering employed in the design and development of their curriculum.

Process of Designing and Developing a Relevant Curriculum

According to Kelly (2009) and Barnette and Coate (2005), the process of curriculum design and development comprises several activities that culminate in planning, designing and operationalising the curriculum in schools. The non-chronological manner of its occurrence, impermanence, dynamism and fluidity renders the curriculum making process difficult to capture into a schema or template (Stenhouse cited in Barnette & Coate, 2005; Walker, 2003). Curriculum making models such as Eisner's artistic approach, Wheeler's model and Walker's model, however, present researchers with some sort of frame to capture curricular making activities (Marsh & Willis, 2007; Walker, 2003).

Comparatively, whereas the classical approaches to curriculum design are characterized by prescriptive methods, modern approaches to curriculum

planning are dominated by the descriptive and critical-exploratory methods. The diversity in these models is based on the underlying orientation like, the contextual nature of knowledge and the subjective views and assumptions of curriculum planners (Lewis 2009; Marsh & Willis, 2007; Peach, 2010). The dominant approaches in curriculum design thus include the prescriptive, descriptive and critical-exploratory orientations (Marsh & Willis, 2007).

Classical Approaches to Curriculum Design and Development

According to Schubert, et al., (2002), the prescriptive model of curricular design and development is characterized by different persuasions like experientialism, behaviourism and cognitivism. Regardless of the differences, classical curriculum theories employ scientific and technological processes to ensure coherence between objectives and devised learning experiences. It was on this foundation that Tyler, the father of modern day curriculum theories, propounded his popular rationale that has continued to inspire modern curricular models and ideologies (Autio, 2003; Schubert, et al., 2002).

Tyler's Rationale emphasizes the critical process of delineation; determination and formulation of educational objectives that are attained from the selection of learning experiences intended to lead the learner to expected overt behaviours (Marsh & Willis, 2007; Pinar, 2003; Schubert, et al., 2002). From Tyler's rationale emerged his linear-staged model that comprises the formulation of purposes; the selection and organization of learning experiences; and evaluation in the curriculum process (Marsh & Willis, 2007). Tyler's model, just like its prescriptive counterpart, has however been criticized for its objectivity, linearity, theory-based, technological and business

bias, idealized logic and abstractness (Pinar, 2003; Schubert, 2002; Walker, 2003). In spite of these limitations, classical approaches to curriculum making have continued to influence contemporary curriculum approaches (Marsh & Willis, 2007; Pinar, 2003; Walker & Soltis, 2004).

Contemporary Approaches to Curriculum Design and Development

Contemporary curricular theories are more critical in intent, as they interrogate deficiencies in existing curricular practices and engage with the intellectual and social context to improve the status quo (Walker, 2003). Walker explained that whereas, critical-exploratory curricular approaches seek to understand what an existing curriculum has been; is currently; and might be; descriptive curricular approaches seek to identify how curriculum development actually takes place, especially in school settings, in order to understand the relationships between the steps and the procedures involved. Prominent among the contemporary theorists are Pinar, Eisner, Apple, Bowles, Gintis, Walker, Shubert and Schubert and Schwab (Walker, 2003). It is against this background that Walker's Naturalistic approach was chosen to interrogate the process that was employed to design and develop the curriculum used by Electrical and Mechanical engineering programmes in Ghana's polytechnics.

Walker's Naturalistic Approach

Walker used the naturalistic approach to study how curriculum making occurs in some schools in the United States of America. After several observations of an on-going curriculum process, Walker concluded that, inasmuch as the process of curriculum design and development eludes chronology, it was possible to capture its activities under the three major phases

namely, platform, deliberation and design (Marsh & Willis, 2007). According to Walker (2003), curriculum planning begins at the platform stage and ends at the design stage, with deliberation acting as the keystone that provides the means of progression from the beginning to the end. Walker's naturalistic approach is sometimes referred to as the deliberative approach since it denotes decisions attained from interactive processes without applying/giving consideration to existing solutions or axiomatic forms of reasoning (Ross & Hannay, 1986; John, 2011; Walker, 2003). In other words, deliberation foregoes existing solutions in order to generate specific resolutions to address problems identified in each curricular project (Ross & Hannay, 1986; John, 2011; Marsh & Willis, 2007).

Walker's Platform Stage

The platform in Walker's model is built on the ideas of Schwab, and it refers to the convergence of individuals to deliberate on how to approach a curricular task (Marsh & Willis, 2007). The platform, Marsh and Willis explained, is based on the assumption that individuals on curriculum development projects naturally have their perceptions and ideas about what the problem is, what should be prescribed, and commitments to make in the task ahead. Thus, curriculum designers, whether informed or not, discuss their beliefs, conceptions, theories, aims, images and potential procedures concerning the curriculum intended (Walker, 2003). The final decision(s) at the platform stage eventually embody trade-offs from the competing values and opinions of curriculum designers, as well as, consensus in the terms of reference for subsequent curricular activities (Marsh & Willis, 2007). It is against this background that Walker (2003) used the term platform, for this

initial stage of the curriculum design process since, it marks the foundation upon which subsequent curricular actions are pursued.

Walker's Design stage

According to Barnett and Coate (2005) and Walker (2003), in spite of any form of tensions, the curriculum project must at all cost conclude with a document for implementation and this constitutes the design stage in Walker's Naturalistic Approach. Decisions concluded from the deliberations culminate in the drafting of the curriculum document, which is referred to as the designed curriculum (Bowe et al., 1992 & Marsh & Willis, 2007).

Deliberation in Walker's Naturalistic Approach

Deliberation, which according to Walker (2003) is the keystone that provides the means of progression from the beginning to the end of the curriculum design process, is fundamentally concerned with problem identification and the generation of alternative. A "sense of the problem", which may include distortions in subject matter, increases in the rate of failures, and boredom on the part of students or teachers, becomes the concrete practical situation that disturbs or challenges one's feeling that something better is possible (Ross & Hannay, 1986; Walker, 2003). Unlike the rationalists who follow pre-determined steps in curriculum planning, Walker's idea of deliberation connotes uncertainty as curriculum committee members strive to understand the exact problem to address (Ross & Hannay, 1986; Mulder, 1991). The deliberative curricular process thus becomes a non-linear social enterprise that seeks to respond to practical problems (John, 2011). John adds that several definitions can be constructed for the problem, but the most defensible and feasible to achieve is usually settled on, and ultimately

determines the choice of solution.

The curriculum at the national level differs from the institutional level curriculum in the sense that, whereas the former seeks to respond to a policy imperative, the latter strives to fit the curriculum into purposes outlined in the national curriculum (Walker & Soltis, 2004; Diamond, 2008). Deliberations at the national level therefore include the statement of purposes in broad terms; details on programme duration and coverage; admission criteria; sourcing and distribution of requisite resources to enact the content of the curriculum at the micro level; strategies to monitor the use of resources; and structures and levels of supervision in the enactment of the curriculum (Bowe et al., 1992; Diamond, 2008). In some cases, deliberation at the national level also covers the subject matter or the content and principles of organization of the intended discipline (Diamond, 2008). A framework for the subject matter is therefore set at the national level, as the broad range of courses (full and short courses) with guidelines and sometimes course materials to guide the institutions at the micro level are dictated (Apple, 2004; Lewy, 1991; Marsh & Willis, 2007; Scott, 2004). To ease the work of curriculum designers in the selection of content of knowledge, John (2011) indicates that smaller groupings are usually adopted to focus on each discipline.

Addressing Limitations in the Platform and Deliberation Phases

According to Ross and Hannay (1986) and Marsh and Willis (2007), conflict is inherent in both the platform and deliberation phases, but more apparent in decision making activities that are not informed by any data. Data on the curriculum phenomenon is very critical to inform activities of curriculum designer. Thus, Hussain, et al., (2011) and Marsh and Willis

(2007) recommend research into the curriculum phenomenon prior to the curriculum design project in order to enable curriculum planners to prioritize problem(s) to attend to. Knowledge about the curriculum phenomenon also enables curriculum planners to overcome an over reliance on practical experiences and conventional wisdom or speculations during the process of designing and developing a curriculum (Walker, 2003).

Research into the curriculum phenomenon should cover the, background of students (home, economic, and academic entry characteristics); existing policy and curricular dictates; cultural and social changes (global influence); climatic conditions; staff (national and institutional levels); institutional facilities and equipment; stakeholders' expectations and values and ideologies (Nicholls & Nicholls, cited in Hussain, et al., 2011). According to Hussain, the type and level of education determines which areas to research into. In order to organize and structure information from the curriculum phenomenon, which is characteristically overwhelming, Marsh and Willis (2007) recommend Schwab's four (4) commonplaces which include, the milieu, the learner, the teacher, and the subject matter. In its simplest sense, the milieu refers to the environment within which curricular activities are enabled, and this encompasses structures that facilitate and stimulate learning or constrict or repel interest (Apple, 2004).

Of the elements in the milieu, policies play a critical role in determining the spaces individuals, groups or institutions can occupy, operate and influence in order to facilitate meaningful contributions in the curriculum design process (Griffith, 2004; Howlett, Ramesh & Perl, 2009; Ross & Hannay, 1986). Critical in Schwab's milieu are the teacher and the student

since these aggregate data at the classroom and social levels following deliberations on issues in and outside class sessions (Marsh & Willis, 2007). As the core enactors of the content of the curriculum, Barnett and Coate (2005) and Marsh and Willis (2007) argue that, the needs of the teacher and the learner, especially the latter, must be prioritized since the curriculum has the leverage of shaping the life of the student. Diamond (2008) asserts that, the student is usually not represented on curriculum design projects because of the assumption that the teacher and the school management have authority over the students in terms of professional knowledge and skills. Students' opinions and accounts of their experiences, Diamond (2008) and Marsh and Willis (2007) indicate, can be extremely valuable to the work of curriculum planners; thus, the student's participation in curriculum designing should be re-considered.

Another element that is critical in the curriculum context is the selection and organization of knowledge. According to Apple (2004), the selection and organization of knowledge is inherently contentious, since different ideological interests seek to dominate the subject matter. The contentions, according to Apple (2004), Porpora and Giddens (cited in Scott, 2004), usually arises from the conflicting interest of the state and the elite who have overriding powers in controlling material and ideological apparatus in societies. Such contentions, Apple (2004) argues, reflect a democratic society where education becomes a product from the conflicts between the dominant and the dominated. The struggle for dominance in knowledge therefore does not always reflect the ideas of the ruling class as imposed through an unmediated and coercive manner (Scott, 2004). The politics of official

knowledge simply becomes the politics of accords and compromises and not necessarily impositions (Apple, 2004).

Each stakeholder institution therefore has areas they wield power over the selection of economic, political and cultural resources, although, some wield more powers than others especially in the area of economic spaces (Apple, 2004; Bernstein, 2000; Scott, 2004). The teacher, for example, plays a critical role in the process of curriculum making, yet may not have the jurisdiction to make major curricular decisions like the selection of subjects or courses of programme offerings which may be under the control of some agency or businesses that dictate the flow of money into that area of study (Ross & Hannay, 1986; Apple, 2004). Regardless of possible influences, knowledge in the psychology of learning is recommended to enable curriculum planners to attend to the more critical issue of students' background in order to assure curriculum relevance (Walker & Soltis, 2004).

Collaboration is critical to the curriculum design process; yet, interactions among stakeholders often defy models of collaboration that is built on concepts of rational planning and teamwork (Briggs, 2007 & Ross & Hannay, 1986). Lack of collaboration causes the curriculum process to be characterized by complexities and chaos as different groups push for their interests to the point of causing tensions among stakeholders. The application of practical reasoning and rationality through collaboration, communication skills and adherence to outlined norms of behaviour are among the strategies offered to address such tensions (Ross & Hannay, 1986). In Ross and Hannay's (1986) opinion, practical reasoning depends on personal practical knowledge that is built through extending, elaborating and refining the criteria

by which actions are justified and weighed in practical situations. Practical reasoning in curriculum designing activities is therefore premised on the notion that each situation is unique and problematic and requires an interactive consideration of means and ends in order to inform the most appropriate resolutions (Schwab, cited in Marsh & Willis, 2007).

Communication skills and norms of behaviour require coherent and fair argument; consideration to relevant alternatives; one's volition to question his/her own assumptions and those of others and; the ability to identify and argue for or against competing alternatives (Brice, 2000; Onosko, 1996). Fullan, cited in John (2011), also recommends the application of the principles of fidelity and adaptation in facilitating clarifications of confusions surrounding curricular goals and means. John explains that the fidelity principle implies adherence to pre-determined goals, whilst the adaptive principle enables revisions to the curriculum to suit different purposes, particularly in response to changing social needs.

On the other hand, conflict at the platform and deliberation stages does not always connote strife but benefits the curriculum process when it is considered as a source of pressure for innovation, creativity and change; and a deterrent from complacencies that may arise from too much stability (John, 2011). Conflict eventually benefits the curriculum process and the society in general when it acts as a catalyst for individuals to proceed from personal (subjective) interpretations to consensus for change. Collaboration among curriculum planners for deliberation therefore becomes a means of validating the opinions and ideas of participants, as well as creating a deeper sense of ownership for intended curriculum (Lattuca & Creamer, cited in Briggs 2007).

This goes to say that, in spite of the unequal powers different stakeholders may wield, a well-managed deliberated process results in the creation of a document that embodies the contrasting opinions and concerns of stakeholders (Apple, 2004; John, 2011; Scott, 2004). It is against this background that McCutcheon defines deliberation in curriculum making as:

a process of reasoning about practical problems. It is solution oriented, that is, toward deciding on a course of action. A deliberative approach is a decision-making process in which people; individually or in groups, conceive a problem, create and weigh likely alternative solutions to it, envision the probable results of each alternative, and select or develop the best course of action... (cited in John, 2011, p.72).

A well-managed deliberation process therefore recognizes the variety of beliefs, aims and images that individual groups hold unto, before arriving at the most defensible and widely accepted resolution (Ross & Hannay, 1986; John, 2011; Kessel & Plomp, 1996; Walker, 2003).

Relevance of Walker's Naturalistic Model to the Present Study

The platform and deliberation stages in Walker's Naturalistic Model possess the structures required to interrogate a socially relevant curriculum. The platform stage in Walker's model generally permits convergence and collaboration among curriculum designers and developers to conclude on a concerted strategy to pursue for the actual curricular activity. This implies that, it is at the platform stage that the composition of curriculum planners can be known for the design of the tertiary TVET curriculum. Knowledge about the composition of stakeholder groups, Friedman and Miles (2006) have

indicated on page 19 conveys the structure, the image and the organization of the institution concerned. It was therefore expected that knowledge about the composition of the stakeholder group will reveal the constellation of values and ideas drawn to define the educational need; skills and knowledge drawn upon to design and develop the sector's curriculum; and inherent competitive interest of each group.

As already presented the deliberation stage denotes actual curricular design activities that conclude on the need to address, the content of knowledge and the intended approach of delivery. At the deliberation phase, the present study sought to explore the activities that the various stakeholders undertook during their participation in the design and development of Ghana's polytechnic HND Electrical and Mechanical Engineering curricula. Some major benefits of exploring the deliberative phase is to gain knowledge about the challenges confronted by each stakeholder group and the implications of their roles to the development of the tertiary TVET in Ghana polytechnics. Walker's model, as adapted in this study, however, presents some limitations in structure and methodology, and these are discussed in the subsequent paragraphs to conclude the discussion in the chapter.

Structural Limitations of Walker's Naturalistic Approach on the Present Study

Walker's model is structurally limited for this study, because of the inability of it's to provide for activities carried out after the design stage. The task of curriculum designers, especially at the national level, goes beyond the documentation of decision to include the creation of an enabling environment, resource mobilization and allocation and, quality assurance practices to

facilitate the enactment of the content of the curriculum in the various educational institutions (Friedman & Miles, 2002; Lunenburg, 2011). It is in light of this that Ross and Hannay (1989) argued that the curriculum process can be considered complete only when the results from the courses of action are considered satisfactory by all parties. The present study therefore replaces Walker's design stage with Ross and Hannay (1986) and Marsh and Willis (2007) implied "development stage". The development stage therefore sought to permit explorations into the work of curriculum developers beyond the design stage (Marsh & Willis, 2007).

Theoretical Framework

The review on the emergence of the tertiary TVET has shown that the fundamental aim of the sector is to address the socio-practical aspect of academic content of knowledge (Maclean, 2007; Maclean et al., 2009). In effect, the tertiary TVET curriculum is characterised by considerations to social developmental models, educational theories to enable its practical content, and a socially deliberative and collaborative design and development for its curriculum. It is in this light that the concept of relevance and development, educational theories and Walker's Naturalistic approach were drawn upon to inform the framework for this study.

From the review, the concept of relevance and Walker's Naturalistic approach connote a process that commences with the definition of need(s) and planning to address defined needs (Giora, 1997; Hirst, 1986; Marsh & Willis, 2007). At the "need identification" stage, however, Walker's model emphasises the chaotic situation that precedes the building of consensus among different stakeholder groups (Walker, 2003). Chaos might not have

been considered worthy of mention in the concept of relevance; yet, both Walker's model and the concept of relevance consider it critical to have a focus to pursue and harmony in decisions made and activities undertaken (John, 2011; Griesdorf, 2002; Ross & Hannay, 1989). At the end of the continuum of both Walker's approach and the concept of relevance, the former concludes with the design stage, whilst the latter concludes with the evaluation of output attained from enacting plans made to address defined needs (Griesdorf, 2002; Marsh & Willis, 2007; Walker, 2003). Thus, the concept of relevance in this study provides continuity from where Walker's model terminates.

Moreover, whereas Walker's model was generated from observed activities, the concept of relevance provides for what is currently unobservable, especially of the meanings and judgement that have underpinned the activities of curriculum designers (Giora, 1997; Griesdorf, 2002; Marsh & Willis, 2007). Thus, whereas Walker's Approach offers the frame to explore the process employed to design the curricula of concern in the present study, the concept of relevance permits explorations into the meanings and judgement that are embodied in stakeholder who contribute to the design and the development of the curricula.

Based on the variety of needs that characterizes the tertiary TVET curriculum, multi-developmental and merged educational theories are drawn upon (Darby-Hobbs, 2011; Ebert, 2009; Peach, 2010; Rojewski, 2009). The design and development of the curriculum process is thus characterised by a multi-developmental and multi-disciplinary theories that allows for a multi-stakeholder involvement in all activities undertaken. The perspectives of

different stakeholders are therefore considered critical to attain the diverse theories, knowledge and practical skills the tertiary TVET seeks to thrive (Maclean, 2007; Maclean, et al., 2009; Maclean, et al., 2013). Figure 3 illustrates the connections between the various theories drawn upon to inform the theoretical framework employed in this study.

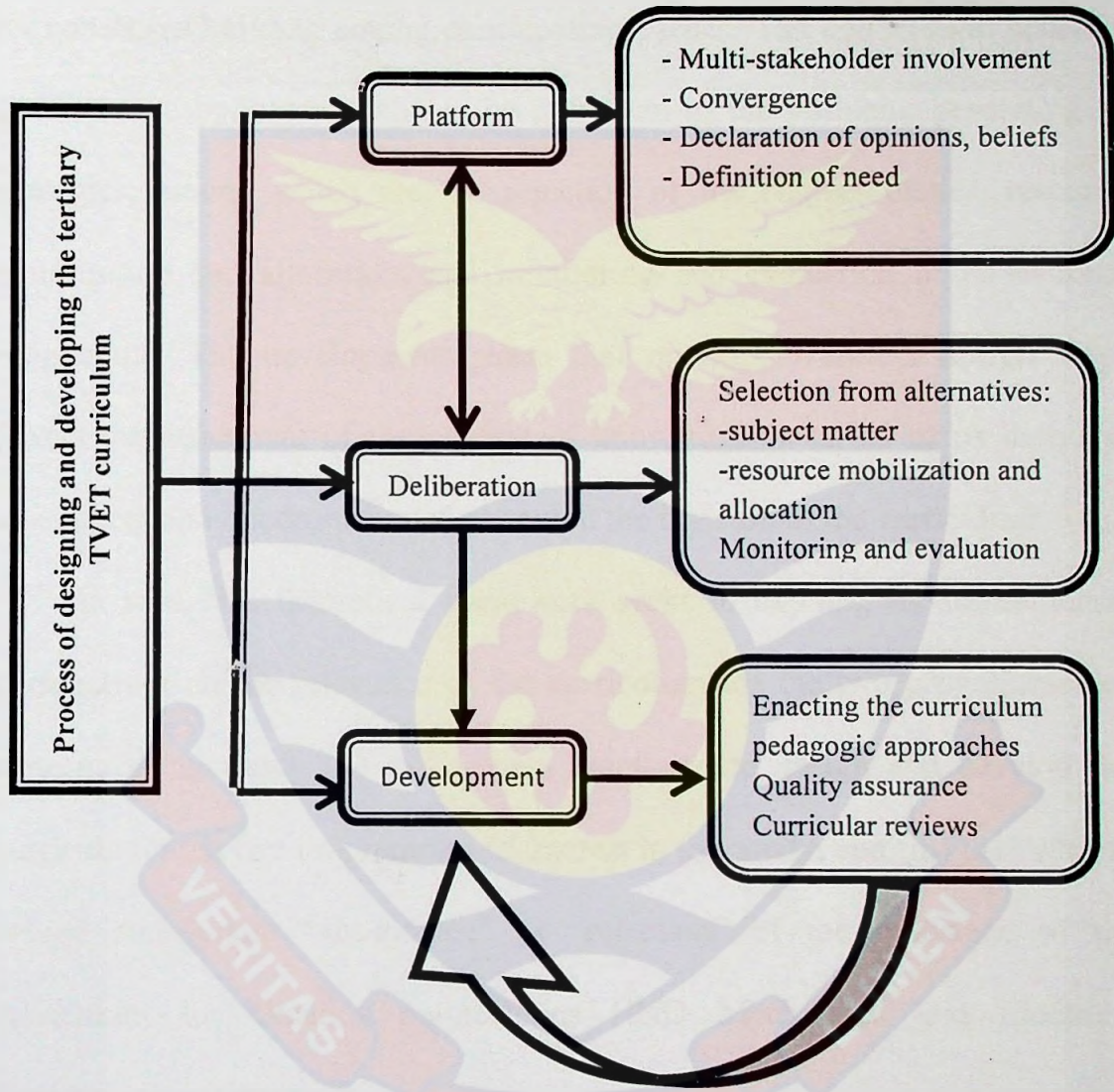


Figure 3: Process of designing and developing a relevant tertiary TVET curriculum.

Source: Author's construct from the contributions of Apple (2004); Atchoarena (2009); Diamond (2008); Dietrich & List (2012); Doolittle & Camp (1998); John (2011); Lewis (2009); Maclean (2007); Meyer (2003); Olssen & Peters (2005); Peach (2010); Powell & Snellman (2004); Sant'Ana

(2008) to the nature of the tertiary TVET and its implications for curriculum design and development.

The theoretical framework, as illustrated in Figure 3 presents the three major phases of platform, deliberation and development. The platform phase is characterised by convergence to enable the declaration of opinions and beliefs for consensus building among participating parties. The deliberation phase is characterised by, among others, the definition of the problem; generating of strategies, among which are the selection of the subject matter, resource mobilisation and allocation, and monitoring and evaluation of educational programme. The development phase that replaces Walker's design stage covers the enactment of the content of knowledge in terms of its delivery, assessment and opportunities of redress in the revision of the curriculum.

In sum, this theoretical framework seeks to explore, (i) stakeholders' perspectives on the relevance of the curriculum for the two programmes of concern in the study (ii) the process employed to design and develop the curricula for the two programmes of interest in this study, and (iii) the "why's" behind stakeholder "acceptance" or "rejection" of the relevance of the curriculum for Ghana's polytechnics HND Mechanical and Electrical Engineering programmes.

Methodological Limitations in Walker's Naturalistic Approach in this Study

Methodologically, Walker's study employed the observation method on purposively selected experts on a national curriculum project. The retrospective turn this study assumes cannot employ the observation method since the data the study sought to draw on is in the past experiences and perspectives of selected participants. Some methodological alterations were

thus required for the present study. First, whereas Walker's participants were selected by virtue of their expertise in curriculum planning (Marsh & Willis, 2007), stakeholder participants in this study are selected by virtue of their participation in the design and development of the curricula of interest, and not necessarily in relation with their expertise. In other words, stakeholder representatives who are reputed to have participated in the design and development of the curriculum of interest constitute the participants for this study.

Second, Walker's observation method would have presented a daunting task to employ, since (i) the curricula of interest was designed in the past and (ii) the implied variety of stakeholder institutions contributing to the tertiary TVET curriculum challenges the concurrent observation of especially multi-sites curricular planning activities at places of non-convergence. It is against this background that the study preferred the hermeneutic phenomenological approach to permit the use of the interview and the documentary analysis methods.

Summary of the theories underpinning the tertiary TVET

This chapter has presented the context and the ideologies that are related to the tertiary TVET curriculum. Consequently, the emergence of the tertiary TVET, and its implications for the sector's curriculum and the underlining development models have been extensively explored to identify the constituents of a relevant tertiary TVET curriculum for different stakeholders. Generally, whereas, the concept of relevance has provided the general process by which individuals conclude on what is relevant or not; the concepts of development and the educational theories of behaviourism and

constructivism have sought to provide the theoretical basis upon which the relevant tertiary TVET curriculum is designed and developed. Walker's Deliberative model, as adapted in this study, has provided the curricular design and development process model to explore the design and development of the Mechanical and Electrical Engineering curriculum of Ghana's polytechnics.



CHAPTER THREE

RESEARCH APPROACH

There is "... one life world among many worlds" (Laverty, 2003; p.11)

From the previous chapter, the literature has revealed that different perspectives characterize what is construed as a relevant curriculum, with the subjective interest playing the critical role of influencing what to express as relevant. Moreover, relevance is an on-going process to the end of the project and stakeholders' expressed judgments may be informed by the existence or absence of individual external elements, as well as the interest of the man.

In order to explore the perspectives of the stakeholders in this study, hermeneutic-phenomenology was considered the most appropriate philosophy to uncover both common and divergent essentials in a phenomenon being studied (Seamon, 2000). The fundamental essence of hermeneutic phenomenology found useful in this study is expressed by Laverty's in the quote above, is to understand the phenomenon from different perspectives (Laverty, 2003). This chapter presents the research paradigm and the design employed to conduct this study. The chapter also presents the reflexive practices and ethical principles which were adhered to during the conduct of this study.

Choice of Approach: Hermeneutic-Phenomenology

As a philosophy hermeneutic-phenomenology was a term coined by Martin Heidegger to refer to a combination of a method (hermeneutic) and a philosophy (phenomenology) with the aim of creating meaning and understanding of a phenomenon (Creswell, 2006 & Laverty, 2003). Pure phenomenology as developed by Husserl, seeks to examine and explain

structures and incidences as recounted by the experienced (Fite, 2012; Morrison, 2007). According to Bound (2011) and Creswell (2006), phenomenological approaches begin with an experience or a condition where the individual's perspectives on their experiences within their world become the focus of research. Phenomenology is therefore oriented towards the practice of living, although experiences are "... taken at face value: and one which sees behaviour as determined by the phenomena of experience rather than by external objective and physically described reality" (English & English, cited in Cohen, Manion & Morrison, 2007; p. 22).

Dwelling on the principle of reciprocity of perspectives, phenomenology seeks to systematically investigate the consciousness of a phenomenon by its social actors, in order to affirm the constructivist ontological view that reality is relative, multiple and socially constructed (Constantine, 2008; Adams & Manen, 2008). Currently, variants of phenomenology include existential, realistic and empirical/transcendental/psychological phenomenology (Creswell, 2006). Cohen et al. (2007), however, indicated that "all phenomenologists believe in the impotence and, in a sense, the primacy of subjective consciousness; an understanding of consciousness as active, as meaning bestowing; and a claim that there are certain essential structures to consciousness of which we gain direct knowledge by a certain kind of reflection" (p. 22).

Hermeneutics, on the other hand was originally used to refer to the study of sacred text like the Bible (Bound, 2011). From the works of Heidegger, Gadamer, van Manen and Ricour emerged the understanding that discourse constitutes an essential aspect of textual understanding and these texts embody

facts about the context within which human actions are undertaken (Bound, 2011; Pinar, 2003; Skinner, 2008). Moreover, since humans view their world as an interaction of parts and whole, the subjective can neither be interpreted nor understood in the absence of the “historicality of a person”, namely the cultural, social and history of a person or a phenomenon (Heidegger, cited in Creswell, 2006; Lavery, 2003).

According to Langdrige (cited in Sloan & Bowe, 2014), phenomenology describes one’s orientation towards a lived experience, whilst hermeneutic permits the description of one’s interpretation of the text of a lived experience. As a method, whereas phenomenology facilitates descriptions of lived experiences, hermeneutic use the hermeneutic cycle to analyze “texts” of lived experiences (Kafle, 2011; Sloan & Bowe, 2014). Language thus becomes the most useful tool to represent the world of the phenomena as it reveals the being (what exists) within its historical context (Lavery, 2003).

Following van Manen’s (cited in Sloan & Bowe, 2014) application of hermeneutic-phenomenology to explore approaches to pedagogy and parenting, other researchers like, Evans (cited in Kafle, 2011) employed hermeneutic-phenomenology to explore the life world stories of school principals and challenges they encounter in their instructional role. Sloan and Bowe (2014), also employed hermeneutic-phenomenology to investigate lecturers’ experience of curriculum design. It was against such uses of hermeneutic-phenomenology that this study considered its usefulness to explore stakeholders’ perspectives on the relevance of Ghana’s polytechnic

HND Electrical and Mechanical Engineering curricula, and the process employed to design and develop the two curricula of interest.

Research Design

From the perspective that knowledge is local, multiple, and co-constructed from both the researcher and the participant's experiences, the research design adopted simply sought to enable the study of the phenomenon of interest among different stakeholder groups (Neuman, 2014; Bound, 2011).

Figure 4 illustrates the study's design.

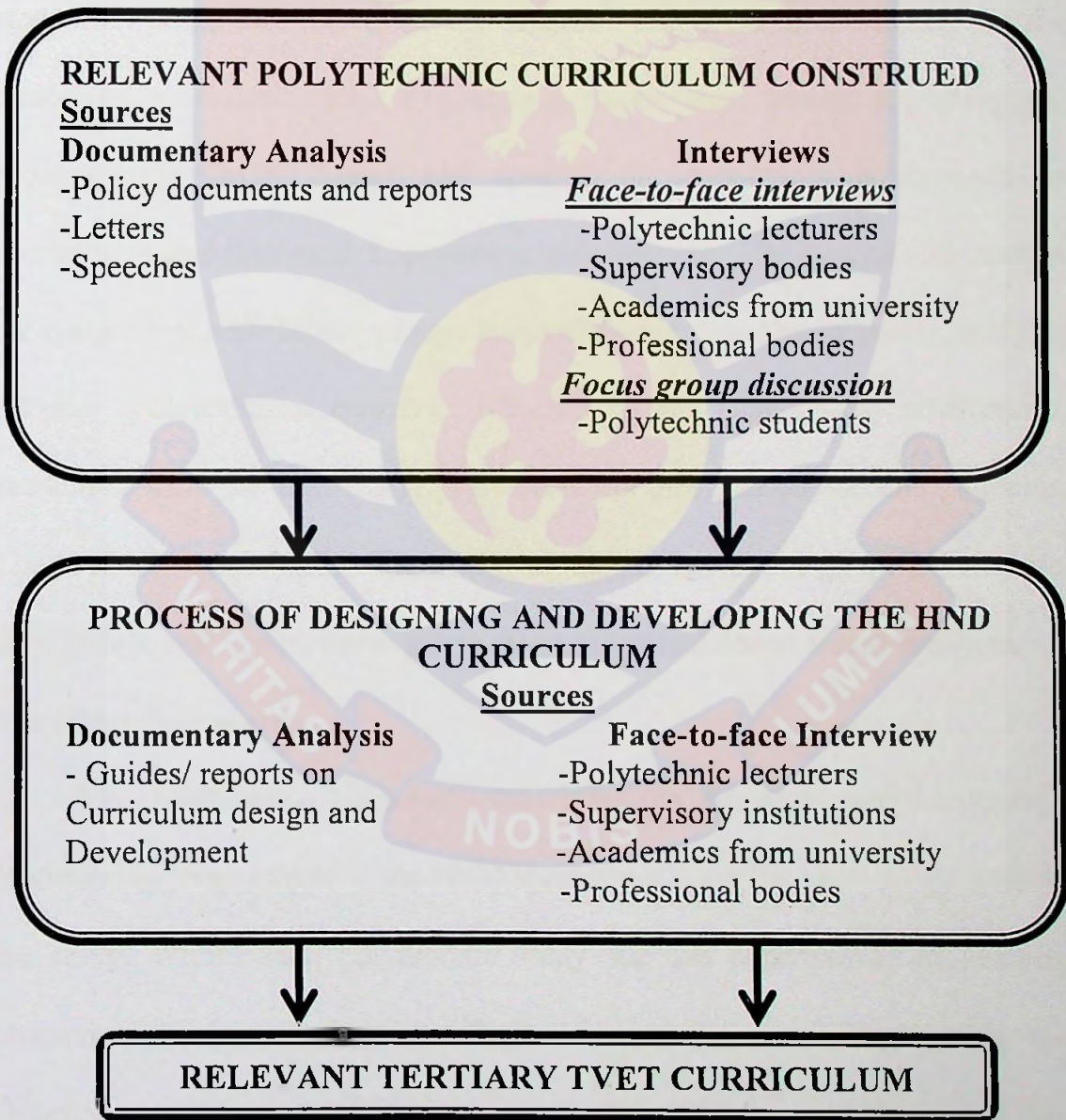


Figure 4: Research design.

Source: Author's construct from contributions made to research design by Bound (2011); Bryman (2008); Chadderton & Torrance (2011); Morrison (2007); Mabry (2008); Pinar (2003) & Skinner (2008)

Figure 4 presents a three-tier design that illustrates the two major concerns of this study, the sources of data, and the methods used to gather each category of data.

Thus, in order to arrive at what is construed as a relevant tertiary TVET curriculum for Ghana's HND Engineering programmes, the design of the study first seeks to explore the connotations that stakeholders assign to the notion of a relevant HND Engineering curriculum, before exploring the process employed to design and develop the curriculum being used by Mechanical and Electrical Engineering programmes. The design also reveals the category of stakeholder groups selected to contribute to the study, and this include, polytechnic lecturers, officials from supervisory institutions, academics from the university, professional bodies and polytechnic students. The methods employed in the study, as the design above presents, include, face-to-face interviews, focus group discussions and documentary analysis.

Sampling Procedure

Two polytechnic institutions that offer the Electrical and Mechanical Engineering programmes at the HND level constituted the main study sites for the study. Within each polytechnic study site are departments of teaching programmes, which include the Department of Electrical Engineering and Department of Mechanical Engineering; and these became the centres of data collection in the polytechnics. The professional bodies, academics from the universities, and the supervisory institutions were also drawn to add to the

information sourced from selected polytechnic institutions. These non-polytechnic stakeholder institutions and groupings provided data on the phenomena of interest from the national-level perspective, as well as authenticated data from across the sources.

The selection of respondents for the study was informed by the URC's (1991) recommended collaborated curriculum design and development of HND programmes; which is to draw on the polytechnic institutions, professional bodies, academics from the university and supervisory institutions. The choice of polytechnic institutions was informed by; (1) the offering of the two programmes of Electrical and Mechanical Engineering in their programmes of study, (2) participation in the design and development of the curriculum for the two programmes at the national level; (3) accessibility by distance and availability of participants to contribute to the study and; (4) not being the polytechnic institution where I was employed at the time of conducting this study, so as to avoid Leeuw's (2008) interviewer variance; a situation where participants could develop pre-conceived notions from participating in an earlier or multiple studies with similar focus and intent.

The two universities were selected based on their specialization in science and technology programmes that positioned them to contribute to the design and development of the HND Electrical and Mechanical Engineering curriculum. In the case of the professional bodies, it emerged that two institutions could be associated to Ghana's polytechnic HND Engineering sector; yet, only one, that is Ghana Institute of Engineers (GhIE), was recognized by the government of Ghana and has thus contributed to the design and development of the curriculum for the polytechnics.

Preliminary familiarization with the study sites revealed that the professionals who contribute to the design and development of the polytechnic Engineering curriculum usually double as representatives of employers; thus, according to one academic from the university, the convention has been the selection of either a member of the professional body or a member of the Employers Association to contribute to the HND curriculum (Oto, interviewed on Aug., 10th, 2012). I therefore opted to have a member of the professional body who could also convey the employers' perspective.

The supervisory institution, on the other hand, had only one outfit each to seek information from. So, all the institutions with oversight responsibilities over Ghana's polytechnics were selected to participate in the main study. The diversity in the sample drawn for this study was in line with the interpretivist belief in the contextualization and co-constructiveness of reality (Constantino, 2008; Laverty, 2003). The final plan for the study was based on my experiences and findings from the pilot study conducted before the main study.

Piloting the Study

Generally, the pilot study was conducted to refine the questions, determine the final sampling, appropriateness of intended methods for data gathering and analysis, and ethical pitfalls to guard against in the main study. The pilot study also afforded me the opportunity to extend and finalize the scope of my study. One polytechnic institution that is not participating in the main study, one supervisory institution and one industrial firm were sampled to contribute to the main study. State institutions with oversight responsibilities over the polytechnics and the professional bodies were

deliberately excluded from the pilot study, because of the absence of sister institutions to replicate my intentions in the main study. In the case of one supervisory institution, the decision to avoid Leeuw's (2008) principle of interviewer variance was rescinded after an encounter with one of its staff in a national policy fair hosted in the Western Region of Ghana, 2012. This official assured me that a superior officer would attend to me during the main study; thus, he offered to enlighten me on the activities of his institution in relation to tertiary educational institutions in general.

The sample for the pilot study comprised; i) the heads and two students from the teaching departments of Electrical and Mechanical Engineering in one polytechnic institution; ii) two employers/supervisors of HND graduates from two Electrical and Mechanical Engineering firms; (iii) two HND graduate employees each from the two participating firms; and (iv) one official from one of the supervisory institutions. In all, 13 participants were sampled through the purposive and snowballing methods.

For the polytechnics, one institution that was easily accessible and had offered the two said programmes from the inception of the tertiary polytechnics in 1992 was selected for the pilot study. To sample the HND graduate employees and their employers, the industrial liaison officer of the polytechnic institution contributing to the pilot study furnished me with contact details of HND engineering graduates and their employers from a record of HND graduates who had been employed through the polytechnic. HND graduate employees located within the Takoradi Metropolis were called through the telephone to introduce the study, ascertain their employability, and readiness to contribute to the study if permitted by gatekeepers. As the persons

who control access to study sites and participants, and the amount of information participants may offer, the gatekeepers of potential pilot study sites were visited to introduce and to gain permit to conduct the study (Oliver, 2003). Eventually, two engineering industries, each with a focus on Electrical and Mechanical Engineering, were selected to participate in the pilot study. Negotiations into the pilot study sites to gain access to the participants were fairly easy, as gatekeepers permitted the commencement of data gathering at my own convenience.

Findings of the Pilot Study and their Implications for the Main Study

The pilot study offered me my first experience with the flexible and non-pre-emptive nature of qualitative research and field opportunities to adhere to reflexive and ethical principles. In terms of the flexible and non-pre-emptive nature of qualitative research, the pilot study made me realize that sampling, methods, and issues for interrogation are not conclusive until one enters the field. For example, the characteristics of some of the sample had to be altered, as the context demanded. From the pilot study polytechnic, for instance, it emerged that: (1) the head of the HND Mechanical Engineering Department was not an employee of the polytechnic when the current curriculum designed; and (ii) the head of the HND Electrical Engineering Department has been an employee of the polytechnic from inception, but he had never participated in national curriculum design projects.

I was therefore directed to long-serving lectures who had contributed to the design of the curricula of interest and retired polytechnic heads (referred to as principals at the time), who were in office at the inception of the tertiary polytechnics. The choice of teaching staff and retired polytechnic principals

was made in anticipation that, the former will offer information on their experiences in the design and the development of the curricula of interest in the study, whilst information from the latter will cover both antecedents to the upgrade of the polytechnics into tertiary status to offer tertiary TVET programmes and the drafting of the first HND curriculum for Ghana's polytechnics.

In relation to HND graduates and students, the pilot study revealed that comparatively, the former could not readily establish the relevance of the knowledge and skills that they had acquired during their course of study in the polytechnics to their current jobs as the latter. According to three (3) HND graduate participants, they had acquired other skills after graduating from the polytechnics before gaining employment, hence their difficulty in linking only HND content of knowledge to the work they are engaged in. Final year polytechnic students who participated in the pilot study however proved that they could easily identify relationships between the content of their programme of study and field experiences from industrial attachments. Consequently, it became more expedient to sample polytechnic final year HND engineering students who had undertaken their six months' industrial attachments than HND graduates for the main study.

In relation to methods, the face-to-face interview method proved most appropriate to employ on all the participants, except for the polytechnic HND students and HND graduate employees. In spite of informing participants of the academic purpose of my work, first time face-to-face interview sessions with polytechnic students and HND graduate employees proved challenging as most of them appeared clumsy. A request by one student to join his colleague

proved more fruitful as the interactions became more relaxed and lively. I therefore decided to employ the focus group interview method on polytechnic students during the main study.

To operationalize the methods in the pilot study, I was faced with delays in honouring interview appointments and the management of data recording implements. Regardless of scheduled meetings, some participants in the pilot study failed to honour meetings due to either unforeseen demands at the workplace or forgetfulness. Inasmuch as I had less control over the former, reflexivity and ethics prompted me to address the latter by confirming appointments on the eve of meeting days and, where necessary, some hours before scheduled appointments. Experiences such as delays and re-scheduling of meeting sessions, also caused me to ponder on its potential consequences for the main study; especially where potential participants for the main study were located in different parts of the country, with some requiring a journey of four to six hours from my place of study. Delays to meetings implied, among others, extra cost in my lodgings and upkeep especially where I had planned to have an initial three to five days stay in each data gathering site.

The importance of carrying recording implements like note-pad, pen and audio recorders throughout the conduct of the study became very apparent during the pilot study, especially where the gatekeepers and some participants began to offer information right after introductions. Such information from gatekeepers and potential participants offered me overviews in relation to the phenomenon and some signpost to pursue during the main study. For instance, it was from such interactions that I became aware that members of the professional bodies who contribute to the design of the HND curriculum

usually played the dual role of employers and professionals. In effect, curriculum design project usually has either a member of the professional body or employers represented. It was therefore planned to request for a participant from the professional body who was also an employer.

The amount of data gathered from the participants in the pilot study was quite overwhelming; nonetheless, data analysis offered me initial insights into the diversified perspectives that could emerge in the main study. In relation to the process of curriculum design and development, one issue that kept emerging from the data, was that, all participants indicated that NABPTEX designs the HND curriculum, until further probes revealed that NABPTEX merely played the role of an organizer. I therefore decided not to ask the question “who designs the HND curriculum?” during the main study. The question “what role did your institution play in the design of the HND curriculum?” and “what other institutions contributed to the design of the HND curriculum?” were considered equally appropriate to inform the study on the composition of curriculum designers for the HND Electrical and Mechanical Engineering programmes.

Knowledge in reflexivity and ethics proved very useful in different stages in the pilot study. At the planning stage of the pilot study, reflexivity and ethics guided me to a construct research protocol to access study sites, taking into consideration the significance my study to each stakeholder represented institution. On the field, consent forms for pilot study generally promised confidentiality and anonymity of participants. Some participants, especially from the students and HND Engineering sample, however doubted such assurances. For instance, there was an HND graduate who requested to

have the interview over the telephone in order to assure his confidentiality. I declined the offer, since I had planned for the face-to-face interview method that could, among others, gain me access to facial expressions to determine the seriousness with which one attaches to submissions and as cues for probes.

Reflexivity and ethics also helped to operationalize the methods during the pilot field work. For instance, in terms of sampling, it was through reflections that I realized that it would be more appropriate to sample polytechnic teaching staff who contributed to the design of the curriculum, than heads of teaching departments who might not have even been employed in the polytechnic at the time of the curriculum design project. In terms of methods, it was reflexivity and ethics that enabled me to appreciate the discomfort of the HND graduate to subsequently inform the choice of the focus group discussion method.

The pilot study also offered me a firsthand opportunity to ascertain the credibility, transferability and dependability of my research design. According to Shenton (2004), credibility (or validity in positivist research) demands the adoption of well-established research methods to ascertain a reliable and objective outcome of qualitative research studies was ascertained in the pilot study by; (i) the use of interview and documentary analysis methods which are widely used in qualitative studies gather in-depth data as this study required; (ii) having preliminary visits to study sites to establish relationships to facilitate the gathering of (reliable) data that is built on trust; (iii) the use of a wide range of informant, as drawn from the polytechnics, industry and supervisory body to authenticate data from the different sources; (iv) selecting willing participants, which was done by participants' signing of consent

contract; and (v) frequent debriefing, which was achieved by the discussion of plans, operationalization and findings of the pilot study with my supervisor and a progress report seminar on the pilot study to staff of IEPA department, UCC.

Transferability (or external validity in quantitative studies) and dependability require making wider claims for the study is facilitated by accounting for every step taken (Guba & Lincoln, 2000). Briefly, these steps are accounted for from the planning and operationalizing of the pilot study. Inasmuch as these accounts does not guarantee the generalization of results, the context of the pilot study was considered to reflect an aspect of the context of the main study, thus the extension and application of plans in the pilot study to the main study. In all, the pilot study granted me the opportunity to confirm, refine and alter decisions related to the scope and methods that were to guide the conduct of the main study (Kafle, 2011).

Final sampling

Sampling categories

From the experiences of the pilot study, 13 individual participants and four focus groups were planned to contribute to the study. One polytechnic teaching staff and one focus group of final year students from each of the departments of Electrical and Mechanical Engineering in the two selected polytechnic institutions; two retired heads of polytechnic institutions; a representative from each of the four supervisory institutions; and a member of the professional body were to be sampled. On the field however, this intended sample size was slightly altered because of gaps in the knowledge and

experiences of some selected participants. This necessitated the participation of 4 other individuals to contribute to the study.

The final sample for the main study consequently became; four lecturers from the two programmes of interest in the two selected polytechnic institutions; one administrator from one of the participating polytechnic institution, four focus groups, one each from the two programmes of interest in the two selected polytechnic institutions; two retired polytechnic principals; seven officials from the four government agencies with over-sight responsibilities over the polytechnics; two officials from the professional bodies and; two academics from the university, one representing each of the two programmes of interest in this study. In all, 17 individual participants and four focus groups of students participated in the main study.

Considerations to sample size and categories

The purposive composition of curriculum designers for the polytechnics, theoretical saturation and methodological issues were considered in the sampling of participants for the study. In terms of purpose, the categories in the sample for the study was informed by the URCs (1991) categories of stakeholder institution to contribute to the design of Ghana's HND level curriculum and the students who the beneficiaries of the curriculum. In terms of theoretical saturation, participants were selected in anticipation that they would account for, at least, experiences that related to their backgrounds and the theories presented in the study (Mason, 2010). According to Dworkin (2012), Marshall et al., (2013) and Mason (2010), theoretical saturation is attained at the point of diminishing returns where data begins to reveal repetitions than new information. Thus, whereas the participant from NAB

was expected to account and appreciate quality assurance issues related to the polytechnics, participants from the professional body were expected to account for issues related to the content of knowledge and professionalism inherent in the polytechnic HND curriculum. A comprehensive description of the phenomenon was therefore expected from the diversity in sampling categories (Creswell, 2009; Flick, 2009; Gadamer, Heidegger & Warne, 2003).

Methodologically, I took cue from Creswell (2008) and Mason (2010) to sample very few participants since hermeneutic-phenomenology's reliance on oral accounts and texts tends to generate a large amount of data even from one participant. Thus, the manageability of data from the interview and document analysis methods was also taken into consideration in the sampling of participants for the study (Creswell, 2008; Dworkin, 2012; Smithson, 2008; Tonkiss, 2012).

Process employed to sample participants for the study

The actual sampling of participants was generally facilitated by reliance on gatekeepers in the various stakeholder institutions and the questionnaire instrument. All stakeholder institutions were generally furnished with research protocols which informed gatekeepers, among others, the characteristics of the participant required in this study. After some discussions with each gatekeeper, participants who were considered to possess the requisite background to contribute to the study were introduced to me.

In the case of HND student participants, a questionnaire instrument was used in their sampling (Appendix C). The Heads of Departments of the HND Electrical and Mechanical Engineering programmes in the two selected

polytechnic institutions introduced me and my study to final year students who were about to end a lecture. Students were encouraged to pick and respond to a questionnaire instrument placed on a table in each lecture room. The questionnaire, which had six items, solicited information on: contact details of respondents; type of secondary school attended; name and focus of industries they had undertaken their industrial attachment; and students' perceived relevance of the curriculum for their programmes of study to activities undertaken during industrial attachments.

Questionnaire item 1 solicited contact details, in order to facilitate the contacting of shortlisted participants for the focus group. Respondents were however advised to use pseudonyms, instead of the actual names on the questionnaire. Questionnaire Item 2 aimed to select a fairly equal number of participants to represent different backgrounds in secondary education, in order to establish possible relations between the polytechnic curriculum and the academic backgrounds of students. Questionnaire Items 3 and 4 facilitated the selection of students who had worked in industries related to their polytechnic programmes and had interesting experiences to share on the relevance of their polytechnic programmes and industrial experiences. In relation to Questionnaire Item 3, each HOD assisted me to select students whose programme of study related to the core activities of the industries they had undertaken their industrial attachment. Ten students from each of the participating departments were contacted for the focus group interview sessions, but between five to seven students honoured the invitation.

Data Collection Procedure

Language was the main consideration in the choice of methods to gather

data for the study. Language, according to Annells (cited in Laverty, 2003), Gadamer, Heidegger and Warne (2003), Gall, Gall and Borg (1999), is usually revealed in the forms of voice and signifiers embodied in objects, texts or visuals. For hermeneutic-phenomenological studies, language, in its various forms thus provides the means of gathering data (Gadamer et al., 2003; Sloan & Bowe, 2014). It was against this background that variants of the voice, that is in interviews and documents were employed to explore the concerns of the study.

Interview Method

The face-to-face and the focus group interview were the two forms of interview methods the study employed. Generally, the interview is defined as a purposeful conversation between people, but usually directed by one to gather information from the other (Morgan, cited in Creswell, 2007). The face-to-face interview method was considered most appropriate to use on all stakeholder participants, since it permit the researcher to personalize encounters, observe and utilize facial expressions as cues for further inquiries; a feature that is absent in methods like questionnaire or telephone conversations (Creswell, 2003). The choice of the face-to-face interview method was also informed by the fact that some participating institutions were located in different part of the country.

Similar interview guides were constructed but adapted to the mandate of individual stakeholder institutions during the interview sessions (Bryman, 2012). Participants were generally inquired of what they construe as a relevant tertiary TVET curriculum for the HND Electricals and Mechanical Engineering programmes offered in Ghana's polytechnics, and the role they

played in the process of designing and developing the curricula being used by the two programmes of concern. Generally, the face-to-face interview sessions lasted between 30 to 50 minutes as participants' submission and time permitted. A minimum of two sessions and a maximum of four sessions were held with each participant. Interview sessions after the first interviews were determined by gaps identified in data.

Focus group discussion was the second type of interview method employed in this study. The focus groups were interrogated regarding the relevance of their polytechnic curriculum to their experiences on the field, especially in relation to industrial attachments and pedagogic practices in the polytechnics that advance or impede their performance. Focus group sessions were generally lively as all the group members stimulated discussions around the topic of interest and even signaled for their turns (McCabe & Holmes, 2009; Smithson, 2008). Focus group participants utilized every opportunity to share their opinions; which eventually resulted in well-deliberated and credible ideas (Henn, Wienstein & Foard, 2009; Smithson, 2008). Distractions like, digression and the domination of one participant were discouraged, as participants were prompted to stay on the topic of discussion as well as wait for their turns (Flick, 2009).

The use of the interview method in qualitative studies assumes an emancipatory role when narrations by participants eventually leads to reflections on the consequences of actions and inactions on the affected; thus, informing the making of decisions that can be considered as better than previously (McCabe & Holmes, 2009). Barnett and Coate's (2005) expositions on curriculum and Sen's (2005) capability approach suggests that, curriculum

making must be a moral activity that requires reflections to lead to a concerted and relevant education. Explorations into the curriculum can therefore not be devoid of reflecting on one's contributions. Table 2 presents the planned and actual sample and methods used in the main study.

Table 2: Sampled Stakeholder Institutions/Groups, Participants and Methods used in the Study

Categories of Stakeholder Institutions	Planned No. of Participants	Actual No. of Participants	Mode of Selection /Data Collection Method
<i>Polytechnic institutions</i>			
Polytechnic Lecturers	4	4	Purposive/Face-to-face interview
Polytechnic Administrator		1	Purposive/Face-to-face interview
Retired Polytechnic Principals	2	2	Purposive/Face-to-face Interview
Students	4 Focus Groups	4 Focus groups	Purposive/Focus Group Interview
<i>Supervisory institutions</i>			
NCTE	1	1	Purposive/Face-to-Face Interview
COTVET	1	2	Purposive/Face-to- Face Interview
NAB	1	1	Purposive/Face-to-Face Interview
NABPTEX	1	2	Purposive/Face-to-Face Interview
<i>Other institutions</i>			
Academics from the universities	2	2	Purposive/Face-to-Face Interview
Professional body/Employers	1	2	Purposive/Face to-Face Interview
Total No. of Participants	13 Participants and 4 Focus Groups	17 Participants and 4 Focus Groups	

Source: Researcher's construct from final decisions made on the design of the study.

Table 2 reveals the categories of stakeholder institutions who participated in the study in relation to the planned and actual number of participants that contributed to the study. From Table 2, 13 participants were intended to be sampled for the main study, but gap in the knowledge of selected participants necessitated the addition of 4 more participants (See p. 103). In other words, the difference between the planned and actual number of participants was due to the inclusion of four more participants during the data gathering phase because of a gap in the knowledge of the planned participants. The table also reveals the methods employed in sampling and gathering data from the various categories of stakeholder institutions' participants. All interviews were conducted in the English Language, since it is the medium of communication in formal settings in Ghana.

Documentary Analysis

Documents are standardized artifacts which typically occur in particular format as notes, case reports, contracts, remarks, newspapers, diaries, letters and others (Flick, 2009; Prior, 2008). Every society, Bourdieu asserts, "... has theories about the world and their place in it: models of how the world is, of how the world ought to be, of human nature... and these are usually embodied in official accounts" (cited in Jenkins, 1992; p. 69). In other words, documents contain discourses in societies which act as legitimate sources of knowledge or information (Prior, 2008). Subsequently, documents that contain information on the context of designing and developing the HND Electrical and Mechanical Engineering curricula were gathered, and these, included the polytechnic policy, the purpose and objectives in the syllabi of the two programmes of concern, newspaper articles on the background of the tertiary

polytechnics, directives and guidelines from the supervisory institutions, a letter and a speech by some key stakeholders (See Appendix F).

The gathering of documents for the main study commenced with visits to the libraries of three polytechnic institutions, University of Cape Coast (UCC) and University of Ghana, Legon. Whereas, documents like the URC's Report of 1992; Government of Ghana (GoG) (2002) and the White Paper Report on the Education Reforms of 2002 were easily accessed from the libraries and NCTE's documentation Centre; a document like the White Paper on reforms to Ghana's tertiary education sector, 1992, had as at the time of my writing not been accessed. The URC's report, the document which informed the White Paper Report on reforms to Ghana's education in 1992 and the Polytechnic Policy of 1992 remained the major national policy related documents I relied on for the study. Documents therefore became both primary and secondary data to add to and authenticate information gathered from the interview methods. As a primary data however, selected documents were analysed to add to the data for analysis. See Appendix G for examples of documentary analysis.

Researcher's Role, Ethics and Reflexivity in the Study

Regardless of the type of qualitative study, Paechter (2012), asserts, the researcher is central to the research process. The role of the researcher therefore becomes critical to the research process, as it can impact negatively or positively to the outcome of the study (Berglund, 2006). Unlike, pure phenomenology which requires researchers to bracket their assumptions and biases, hermeneutics permits the researcher to reveal his/her biases and strategies undertaken to prevent such biases from adversely affecting the

outcome of the study (Laverty, 2003; Sloan & Bowe, 2014). The researcher in hermeneutic-phenomenology thus, assumes the two positions of a pilot and a co-pilot in the research process as he/she creates understanding of a phenomenon from data gathered from participant and self (Crotty, 1998; Creswell, 2003; Costantino, 2008). This section of the chapter presents my position in the research process, the ethical principles I adhered to, and the reflexive practices I engaged in during the study.

As noted on pages 8-9, I am a lecturer in one of Ghana's polytechnics and an educational planner by training. Fundamentally, both my Bachelor's and Master's degrees were in relation to education, specifically, Bachelor of Education in Arts, and Masters in Educational Planning. Curriculum studies and engineering were therefore not my area of expertise, although I undertook few courses in curriculum studies at the first-degree level. Moreover, my research experience as at the second-degree level was in the positivist tradition, until I became a research assistant in the University of Bristol and IEPA, University of Cape Coast project on quality education, EdQual project from 2005 to 2009. The EdQual project thus offered me my first experience in qualitative studies; yet, it has been the course work I undertook for this Ph.D that afforded me with the theoretical knowledge in qualitative approaches to pursue this study.

The lack of a solid background in qualitative-biases research and curriculum studies and, in engineering or TVET however posed some challenges in this study. For instance, some principles in qualitative approaches, like the pre-emptive nature of qualitative research, could only be appreciated during fieldworks and writing up stages when emerging issues

determined actions to be taken. In the area of curriculum studies, it took me a while to read and understand its theories, principles and process before arriving at the model to inform the framework to guide the conduct of this study.

As an employee in the polytechnic, I considered myself as an insider; however my role as the researcher exploring the concerns of the study saw me equally assuming the position of an outsider. Objectivity is a central concern to the issue of the researcher being either an insider or an outsider in qualitative studies, although each position offers some advantages and disadvantages to the research process (Ferber, 2006; Kafle, 2011; Paechter, 2012). As an insider, I approached this study with the confidence that I knew the type of education the HND polytechnics offered, the structure of programme offering, and colleagues who could advise and snow-ball me to sources of information (Alan & Arthur, 2010).

To avoid familiarity with site and participants that could compromise the objectivity of the data, my institution of employment did not constitute part of the polytechnics sampled for this study (Unluer, 2012). Yet, participants from polytechnic institutions welcomed me as one of their own. This status, however found me being perceived an advocator of TVET, thus teacher-participants' expressed expectation of seeing my study leading to revisions in policy. Also, I was expected to use my study to explain why the Polytechnic Policy 745, 2007 grants the polytechnics the autonomy they required not to remain under NABPTEX. I had to emphasize the purpose of my study in order to lower the expectations of polytechnic teaching staff participants.

As a graduate and a student researcher from the university, I also assumed the position of an outsider researcher among the selected stakeholder institutions, including the polytechnics. Entrance into the field was preceded by familiarizing myself with the study sites in order to build the necessary relationship to gather data and appreciate the context of the study sites and participants. For instance, knowledge about the frequent meetings in the supervisory institutions positioned me to prepare for delays and re-scheduling of interview sessions. As an outsider, I was generally welcomed in all the institutions. Some participants however saw an opportunity in my work to convey to other stakeholder institutions about their “ill-performance”. For instance, one participant from the supervisory institutions said, “when you go tell those [name of another supervisory institution] people that they are playing with the HND students” (Tete, interviewed on Aug., 3rd, 2012). Indeed, the status of outsider/insider researcher in the study offers both advantages and disadvantages, reflexivity and ethics became the critical tools employed to reduce the negative effect any of them could have had on the study’s output.

Burns and Chantler (2011), Piper and Simons (2011), and Titchen and Hobson (2011) consider reflexivity as the ability to reflect upon one’s own epistemological and ontological authenticity, in order to conduct a fairly objective, neutral and value-free research; whilst ethics is the situated practice that requires decisions to be made in relation to factors pertaining to defined social and political situations. Ethics and reflexivity were considered at the three interconnected levels of entry into the field, on the field and presenting the data at the writing-up stage. Entrance into stakeholder institutions was

preceded by a rigorous research protocol which included the seeking of clearance from the University of Cape Coast's (UCC's) Institutional Review Board (IRB) to conduct my study; submission of research protocols to study sites to access UCCs IRB research clearance (Appendix A); the signing of consent form by study's participants; and reminding participants of agreements in the consent form prior to the start of every interview session. The construction of these research protocols required reflexivity and ethics to enable consideration to the mandate and role of selected institutions and respect for the participant and his/her context (Guillemin & Gillam, 2004),

On the field, inasmuch as Guillemin and Gillam (2004) assert that the researcher arbitrarily applies his/her knowledge in ethics to situations encountered, I endeavoured to adhere to the ethical conventions I had learnt in the course of my study and to frequently communicate with my supervisor and colleagues to know how to address issues I had less control over (Israel & Hay, 2006). The principles of justice, autonomy and voluntary participation generally guided the sampling of participants in the study. The willingness of participants to contribute to the study was ascertained by the signing of consent contract forms; and the voluntary picking and responding to questionnaires that was used to sample polytechnic students (Scott-Jones, 2000). Consent forms outlined the rights of the researcher and participant and the ownership of the data to be gathered for the study. Some participants declared their willingness to participate in the study but refused to sign the consent form. One participant for instance said, "I will not like to sign any document, since you can become a journalist tomorrow..." (Toku, interviewed on August, 16th, 2012). The participant's position was appreciated since the

decision to sign a consent form lies with participants' perception on what is ethical and not (Israel & Hay, 2006; Munhall, 1988).

The relationship between the researcher and the participant can develop beyond the formal level to aid in the successful gathering of data; although, this can become blur and negatively impacts on the outcome of the study (Tracy, 2013). This blurred relationship, according to Tracy, usually emerges in the scheduling of appointments; the approach employed to gather data; the position assumed by either the participant or the interviewer (researcher); and compensations for possible inconveniences caused. The scheduling of appointments and interactions with participants were guided by the ethical principles of patience and tolerance (Oliver, 2003). Knowledge about the schedules of participants informed the scheduling of appointments; a situation that, among others, also gave me more control over my time. There was however an instance when one eager participant re-scheduled our interview meetings several times as a result of his tight work schedule. After failing to honour appointments on two occasions, this participant asked me to meet him at his workplace on a Monday, at 7 am, an hour and half before his office opened to the public.

I arrived the Monday, at 7:00am, as scheduled, after having confirmed our meeting on the day before. My participant had however not reported to work and calls to his mobile phone were not going through. Around 9:00am, the receptionist told me my host had been in the building and he had instructed that I wait for him. After 10:30am, my host arrived and signalled to be with me shortly, only to disappear again. Mid-day was approaching and two other interview appointments at 11:00am and 1:00pm had to be re-scheduled in

order not to keep participants waiting. About an hour later, my participant re-appeared, apologized and ushered me into his office, only to attend to his subordinates and clients who had also been waiting for him. As I sat waiting, he looked up occasionally, smiled, and said “Madam, I’ll be with you soon, eh” (EMP 2, interviewed on, Oct., 17th, 2012). Eventually, my “overly-scheduled” participant made time for our interview session around 2:00 pm. After this I decided to devote a full day to participants who exhibited less control over their time, in order not to keep others waiting.

The main data gathering method, the interview, has been described as highly personal and interpersonal as it seeks to explore thoughts, feelings, knowledge and experiences of both the interviewer and interviewee (Orb, Eisenhauer & Wynaden, 2001; Patton 2002). In order to avert any possibility of digression, I personally directed interview sessions and employed prompts, where necessary (Orb et. Al., 2001; Patton, 2002). The issue of power play was generally absent in interview sessions in spite of the senior positions most of my participants held at their workplaces and the store of knowledge they presented. The presence of a lady pursuing her PhD seemed to have enthused most participants, especially those of high profiles, than the exertion of their position over interview sessions. There was, however, one instance where prejudice, largely based on the significance of qualitative studies caused a potential participant to refuse to participate in the study.

One academic from the university had emphatically stated after our introduction that, “qualitative research is fundamentally flawed, and I’ll make nonsense of your research, that is, when I am able to meeting you” (ACA 1, interviewed on, September, 8th, 2012). This participant subsequently failed to

meet me on four occasions to schedule interview appointments. A recall of the comment he had made during our introduction caused me to conclude that I had a less willing participant. I subsequently selected another academic from another university. Ironically, my “substitute” participant was very amicable to the extent that he requested to be interviewed right after our introduction.

Regarding the issue of bribery and extortion in rewards for research participant, Vanderstoep and Johnston (2009) argue that, technically participation in research should be voluntary, yet depending on the time, task and complexity of task, participants' must on ethical grounds be compensated for their time and effort. In this study, introductory letters to stakeholder institutions clearly indicated the academic purpose of my study and the requirement of voluntary participation (Oliver, 2003). This stance was however relaxed in the case of student participants who met me after 5:00pm and it was obvious that they were tired from lectures; some snacks prior to the interview sessions were thus considered necessary to minimize feelings of hunger and have relaxed focused groups to interact with.

At the analysis and writing-up stages, the major ethical principle observed was the operationalization of confidentiality promised to participants and study sites. At the write-up, the names of participating institutions were obvious and thus not worth concealing, but the identity of institutional representatives were considered critical to conceal, thus, applying the principles of trust and respect for persons by using pseudonyms (Munhall, 1988; Sales & Folkman, 2000). In all, reflexivity and adherence to ethical principles enabled the detection and resolution of both anticipated and unanticipated problems before any possibility of militating against the

progress and the credibility of the research (Guillemin & Gillam, 2004; Oliver, 2003).

Data Processing and Analysis

Devising a framework to analyse qualitative data can never be conclusive at the design stage of a research study, thus, the employment of both deductive and inductive approaches in this study (Langdridge, 2007; Saldana, 2013). The deductive approach saw the generation of an initial coding frame from the research questions and the theories, and this provided the basic frame to build a code book to contain both deduced and emerging codes from the data (Saldana, 2013; Sloan & Bowe, 2014). The data analysed in this study were from the interview, documents, field notes and memos. The memo accounts which constituted my reflections during and after field work were recorded in a diary and within interview data. Transcribed interviews therefore had accounts of some reflections I had on participants' submissions and filed experiences, and these were italicized in parenthesis to differentiate them from the actual interview accounts.

The data gathered were transcribed personally and saved on my computer and a memory stick. The management, analysis and interpretation of data were facilitated by the use of Attride-Stirling's thematic network analysis strategy and the Nvivo software (Attride-Stirling, 2002; Kafle, 2011; Sloan & Bowe, 2014). Specifically, whereas Attride-Stirling thematic network analysis was used as the overall frame to analyse and interpret data, the Nvivo software was used to ease the categorization and analysis of data (Attride-Stirling, 2002; Saldana, 2013). The analysis of data commenced with

an initial coding frame, Table 2, deduced from the literature review conducted in Chapter Two.

Table 3: Initial Coding Frame

Initial Coding Frame for A Relevance Tertiary TVET Curriculum	
1. <i>What are the perspectives of key stakeholders of Ghana's polytechnics on the relevance of the HND Mechanical and Electrical Engineering curricula?</i>	
	<ul style="list-style-type: none"> Purpose <ul style="list-style-type: none"> -Clarity in purpose Development model <ul style="list-style-type: none"> -type - Appropriateness - Inappropriateness Educational philosophy <ul style="list-style-type: none"> -Behaviourist/constructivist traditions - Content of knowledge - resourcing - Pedagogy Outcome <ul style="list-style-type: none"> -employability -usefulness of graduates to social development
2. <i>What was the process followed in designing and developing the HND Mechanical and Electrical Engineering curricula in Ghana's polytechnics?</i>	
	<ul style="list-style-type: none"> Composition of curriculum designers and developers <ul style="list-style-type: none"> -mix -appropriateness Process <ul style="list-style-type: none"> -Pilot stage -Convergence -declaration of intent, opinions -Deliberation <ul style="list-style-type: none"> -selection of subject matter - sourcing and allocating resources to facilitate -challenges <ul style="list-style-type: none"> -funding/resourcing -adept teacher

Source: Authors construct derived from the theories drawn upon in the study (Relevance theory: Giora (1997), Greisdorf (2000 & 2003); Hirst (1986); Concept of development: Fukuda-Parr (2003); Ebert (2009); Kelly (2009); Educational philosophies: Marquis (2016); Apple (2004); Walker's

Naturalistic Model: Diamond (2008); John (2011); Kessel & Plomp (1996); Ross & Hannay (1989); Marsh & Willis (2007) and Walker, cited in Marsh and Willis (2007).

The initial coding frame in Table 3 was derived from the theories on the concept of relevance, emergence of the tertiary TVET, concept of development, educational philosophies for the tertiary TVET and Walker's Naturalistic model that constituted the literature of the study.

Data Analysis Strategy

Thematic net-work analysis is the “web-like illustrations (networks) that summarize the main themes constituting a piece of text” (Attride-Stirling, 2002; p. 2). As a strategy that shares key features with hermeneutics, Attride-Stirling utilizes Toulmin's argumentation theory in thematic net-work analysis to aid explorations into the understanding of issues or the significance of an idea constituted in a text. Toulmin's argumentation theory provides a structured method to analyse negotiation processes, in order to (1) define and elaborate the typical and formal elements of an argument; and (2) highlights the connections between explicit statements and their implicit meanings in discourses (Toulmin, 2003). Argument, according to Toulmin, is the progression from accepted data through a warrant to a claim. Thematic net-work analysis was therefore used to enable the systematic presentation of textual data, facilitates the disclosure of each step; and enables the sensitive, insightful and rich exploration of a text's overt structures and underlying patterns (Attride-Stirling, 2002).

To engage in thematic net-work analysis, I had several readings of printed transcripts of both the interview and documentary analysis data in

order to identify patterns of experiences and their supporting data (Lavery, 2003; van Manen, 2007). The interview data in particular, was read severally with a full awareness that they unstructured, since the reflections of humans are not structures to be expressed coherently (Silverman, 2011; Wood & Koger, 2000). Pattern identification thus began with data reduction, which is the selection of salient data to address the research questions began with the coding of the data (Saldana, 2013). Texts were explored and integrated to generate thematic net-work analysis' three classes of basic, organizing and global themes (Attride-Stirling, 2002).

Guided by the initial coding frame, I identified text segments like passages, quotations and words that typified each code. These text segments were subsequently explored to generate common or significant themes; which were in turn, refined to generate discrete themes that captured the main idea contained in a set of text segments. The categorized data and their themes were imported unto the Nvivo 10 software to create a two project on; stakeholder's perspectives on the relevance of the HND curriculum and the process that was employed to design and develop the current curriculum of the HND Electrical and Mechanical Engineering programmes. Initial data analysis activities were undertaken in recognition of the fact that I was a novice in the Nvivo software; thus, I manually worked on the data to the point where it eased my identification and categorization of data for the use of the Nvivo software.

From the various sources, that is files that contained data from the various sources, I created nodes (Nvivo version of codes). Descriptions were assigned to the nodes, in order to know the content of the nodes. Texts in the

transcripts were highlighted and assigned to corresponding nodes, and categorized into parent and child nodes to correspond with thematic network analysis three categories of global themes, organizing and basic themes (Attride-Stirling, 2002). In general, Nvivo facilitated organization of the codes into hierarchies to ease the identification of links between codes, and common and opposing codes. The screenshot of Nvivo work page in Figure 5 illustrates the list of sources of data, the on-going generation of nodes from the various sources and the number of data identified to support each node.

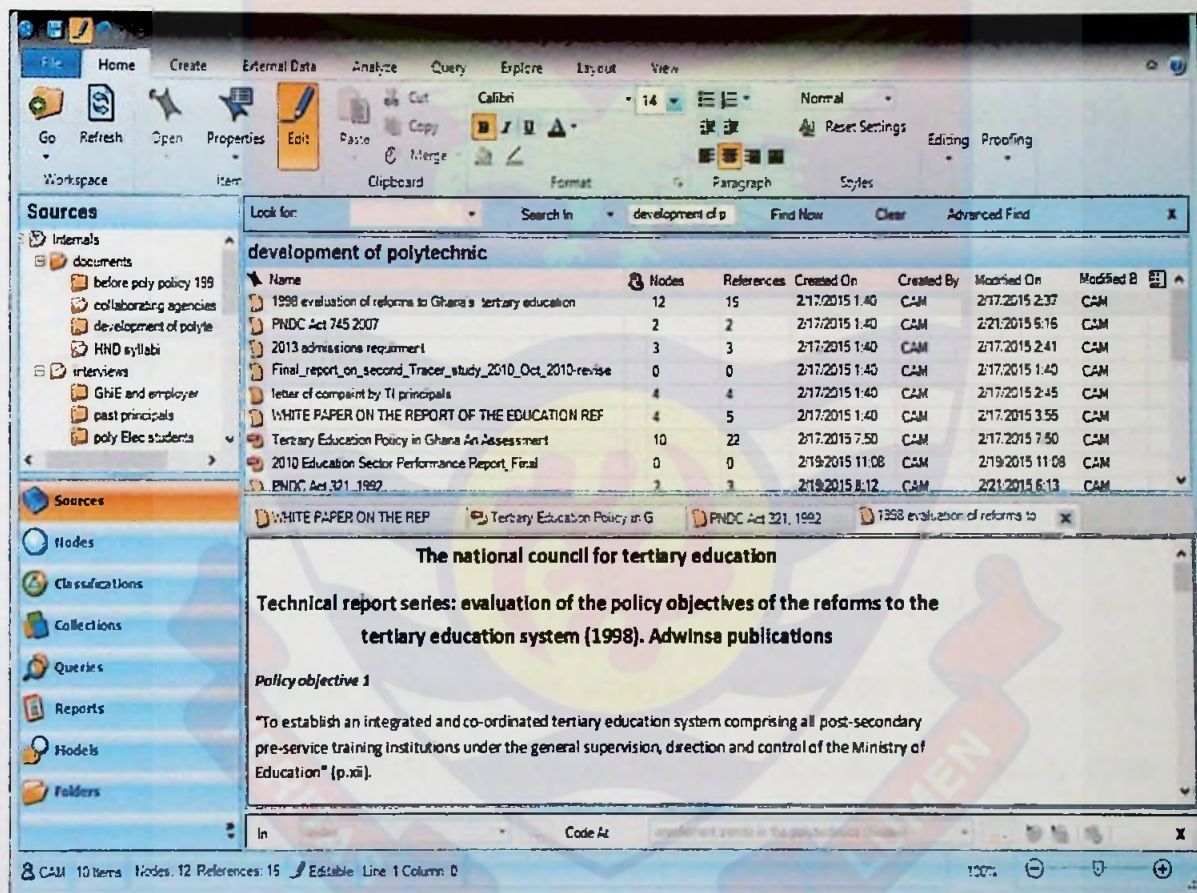


Figure 5: Nvivo illustration of coding the documents

To create meaning, short summaries on each node under the various themes were written to highlight the experiences and perspectives. The background of the source of information and memos written on the field and during analysis were also compared with the summaries made. This informed the themes that are presented on page

Trustworthiness in this Study

In order to ensure trustworthiness in the conduct and findings of this study, Guba's four constructs of credibility, transferability, dependability and confirmability were adopted in this study (Shenton (2004). Credibility (which is the positivist version of internal validity), refers to the assurance of the congruence of findings with the reality on the ground (Guba, 1990). The first condition to attain this credibility, has been to establish the appropriateness of hermeneutic-phenomenology to explore stakeholders' perspective and the process of designing and developing the HND curriculum (Shenton, 2004). The major concerns of this study could draw on both subjective and objective data, but more to the former as the study sought to understand meanings and experiences of a phenomenon.

The feature of Hermeneutic-phenomenology to explore both lived and living experiences, made it most appropriate to employ in this study (Sloan & Bowe, 2014). This invariably informed the selection of study sites and participants, choice of methods, data analysis and interpretation strategies. Inasmuch as Shenton (2004) recommends the random sampling of study sites and participants to contribute to trustworthiness, the present study did not permit the randomization of all study sites, since all non-polytechnic stakeholder institutions did not have sister institutions or alternatives to choose from. I therefore resorted to the sampling of participants from different stakeholder groups and institutions in order to ameliorate possible negative effects from participants' biases against or for the phenomenon and create a comprehensive narrative from the similarities and differences in participants' perspectives and experiences (Creswell, 2007).

The choice of the interview and documentary analysis methods was therefore based on their appropriateness to explore ideas and experiences of participants, documents on the context and policies related to the phenomenon (Shenton, 2004). It was in light of this, that semi-structured interview guides were, for example, constructed in order to permit participants to express their opinions with fewer limitations. Although, probes, repetition of questions and rephrasing of participants' responses were used as filters. At the analysis stage, the use of the Nvivo software was considered to have added rigour to this study, since more accurate results are retrieved than the use of manual methods and triangulation of data from the different sources was accessed with ease (Creswell, 2007).

Apart from addressing the possible challenge of participant's biases, I also sought to address researcher biases in order to make the study more credible. This was achieved by (i) undertaking familiarization visits to study sites and participants prior to field work in order to construct informed interview guides that took into consideration the mandate of individual institution in relation to the focus of the study; (ii) permitting gatekeepers to select individuals with the requisite qualities to contribute to the study and the use of a questionnaire instrument to sample student volunteers for the study; and (iv) the provision of verbal and written consent forms in order to have willing individuals whose submissions could be considered as honest and not given under any form of duress (Guba & Lincoln, 2000).

The problem of researcher bias on the outcome of the study was also sought by stating my background and having frequent debriefing sessions. In order to let my role as the insider/outsider researcher benefit this study, my

background, in terms of qualifications, expertise and experiences as a researcher, and as a teaching staff in one of the polytechnics, has been accounted for. The use of frequent debriefing sessions to address the problem of researcher bias also saw me having regular sessions with my supervisors; peer discussions, progress report presentation to teaching staff of IEPA and recording of reflections in a diary. These strategies afforded me the divergent views my supervisors, peers and others on issues emerging at different stages in the study. One major outcome of accessing such a wide range of perspectives is the more objective presentation of interpreting the findings of the study, than my own experience and knowledge would have afforded me.

The diary also enabled the interrogation of choices made and how they fitted into the whole study. Notes in the diary served as clues to build upon. For instance, at the beginning of this study, I had contemplated using either critical theory or constructivism. Further reading informed the choice of Hermeneutic-Phenomenology which had been established to be more useful to explore the process of curriculum design and development (Kafle, 2011; van Manen, 2007).

The second and third on Guba's trustworthiness, transferability and dependability can be likened to the positivist versions of external validity and reliability, respectively (Shenton, 2004). Unlike the positivist demonstration of external validity of studies by replicating studies in a wider population, the contextualized nature of qualitative studies challenges this practice. External validity in qualitative studies is however possible insofar as accurate descriptions of the context of the study is given, in order to enable replication in context with similar features (Guba & Lincoln, 2000). It is against this

background that the context of this study as covered in Chapter Four presents the social, economic and educational context of establishing Ghana's tertiary polytechnics; the structure of the HND level and descriptions of the mandates of the various stakeholder institutions who contribute to the design of the HND curriculum; antecedents to the design and development of the first curriculum for the HND level. By extension, Chapter Three also sought to satisfy the condition of possible transfer of the study by describing in as much as possible, the methodological decisions taken to operationalize the methods employed. Particular attention has therefore been given to the procedure employed to arrive at the study's findings. Ascertaining credibility invariably addresses issues of the reliability of the research methods and their application as their thorough description culminates in revealing the circumstances under which each was used to suit different circumstances.

Guba's criterion of confirmability, which fundamentally seeks to ensure objectivity in qualitative research, has been addressed in this study, through the triangulation of sources of information, methods and analysis and descriptions of my background to reveal my possible biases and its relationship with informants' submissions. The use of triangulation therefore becomes a strategy to confirm and authenticate informants' submission and to reduce the impact of researcher's biases. Apart from using triangulation to address my biases, the triangulation of data sources also enabled the comparison of information from different sources to culminate in a comprehensive analysis and interpretation from the perspectives of different stakeholders (Morrison, 2007). The different characteristics of sources of data thus informed the use of different methods that could effectively gather data

for triangulation. For instance, whereas focus group discussion was considered most appropriate to gather data from students, the face-to-face interview method was preferred to gather data from the stakeholder institutions of Ghana's HND polytechnics.

According to Morrison (2007) strategies to attain trustworthiness and reliability in research is context-bounded. Thus, Guba's four constructs that guided the attainment of trustworthiness in this study generally took into consideration the research approach and the context of designing and developing the polytechnic HND Electrical and Mechanical Engineering curriculum.

Profiling of Study Sites and Participants in the Study

As elaborated in Chapter Three, the study was mainly undertaken in two polytechnic institutions, with supporting evidence from supervisory institutions, academics and the engineering professional body. This concluding section of the chapter profiles the two study sites and all the participants drawn upon for the study, in order to establish the context of the former and the capacity of the latter contributed to the study.

The polytechnic institutions

Of the two polytechnic institutions that were selected for this study, one of them, Polytechnic A, existed prior to the promulgation of the polytechnic Law of 1992, whilst Polytechnic B was established in 1998, six years following the passage of the Polytechnic Law of 1992. All polytechnic institutions had been offering the two programmes (Electricals and Mechanical Engineering) and had had representation in the designing process of the current curricula-in-use. From NCTEs (2012) statistics for academic

staff strength of the School of Engineering in Ghana's polytechnics, polytechnic A had 82 lecturers and polytechnic B had 34 lecturers. All study sites were adequately resourced in the two programmes of interest in this study. Teacher participants admitted that, whereas polytechnic A was adequately equipped in all the two engineering programmes, polytechnic B had recently been equipped with modern plants by a benevolent company.

Polytechnic Lecturer participants

All the lecturers selected from the two polytechnics had been in the services of the polytechnics for over ten years, with some having assumed headship positions over some teaching departments. In all, four lecturers participated in this study; each representing a teaching department of either the Electrical or the Mechanical Engineering programmes. In Polytechnic A, the two lecturers were assigned the pseudonyms, Ato and Atta; whilst lecturers from Polytechnic B were given the pseudonyms Ben and Billy. All participating teaching staff (lecturers) in this study, possessed qualifications in Master's degree.

Final Year Polytechnic HND Students

Four groups of final year polytechnic students participated in the focus group discussion for the study. Data from each focus group were treated as one data set, and given the pseudonyms AElect, AMech, BElect and BMech, to identify each group with their programme of study. The student focus groups generally exhibited the diverse streams of secondary level students who enroll into the two engineering programmes in the study; thus, there were students with SSS, SSS/STS and TI backgrounds. Most of the students from the SSS and SSS/STS background indicated that, they had settled for the HND

programme after failing to gain admissions into the university; whilst students from the TI indicated that they had no other choice at the tertiary education level, than to seek admissions into the polytechnics.

The grammar-based background of the SSS/STS, student participants attested, afforded them an upper-hand in grasping theories and perform better in science and mathematics, than their counterpart from the TVET sector. The reverse was true for the students with the TVET background, whose performance in the science and mathematics was challenged, but did well in the principles of the trade and practical work than students from SSS.

Retired Polytechnic Principals

Two retired polytechnic principals who contributed to this study are given the pseudonyms of Kofi and Koby. These participants were heads of two post-secondary polytechnic institutions that were upgraded to tertiary status upon the operationalization of the Polytechnic Act 321 of 1992. These retired heads of institutions played active roles in the preparations towards the upgrading of the polytechnics to tertiary status. Both participants, for example, had been part of delegates who travelled to the United Kingdom in 1991 to study the British polytechnic system to inform Ghana's intended tertiary TVET sector. These principals also participated in the first syllabus writing project. In fact, Kobi was the General Co-ordinator for the syllabi writing task ("Excerpts of Reports", July, 1992). Both retirees were also present in meetings with the then Minister of Education, among which was the meeting that resulted in the directive to operationalize the polytechnic law.

Polytechnic Administrator

An administrator, given the pseudonym Kojo, was not part of the initial respondents selected for the study. He however requested to be interviewed since he had some insights to share concerning the process of curriculum design and development at the polytechnic institutional level and at the national level. Information from Kojo provided an opportunistic data on the administrative aspect of the processing of the curriculum documents.

Government Institutions

As discussed in Chapter Four, four government institutions contribute to the design and development of Ghana's polytechnic HND curriculum, although each has a specific mandate to play. Comparatively, NCTE, NAB and NABPTEK were established during the early years of the tertiary polytechnics, whilst COTVET was established in 2006 (See p. 148). The late establishment of COTVET does not only imply its absence from initial curriculum design and development projects but, has also resulted in its relegation to the background. In fact, one participant from the supervisory body explained that the older supervisory institutions have considered the role of COTVET as duplicating aspects of the mandates of the older institutions (Effah, 2010; Sid & Sena, interviewed on Sept., 15th, 2013; Roy, interviewed on Feb., 8th, 2013). Sid and Sena (interviewed on Sept., 15th, 2013), however indicated that COTVET contributes to the development of the polytechnics by virtue of their policy making role; a recent input being the qualifications framework for Ghana's TVET sector (See p. 139).

During the gathering of data for this study, all of these government institutions occupied a storey building complex within the same compound.

Each institution was headed by an Executive Secretary, yet it was the administrators who acted as gatekeepers to facilitate my contact with participants who had the store of knowledge and experience to inform my study. The exact profile of the participants drawn from the government institutions and had oversight responsibilities are presented hereafter.

National Council for Tertiary Education (NCTE)

From NCTE, one participant given the pseudonym, Patrick, participated in the present study, by virtue of his membership on the panel that audit and assess funding requests from tertiary institutions to advise the Minister of Education on funding allocations to public tertiary institutions and their programmes. The mandate of NCTE in relation to developing the polytechnic curriculum and the criteria by which funding was given to public tertiary institutions, particularly, the polytechnics. From this background, therefore, Patrick has enough experience to share.

National Accreditation Board (NAB)

In the case of NAB, one participant with the pseudonym, Paul contributed to this study. Paul was a head in one of the departments in NAB, at the time of data collection, although he had risen through the ranks to witness different aspects in the process of accrediting Ghana's polytechnics and their programmes. It was within such experiences that Paul offered information related to the accreditation of the polytechnics.

National Board for Professional and Technician Examination (NABPTEX)

For NABPTEX, two participants given the pseudonyms Ray and Roy contributed to the study. Both participants were officials in the institution, although Roy is senior to Ray. Officially, Ray was assigned to participate in

the interview, but because of gaps in his responses, his superior officer, Roy decided to join the study. Roy did not just fill gaps in Ray's responses but could also give explanations and recommend documented materials to substantiate his submissions.

Council for Technical and Vocational Education and Training (COTVET)

Two participants, given the pseudonyms Sid and Sena represented COTVET in the study. Sid and Sena have the same job description in their institutions, thus, occupying the same office to work on research projects assigned to the department. Both participants had participated in several projects that had seen them, (1) travel to highly TVET developed nations like Japan and China and (2) hosted TVET experts from nations like Israel, Holland, Canada, among others, in workshops and conferences. As such, these two participants possessed an appreciable comparative knowledge and experiences between Ghana's TVET, that of other contexts.

Professional Bodies

The two participants from the professional body who contributed to the study were given the pseudonyms Tete and Toku. Tete had been a member of the professional body for over 12 years and a graduate from one of the technology universities in Ghana. Tete is an entrepreneur, who employs graduates from both the polytechnics and the universities. At the professional institution, Tete had been in charge of polytechnic affairs for two years and had consequently had valuable experiences regarding issues relating to the polytechnic graduates. Upon his assumption of office, Tete observed from documentation at the institute that, at the student level more polytechnic HNDs registered with the professional body than students from the university,

whilst the reverse happens upon graduation when new graduates are expected to confirm their membership from the student to graduate status. This finding from his research culminated in the desire to research into the HND polytechnic graduate and his/her membership with the institution.

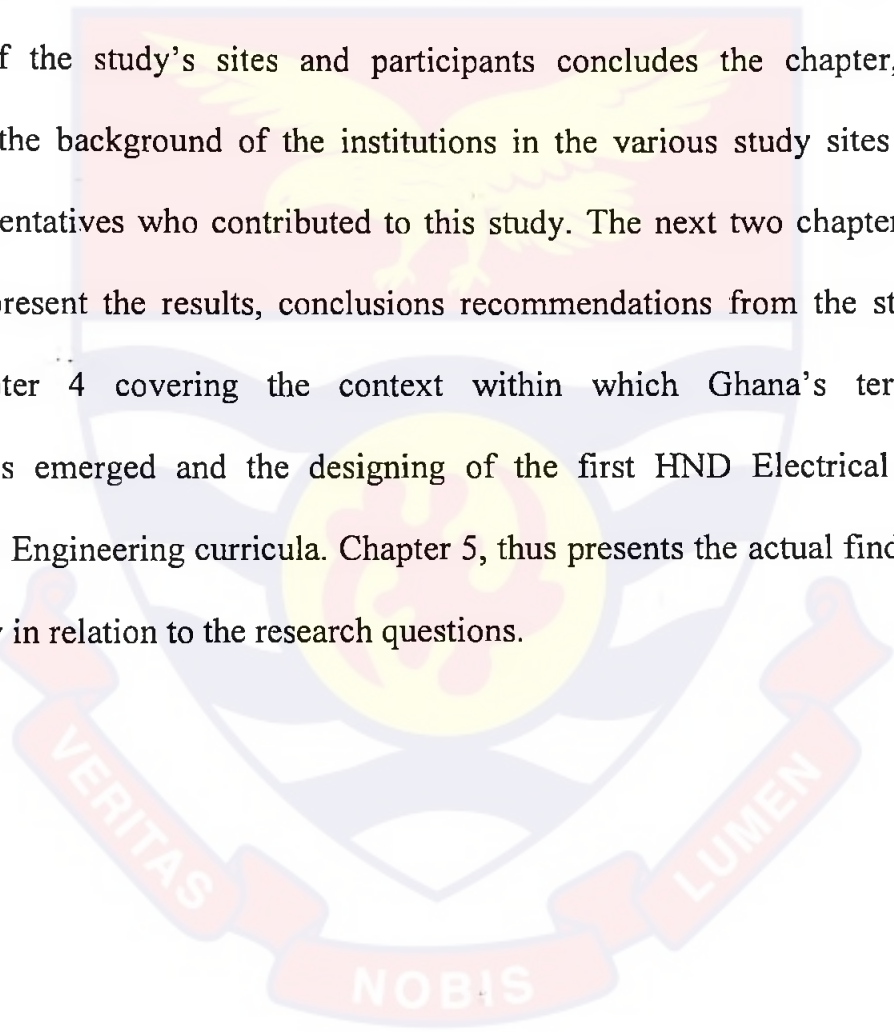
The second participant from the professional body, with the pseudonym Toku, was a ranking executive member of the institution and had been a member for more than 25 years. Toku, was also the gatekeeper who granted me the permit to conduct the study and assigned Tete to address my inquiry. Toku is a product of the old TVET system, who went through London City and Guilds TVET system before proceeding to the university, after a period of working in the industry. Toku, become a participant in the study, because of the gaps Tete's accounts presented during the course of gathering data for the study.

Academics from the University

Osei and Oto represented the academics from two different universities. Both academics had contributed to several curriculum design and development projects for the polytechnic HND engineering programmes. Osei was a retiree who was on contract in the university and had participated in numerous HND Engineering curriculum design activities for the polytechnics. Oto, on the other hand, was in active service and a full-time lecturer at one of the universities in Ghana, as well as a part-time lecturer in one of the polytechnics. Oto claimed to been a full-time lecturer in one of the polytechnics, before his employment in the university.

Summary of Research Approach

This chapter has presented the research paradigm methodological decisions that were undertaken to conduct this study. The chapter has thus presented the philosophy of hermeneutic-phenomenology and its justification for use in the study and how it determined the choice of sampling, data gathering and analysis methods. The chapter has also catered for ethical principles and reflexive practices that were adhered to in the study. The profiling of the study's sites and participants concludes the chapter, by presenting the background of the institutions in the various study sites and their representatives who contributed to this study. The next two chapters of the study present the results, conclusions recommendations from the study, with Chapter 4 covering the context within which Ghana's tertiary polytechnics emerged and the designing of the first HND Electrical and Mechanical Engineering curricula. Chapter 5, thus presents the actual findings of the study in relation to the research questions.



CHAPTER FOUR

THE CONTEXT AND THE DESIGN AND DEVELOPMENT OF GHANA'S FIRST POLYTECHNIC HND CURRICULUM

We must... provide further outlets for these children and give them an opportunity to learn something of engineering ...

(Kwame Nkrumah, quoted in McWilliam & Kwamena-Poh, 1975; p. 94)

Introduction

The quote above was made by Ghana's first president, Dr. Kwame Nkrumah, two days to the independence of the nation from colonial rule. The quote embodies intentions of the nation to move away from the provision of a constricted form of education to a multi-pathway that could develop and harness different potentials and skills for national development. Subsequent governments pursued the same path at the pre-tertiary level of education until the development of tertiary TVET programmes in the polytechnics to develop TVET at the higher level of education.

Drawing on documents, field notes and informal interviews with participants, this chapter presents the findings related to antecedents to the development of the HND level programmes in Ghana's polytechnics and the design of the first curricula for the sector. The context of developing HND level programmes in Ghana's polytechnics covers the key areas of the structures instituted to enable the tertiary polytechnics to function as expected and the designing of the first curriculum for the sector.

Emergence of the tertiary TVET in Ghana's polytechnics

As discussed in Chapter Two, the history of TVET in Ghana's education sector can be traced back to the pre-colonial era. However, the introduction of

TVET into mainstream education remained at the pre-tertiary education level until 1992 when the government decided to develop TVET tertiary programmes in the polytechnics as a means of diversifying the nation's tertiary education sector, in order to improve access and address issues of relevance between education and the needs of the society (Akyeampong, 2007; GoG, 2002; Girdwood, 1999).

Prior to 1992, Ghana's education sector was dominated by the academic tradition, where the pre-tertiary sector was grammar-oriented and the tertiary education sector was dominated by the universities and their academic tradition (URC, 1991; NCTE, 1998). TVET in the formal education sector was first introduced as subjects into the basic level education provided by the missionaries and the colonial government. TVET, beyond the basic level emerged in the trade or industrial schools that were established from 1922 to 1938 to train labour for the growing industrial and agricultural sectors (McWilliam & Kwamena-Poh, 1975).

After independence in 1957, apart from Nkrumah's Seven Year Development Plan which was truncated as a result of his overthrow in 1966, the 1967 Continuation School for students who were not admitted into the second cycle grammar schools was the next most significant education policy that considered TVET (Akyeampong, 2007). Students who enrolled into the Continuation Schools were offered pre-vocational education, until the piloting of the Dzobo Committee's proposed Junior Secondary School system from 1974. In Dzobo's Junior Secondary Schools, pre-vocational education was incorporated into the first three years of the second cycle level. Among others, reforms to incorporate TVET into Ghana's pre-tertiary educational levels saw

a sudden increase in enrolments at the pre-tertiary levels. This expansion at the pre-tertiary levels however, failed to be translated into the tertiary education sector, since the universities failed to expand and re-structure to enrol more students and cater for the diversity in the students' pre-tertiary educational background (Owusu-Agyeman, 2006).

The failure of the university to expand and re-structure for the purposes of diversification was fundamentally challenged by funding constraints and the thick academic orientation of the university (Ayisi, 2001). The quality of education in the universities began to deteriorate as facilities began to be over-stretched in spite of stringent measures applied to her admissions (Atchoarena et al., 2002). The academic orientation of the university also made it needful to take steps to bridge the gap between academic knowledge and the needs of the society. The training the nation's labour accessed, appeared inadequate, especially where the economic crisis saw increasing unemployment at the public sector and for graduates (Atchoarena & Delluc, 2002; ILO, 2003). It was against this background that Ghana's major development partners, the World Bank and her associate, the IMF, recommended the diversification of the nation's tertiary education sector in the comprehensive educational reform that was being undertaken in the Structural Adjustment Programme (SAP) (Girdwood, 1999).

Prior to the Education Reform of 1987, Ghana's pre-tertiary education system covered a period of 17 years; six years for primary education, four years for middle-school, five years for secondary education and two years Sixth Form (GoG, 2002). This situation was considered inimical to the development of the nation as the more years spent in school reduced the

manpower hours the nation could benefit from. The Education Reform of 1987, therefore, sought, among others, to reduce the number of years spent in school from 17 years to 12 years to comprise, six years primary education and three years Junior Secondary School (JSS), now Junior High School (JHS) at the basic level and; three years Senior Secondary School, now Senior High School (SHS) (World Bank, 1995; GoG, 2002). The length of education was therefore aimed to be reduced in order to lengthen the man/working hours to maximise benefits from the nation's store of labour, and to enhance the quality and the relevance of the education system to the Ghanaian context (GoG, 2002; World Bank, 1995).

As part of addressing the issue of relevance, the education reform also sought to incorporate TVET into all levels of Ghana's education sector. TVET subjects were, however, first incorporated into the curriculum used at the basic education level. This was to prepare school children to pursue either or, both TVET and grammar subject combinations at the secondary level, as well as equip the youth with basic TVET skills to enable decent sources of income in case of discontinuity at any point from the pre-tertiary education sector.

At the tertiary education level, the government of Ghana took cue from IMF and the World Bank's recommendations to diversify and open-up access to the sector. A University Rationalization Committee (URC) was thus instituted in 1988 to identify loopholes in Ghana's tertiary education sector in relation to the nation's economy and recommend accordingly (Girdwood, 1999). From the URC's needs analysis report, Ghana required about 43,840 scientists and 32,880 technicians for the research and innovation industry alone, but the orientation of the universities inhibited expectations of opening-

up access and diversify their programmes to develop the requisite skills (URC, 1988). In fact, the URC described the academic orientation of Ghana's universities as having developed a strong "... attachment to outmoded metropolitan models that... the typical product of Ghana's universities accept dogmatically that he is entitled only to prestigious positions and that society owes him a living" (1988; p.6). Ghana's universities had for years focused on the training of personnel to occupy key administrative, commercial, research and professional positions in both private and public establishment; leaving a middle-level manpower gap in the nation's store of labour (URC, 1991).

It was against this background that the URC recommended a three-tier tertiary education system with the university at the top, the polytechnics in the middle and Regional Colleges of Applied Arts and Science (RECAAST) at the bottom (URC, 1991). According to the URC, the polytechnics were however to be the leading institutions in the non-university tertiary sector; but whereas, the duration for university degree programmes were made four years, diploma programmes in the polytechnics and RECAAST were to cover a period of three years. In addition, the universities were to continue in their academic vision, whilst the polytechnics and RECAASTs were expected to focus on developing tertiary TVET programmes. The distinction between the RECAAST and polytechnics was such that, whereas each college in the former was to develop specific profession at the diploma level, eg., agriculture, nursing and teacher training institutions; the latter's focus was to develop different professional tertiary TVET programmes like, engineering, science, business and the arts (URC, 1991). Subsequently, the White Paper on Reforms to Ghana's Tertiary Education was constructed to inform among

others, the promulgation of the Polytechnic Act of 1992 (Akyeampong, 2007; URC, 1991).

Ghana's Tertiary Polytechnics

Generally, Ghana's tertiary polytechnics were mandated to develop TVET programmes to supply labour to fields in the areas of manufacturing, commerce, science and technology, applied social science, and applied arts (Polytechnic Act 321, 1992; p. VI-3152). In order to address the immediate need of filling the middle-level manpower gap, the tertiary polytechnics were to commence with Higher National Diploma (HND) programmes (URC, 1992). Starting with the upgrading of six post-secondary technical institutions, Ghana's polytechnics currently have 10 institutions, one in each of the 10 administrative regions of the nation (Akyeampong, 2007). Most HND programmes are offered across all of Ghana's polytechnics, although in some instances some programmes are offered in one or few of the polytechnics, depending on the comparable advantage of individual institutions to their immediate context (NCTE, 2013).

Ghana's HND polytechnics had its first major assessment in a JICA/Ghana government collaborated study in 2002, which looked into the performance of the nation's TVET sector across all the levels. (Akyeampong, 2007). One major finding from the study was the outmoded nature of all the curricula in use in the sector. Subsequently, the polytechnics attracted among others, the training of polytechnic teaching staff in Competency Based Training and Education (CBTE) by donor agencies like Netherlands University Foundation for International Cooperation (NUFFIC) in collaboration with Ghanaian institutions like the University of Cape Coast

(Kouwenhoven et al., 2009). This CBTE model was later piloted in some programmes in some of the polytechnic institutions; after which the model was to be applied to all HND programmes from 2015 onwards (MOE, 2014). At the time of submitting this study, the adaptation of the CBTE model for all HND programmes was yet to be realized (Atta, interviewed 9th September, 2012).

In 2007 the mandate of new the polytechnics was extended to develop programmes beyond the HND level and to have the autonomy to certify their own programmes by the Polytechnic Law (Act 745, 2007). Tensions between the polytechnics and their supervisory body ensued, as the former sought for an interpretation of their autonomy and the role of the latter in the polytechnic system (Ray interviewed on 8th February, 2013). Currently, the polytechnics have been upgraded into Technology Universities by a presidential declaration in 2013, programmes beyond the HND levels are to be introduced from the 2018/2019 academic year; within which the CBTE is to adopted in all programmes of being offered (Atta, interviewed 9th September, 2016; NCTE, 2014).

The introduction of the Technical Universities seeks to continue with the mandate of developing TVET oriented programmes as stipulated in both the Polytechnic laws of 1992 and 2007 (MoE, 2014). The Technology Universities are also to resolve, among others, the (i) setting of bench marks for upgrading in terms of resources; (ii) statement of clear purpose among stakeholders; (iii) perceptual phenomenon that has resulted in the polytechnics being perceived as junior universities; and (iv) recruiting and retaining staffs that are competed for by the industry (NCTE, 2014). The levels of programme

offerings in the Technical Universities are to be within COTVET qualifications framework for Ghana's TVET sector that seeks to resolve the issue of academic progression beyond the HND level (COTVET, 2012).

By a Legislative Instrument, Ghana's TVET sector now has an eight-level qualification framework that starts from National Proficiency I and II, National Certificate I and II, HND, Bachelor of Technology (B.Tech), Master of Technology (MTech), and Doctor of Technology COTVET (2012). According to the COTVET (2012), National Proficiency I certificate is equivalent to the apprentice-trained in the informal sector. The mainstream TVET formal education however commences with the National Certificate Level, which is equivalent to the SSS level. After the Certificate Level, one has the option of offering BTech or HND programme, depending on one's grade point; then to MTech and Doctoral levels. Ghana's polytechnic institutions therefore seek to offer different levels of programmes to its students, but the HND level has remained the dominant level, since programmes for the other levels are yet to be operationalized.

HND Polytechnic Level

The curriculum of HND programmes offered in Ghana's polytechnics is designed at the national level, towards a nationally awarded qualification (URC, 1991; Polytechnic Act 321, 1992). HND programmes cover a period of three years, of six semesters and with a minimum credit of 90 hours (Minutes of Panel Meeting, 1992). The content of the HND syllabi is delivered through lectures, practical work, class assignments and end of semester examinations that have a 60% theory and 40% practicals weightings (Republic of Ghana, 2004; Minutes of Panel Meeting, 1992). A major component of the practical

aspect of the HND curriculum is offered in a six-month industrial attachment in two different industries during the first and second year long vacations (Government of Ghana [GoG], 2002).

From my experience in the polytechnics, two supervisors, one from the industry and a polytechnic staff oversee the training of the student in every industrial attachment. Whereas, the supervisor at the workplace guides and allocates the student to specific skill training tasks, the lecturer pays some visits to inquire about the performance of the student on the field. Eventually, both supervisors and students submit a report on the student's performance and experience on the field; by which the student is assessed in addition to practical and course work undertaken on campus. As a condition for graduation, students are also required to undertake a project work related to their programme of study.

Admissions into the HND Electrical and Mechanical Engineering Programmes

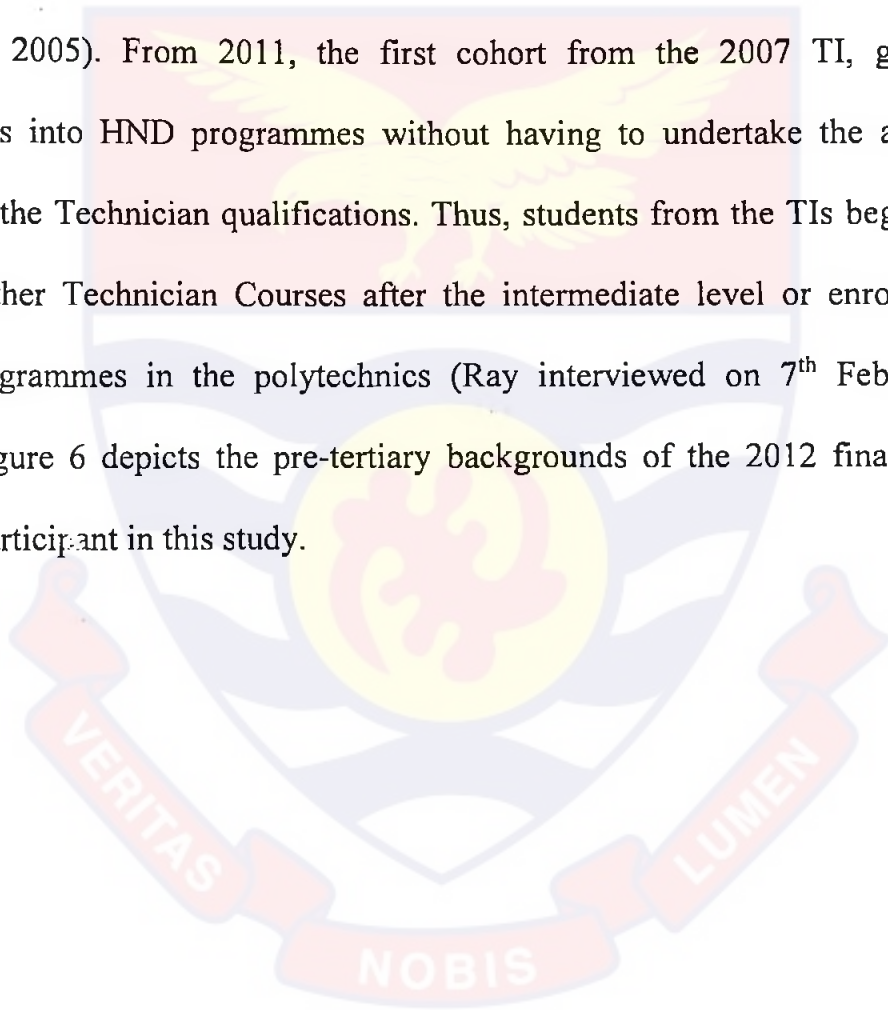
Generally, three main streams of secondary education are offered in Ghana's education sector, and these comprise of, the purely grammar secondary high schools (SHS), formerly called senior secondary schools (SSS); the grammar/TVET secondary technical secondary (STS); and the purely TVET technical institutions (TI) (GoG, 2002; NCTE, 2013; Ray, interviewed on 7th February, 2012). All these streams of secondary education (SHS, STS and TI) are offered in duration of three years and seeks to "... cater for the different aptitudes, interests and skills of students ..." (GoG, 2002, p. xxviii).

Whereas the SHS and STS levels culminated in Secondary School Certificate from the West African Examination's Council, the TI stream culminated in an Intermediate Certificate of Examination from NVTI. Whereas the SHS and STS certificates could be used to access admissions into any tertiary education, further education after TI used to be accessed only in the three-level Technician Certificate Examinations of; Technician I, Technician II and Technician III (NCTE, 2001). According to the student participants in the study, the Technician I, II, III examination certificates were taken sequentially and interspersed with at least one-year industrial attachment training. In the industry, Technician III was considered equivalent to the polytechnic HND qualification; however, in terms of higher education, the Technician III qualification was not considered equivalent to HND to pursue Bachelor of Technology Degree programmes because of its less theoretical content (Koby, interviewed on 7th September, 2012; AMech, interviewed on 3rd September, 2013).

Prior to 2004, TI qualifications did not constitute part of the admissions criteria in HND programmes because of the lack of the requisite background in the core disciplines of English, Mathematics and Science. In fact, the TI offered the three core subjects as one subject which was not examined (Dawson, 2005). Consequently, NCTE consented to the TI qualification as one of the admissions criterion into HND programmes, but on the condition of a successful pass in a one-year access course organised by individual polytechnic institution (Paul, interviewed on 2nd February, 2013). According to polytechnic student and teacher participants in the study, enrolment into the access course was conditioned on passes in TI certificate examination result

that is, the intermediate certificate, and a professional certificate of either Technician I or Technician II; as required by individual polytechnic institutions. The one-year access course covered the core subjects of English, Mathematics, Science and ICT and culminated in a finale examination to gain admissions into HND programmes (Dawson, 2005).

From 2007, the TI began to offer the core subjects- English, Mathematics and Science- as three different subjects that were examined (Dawson, 2005). From 2011, the first cohort from the 2007 TI, gained admissions into HND programmes without having to undertake the access course or the Technician qualifications. Thus, students from the TIs began to pursue either Technician Courses after the intermediate level or enrol into HND programmes in the polytechnics (Ray interviewed on 7th February, 2012). Figure 6 depicts the pre-tertiary backgrounds of the 2012 final year student participant in this study.



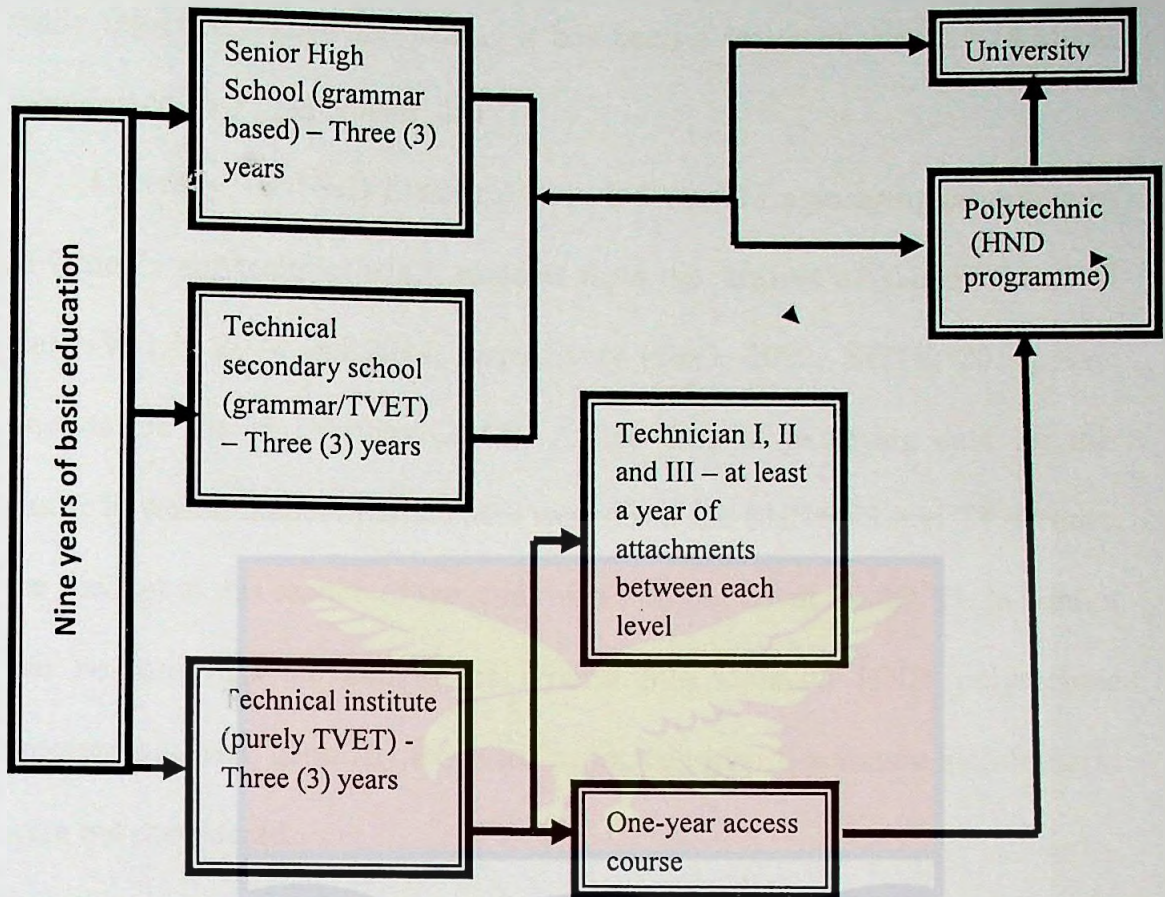


Figure 6: Educational pathway of HND electrical and mechanical engineering student participants in this study

Source: Author’s construct from GoG (2002), NCTE (2013) and interview data

From Figure 6, students from the TIs had spent about thrice the number of years spent by students from the SHS/STS before possessing the requisite certificate for tertiary education. According to the students from the TI, they had averagely spent between four to seven years to write all the Technician course certificates, because of the difficulty in combining work with education. Decision to join the polytechnics mid-way, that is, after Technician II, implied about two to four years after graduating from the TI. The pre-2011 route to gain admission into HND polytechnic programmes was therefore considered too long, such that one student participant indicated that, “I have

really regretted taking this path... it has been a waste of time..." (AMech, interviewed on 5th September, 2012).

Currently, the HND Electrical and Mechanical Engineering programmes in Ghana's polytechnics admit students from the streams of SHS/STS and TI and NVTI in 2007 and 2014, respectively (GoG, 2002; NCTE, 2014; Ray, interviewed on 7th February, 2012). At the time of gathering data for this study, however, student participants were from the SHS/STS and TI streams; the account in this section of the study will thus not cover the NVTI. In sum, it can be said that the admissions criteria into Ghana's HND polytechnic programmes have generally extended to include qualifications which hitherto were not considered.

Key Stakeholders of HND level programmes

To design and develop the curriculum for the HND, the URC recommended that the sector's curriculum should be a collaborated affair between government supervisory institutions and some stakeholder institutions (URC, 1992). Four state institutions, National Council for Tertiary Education (NCTE), National Accreditation Board (NAB), National Board for Professional and Technician Examination (NABPTEX) and (COTVET) currently have supervise different aspects of the operations of the polytechnics (Effah, 2010). Prior to 1993, Ghana's tertiary education sector was under the National Council for Higher Education (NCHE); a council placed under the Office of the President to deal directly with the Ministry of Finance and Economic Planning. Reforms to the Ghana's tertiary education sector in 1992, however, saw the need to re-constitute the council to be referred to as NCTE.

NCTE was established in 1993 to fundamentally research and gather information from the various tertiary institutions and advise the Minister of Education on areas to prioritise spending (Effah, 2010). The work of NCTE, according to Effah, include; (i) the setting of national norms and standards on unit cost, which includes approved fees, minimum requirement for admissions into the tertiary educational institutions, student/teacher ratio, student/classroom ratio; (ii) the monitoring of the implementation of policies through the tertiary education sector, like ascertaining the relevance of proposed programmes by tertiary educational institutions to Ghana's developmental aspirations and to the orientation of the institution in question and; (iii) the verification of possible duplication of programme in proposed programmes; targeted population; teacher qualification and; the availability of senior lecturers to supervise proposed programmes within the various tertiary institutions (Effah, 2010, p. 30).

In the very year NCTE was established, NAB was also established under PNDCL 317 to implement external quality assurance strategies, especially in the area of institutional and program accreditation (Effah, 2010). The core functions of NAB include, to;

- (i) Accredite both public and private tertiary institutions with regard to the contents and standards of their programmes.
- (ii) Determine, in consultation with the appropriate institutions or body, the programme and requirements for the proper operation of that institution and the maintenance of acceptable levels of academic or professional standards;

(iii) Determine the equivalences of diplomas, certificates and other qualifications awarded by institutions in Ghana and elsewhere (Effah, 2010; p. 44)

The NAB has a board that was initially made up of 23 members comprising a chairman, one Executive Secretary, three government appointees, one representative from each of the then 5 universities, two representatives from the 10 polytechnics, two from the Association of recognized professional bodies and; one representative each from Ministry of Education, Science and Sport (MOESS), Association of Ghana Industries, Employers Association of Ghana, NCTE, NABPTEX, Committee of Heads of Assisted Secondary Schools (CHASS), WAEC; Nurses and Midwives' Council, and the Public Service Commission. Under Act 744 of 2007, NAB board saw a reduction in membership from 23 to 15, as the universities were required to have only two slots, instead of a representation from all the public universities (Effah, 2010).

NAB's board is further divided into the two main committees of Accreditation and Finance and Administration Committees. The two sub-committees- Assessments Criteria, and Institutional Visits and Monitoring- feed the Accreditation Committee with the necessary data to decide on the accreditation of tertiary institutions and their programmes (Effah, 2010). Whereas, the Assessments Criteria develops the instruments to assess institutions for accreditation, the Institutional visits and Monitoring unit conducts initial visits to tertiary institutions to verify their preparedness to commence or continue a programme (Effah, 2010; NCTE, 1998). According to Effah and NCTE, the Finance and Administration Committees see to the

funding and the administration of the NAB. Accreditation processes can either be for a new or old programme. Either way, tertiary institutions are required to fill a questionnaire taken from NAB and some documents as part of their proposal for accreditation (Effah, 2010). According to Materu (2007), from 2001 individual tertiary institutions including the polytechnics began to set-up quality assurance units to ascertain quality assurance practices within the various tertiary education institutions in order to ensure that institutional and national standards are adhered to.

The National Board for Professional and Technician Examination (NABPTEX), the supervisory body specific to the TVET sector, was established in 1994 by Act 492 to develop and streamline the activities of the TVET sector (TI- polytechnic) through the formulation and administration of schemes for examinations and standards (NCTE, 2001). In line with this, NABPTEX evaluates teaching and learning, as well as assists staff of the TVET sector to acquire more competencies in their chosen disciplines (NCTE, 2001). To ensure uniformity and relevance in HND programme offerings, NABPTEX organises the design and development of the HND curriculum by drawing on the relevant stakeholder groups (NCTE, 2001; URC, 1991).

COTVET, the last to join the string of government supervisory agencies, was established by Act 718 in 2006 to co-ordinate and oversee all aspects of technical and vocational education in the country through the formulation of policies for skills development, control of qualifications framework and standards in training packages. In other words, COTVET was to see to the harmonisation of all aspects of Ghana's TVET sector (Akplu & Amankrah, 2008; Effah, 2010). None of these government supervisory agencies,

therefore, existed during the commencement of the first curricular activities for the polytechnics. Officials from the Ministry of Education (MoE) then had to facilitate the activities undertaken to design the first curriculum for the HND level (Effah, 2010).

For the non-governmental stakeholder institutions and groups, the URC established that the polytechnic institutions- represented by their teaching staff, the academic from the university, the professional bodies and employers- are to contribute to curriculum design and development for the HND level. Representations from all these stakeholder institutions and groups were, thus, expected to contribute to the HND curriculum, bringing to bear their expertise. All representing institutions were to ensure that their mother institutional standards are addressed in the polytechnic curriculum. A co-ordinated and a harmonised content of knowledge between the polytechnics and the universities were, however, to be ascertained by the universities (URC, 1992).

In the case of the professional bodies, two institutions, namely the Ghana Institute of Engineers (GhIE) and the Ghana Institute of Incorporated Technician Engineers (GIITE) could be associated with the nation's polytechnics. Since the inception of these two professional institutions, the secretary of GIITE asserted that the polytechnic HND and their government's supervisory institutions have engaged with GhIE (secretary of GIITE, interviewed on 14th April, 2012). This was because the Technician level, which is the professional level the HND offers to its graduates, is the last level of professional attainment at GIITE. The GhIE's professional levels however has the Technician level at its base, thus, preferred by the HND polytechnics, since, it offers them higher heights to progress in the engineering profession.

In the case of the universities, the University of Science and Technology, now Kwame Nkrumah University of Science and Technology, used to be the only technology inclined university at the inception of the polytechnics. Currently, academics are drawn from other universities like the University of Mathematics and Science and, Ghana Technology University College to contribute to the HND curriculum.

Operationalizing the 1992 Polytechnic Law

Preparation to operationalize the polytechnic law of 1992 had actually commenced prior to the promulgation of the law, although very little gains had been made when the polytechnics were directed to assume their tertiary status for the 1993/1994 academic year. As part of preparations to upgrade the polytechnics, a six-member delegation, which included my retired polytechnic principals, were sent to study the United Kingdom's (UK) polytechnic system in 1991 (The British Council, 1991). According to Kofi (interviewed on, 21st September, 2012), the aim of the visit was to inform, among others, the design and development of Ghana's Polytechnic Law and the curriculum for the sector. For two weeks, the delegates visited seven polytechnic institutions and Manchester University and, had meetings with the Committee of Directors and relevant specialists of the British Polytechnics (The British Council, 1991).

Upon the return of the delegates to the UK, the then Deputy Minister of Education for Tertiary Education, Mrs. Esi Sutherland concurrently tasked, (1) a committee to study the report on the visit to UK and assess the feasibility of applying its findings to the context of Ghana and; (2) a syllabus writing task force to commence the process of designing programmes for the tertiary polytechnics (Kofi, interviewed on 21st September, 2012). Neither of the

committees had completed its task, when the exit of the first cohort of the 1987 Education Reform in 1993 caused the government to demand the operationalization of the Polytechnic Law of 1992 in 1994.

From PNDCL Act 321 of 1992, the Polytechnic Law was made on 5th January, 1993 and notified in the Gazette on 5th March, 1993 (Act 321, footnote 1). Most stakeholders, the retired polytechnic principals had asserted, had least anticipated the operationalization of the polytechnic law of 1992 in its next year of promulgation (Koby, interviewed on 7th September, 2012; Kofi interviewed on, 21st September, 2012). Many stakeholders have rather assumed that the year of passing the polytechnic law was to mark the beginning of resourcing the polytechnic institutions to the level of tertiary status. The General co-ordinator of the syllabi writing task force had earlier on informed his panel leaders to “... consider the reform programmes as guidelines...” and that “...the transition would take a long time” (“Excerpts of Reports”, July, 1992; p. 5). Unfortunately, an extended impasse between the government of Ghana and the universities was about to render most of the graduates from the new education system stranded in the pursuit of tertiary education, thus the need to quickly operationalize the polytechnic law in 1994. The next section of the chapter covers the impasse between the government of Ghana and the universities, before the presentation on the construction of the first curriculum.

Impasse between the Universities and the Government over the Admissions of the First Cohort

According to the retired polytechnic principals, the tension between the universities and the government over the admission of the first cohort from the

new education system in 1993 was basically rooted in tensions associated with the implementation of the New Education Reform of 1987. The implementation of the new Education Reform of 1987 lacked the support of key stakeholders, like the academics from the universities, technocrats and educationists from across the country because of the rush in its implementation that was anticipated to worsen the deteriorating conditions in the nation's education sector.

Prior to 1987, the universities had complained of stretched facilities, backlog of students from the old system, inadequate government allocations, out-dated equipment and books and high teacher attrition as a result of poor conditions of service (Ayisi, 2001). The government's refusal to attend to the needs of the universities eventually caused the tightening of admission requirements into the universities, such that, the minimum requirement of two (2) "E"s could no longer be accepted. In other words, the admissions requirements were made so high that it became "... nearly impossible for the academically "average" and "good" candidate, and in some cases, "excellent" students to be admitted to pursue tertiary studies" (Ayisi, 2001; p. 84). The universities consequently began to admit an average of 48% of qualified candidates who sought to enrol into their programmes (AAU, GOG & Versi, cited in Ayisi, 2001). The government had thus, been expected to commence the reform with Primary One pupils of the old system, in order to prepare for the tougher demands inherent at the secondary and the tertiary education levels (Kofi, interviewed on 21st September, 2012). The directive to implement the new education system with Primary Six pupils had therefore caused the non-governmental stakeholders to anticipate a high rate of failures,

which was to have a ripple effect on the other levels in the nation's education system (Bour, 1994; Koby, interviewed on 7th September, 2012).

Unperturbed by the prognosis of the technocrats, the government pursued its plan and the first cohort of the 1987 Education Reform who graduated passed-out from the SSS had such failures that out of 42,105 candidates, only 1,656 (3.93%) passed in all nine subjects (Fynn & Okyere, 1994). As if in anticipation of that, Mr. Harry Sawyer, the then Minister of Education earlier said in a meeting with vice chancellors of the universities that, "there were initial difficulties during the take-off of the SSS programme in 1991 due to the late arrival of text-books and other equipment. There were also technical difficulties ... this has left some of the final year SSS students not to adequately prepared for the SSSCE" (Minister of Education Meets Vice-chancellors, 1993; p. 3). This speech of the Minister was a reaction to the universities and their affiliate's position to admit successful students from the new system. The universities had, for instance, indicated that successful students from the new education system would be admitted upon a successful "justify your inclusion" result from entrance examinations the universities organized (Daily Graphic, 21st October, 1993). Meanwhile, Ghana Institute of Journalism had announced in the Daily Graphic (22nd February, 1993), that no SSS graduate should buy their admission forms since the institution's admission's criteria had not been reviewed to consider them for admission.

According to, Kofi and Koby, interviewed on, 21st September, 2012 and 7th September, 2012 respectively, there was a rising anxiety among students and parents over the apparent failure of the new education system. Discussions between the Minister of Education, Mr Harry Sawyer and the

universities to consider partially successful student for admissions failed, although the universities agreed to postpone the entrance examination for the first SSS cohort to the following academic year. With the Polytechnic law already passed and preparations underway, the government implored polytechnic principals to quickly mount HND level programmes in order to admit the partially successful students from the first cohort (Koby, 7th September, 2012). The “partially successful” students, according to Fynn and Okyere (1994), were students with failures in some of the nine subjects. In all, an estimated number of 5,000 SSCE candidates enrolled into the polytechnic HND programmes, resulting in a total of 15.8% of the first cohorts of SSS graduates transiting into Ghana’s tertiary education level.

Designing the First HND Curriculum

According to Kofi, one of the retired polytechnic principals (interviewed on, 21st September, 2012), plans to proceed from a thorough research on the industrial needs of the nation to design a contextually relevant HND level curriculum was truncated by the need to quickly establish the polytechnics in order to admit the first cohort from the SSS level. The work of the syllabi writing task force assumed such a speed that, panel members, comprising representatives from all contributing stakeholder institutions, were grouped to work on programmes related to their areas of expertise. The retired polytechnic principals asserted that because of the rush, the final syllabi were generally constructed from information quickly gathered from the industries and the syllabi of the universities and the British polytechnics. In some instances, however, copies were simply made from the syllabi used by the university or the British polytechnics.

In the course of designing the curriculum, the retired polytechnic heads observed that different stakeholder representatives assumed different postures to the task (Kofi interviewed on, 21st September, 2012; Koby, interviewed on 14th September 2012). Most representatives from the universities, for instance, generally tried to dominate the curriculum design process to the extent that, some academics abandoned the project on the impression that their advices are not being heeded to by other panel members (Kofi, interviewed on 3rd August, 2012; Koby, interviewed on 14th September, 2012.). Consequently, whereas some programmes saw the active participation of the academics and the professional bodies resulting in harmonizing the HND content of knowledge with what is used by the universities and the professional bodies to examine their members, some instances saw the lack of consensus on even the content of knowledge.

The professional bodies in the business disciplines, were for instance, cited to have pursued harmonization with the HND syllabi to the extent that, from inception, HND graduates from most business programmes have had exemptions from some professional courses (Kojo, interviewed on 14th September, 2012.). On the whole, Koby alleged that the contributions of the non-polytechnic teaching staff panel members were considered as more of personalised efforts than an obligation required by their institution. In fact, a 2001 NCTE document reported that from inception, no formal agreement on curriculum design and development existed between the polytechnics and the universities (2001). The retired polytechnic principals' observation about the relationship between the polytechnics and their non-supervisory stakeholder groups, had, thus not changed during the compilation of the NCTE report.

In order to create an avenue to admit partially successful students from the 1987 education reform, the government had not only rushed the design of HND curriculum, but had also, neither been able to equip the polytechnic institutions with the requisite resources, especially for practical work, nor operationalize supervisory bodies to facilitate the enactment of the new mandate of the polytechnics. Both NCTE and NAB were, for eg., established in 1993, whilst NABPTEX was established in 1994, the very year the HND programmes started. These supervisory institutions were, however, not in the position to impress the polytechnics with their mandates, until some conditions were met. For its first requirement, NCTE was for instance, expected to properly brief its council members on the reforms to the tertiary education sector; a situation that occupied its activities until its 1995 first public fora to solicit for funding for Ghana's tertiary education sector (NCTE, 1998). All the three supervisory bodies were also challenged in terms of office accommodation, equipment, personnel and funding to carry out their work even as at 1998 (NCTE, 1998). NAB was for instance, delayed in assuming its role to accredit the polytechnics because of the problem of getting the requisite academic and physical facilities (NCTE, 2001).

In effect, none of the supervisory institutions was in operation at the time of operationalizing the Polytechnic Law of 1992, nor were they ready even within the first five years of the introduction of the HND. These antecedents to the operationalization of the Polytechnic Law of 1992 the retired principals explained, deepened public notions about the TVET at the HND level.

Access to HND level programmes

In spite of the challenges, by 2002, Ghana had a polytechnic institution in each of its 10 administrative regions (Akyeampong, 2007). According to NCTE (2014), student enrolment has continued to increase in the polytechnics, such that, from the first cohort of 1,689 in 1993/1994, Ghana's HND polytechnics recorded 16,956 in 1999/2000 and 45,934 in 2009/2010 academic years. Due to limited academic facilities, Ghana has continued to struggle with access to tertiary education; yet, the polytechnics have continued to record increasing enrolment. For instance, from 2010 to 2012 the polytechnics recorded 21.4% in enrolment (Atuahene & Owusu-Ansah, 2013).

Summary

The chapter has presented the context within which Ghana's HND engineering programmes was introduced. Commencing with its historical context, the chapter has traced the development of the HND polytechnics from its TVET tradition at the basic level. Trends in Ghana's economy that necessitated the upgrade of the polytechnics to tertiary status has also been accounted for. The chapter has also covered the antecedents that led to the operationalization of the Polytechnic Act 321, 1992, in 1993. It is against this context that the next chapter presents the major findings of the study, in order to discuss the critical issues this study sought to explore.

CHAPTER FIVE

GHANA'S POLYTECHNIC HND ELECTRICAL AND MECHANICAL
ENGINEERING CURRICULUM

Ghana's polytechnics are tertiary institutions, but what kind of tertiary?

(Ato, 22nd August, 2012)

Introduction

The quote above sets the tone to discuss the findings of the study gathered from the outcome of the analysis of documents, interview data, field notes and memos. To address the purpose of the study, the findings from the data are presented under themes that were first derived from the research questions, then from the sub-themes which were derived from the interview data and documentary analysis. Table 4 illustrates the Research Questions with their major themes, while Table 5 offers the sub-themes linked to the major themes.

Table 4: Research Questions and their Major Themes

Research Question	Themes
1. What are the perspectives of key stakeholders of Ghana's polytechnics on the relevance of the HND Mechanical and Electrical Engineering curricula?	Key stakeholders perspectives on the relevance of the HND Mechanical and Electrical Engineering curricula used in Ghana's polytechnics
2. What was the process followed in designing and developing the HND Mechanical and Electrical Engineering curricula used in Ghana's polytechnics?	Process followed to design and develop the HND Mechanical and Electrical Engineering curricula
3. How, in the opinion of stakeholders, process of curriculum design and development for Ghana's polytechnic Mechanical and Electrical engineering programmes be improved to enhance the relevance of the curricula?	Strategies to enhance the can the relevance of the HND Mechanical and Electrical HND Engineering curricula through its design and development

Source: Researcher's construct from the research questions

Table 5: Major Themes and Sub-Themes derived from research questions

Themes	Sub-themes
1. Perspectives of key stakeholders of Ghana’s polytechnics on the relevance of the HND Mechanical and Electrical Engineering curricula	<ul style="list-style-type: none"> - Purpose underpinning Ghana’s HND Engineering programmes -Theoretical and practical content of the HND curriculum <ul style="list-style-type: none"> -Uniformity in content and assessment -A multi-stakeholder collaborative design and development for the HND curriculum -Frequent revisions to the content of knowledge in the curriculum -Teacher quality for the HND Engineering curriculum -students background for a relevant HND Engineering curriculum -Ghana’s Social TVET orientation
2. Process followed to design and develop the Mechanical and Electrical Engineering curricula	<ul style="list-style-type: none"> -Constructing the first drafts of HND Electrical and Mechanical Engineering curricula -Moderating HND curriculum for accreditation -Accreditation decisions -Facilitating the delivery of HND Curriculum
3. Strategies to enhance the relevance of the HND Mechanical and Electrical Engineering curricula through the process of curricular design and development	<ul style="list-style-type: none"> - Pre-tertiary level - HND level - Post HND level

Source: Author’s constructs from interview and document data

Key Stakeholders Perspectives on the Relevance of the HND Mechanical and Electrical Engineering Curricula Use in Ghana’s Polytechnics

In order to address Research Question 1, the first section of the chapter presents the factors that emerged from interview and documents data to have underpinned stakeholder participants’ expressions of relevance in Ghana’s HND Electrical and Mechanical Engineering curricula. These factors include

interpreted purpose of the Polytechnic Act 321 of 1992; collaborated curriculum design; revisions to the curriculum document, among others.

Purpose of Ghana's HND Engineering Programmes

According to the PNDCL Act 321, 1992, Ghana's polytechnics were mandated to; (i) ...encourage study in technical subjects at tertiary level and; (ii) Provide opportunity for development, research and publication of research findings (p. Vi-3152). Both the URC, the document that informed the Polytechnic Act of 1992 and the Polytechnic Act 321, 1992, thus agreed that the upgrading of the polytechnics was to culminate in the development of tertiary TVET programmes. The level(s) of programmes and the conditions under which different or higher levels of programmes were to be developed in the polytechnics were however unclear in the URC and the polytechnic law.

The tertiary TVET in the polytechnics were however to "...restrict themselves in the first instance to the designing and teaching of courses leading to a certificate in diploma until their academic standards are firm" (URC, 1991; p. 161). In another vein however, the URC stated that the polytechnics are to "... train students mainly for the award of Diplomas in the various subjects" (p. 175). These two statements contradict intentions to develop different levels of programmes in the tertiary polytechnics, since the first statement suggests the development of programmes beyond the diploma level, the second statement conveys the intention of developing programmes to the diploma level. The adverb of manner "mainly" in the Advanced Oxford Dictionary (2009) presents two meanings; the first, which is old English means, "In a forceful manner"; whilst, the second, which is contemporary English means "for the most part"; "more than anything else";

“predominantly”; “chiefly” etc. A sense of compulsion and dominance is apparent in the usage of “mainly” in the second quote to emphasize the focus on the development of diploma level programmes than any other.

The Polytechnic Act 321 of 1992 however seemed to have concluded the matter by providing that the polytechnics are to award certificates, diploma and degree programmes (PNDCL Act, 321, 1992). A qualifications framework that was similar to that of the university system seemed to have been imminent for the tertiary polytechnics. Yet, the conditions under which programmes beyond the diploma levels were to be developed were however “subject to the conditions that the authority responsible for higher education shall direct” (PNDCL Act 321, 1992; p. VI-3152). The development of degree programmes was therefore left to the discretion of the authority responsible for higher education with no further explanations given to what criteria may guide decisions to develop diploma level programmes in the polytechnics.

The tertiary polytechnic was thus introduced to develop tertiary TVET oriented programmes, in order to bring diversity to Ghana’s tertiary education sector. At inception, however, the immediate need to address was the filling of the “middle-level manpower” gap that had been identified to exist in the nation’s industries, and militated against the general economic growth of the nation; thus, the commencement of the tertiary polytechnics at the HND level. The emphasis on the HND level eventually over-shadowed the over-all intentions for the tertiary polytechnics to the extent that, the middle-level focus of the HND level was, in most instances, attributed to the tertiary polytechnic also; thus, creating a synonymous sense around the usage of HND and the tertiary TVET.

The preamble to the syllabi for the HND Mechanical and Electrical Engineering programmes, for instance, failed to distinguish between the purposes of the tertiary polytechnic sector and the HND levels as implied in the Polytechnic Law of 321 (1992). Rather, these preambles reflect the URC's second recommendation of developing only diploma level programmes in the polytechnics by stating, that the HND Mechanical Engineering syllabus, Production Option seeks to "provide all the necessary skills, qualification and knowledge for positions in manufacturing, design, and the service area of the manufacturing industry" (2002; p. 2); and the HND Electrical/Electronic Engineering Programme Syllabus seeks for "a very high level of occupational/practical skills..." (2002; p.1). The use of "all the necessary skills... for positions" in manufacturing and "a very high level" connotes the HND level that seeks to address all the technical manpower needs of the industry. The HND level, according to the URC (1989; 1991) was however intended to be introduced within the broader vision of developing a tertiary TVET system to realize the broader intension of diversifying Ghana's tertiary education sector. An urgent need to address a middle-level manpower gap that had been identified in Ghana's industry however seemed to have occupied the minds of the URC more than the need to introduce a tertiary TVET system (URC, 1991). This seems to have subsequently informed the notion that the tertiary polytechnics was synonymous to HND level.

Apart from the documentary sources, the participants in the study also articulated the same mandates for the HND level and the polytechnics in general. Most of the participants indicated that, HND does not refer to a level in the polytechnics' programme offering, but was rather synonymous to the

polytechnic system; two participants, one from the professional body and one from the supervisory bodies, for instance, intimated that:

When they (*polytechnics*) weren't tertiary, they were rather effectively playing their part. Now that we gave them the tertiary this thing [sic], all of a sudden, they want to compete with the universities; and their mandate is not there...it's a defeated mandate; because if the middle level manpower is well trained and they are doing their job very well, you can't take it from them ... We've lost that... and we (*polytechnics*) want to become like those at the top, designing and all that, whereby, their mandate is confused. So the polytechnic education that they say they aren't performing, it's because they aren't on their rail track, simple as that! (Toku, interviewed on 7th August, 2012)

Ray, echoing the Polytechnic Act, added that:

The polytechnics were established to ... train middle manpower needs of... Ghana. You know we have the high level ... with management then...we have the production, middle level before we have the factory kinds that are around. So the polytechnics are supposed to train the middle... level people ... who can oversee the... factory or the industrial floor members... (Ray, interviewed on 8th February, 2013)

From the two quotes, the mandate of Ghana's polytechnics is to develop the middle-level manpower level. Efforts to develop other programmes higher than the HND in the polytechnic is therefore considered "... out of place ... since ...it defeats the purpose of training students to fill the middle-level manpower gap..." (Toku, interviewed on 7th August, 2012).

In contrast to the position expressed by Toku and Ray, others consider the HND as one of the levels of programme offerings to be developed within the mandate of the polytechnic tertiary system. Sid, an official from the supervisory agencies, therefore anticipates a situation where the polytechnics:

... Shouldn't short-circuit ourselves (*polytechnics*) and reflect our (*polytechnics*) image into the university; we (*polytechnics*) should couch a niche (*sic*) for ourselves (*polytechnics*)... We are... called the polytechnic... So if you opt for TVET stream there is clear cut progression from down up to the highest you can decide to achieve... So if ...you can acquire that skill, the training in the polytechnic up to your masters, Ph.D.” (Sid, interviewed on 15th September, 2012).

In the opinion of the Sid, quoted above, the polytechnic system is a pathway that should develop programmes of different levels, to include HND level. A clear mandate that links with other sectors in the Ghanaian society is thus expected. Yet, from inception a confused mandate has defined the HND curriculum and the polytechnics in general, such that Sena, from the supervisory body said that, “...it is a common knowledge among policy agencies that an unclear policy underpins Ghana's polytechnics” (Sena, interviewed on September, 15th, 2012).

Collaborating to design the HND curriculum

In relation to curriculum design in the polytechnics, the URC (1991) document states that, “the design of courses for these institutions (*polytechnics*) should be a cooperative effort involving the institutions, the universities, the professional bodies, employers and other organizations ... (p.161). The URC further indicated that:

... subject panels should be used. The representation on the subject panel should include user agencies; Professional bodies, the universities and the institutions so that the outcomes in review of existing courses and the development of new courses will meet acceptable standards of all interested parties. However, the content of the courses must be related to the needs of the country...the organization of practical work and... recommendations of user agencies (URC, 1991, p. 175)

The list of stakeholders given in the first quote reveals the engagement of different stakeholders in the design of the HND curriculum. The aim of which is to construct a curriculum that seeks to address the needs of the various stakeholder groups. Consequently, subject panels should constitute representatives from contributing stakeholder institutions and groups. The Board of Accreditation and the Technical and Professional Examinations Board, the URC (1991) provided, was however to see to the organization of the teams to design the HND course content.

Most participants in the study, however, claimed that NABPTEX designs and owns the polytechnic HND curriculum in their initial explanations. This was due to the fact that, the type of collaboration the authorities of the polytechnics (*supervisory agencies*) have been enabling emerged most worrisome to participants, especially from the non-supervisory category. The practice of designing the HND curriculum, polytechnic lecturer participants indicated, has been characterized by work-in-isolation, where each stakeholder group or institution works separately from each other even in instances where the same task is assigned to different stakeholders. Boxes 1, 2,

and 3 present instances of collaboration recounted by different stakeholder participants in the study. Box 1 and 2 hold the account of Kojo, an administrator in charge of introducing new educational programmes in one of the polytechnic institutions that participated in the study. Box 3 holds the account of Ben, a polytechnic teaching staff in one of the study's participating polytechnic institution.

Box 1: Introduction of a new engineering programme at the HND level

For a new programme, it is either NABPTEX that convenes polytechnic teaching staff to put up a draft document for inputs by other stakeholder groups; or it is the polytechnic institution that is convinced they have the capacity to offer a programme that initiate the design of the curriculum. In the second instance, it is the polytechnic institution that takes up the responsibility to construct the curricular document and seek for other stakeholders' inputs before seeking for accreditation.

In a new programme my institution recently introduced, we organized a stakeholders' meeting that saw representatives from NCTE, NABPTEX, NAB, EPA, CSIR and the Municipal Assembly. The aim of the meeting was to fine tune the curricular draft document that had been put together by polytechnic teaching staff. Each group talked about their impression of the content of the curriculum. Some took copies of the documents away to make more inputs. It was after that meeting that the polytechnic staffs met again to finalise the document (Kojo, interviewed on 7th September, 2012)

Box 2: Introducing an HND engineering programme that is already running in some polytechnic institutions

If my institution wants to offer a programme that is already running in other polytechnics, the norm has been picking of a copy of the curriculum from either NABPTEX or sister polytechnic institution to help us to fashion out what we want to do with that particular programme. Because sometime you don't just go with the flow as the other polytechnics are doing.

A programme advisory committee constituting three individuals with expertise from academia, industry and the polytechnic review the content of the picked curriculum document, in order to make the programme marketable upon its introduction, especially in the area of resources (Kojo, interviewed on 7th September, 2012)

Box 3: Ben's sole construction of an HND syllabus

I had just been employed as a teaching staff in this polytechnic, after teaching for over 10 years in the Technical institution. I desired for a more challenging task. So I came to the polytechnic.

Administration (*polytechnic*) asked me to put-up the curriculum for Basic Electronic Course for a new programme when I had not even spent a year in the institution (*polytechnic*). With no background in curriculum construction for the tertiary level and the programme not being offered in any of Ghana's polytechnics, I relied on my experience at the secondary level and some research to construct the draft; all alone!. After submitting the draft, I never received any acknowledgement or feedback on the work done. It's been years now and no feedback at all! But, interestingly I have been setting questions on the draft submitted and for every academic year the questions I set return from vetting with minor corrections and the students are examined with it. It is only through this vetting and returning of my questions that I know that my work was accepted. So it looks as if they've (*polytechnics' supervisory body*) isolated themselves from us, which shouldn't have been so? (Ben, interviewed on 10th March, 2013)

These accounts are for more recently introduced programmes of study in the polytechnics, but not necessarily the two programmes of Electrical and Mechanical Engineering. These accounts were however considered relevant to the study, since they are engineering programmes, and it is the same persons who contributed to the curricula of interest in this study. From the accounts in Boxes 1, 2 and 3 contributors to the HND curriculum generally work in isolation from each other, as the polytechnic teaching staff constructs the draft curriculum document and the other stakeholders make their inputs by commenting on the draft document. This practice raises several issues in the process employed by Ghana's polytechnics to design the HND curriculum.

First, the assignment of each stakeholder group to specific task in the curriculum design process inhibits the attainment of the multi-stakeholder curriculum document that the URC recommended. This is because, the assignment of different categories of stakeholders to different tasks in the curriculum design process connotes the absence of convergence to agree on what and how to pursue their task. The final document may thus have the

inputs of different stakeholders, but it will not reflect a concerted effort since each contribution is done with no recourse of knowledge of the needs of other stakeholders. There is therefore the possibility of conflicting or no input by some stakeholders.

Second, the narratives in the boxes reveal inconsistencies in the procedure used to design the HND curriculum. In Box 1, for example, the process sees polytechnic lecturers constructing the curriculum draft for other stakeholders to make their input; whereas, in Box 3, the process sees Ben solely designing the curriculum. Ben's narrative connotes the possibility of having individual, instead of a group drafting the curriculum document and the non-vetting of a curriculum document before its use in the polytechnics. An instance such as Ben's, also highlights the possibility of assuring standards of practice in the content of knowledge in relation to the needs of different stakeholders in the society.

Third, Ben narrative also questions the criteria and expertise used to select contributors to the design of the HND curriculum. This is because, inasmuch as Ben knew he lacked the requisite background in terms of curriculum designing and experience in teaching at the tertiary education level, his institution assigned him to the task. His expectation of a rejected document at the national level was also not realized, such that Ben questioned the standards used at the national level.

Lastly, in spite of the fact that one government institution issues the nationally awarded certificate to graduating HND students from all the polytechnic institutions across the country, Box 2 reveal the possible disparity in programme offerings at the HND level in different polytechnic institutions.

This is because, in Box 2, Kojo talked of his institution seeking to offer a “more marketable curriculum” in order to attract more students. Any alteration to the curriculum document, whether in content of knowledge of resources, suggests disparities in the delivery of knowledge in the curriculum. This situation becomes inimical to the attainment of the objectives of offering the same content of knowledge for the nationally awarded HND qualification.

Apart from the polytechnic staff, stakeholder participants from the academia, that is the professional body and the academics, claimed that no formal arrangement exists between the polytechnics and their institutions in the design and development of the HND curriculum. The academics therefore said that their contributions to the HND curriculum have been by choice, and not by any institutional arrangement that obliges them either to do so or to adhere to their institutional standards. Tete, from the professional body, for instance indicates that, members from his professional body who have been contributing to the HND curriculum do so by choice, but not by the directives of the professional body.

From the inception of the tertiary polytechnic, Tete emphasized, his professional institution has never been formally written to, as a body, to participate in curricular projects for the polytechnic HND curriculum, although, it had been in the grapevine that, “...individuals in the membership of the professional body had been moderating HND curriculum documents without the knowledge of the body” (Tete, interviewed on 3rd August, 2012). The practice has, rather been the professional institution’s receipt of copies of HND curricula documents from the supervisory bodies for the record of the institutions and to inform the institution’s assessment and entry point of the

HND graduate. The underlining rationale for this trend, Tete opined, may be due to the professional institution's strict adherence to standards that would not overlook anomalies simply to expedite vetting processes to run a programme without the requisite standards in place.

In reaction to the apparent non-convergence of stakeholder groups to design the HND curriculum, one participant from the supervisory agency said that, the convergence of all stakeholders was not possible due to the huge cost implied in sitting allowances and lodgings. The strategy of circulating drafts to contributing stakeholder groups to comment on curriculum drafts is considered to attain the collaborative objectives intended for the HND curriculum. From another dimension, some participants argued that the supervisory bodies' guidelines for different aspects in the process of designing and developing the HND curriculum embody the inputs of different stakeholder groups; thus, the guidelines can ascertain a curriculum that embodies the concerns of the various stakeholders. Polytechnic lecturer participants however argued that the guidelines seek for information or documents required for accreditation purposes and these include statistics in the various polytechnic institutions, but not necessarily on standards for the various stakeholder groups to design the curriculum.

The current practice of collaboration, participants expressed, has generally caused apathy for the HND Engineering programme. In relation to the professional body, Tete claimed that, an attitude of indifference has seeped into its membership to the extent that, as soon as someone raises issues related to the polytechnic HND, some members quickly retort, "ohh drop that!" (Interviewed on 3rd August, 2012). In fact, Tete emphasized, "They [*members*

of the professional body] don't want to be bothered!" This posture of the professional body, Tete continued, did not develop solely from the non-involvement of the professional body, but also from the apparent sidelining of his institution by the polytechnics and their supervisory agencies. In spite of the posture the professional body, Tete claimed that several calls have been made to meet the various stakeholder groups, especially the supervisory agencies, in order to highlight anomalies identified in the HND engineering curriculum; yet, these calls have fallen on deaf ears. Members of the professional body have generally been "really hurt" by happenings in the polytechnics, especially, the older engineers who saw the introduction of the HND polytechnic (Tete, interviewed on 3rd August, 2012).

The lack of consensus between stakeholder groups therefore emerged strongly, as a major consequence in the type of collaboration employed to design and develop the HND curriculum. According to the participants, especially from the university and the polytechnics, the current system gives them little room to interact and agree on HND curricular issues before the final documentation of the curriculum. Several puzzles have, therefore, remained unaddressed and have eventually informed attitudes of indifference by especially, the academics. One academic lamented that, "you make suggestions and they (*polytechnics*) don't take it..." (Oto, interviewed on 5th September, 2012). Thus, the continuous repetitions of some anomalies and gaps in, different but, HND curriculum documents sequentially submitted to Oto. This situation has impressed Oto to consider his inputs as a mere formality and not a necessity, since the polytechnics hardly attend to inputs made. He had therefore ceased to offer detailed critiques and

recommendations. Atta, a polytechnic lecturer participant however claimed that, sometimes industry players (*the academicians*) are:

... overzealous and they will like us to do so many things... but we will have to look at our ability, capability and the capacity of the institutions also... do we have the equipment; if we don't have, what do we do (Atta, interviewed on 3rd September, 2012)

Consequently, the polytechnics have sometimes found it necessary to overlook, in their estimation, unrealistic, recommendations by the academics in order to proceed with their intentions. In fact, Atta indicates that the conditions within which his polytechnic institution finds itself often determines the final content of the curriculum documents than, recommendations made by the industry's players. Polytechnic lecturer participants, however, agreed that meetings with the industry players would have been more beneficial in determining a concerted content for the curriculum, than it is currently practiced.

Content of the HND curriculum

All the participants from the polytechnics, government institutions and professional body agreed that the HND curriculum was to constitute theoretical and practical knowledge and skills, but with a strong leaning to the latter. All participants indicated that the HND Electrical and Mechanical Engineering programmes is generally relevant, but for different reasons. To the academics from the university and polytechnic lecturers, the content of knowledge in the current HND Electrical and Mechanical curriculum is relevant. Citing the syllabi for the two Engineering programmes of interest in this study Ato, a polytechnic lecturer said, "...the training itself is not of low

quality ... "(Ato, interviewed on 22nd August, 2012); whilst Oto from academia also said:

... ok. That one [sic] is good. If only people should take it serious, it's good. Because for example, if you take something like engineering drawing, and I don't see any difference between the drawings being taught there (*polytechnic*) and what we teach here (*university*) (Oto, interviewed on 5th September, 2012).

In the two quotes, both participants concur that the curricular content of the HND engineering training is not of low quality, since Oto, for instance supported his claim by highlighting comparisons he had identified in the content of knowledge in a first-degree engineering programme of the university and that of the HND Engineering curriculum.

Student participants were also convinced that the theoretical content of knowledge in degree programmes offered at the HND and the university's degree levels are the same. In one instance, a student from one focus group, given the pseudonym, AElect, said:

... we've this course here, Engineering Maths – we do Engineering Maths 1; Engineering Maths 2; Engineering Maths 3; Engineering Maths 4, for that course, the tech (*University*) student uses 4 years whilst we use 3 years to do the same thing! (AElect, interviewed on 5th September, 2012).

AElect is not only convinced that the content of knowledge in the HND curriculum is the same as that of the university, but also, the HND student has a lesser duration than the university student to cover this same content of knowledge. Part of the student participants' conviction of the similarity in the

syllabi used in the university and the HND polytechnic is based on the fact that:

most at times (*sic*) we have these lecturers from Tech (*university*) that comes (*sic*) here to teach us and most of them complain (*explain*) that if you go to Tech (*university*) sometimes it's the same courses that we are doing. The polytechnics go into detail than when you go to the universities. There is one lecturer from there (*university*), he works at Tech (*university*) ...he has been saying that kind of thing several times; he went to tech (*university*), he says that what they did... looking at the syllabus here (*polytechnic*) and the syllabus there (*university*) we go into details than they (*university*) do (BElect, interviewed on 13th September, 2012);

And in some instances, "... even he (*the lecturer working in both the polytechnic and university*) has added up onto more things that, when we get there we will not find ourselves wanting..." (AElect, interviewed on 5th September, 2012). From the quotes the students are also convinced that their polytechnic institutions offer them more coverage in the content of knowledge than what is offered in the universities. In sum, none of the participant could describe the content of knowledge of the HND Engineering curriculum as below expectation.

In spite of claims of relevance in the content of the HND Engineering curriculum, some polytechnic lecturers indicated that there are aspects of the curriculum which are out of date and such are usually corrected during class sessions. Billy, a polytechnic lecturer, for example, said:

we have additions to ... the curriculum especially with the ... practical aspect. If we see that, that one is not... up to date then we (*polytechnic teaching staffs*) will meet and see where we can come or bring those together so that, we match it to our time and resources that we have here ... (Billy, interviewed on 6th September, 2012)

Ben, also a lecturer said:

... in our own way, like teaching some courses like telecoms engineering, you know it one of the dynamic technologies so far as technology is concerned. So what you learn today becomes archaic in the next two... three years; for that matter, we're always abreast with new technologies, and therefore we try to make an input in terms of whatever we teach... Now, we're in digital. And if the course outline is on analogue and you continue to teach analogue ... you're out of the system. ... Yes, currently we're still teaching analogue. Like say television systems, now the analogue is off the system, so we talk about some old old terminology devices; if it is in the course outline, we'll mention it that, these things were used, but now these are the modern that are being used, and we teach those things ... in effect, we don't write to (*the supervisory body*) correct anything, but we try to adjust with the new system (Ben, interviewed on 3rd March, 2012)

From the quotes, inasmuch as lecturers are at liberty to review content during delivery, a lecturer's revision to out dated content of knowledge is however dependent on his/her knowledge of what is current.

Delivering the HND Electrical and Mechanical Engineering Curriculum

Participants' perspectives on the delivery of the HND Engineering curriculum were related to the two major concerns of opportunities for practical work and reliance on conventional pedagogy. According to the participants, neither on-campus or off-campus practical opportunities afford students with the requisite practical experiences.

In terms of on-campus practical opportunities, all categories of participants indicated that the polytechnics are generally under-resourced in terms of workshops, laboratories and ICT. Although, under-resourcing in terms of equipment does not pertain to all the polytechnics, as some institutions, though few, are adequately furnished. For instance, Electrical Engineering in one of the participating polytechnic institution was described as the most adequately resourced in the polytechnic sector.

Delays in the procurement of resources were claimed to have been a major cause of the under-resourcing of the polytechnics. Ben, a polytechnic lecturer participant, for instance exclaimed:

I don't know why, but every item you want to buy, it must go through procurement! And it must go through tender... I tell you! As at now, materials ... for hands-on... we made the input but we're about to end the semester... I don't know ... It may take over a year (Ben, interviewed on 3rd March, 2012)

One major consequence of the resource situation in the polytechnics, has been the over-reliance on conventional teaching approaches. For even where there is equipment, the general delays in procurement has often caused under-supplies in recurrent items, such that, lecturers resort to teach theories than

engaging in practical work. Ben, for instance, questioned the typical practical experience for the Electrical/Electronic Engineering programme in his institution, when he said:

I mean theories have been propounded and they've been verified and ... certified! Why do we continue to ... prove Holmes law... it is already there for you... to apply...? You see, if you're talking about something like... operational amplifier, it's an IC ... what we should be doing with this thing is not to chew (*rote learning*) theories on operational amplifier... why can't we buy the device, put it on the board and see how it works! (*Sounds stressed-out*) ... We aren't learning anything! ... But where we continue equipping labs with already made things for students to come and just ...fix it in the circuit and then they display the output? They don't understand anything... that's not the way... if we continue doing that; we can never develop (Ben, interviewed on 3rd March, 2012)

In the quote, Ben describes that instead of ensuring that students are supplied with resources to apply theories and principles learnt to resolve practical problems, the proof of theories have continued to dominate teaching in the polytechnics than applying knowledge to resolve practical problems.

Off-campus industrial attachment, where students could have been afforded with opportunities for practical work, student and lecturer participants reported, has also been beset with some challenges which make it difficult to realize its contribution the objectives that underpinned the HND curriculum. According to polytechnic lecturers, until 2007, the competencies for industrial attachment had not been set, thus there were no standard in

training and assessing students. Currently, supervisors in the industries are guided by defined competencies set for different academic levels in HND Engineering programmes. However, participants expressed various limitations to the practice, among which were limited industrial firms to undertake attachments and the lack of some pre-requisites to participate in activities undertaken on the field.

According to lecturer participants, there are few industries with standardized settings to absorb all the student interns during industrial attachment sessions. Most students are thus compelled to undertake their attachment in work-settings with less equipment and formally trained supervisors. For instance, student participants from HND Mechanical Engineering programme cited *fitting (artisanal)* shops as some of the places they had had to undertake industrial attachments, after failing to access the industrial firms. A major consequence of this has been the acquisition of some rudimentary skills and attitudes that oppose the scientific based skills intended for the HND graduate and the well trained supervisors to link theory to practice.

Also, polytechnic authorities generally have less control over the content of knowledge each workplace makes available to students. One student for instance said:

We go for attachment... may be (*sometimes*) they (*industrial firm*) don't have any particular job to do based on what we were taught in the school; so when you get there whatever that they are doing you have to... follow them. Sometimes with the area that you might be needing won't be there [sic]. But then you will be in school and they

have already done that. Looking at A (*names an industrial firm*) like this, they (A) normally do their fittings..., that is, they install more... equipment in the unit that they are using in October that way [sic]... Meanwhile we will be in school. So the vital part (*critical training*) that we need to ... know much about the way the things work over there, the equipment work over there we will be in school; so whatever that you go and meet over there we just cope with that (AElect, interviewed on 5th September 2012)

From the quote, defined competencies by the polytechnics do not necessarily imply that industries are obliged to engage the students in tasks that will lead to the acquisition or enhancement of such competencies. Rather, most workplaces expect students to participate in activities being undertaken by workers; whether it includes the defined competencies or not. Moreover, in some instances, the student's access to practical skill opportunities is conditioned on the calendar activities of some companies and this, can conflict with the academic calendar of the HND. There is therefore no certainty to the uniformity and standards in the practical skills offered to students whilst on the field.

In relation to prerequisites for practical training, the lack of protective clothing and insurance by polytechnic institutions limits students' access to some opportunities for skill training, even when they access standardized workplaces for industrial attachment. Student participants in HND Electrical Engineering for instance claimed that, they (*students*) are not allowed to participate in some activities during industrial attachments when they lack protective gears and insurance. According to Ben, the lecturer participant, it is

the responsibility of the polytechnic institutions to provide the work-gears and insurances; yet, none of the polytechnics have been able to do that, although some workplaces have been insisting on it. The student must personally acquire his/her insurances and protective gears if he/she does not want to miss any activity during industrial attachments. The disparities in industries which are accessible to students during industrial attachment, conflicting calendar activities of industries and the lack of prerequisites to enable participation in all industrial attachment activities culminates in disparities in experiences in skill acquisition for different students.

In spite of these limitations in the practical opportunities for the HND, lecturer and student participants claimed that students' industrial attachment reports usually record positive students' performance. In one instance, Ato said:

Eh... one funny thing is that when you go to the industry to receive report on student attachment they tell you that our boys are good but ehh. I don't know how good they are; some of them would say your boys are good but the other polytechnics their boys are not performing at all... I don't know how good they are! Because even if you teach them and give them assignments... even the examination they find it very difficult to pass; but, when they go out they perform... I don't know why? Am yet to find out so they (the students) keep telling me '*ye ko outside a yeye adeoo*' (we perform better when we are outside the polytechnic campus) ... and I say ok! ok! (Ato, interviewed on 22nd August, 2012)

In the quote above the students' attachments reports and the students themselves attest to their good performance during fieldwork. Yet, Ato is unable to reconcile the students' weak academic performance on-campus to their impressive performance during industrial attachment.

Assessment Strategies Employed in the Delivery of the HND Electrical and Mechanical Engineering Programmes

Students' assessment also emerged to be heavily laden in theory, such that:

Even the practical, we have to do it as written. We don't do the practical as the practical that is, "this is my practical work; mark it for me", NO! The practical has been set as a theory question...! We're bothered with a lot of questions from one lecturer too! It can be 10 questions emmm illustrate; discuss; explain; sketch- that will be one question, before the grandson and the grand-children (*sub-questions*) ... all will come; I; II; III will all come. Madam, one question- will require-, about 4 sheets of papers or 5 sheets of papers ... Ok. And even if you use your own idea, your understanding to answer the question and write, they'll mark you down, it's very very pathetic! (AMech, interviewed on 3rd September, 2012).

According to the quote, assessment in HND level engineering programmes focuses more on theories than practical such that, students are expected to address questions that demands "describe"; "illustrate", and "discuss", instead of producing project work for assessment. To this end, one student queried, "Is the polytechnics not for hands-training... the technical institutions even do better" (AElect, interviewed on 5th September, 2012).

The mode of assessment, some participants from the supervisory bodies indicated, reflects the conventional system such that, “when the world has moved into more of credit based, credit valued, credit accumulation programs, we (*the polytechnic HND*) are still in our norm referencing system of assessment where our students are graded A, B, C, D, and 1, 2, 3, 4... “(Sid, interviewed on 15th September, 2012). Two major limitation of the norm-referencing system of assessment, Sid explained, are its inability to appreciate (i) differences in students’ ability to acquire knowledge and skills; and (ii) knowledge and skills acquired outside the educational institution’s setting. In instances where there are opportunities for practical work, students claimed that more weight is assigned to the theoretical aspects than its practical component. To student participants, the measure against which student’s retention or withdrawal in the programme is determined makes ingenuity insignificant.

No student could, however, claim that his/her HND education had been devoid of practical work. In fact, some students prided themselves with their skills acquired, such that one student for instance claimed:

Madam, I can tell you that, now... Even the university, their project work, they bring it to us for us to work on the practical aspect of it for them!... and they carry it to their school to have the marks! ... while, those of us who have the qualifications or providing those (*skills*) have been left out! (AMech, interviewed on Sept., 3rd, 2012).

In the quote, the participant feels elated for his ability to translate the university students’ theoretically-based written project work into its physical

state but feels disappointed that the educational system fails to appreciate this type of education.

Revisions to the Content of Knowledge in the HND Curriculum

All non-student stakeholder participants in the study agreed that frequent revisions to the HND curriculum are vital to the attainment of relevance, especially where technology is continually evolving. Making an example of Automobile Engineering, Osei said;

This time there are cars when you open you don't know where this component is?... And where is the training, so we need that and incorporate a kind of mechatronics, someone who is good in electronics and at the same time in mechanical, but we don't do that and it's leaving us behind... the graduate may not have accessed to all the practical component of his/her curriculum... so we need to do a lot in terms of that... (Osei, interviewed on Sept., 9th, 2012)

In contrast to expectations, Osei's quote above reveals that, the polytechnic system has failed to update her curriculum. A major consequence of which, has been the delivery of a content of knowledge that is considered not relevant to trends in technology, especially for practical work.

According to some participants from the supervisory bodies and the preamble to the HND Electrical and Mechanical Engineering programmes, the Economic Recovery Programme (ERP) of 1986 is still identified with the purposes of the programmes of interest in the study, although the nation has moved on to other developmental aspirations over the years. In fact, to some participants:

As a nation we don't even know what time it is in the global competitiveness; we don't even know! From the traditional agrarian economy to whatever... we don't even know that...; so, what time are we, what time is it in our nation or the global economy? What time is it? We don't even know, we've even moved from the information age into the knowledge engineering age and for me this is what our polytechnics training institution and the whole of our educational system should be driving towards... (Sid & Sena, interviewed on Mar., 22nd, 2013)

In the quote, the participants reveal that Ghana has been oblivious to the need to underpin its tertiary TVET programme in the HND with current developmental aspirations with their timelines of achievements. This conveys a sense of irrelevance in the HND curriculum, since it fails to find association with contemporary trends in the industry.

Teacher Quality for the HND Engineering Curriculum

The quality of teaching in the polytechnic also emerged as one of the factors that influenced participants' views on the relevance of the HND Engineering curriculum. There was a consensus among participants that, generally, teaching staff in the polytechnics do not have the requisite background to deliver the HND curriculum. Prominent among the concerns of participants were the educational backgrounds of the polytechnic lecturer in terms of TVET and, lack of knowledge in Educational Psychology and Philosophy; the sources of lecturer qualifications and; membership with the professional body as a condition for employment.

All participants concurred that most lecturers in the School of Engineering are university graduates with, no/less background in TVET to effectively deliver the practical aspects of the curricula of concern in the study. For example, Tete claimed that it is common knowledge in the professional institutes that, almost all lecturers in the School of Engineering are "raw products" from the universities with virtually no practical background to facilitate practical work (Tete, interviewed on 25th, Mar., 2013). When employed, Toku asserted, these graduates (*lecturers*) are also not given the requisite training in practical work to enable them gain mastery over the delivery of the practical aspects of the curriculum.

In the area of higher qualifications, participants identified that very few teaching staff possess Master's degrees, a requirement to teach tertiary educational courses of study. Attesting to this fact, Osei, an academic claimed that, visits to the polytechnics for accreditation purposes revealed a higher population of teaching staff in the polytechnics pursuing either Masters programmes or are yet to do so. Glaring evidence against the educational qualifications of teaching staff in the polytechnics has been the poorly supervised students' project works, since "... you can't see any input from a supervisor" (Oto, interviewed on Sept., 5th, 2012).

For some polytechnic lecturer participants, backgrounds in Educational Psychology or Philosophy and curriculum planning are the areas they identified as lacking to enable the teacher to effectively deliver the content of the HND Engineering curriculum. Three out of four teaching staff participants insisted that backgrounds in Educational Psychology or Philosophy and Curriculum Planning are critical to the success of their work. According to

teaching staff participants, Educational Psychology or Philosophy and Curriculum Planning have not been appreciated as requisites for effective curriculum planning and enactment. Atta and Ben, for instance, prided themselves with how their backgrounds in TVET, Philosophy and Psychology of Education have enabled them to (i) detect anomalies in curricular documents; (ii) informed their recommendations to their administration; and (iii) apply relevant pedagogic strategies to suit different content of knowledge.

The lack of a background in educational philosophy among other teachers, Atta dilated, has underpinned most lecturers' inability to employ different pedagogic strategies for topics from the different traditions in the HND curriculum and to address difficulties associated with the different second cycle educational backgrounds of students. Additionally, Atta claimed that, the lack of a background in Education has underpinned lecturers' indifference towards the performance of students. Describing the attitude of most lecturers with no background in Educational Psychology or Philosophy, Atta said, "they... just pour the thing... if you fail, you fail! ...They're even happy people are failing their courses" (Atta, interviewed on Sept., 3rd, 2012). In such instances, Atta's quote above suggests that untrained teachers in the polytechnic usually become irresponsible and insensitive to the peculiarities of their students' needs because of the lack of a background to do so.

Student participants also expressed sentiments about the HND teaching staff's professionalism. In one instance, one student said that:

...I know a lecturer here, he will say, "go to tech (KNUST) and see!" "go to tech and see!" "go to tech and see!" for him to teach you as a polytechnic teacher, he is coming from the university side so he must

specify (*stress?*) on tech issues tech issues; for him to take you through the practical work or a little theoretical aspect he'll be giving you a long chat on tech! tech! tech! I think that's not fair! (BMech, interviewed on Sept., 13th, 2012)

From the quote, the student echoes the polytechnic HND lecturer's constant comparison between the HND and the university with the apparent intention of projecting the university above the polytechnic. In another instance, one student participant said "... could you imagine a lecturer can tell you "*mo de moabonn ooo!*" (You are not clever at all). Is it fair to tell a student that "*moabonn ooo*" is not but they do...?" (BMech, interviewed on Sept., 13th, 2012). In this quote, the student interprets the polytechnic teaching staff's abasement of the polytechnic student to the university student as a discredit to the teacher's own output.

In addition to the backgrounds of polytechnic lecturers, the participants from the professional body identified the sources of qualifications and membership with the professional body as two other factors that are implied in Ghana's tertiary TVET in the HND polytechnics and has underpinned their judgment over the relevance of the HND Engineering curricula. Qualifications from across the world, participants attested, have been used to gain teaching appointments into the polytechnics, with no recourse to a national standard. Tete for instance expressed, "... somebody comes from Russia and; he says I have masters in so and so brrrg! Somebody comes from Nigeria; he says I have BSC and they (*polytechnics*) ... recruit anyhow!" (Tete, interviewed on Aug., 3rd, 2012).

Tete also expressed the professional body's sentiment that, "... for one ... to even qualify to teach there (*polytechnic*) you must be tested here (*by the professional body*); most of them don't pass through our hands... as the universities do" (Tete, interviewed on Aug., 3rd, 2012). Yet Tete observed that, "...when they (*polytechnics*) are going to get their accreditation they (*polytechnics*) use the names of solid people, get the accreditation and ...other people go in to teach" (Tete, interviewed on Aug., 3rd, 2012). From the quote, Tete has indicated that the polytechnics are very much aware of their limitations in terms of teacher quality, thus submitting names of individuals with credible backgrounds, but not necessarily polytechnic teaching staffs, to serve as supervisors in the delivery of proposed engineering programmes. The quality of the polytechnic lecturer remains a major concern to most key stakeholders, even from the polytechnic lecturer category.

Students' Background for a Relevant HND Electrical and Mechanical Curriculum

The student's background, especially in terms of education and attitude, also emerged as a strong factor that underpinned participants' perspectives on the relevance of the HND Electrical and Mechanical Engineering curriculum. Apart from Sia and Sena, most participants disputed the relevance of the HND Engineering curriculum based on students' weak academic background and ill-attitude towards academic work. From the academic, polytechnic and professional body category participants, most of the students offering the HND Engineering programmes possess weak results in Mathematics, Science and English subjects in their secondary level terminal examinations.

This situation, participants emphasized, casts doubts over the ability of the HND Engineering students, especially to grasp the content of knowledge in their course work. Focusing on the sciences Tete, from the professional body, expressed that:

Every engineer must know mathematics very well ... It's a mentality, by the time you finish engineering school, that thing must be there, whether you like it or not it's must be there!... Maths background... science background; Physics background! We don't need biology; we don't need chemistry! But Physics! Mathematics! These two! Engineering is a lot of analytical thinking; our lives are so analytical... because they can do mathematics, they can do analytical thinking; they can put things together and get a solution (Tete, interviewed on Mar., 25th, 2013)

Yet, members of the professional body are of the opinion that: "... the children (*HND students*) are so weak that, their Mathematics ... that when you teach them that Mathematics at the polytechnic they don't pass; most of them, more than half of the class will not pass; trust me!" (Tete, interviewed on Aug., 3rd, 2012). From a TVET perspective however, Toku wrote in his speech that:

Most polytechnics these days admit students straight from the SSS level... in ...the old system ... students who were admitted ... had already gone through basic craftwork by sitting exams for the Ordinary Technician Diploma (OTD) or the Ordinary National Diploma (OND). What do we see these days, the raw (*no technical background*) SSS students, who may not have gained admission to

say KNUST finds his (*sic*) way into the polytechnic (speech delivered by Toku in 2005)?

From the quote, Toku compares City and Guild's to Ghana's HND to highlight the strict condition of technical and vocational training to gain admission in the former, but not in the latter. Toku therefore described the HND student as a raw material who lacks the requisite background to undertake the programme. Toku is thus convinced that the HND polytechnic has become an escape route or the last resort to pure grammar secondary level students who fail to gain admissions into the university.

Without disputing the claims made in the preceding paragraphs, student participants indicated that their secondary school education generally did not prepare them for the HND level work. However, student participants expressed that the differences in their secondary educational background poses different challenges. In an interaction, a student participant said:

Our class looking at the technical people and the... secondary people, what I see is that... when it comes to ... courses like the elective maths, and ... thermodynamics they (*SSS graduates*) pick those ones fast ...Because, ...the thermodynamics is more of physics... and... chemistry and they have that background so they (*SSS graduates*) pick those ones very fast. But when you come to something like... the principle aspect that deals with... Applied Electricity and Network Analysis... the technical people are good ... because they've done the basis (*sic*) (BElect, interviewed on Sept., 5th 2012)

In the quote, the student indicates the challenges that are peculiar to students from the grammar secondary stream. Currently, student participants indicated

the TI system has been reviewed to permit students to write examinations in the core subjects. First year HND Engineering students, student participants revealed, were therefore enrolled without being required to go through the access courses. This feat, a participant from the supervisory body said, was however achieved with a strong resistance from the polytechnic institutions (Document 13, under Appendix E).

One fundamental reason for the resistance of the polytechnics to admit the initial cohort of the new TI system, one polytechnic lecturer offered, was because of doubt over the credibility of the examining body of the TI, especially, in the core subjects of Mathematics, English and Science. Unlike the examinations of students from the grammar secondary system by the internationally acclaimed West African Examination Council, final examinations for the TI system is organized by NABPTEX, Ghana's nationally examination body for TVET. Thus, whereas the former is considered to offer credible examinations, the latter is not. Yet, it is the latter that also organizes examinations in the polytechnics.

According to participants from the universities, the professional body and the polytechnic teaching staff, the HND students engineering students generally exhibit a lackadaisical attitude towards their programme of study. Comparing the attitude of the HND Engineering students at the polytechnic to the university student, Oto says:

... the attitude of the students here (*university*) and there (*polytechnic*), there is a vast difference ... you go to class and ... you give an assignment for example "go and investigate on this and this and this". In this era, they come with just a paper like this (*holding-up*

a single paper), handwritten and you could see that out of the 50 students, only 2 or 3 have done the researches; the rest just copied... And when you conduct a quiz or an exam, the way they answer and then the maturity they show, there is a vast difference..." (Oto, interviewed on Sept., 5th, 2012)

Oto described the attitude of HND polytechnic students as people who attach less commitment to tertiary education work to the extent that, most of them do not care about their academic output and the credibility of the work they submit. In a sad tone Oto says, "there seem to be a correlation between the person's academic performance (WASCE results) and attitude towards work" (*sic*).

This situation, the academics opined, may probably be due to some laxities on the part of the polytechnic authorities, for instance the prioritization of extra-curricular activities over core-curricular activities on campuses. Comparing the extra-curricular activities that are permitted in the university and polytechnics, Oto says:

The only ones (*extra-curricular activities*) here are the church service; then maybe one or two hall week or whatever. But if you take the polytechnics...the funfair, Madam! they're a lot! And so you've a class with them on Saturday, they'll come and tell you we're going for float. Then, there is nothing you can do (*clapping hands! - a Ghanaian expression of frustration*). They'll leave you and go! You see? Then you tell them that, two weeks' time there will be a quiz, then they'll say, "sir, we beg!" Begging for what? You came

purposely to study, so why are you begging? So, it makes it a bit difficult ehmm (Oto, interviewed on Sept., 5th, 2012)

From the quote, the academic has formed the opinion that, in so far as too many extra-curricular activities occupy the student during the term time, students will be distracted from their programme of study.

Governance in the Polytechnics

In terms of governance, some participants complained that supervisory agencies have not been able to set the appropriate criteria for, especially, appointments into governing boards and headship over the polytechnics. This has put into disrepute the appropriateness of decisions for the HND level to merit actions and expressions towards relevance in the sector's curriculum. According to the participants, most of the board members from supervisory institutions lack backgrounds in TVET, causing the making of decisions which often conflict with the fundamental ideas embodied in the tertiary TVET in general. Participants from the supervisory agencies, for instance, asserted that the criteria used to assess and make decisions for the universities are also used for the polytechnics. In a typical instance, Ray queries:

... if we look at TVET, who should accredit TVET programmes? Are structures different in accrediting TVET programmes than the traditional programs? You used the same "FORM" (*criteria*) to judge all? You use the same criteria to accredit all of them? ... the career paths are different, for instance the "FORM" (*criteria*) which says that: State the objectives which are more or less produced from the institution, the TVET, you need to state the competencies which you need to fill, like the skill the child must acquire, you understand,

which is more or less not produce (*sic*) from the institution, but from the industry. So, you can't use the same "form" or criteria to judge this people (Ray, interviewed on Feb., 8th, 2013)

Ray in the quote, does not only question the criteria used to seek for accreditation, but also questions the composition of the experts that accredit HND programmes. According to Ray, the same expert that assesses the academic universities also assesses HND programmes in the polytechnics, although most of the experts are graduates from the grammar/academia tradition. This situation, participants stressed, has been the cause of countless flaws in decisions made in relation to the polytechnics and their HND programmes. Paul from NAB, however, said that, "In assessing the programme, we put together teams of experts in the programme area... the assessors look at the relevance of the various components of (*sic*) and advice whether they are in tune with the end goals of the curriculum" (Paul, interviewed on Feb., 2nd 2013). In the estimation of Paul, the composition of the experts is representative enough of the two traditions to construct decisions that takes into consideration the traditions of TVET and academic.

Another area in which the supervisory bodies have failed to set relevant criteria, participants indicated, has been in the area of appointing heads of institutions for the polytechnics. According to participants from the supervisory institutions, most heads of polytechnic institutions are professors from the universities, who in many cases do not have a background in TVET. Consequently, these heads of polytechnic institutions have sought to make the polytechnics a replica of the universities, as more programmes related to the

humanities like the business and the arts are often promoted over the practically-oriented programmes, like those in Engineering.

In the words of Sid and Sena, the heads of polytechnic institutions “...come with that cloak of the university...so they begin to introduce the business programs, the accounting, and the purchasing and supply ...” (Sena, interviewed on Mar., 22nd, 2013). In one instance, Paul (interviewed on Feb., 2nd 2013) recounted an instance where a polytechnic head of institution’s proposed programmes, in collaboration with some Chinese universities, had to be rejected by the supervisory bodies. The action of the supervisory board was based on the conviction that, the programmes proposed, nursing, pharmacy and business were already being offered in most Ghanaian tertiary institutions. This rector had been expected to introduce programmes in the areas of engineering after undertaking his educational tour in China, and not in what he had presented. To most of the members in his institution, Paul reported that, the rector’s background as an academic on study from the university also informed his selection of the programmes he had proposed to offer in his polytechnic institution. Most stakeholder participants are, however, of the opinion that the supervisory bodies have generally failed to develop a framework to inform governance and administrative decisions that are peculiar to the needs of the polytechnics.

Progression after Graduating from the HND Level

With regard to the progression of the HND graduate, in terms of academics and job opportunities, some participants asserted that the worth of the HND graduate has not been placed in its right perspective within the Ghanaian context. For over a decade, public universities in Ghana failed to

consider the HND qualification as a criterion for admissions. This situation had been foregrounded in the debates over the comparability of the HND and the diploma/degree qualifications from the university. Currently, the infiltration of foreign universities and their top-up programmes for HND graduates, has not only offered an avenue of progression, but also, a wide range of options as most universities in Ghana have begun to consider HND qualifications for admissions.

In terms of career progression, Tete observed that, comparatively, more HND students register to join the professional body whilst in school than university under-graduates. Yet upon graduation, more university graduates join the Professional Institution's membership than HND graduates. Moreover, the progression of the HND graduate in the levels of the professional body is done with great difficulty than the university graduate. In the professional body's constitution, the basic criterion to join their membership is based on the possession of a University Degree, a Diploma or other equivalent awards approved by the Council. Yet, for years "... university degrees built upon a foundation of an accredited four-year undergraduate programmes ... are the only awards recognized ..." (cited in GhIE, 2011). This situation, the report continued, is because of the lack of sufficient theoretical background in both the university diploma and the HND to attain corporate membership. The above quotation reveal disparities in the professional institution's qualification criteria for membership, since it initially cited the diploma qualification as one of the basic criterion to join their membership; yet fails to operationalize this criterion because of

insufficient theoretical background identified in the diploma level qualification.

Tete from the professional body, however, indicated that the issue is more than just the theoretical basis as stated in the report. The harmonization of disparities in curricular content, examinations, and weightings in marking schemes for the nationally awarded qualification in the HND have been some of the major indicators used to assess the suitability of the HND qualification as a criterion to join the membership of the institution. Uniformity in the content of knowledge of the HND curriculum and assessment of knowledge to join the membership of the professional body emerged strongly to underpin the professional body's perspectives on the relevance of Ghana's HND Engineering curriculum.

Uniformity in the content and assessment of knowledge, participants from the professional body highlighted, is critical since HND programmes are offered towards a nationally recognized qualification. Tete, from the professional body, (interviewed on Aug., 3rd, 2012) reported that a collection of HND Engineering syllabi and end-of semester questions from some polytechnics revealed marked differences in the content and assessment of knowledge employed by different polytechnics. This situation was particularly prevalent in HND Building programmes where the transcripts of polytechnic graduates, who had registered to join the membership of the professional institution, revealed disparities in course titles and content.

Tete, also asserted that, in some instances, whereas the curriculum used by some polytechnics is similar to that of a university, others too revealed mismatches between titles and their content to the extent that "... building

technology in Takoradi polytechnic looks like the person is learning quantities and the building; technology in Accra is like the person is doing civil; but they all call it building technology” (Tete, interviewed on Aug., 3rd, 2012). This situation has however not been associated with only the HND Building programme, as members of the professional body have generalized it to all HND programmes offered in the polytechnics, especially where disparities in examination questions and weighting in marking schemes for the same programme offering in different polytechnic institutions have been observed to characterize the HND Engineering curriculum.

Samples of questions and marking schemes from the same programmes, year group and semester in different polytechnic institutions revealed marked differences, Tete (interviewed on August, 3rd, 2012) continued. In one instance, Tete asserted, whereas examination questions in one polytechnic were packed in items and possessed an appreciable degree of difficulty for its intended students, questions from another polytechnic institution could best be served to students of high schools. This has consequently permitted the allocation of, sometimes, huge marks or weightings for less demanding questions and vice versa.

These disparities associated with the HND curriculum have, among others, influenced some members of the professional body to believe that, (i) non-uniformity in the same programme offering across the polytechnic institutions does not merit the nationally recognized certificate issued to the HND graduates; and (ii) the professional body cannot attest to the credibility, substance and harmonization of the HND certificate to inform a higher entry

level for HND graduates. Toku, however, appeared to have been oblivious to Tete's assertion, when queried:

How? When City and Guilds was in place, the whole Commonwealth, we were doing the same program irrespective of the company you're coming from. Such that, City and Guilds was actually having the same program for all countries... But the polytechnics are bound to do that? Am surprised! (Toku, interviewed on Aug., 7th, 2012)

From the quote, Toku was obviously surprised at Tete's assertion and is unable to reconcile Ghana's HND system with the British City and Guild's system where, the latter had the same set of questions for all her students, regardless of your context. Against the issues presented above, Tete concluded that, "the current system that the polytechnics (*HND*) are running... simply defeats the principle of "National" in their qualification" (Toku, interviewed on August, 7th, 2012).

In effect, whereas it takes the university graduate eight years to attain full membership, the diploma or the HND takes 15 years to attain full membership in the professional body (See Appendix F, Document Twelve). This situation, Tete and the report asserted, has resulted in the low membership of polytechnic HND graduates in the professional institution.

In terms of placement and remuneration at the workplace, most participants, especially from the polytechnics and the professional body, concurred that the HND graduate has not been accorded his/her due. Undoubtedly, the degree holder is higher than the HND holder in terms of theoretical knowledge, whereas the latter is adept in practical skills. On the field, Tete explained, whereas, the First-Degree Engineer is expected to

design; the HND Engineer is expected to translate the designs into tangible products. Within the Ghanaian context however, placement and remuneration at the work place have continued to be based on academic qualifications than competencies. In effect, "... if I get higher ... paper qualification, I may be earning that much without looking at competencies. So, when people, even advertise for vacancies and, you still see the qualification thing assigned to it instead of competencies" (Sid, interviewed on March, 22nd, 2013). The disparities in conditions of employment to the detriment of the HND graduate, the participants indicated, are quite wide. Boxes 4 and 5 accounts for some instances of disparities in conditions of employment between the HND and the university first degree graduate.

Box 4: Progressing at the work place

I spoke to a man who works in Ghana GRID Company. He told me that, even if you have first class from the polytechnic HND and, somebody has a pass from the university and you find yourself in the same institution (*workplace*), you will still... no matter what he'll (*the degree graduate with a pass*) be above you. So what that man told me, he has been working there for a long time; I believe he's been there for such a long time but still he is just a supervisor of a section. People come from the university and they are made engineers, area managers and so on. ... "wow! How a small boy, now he came... and now my manager" and you report to him? Besides, all the reports that, you write, you must send it to him to sign before... (BMech, Sept., interviewed on, 13th, 2012).

Box 5: Progressing at the work place

You cannot cross certain levels in organizations. How it is structured, you must have a degree before you can be a manager. Because, it's never possible. I will give you an example, the man I spoke to, he has been in the company for so long. The guy who's the area manager now, he came; he's having work experience, less than 5 years. He (*the man the student spoke to*) was there, I think more than 15 years now! But he's there, he's just the sectional head, you can't be the area manager. But you... but he was there even before the area manager was in school (AElect, interviewed on Sept., 5th 2012)

In the cases presented in Box 4 and 5, the HND holder can only progress with a first-degree qualification, but not by work experience. The HND graduate

can therefore not attain any of the positions held by the first-degree holder by merely staying on the job, although, one HND student participant lamented:

... *job nu ankasa* (the actual job, which is the practical work) they (employers) just give it to the polytechnic students to do, meanwhile the university student enjoy (*sic*) the offices... you compare our syllabus to that of the university ... there is no difference in it... I'll use the word minute! Yet they value the certificate more than the practicality of the work that you're (HND graduate) doing (AMech, interviewed on Sept., 3rd, 2012).

From the quote, the HND student does not comprehend the disparities in the HND and the university graduates' conditions of service, especially where it was considered that the disparities between the two types of education were "very minute" (AMech, interviewed on Sept., 3rd, 2012). Patrick, from NAB however discredited the students' assertion by saying that there is no way the content of the first-degree engineer and the HND will be the same in terms of knowledge and skill (interviewed on Feb., 6th 2013). Most HND graduates have, according to Tete, however continued to consider their qualification as very close to the university degree, thus high expectations to attain levels for the university first degree through work experiences.

The social orientation of Ghana towards TVET in general and the HND in particular

From all the study's participants, the social orientation within which Ghana's TVET students and graduates find themselves also underpins their perspectives on the relevance of the HND engineering curriculum. Conventionally, tertiary education in Ghana "... must lead to elitism... where

we feel learning is earmarked for a few elite... if you don't go to the university, you've not schooled or...well-educated ..." (Sid, interviewed on Sept., 15th, 2012). Tertiary education that is not offered that:

... in a four walled classroom block, ... So if you don't come and sit in a classroom for a lecturer to tell you what you should learn... tie our educational system with years where you have to go through some years of training or learning, whatever you do, whatever learning you do is not recognized, is not accredited..." (Sid, interviewed on Sept., 15th, 2012).

From the quote, the Ghanaian's conception of tertiary education must include, a seasonal timetable, a four-walled classroom that utilizes teacher-centred approaches and the same duration to cover course content with no recourse to students' backgrounds.

To Sena, Ghana's dominant position is actually living "... in the old...the Jesuit era" although "...People have moved on..." (Sena interviewed, on 22nd March, 2012). Trends in education, especially for the tertiary TVET, are such that, one should be able to:

... be in the comfort of your home, develop your own competencies informally or formally ... walk into an assessment center, get it certified and you are qualified. They are not so much grounded in the... Mathematics... But when it comes to the theory of trade then they are better off.... It just as a matter of what our preferences are as a nation... And then what our training objectives are...? Some... countries, for instance... they have polytechnics there, they run degree... masters and... Ph.D. programmes. So, if you are into skills

training and you can acquire that skill... up to your masters, Ph.D.... we would all not come up with same background but we are all trainable people to certain height or expectation, so if I'm training in this and you go through your sciences and mathematics, it does not mean that I cannot... maybe progress up to some height, ... I think our paths ways are so limited ... So, we just pick one and ... trying to force everybody onto that same path way. So that is the problem now ...they are too much focused on long certificates and titles without the know how to perform to move the country (Sid interviewed, on 15th September, 2012)

In contrast to the convention, Sid and Sena opine that the tertiary TVET tradition acknowledges that every human being is trainable. As such:

- (i) there must be multiple-pathways to cater for different backgrounds;
- (ii) knowledge can be acquired through different pedagogical approaches;
- (iii) knowledge acquisition can be accessed in different settings;
- (iv) knowledge can be acquired within different time frames, as the ability of the student may permit and;
- (v) limited pathways compel students to offer programmes they have no interest in
- (vi) Equivalences in the different pathways can be established.

The choice of developing different pathways, Sid and Sena highlight in the quote, is foregrounded in the society's preferences. To this, they queried, is it just an interest in certificates or output or, a combination of the two? Ghana's preference, the authors in the quote attest, has been myopic as her structures

seek to force everyone unto the same pathway, as well as using that pathway to access standards in emerging options.

Two major positions, therefore, emerged from participants' conceptualization of Ghana's tertiary TVET in relation to the university and her tradition. In the first position, which is the convention, is the consideration of the university and its academic programmes as the standard for a tertiary education, which cannot be paralleled by any other. In the second position, which is emerging, tertiary education is diverse in focus because it provides specialized programmes in different types of tertiary institutions. As such, equivalences should be possible across the different qualifications. For participants supporting the first category, a strong dichotomy is emphasized between the university and the polytechnic system. In this regard, Ray noted that:

You see, we are making a very big mistake... you cannot take a crocodile from a river and then take any animal like a dog from the land and say you are comparing them. The career paths of these people are far different. You see the polytechnics have been mandated to implement ... programmes in TVET, and ... the TVET path is not to be a complement to the traditional degrees that we have in the country. While these (*polytechnics*)... deal with skill acquisition and middle level manpower for industry, specific industrial demands ...? You realize that, these people (*university degree graduates*) are more or less literally academic in nature, the skills acquisition is not well enhanced like in the TVET... HND can never be equal with us (*first*

degree graduates from the university) (Ray interviewed, on 8th February, 2013)

In the quote, Ray makes the revelation that Ghana's HND and first-degree university programmes are:

- (i) totally different, and that;
- (ii) whereas the former focuses on skill acquisition, the latter seeks to develop academic skills and;
- (iii) the first degree is higher than the HND and thus should not be compared.

The irony in Ray's submission is that, although he distinguished the two systems by their two distinctive foci; yet, he used the first-degree university as the standard to measure the incomparability of the HND polytechnic curriculum, even though the former is higher in terms of academics to the latter.

In support of the second position Tete said that, continuity from one path to the other should be possible since a level of theoretical knowledge can be appreciated in both the academic and TVET traditions. Tete's conclusion was made from his observation of how the universities in Ghana had refused to consider the HND certificate as a qualification for admission, even for a university diploma programme, for over a decade after the introduction of the sector. Yet, the infiltration of foreign universities, Tete continued, who readily offered top-up programmes to HND graduates for first degree qualification caused most Ghanaian universities to include the HND as a criterion for admission. This change in the position of the universities impressed Toku that

the HND curriculum was not as low in standard as the Ghanaian universities had been conveying.

The Place of the HND Graduate to the Ordinary Ghanaian

The misrepresentation of the HND engineering qualification within the Ghanaian education system, also appeared to be an underlying reason for expressions of relevance. According to some participants, the Ghanaian society has continued to define the HND graduate by the academic entry characteristics of students who enroll into the polytechnics. By design, whereas admissions into the universities rely heavily on academic performance, the HND considers a combination of a background in grammar and hands-on training (NCTE, 2013). Academic grades that would be considered as weak by the universities standards are therefore, accepted to admit students into HND programmes (NCTE, 2014). Yet, the Ghanaian society has continued to measure the relevance of the HND curriculum by the academic grades considered for enrolment. It was against this background that, one teaching staff participant said:

...the training itself is not of low quality, you see... But ... eh the entry characteristics; who enters the polytechnic? who comes into the polytechnic; the perception starts from there... oh this guy bought forms for the university... he wasn't taken but he has been given admission in a polytechnic... meaning that one is lower than the other, so the perception starts from there ... then that aside, they see the polytechnics as the normal vocational/technical school ... so the polytechnics have just become an extension of technical schools ...

hmmm that break has not been very effective (Ato interviewed, on 22nd August, 2012)

In the quote above, Ato explained that, although the content of knowledge in the HND level programme is not below standard, the sector's curriculum has been considered as not relevant because of its appeal to those perceived to be academically disinclined. In other words, the admission of students with weak grades into the HND programmes has underpinned some stakeholder perspectives on the relevance of the sector's curriculum. In Box 8, Tete narrated an experience that made him question the system that Ghana operates. According to Tete:

Box 6: An HND engineering graduate's aspiration in contract bidding

We had this HND Engineering back office guy. This guy had been putting together the company's documentations, including the designs for the award of contracts. In one of the documentations for a contract bidding, my guy requested to add his name, although he had observed that only first-degree holders and above have always had their names listed as staff to undertake the job when the contract is awarded.

We told him that he did not qualify to have his name listed as a professional for the job. But he argued that even in Asia, diploma graduates do apply for contract. I told him that yes, the Asian case is true, the qualifications criterion, in the case of Ghana had been framed in the 1980s when the HND and the polytechnic tertiary did not exist to be considered as a tertiary education qualification. But because the guy was very good and smart, I allowed him to carry on with his wishes.

You see, the trend has been that upon the award of a contract, small amount of monies are deducted from the professionals' allocations to pay this guy; some small monies as compared to the first degree professionals. So, if his HND had been accepted he would have had some huge amount of money. The document was however returned to be reviewed in terms of qualifications.

The realization that his qualification alone, with no consideration given to his skills, determines a lot for him, this guy lost interest in his job and eventually left without notifying the company. Currently, I hear he is jobless (Tete, interviewed on Aug., 3rd, 2012)

From Tete's account above, (i) qualifications, not skill and experience determines opportunities in contract bidding; (ii) the current qualification criteria was set before the introduction of the HND level programmes in the 1990s; Tete is thus, convinced that a review of the qualification criteria may culminates in the inclusion of the HND qualification since most of its

graduates are able to do most of job description of the first degree engineer; and (iii) the HND graduate seemed to be vague about the opportunities his/her qualification has for him until his experience on the field.

In a rebuff to point (ii), Toku, also from the professional body said that, Tete's scenario is not realistic, for the privileges that are accessible to the first-degree holder is simply not applicable to the HND level, since the former is versatile by the extensiveness of knowledge covered, as opposed to the latter. Oto, one of the academics, also added that, until the theoretical base of the HND curriculum attains a level that can be appreciable by most stakeholders, its acceptance in many circles will continue to be challenged. This is because, Oto (interviewed on Sept., 5th, 2013) added, unlike the pure hands-on-training which can be acquired on the job and within a short while, academic knowledge requires is quite elaborate and is acquired over a longer period of time than what is required for TVET.

The ramifications of Ghana's conceptualization of tertiary education and the tertiary TVET on the HND graduate are extensive as it goes beyond placement and remuneration at the workplace. Speaking as an employer, but not as the member of the professional body, Tete revealed in his comparison of the Ghanaian situation to the West when he said:

... in UK and America, nobody looks down on anybody. And sometimes, those on the shop floor are even paid higher than the designers... In this country, I don't know how it happened, but we the designers are paid far more than them (*HND*), and how it started I don't know! And there is a psychological this thing that we are

respected than them! That they're not respected like us! (Tete, interviewed on Aug., 3rd, 2012).

Tete's submission suggests that practical output, the major focus of the latter, should have attracted more remuneration than the former, although the reverse pertains to Ghana. Beyond the conditions of employment, Tete's account presents a psychological dimension in the consequences that has characterized some HND engineering graduates. Generally, demoralization and attrition are two major consequences of the HND student/graduate who begins to exhibit dissatisfaction with the qualification based on what is afforded the university degree graduate.

In relation to demoralization, some student claim that the attitude of the society towards the university student/graduate and the HND student/graduate has often caused them to, sometimes, fake their educational orientation. In one instance, one student participants said that, he had to introduce himself as a student from the university following the observation of reactions to introductions by fellow students. According to this student pleasant looks and comments followed introductions by students from the university; whereas, questions like "why didn't you go to the university?" were asked following each introduction by a polytechnic student (AElect, interviewed on Sept., 5th 2012). This student participant, therefore, opted to introduce himself as a student from the university. Few of the student participants, however, prided themselves with the skills they have acquired in the practical experience, though not satisfactory. Some students, like AMech (interviewed on Sept. 3rd, 2012) claimed to be making monies out of university students for services like, the construction of the physical objects intended in their project work.

At the end of the consequences, is attrition from the HND engineering level. One student lamented, “the course (*engineering programme*) is quite challenging; very difficult! But at the end of it all, you can’t use it to arrive at anywhere (*progress*) that is a university programme; which is regarded as the ultimate in Ghana...” (AElect, interviewed on Sept., 5th 2012). The student in the quote concludes that since reliance on his HND qualification alone would not enable him to accomplish his aspirations, thus, the intention to further his education at the university after graduating from the HND level. Attrition from the HND sector has been so high such that, in Tete’s estimation, although, about 500 engineers graduate from the University and 4,000 graduates from HND engineering programs annually, the nation still grapples with the realization of the norm of four technicians (*HND graduates*) to one engineer (*university graduate*). This situation, Tete lamented, poses a great challenge to the industrial development of Ghana, since, a large number of well-trained engineers in the society addresses critical issues related to employment and health. The attrition of HND graduates is therefore a major concern, especially for participants from the professional body and supervisory bodies.

Support to develop the TVET Sector

According to participants from the supervisory bodies and the professional body, structures at both the national and societal level have not been adequately oriented to support the development and promotion of the TVET sector in general. At the polytechnic institutional level, teaching staff participants revealed that most of the innovations of the departments do not receive the requisite support to permit the sector to impact on the society. According to teacher participants, students’ project work, among which were

several innovations that could have benefited the society, usually lie on the shelves to gather dust and rot. Ato led me to a store room where there was a pile of past students' project works, but the polytechnic had no use for them again after awarding marks. In order to make room for incoming project works, Ato explained that, his polytechnic authority usually directs either to donate or burn (Ato, interviewed on Aug., 22nd, 2012). When asked about exhibiting students' project works to the public, Atta said:

No no, for students, there is no exhibition... we've not been told by the school (*his polytechnic institution*) to do that...! Normally, what I know... we're following the same as the university. Well, you go and make your project defense in your faculty, then that is it! (Atta, interviewed on Sept., 3th, 2012)

Polytechnic institutions, one lecturer explained, do organize or participate in exhibitions. The exhibits for Mechanical and Electrical Engineering, Ato added, are usually of collaborated project works between the polytechnic and some donor agency than the students. Atta for instance showed me a picture of a *fufu* machine his department, in collaboration with a foreign donor agency, had invented. The patent to enable a mass production of the machine was however being sought in South Africa by the participating donor agency. Support to develop innovations at the national level, participants from the supervisory institutions indicated, seems to be virtually absent in Ghana. To buttress this point, Sid and Sena narrated two instances, Boxes 7 and 8, where, in their estimation, state institutions failed to support the development of technologically inclined individuals.

Box 7: A TI student's opportunity lost

In a regional science and technology exhibition, one student from the TI exhibit was the configuration of mobile phones to cars; such that one could use his/her mobile phone to spark and heat his/her parked car thousands of miles away.

One telecommunication company present at the exhibition offered to sponsor the boy's education from the secondary up to the tertiary level in a foreign land. The processing of the boy's document however came to nothing, as the Ministry of Education failed to give approval for the minor's (boy) journey outside. One official told the representative of the telecommunication company that the permit was not granted because of the suspicion that the company intended to tap into the boy's brain. (Sid, Mar., 22nd, 2013)

Box 8: Innovations by a TVET graduate

For almost 10 years, Akwesi has continued to exhibit different electronic gadgets and cars he had manufactured with local materials. Prominent among his innovations are television sets that have the option of being switched on and off with the clap of the hands and four-wheeled drive vehicles.

For every exhibition organized, statesmen who are able to attend, test drive the vehicles and assure Akwesi of ensuring government's patronage. Ministers and parliamentarian, for instance, often promise to impress the government to source state owned vehicles from Akwesi's outfit.

For years, however, no government support came forth and the worse occurred when a Minister directed that, road worthy certificates should not be issued to Akwesi's vehicles. In another instance, a prominent Professor from the university heavily criticized Akwesi for his less grounding in academic knowledge yet prided himself with a statement that he has a large number of university graduates as apprentices due to the non-productive nature of the universities in terms of practical work (Sena, Mar., 22nd, 2013)

In both instances, the state had a role to play to facilitate the opportunity to develop a potential in a TI student in a foreign land (Box 7) and to facilitate the society's patronage of a TI graduate, given the pseudonym, Akwesi's, innovations (Box 8). In Box 4 the TI student's opportunity was whisked away by bureaucratic processes and upon an unsubstantiated assumption that the philanthropic/investor company intended to take advantage of the boy. In Box 8, politicians and the academics did not just fail to appreciate Akwesi's innovations but exhibited signs of stifling his initiative. Example, the Minister used a state structure to prevent the general public's patronage of Akwesi's innovations; instead of assisting him to meet standards and then facilitate the

patronage of the innovations by the public. The academic, in similar vein was silent on Akwesi's achievement, but derided him for comparing his achievements with that of the university.

Emerging Issues on key stakeholder's connotations of a relevant HND

Electrical and Mechanical Engineering curriculum

This section of the chapter has provided findings on key stakeholders' connotations of a relevant HND electrical and mechanical engineering curriculum for Ghana's tertiary TVET polytechnic institutions. Generally, the study's participants agreed that the Electrical and Mechanical Engineering curriculum is relevant in some aspects, especially in the area of its theoretical content. The practical aspect of the curriculum, especially in relation to on-campus practical content, is however generally outdated. A wide range of reasons were ascribed to stakeholders' connotations of a relevant HND electrical and mechanical engineering curriculum. On a scale of preference, however, some reasons emerged more dominant in stakeholders' connotations than others. Participants' connotations however revealed that, Ghana's social orientation of perceiving TVET in general as hands-on intended, generally underpinned assessment of the relevance of the HND Electrical and Mechanical Engineering curriculum. From the data from the interviews and documents, Table 5 presents both common and peculiar characteristics stakeholders expressed to underpin their expressions of relevance or otherwise of the curriculum used in the afore-mentioned programmes.

Table 5: Connotations of a Relevant HND Electrical and Mechanical Engineering Curriculum

<i>Connotations of a relevant HND Electrical and Mechanical Engineering</i>	<i>Category of stakeholder institutions and groups</i>						
	<i>Documents</i>	<i>Supervisory bodies</i>	<i>academics</i>	<i>Professional bodies</i>	<i>Polytechnic teaching staffs</i>	<i>HND final year students</i>	
Academic/TVET oriented	√	√	√	√	√	√	
Socially responsive	√	√	√	√	√	√	
Skill oriented (hands-on-training)	√	√	√	√	√	√	
Multi-pedagogic in inclination	√	√	√	√	√	√	
Multi-sites acquisition in knowledge	√	√	√	√	√	√	
Heavily resourced facilities	√	√	√	√	√	√	
Multi-assessment strategies	√	√	√	√	√	√	
Adept teacher	√	√	√	√	√	√	
Collaboratively designed curriculum	√	√	√	√	√	-	
Diversified students' background	√	√	√	-	√	-	
Uniformity in examinations and assessment	-	-	-	√	-	-	
Dominant social orientation in context of operation	√	√	√	√	√	√	

Source: Author's construct from documents and interview data

Table 5 shows that the most dominant characteristic every stakeholder expects in a relevant HND Electrical and Mechanical Engineering curriculum is its skill (hands-on) orientation and social responsiveness. The tertiary TVET curriculum, stakeholders concurred, must possess a multi-disciplinary content of knowledge that employs multi-pedagogic strategies in its delivery. To this end, heavily resourced facility and multi-sites acquisition in knowledge are pre-requisites to the attainment of relevance in the sector's curriculum. Teachers who are adept in both theoretical and practical knowledge and skills

also emerged as a critical factor in the attainment of relevance in the tertiary TVET curriculum. The least connotations, yet, peculiar to Ghana's polytechnics, are connotations of uniformity in curricular content, examinations and assessment for the nationally awarded HND qualification.

A major connotation that emerged from the data, though not a direct feature of the tertiary TVET curriculum was the role of the social context or orientation in the promotion or hindrance of Ghana's tertiary TVET in the HND polytechnic electrical and mechanical engineering programmes. In terms of promotion, the findings reveal for instance, that because the Ghana's tertiary polytechnics were introduced to address the gap of skills in the university sector, the conception of the former as a shadow of later was alleged to have been used to inform decisions to develop the polytechnics. These decisions include, less resource allocations to the polytechnics, the criteria for accrediting the universities are also used for the polytechnics, and recruitment of teaching staff in the polytechnics is largely based on academic tradition than the TVET tradition.

In sum, whereas some connotations, though few, emerged as generally underlying stakeholders' conception of relevance in Ghana's HND engineering curriculum, some connotations are solely credited to some stakeholder groups. Thus, stakeholders' expressions of relevance are not underpinned by the same set of connotations or factors. The next section of the chapter presents findings related to the second research objective that focuses on the process employed to design and develop the HND electrical and mechanical Engineering curricula.

Design and Development of the HND Mechanical and Electrical Curriculum at the National Level

From the syllabus documents, the current content of knowledge for the HND Electrical and Mechanical Engineering programmes used in Ghana's polytechnics are dated 2002 and 2000, respectively. According to Atta (interviewed on Sept., 3rd, 2012), a lecturer and a dean of engineering in one of the study's participating polytechnic institution, the current curriculum in use are revisions to the first curriculum that was drafted in 1992 to commence the new HND level programmes in the tertiary polytechnics. Atta recalled that polytechnic teaching staff began to call for a revision of the 1992 curriculum document from its fifth year of implementation. Revisions to the curricula could, however, not be realized until its tenth year of use when NABPTEX organised the various stakeholders to do so. The content of the syllabi documents mostly occupied the activities of the reviewers, than the structure of the HND programme, polytechnic lecturer participants indicated.

This section of the Chapter presents the findings related to the process that was employed to design and develop the HND electrical and mechanical engineering curricula of 2002 and 2000, respectively. Commencing from the point where different stakeholder groups were invited to contribute to the revised draft curricula, the chapter also covers the stages of accreditation, funding and the certification of the programmes at the national level.

Constructing the First Draft of the Current HND Electrical and Mechanical Engineering Curriculum

According to the polytechnic lecturer participants and participants from the supervisory bodies, teacher staff from the polytechnic institutions already

offering the electrical and mechanical engineering programmes were invited by NABPTEX to construct a draft revised curriculum in 2002 and 2000, respectively. Teacher representatives were housed for about two weeks to work on course design panels for each programme of study. The core task of each panel, included the updating of the content of knowledge in the syllabi and the listing of facilities like laboratories; workshops and equipment required to deliver the new content of knowledge; teacher expertise required to deliver the knowledge and skills in the revised syllabi; and ideal student/teachers ratios to enable the delivery of the content of the curricula. Upon completion the first draft was submitted to NABPTEX, which in turn disseminated copies to the academics from the university and industry's players (the industry and professional body) for their inputs (Atta, interviewed on Sept., 3rd, 2012).

Inputs to First Drafts

The first drafts of the electrical and mechanical engineering curricula were attended to by a panel of three that comprised of an academic, one from the professional body and one from the industry. Both Osei and Oto, the academic participants in the study indicated that, the inputs of the first draft focused on the appropriateness of the content of knowledge proposed for the HND level, gaps in knowledge and recommended resources to deliver the HND curriculum (Osei, interviewed on Sept., 9th, 2012; Oto, interviewed on Sept., 7th, 2012). The first drafts of the curriculum documents and their comments were returned to NABPTEX for the polytechnic syllabi writing panel to finalize the content in the draft document.

Concluding the Curricula Draft Document

Essentially, the re-convened polytechnic teacher panels sought to place the curriculum and the comments from the academics and the industry's players into its context of delivery. Atta, interviewed on Sept., 3rd, 2012, for instance said that, they looked at "... when to deliver each unit; how many hours do we use in dealing with what they have commented; we also look (*sic*) at the relevance of it (*each comments*) ...". The comments made by the industry's players were generally assessed in terms of their feasibility to be implemented in the polytechnic institutions (Ato, interviewed on Oct., 7th, 2012; Atta, interviewed on Oct., 5th, 2012). Generally, the content of knowledge for each level in the three-year HND programme, the number of credit hours for each course content; the ability of the polytechnics to offer suggested knowledge in terms of teaching and learning resource materials and teaching staff; the availability of industries to enable students undertake industrial attachment in related knowledge were mainly attended to in the second polytechnics' course panel meeting. The final drafts were then re-submitted to NABPTEX, which in turn made copies available to individual polytechnic institutions with intentions to offer the revised curriculum.

Accreditation Stage

According to the polytechnic lecturer participants, polytechnic institutions which were already offering the electrical and mechanical engineering programmes sought for a renewed accreditation from the National Accreditation Board (NAB) to run the revised curriculum. Individual polytechnic institutions sought to contextualize the national curriculum document by taking into consideration the resources at their disposal (Ato,

interviewed on Oct., 7th, 2012; Atta, interviewed on Oct., 5th, 2012; Paul, interviewed on Feb., 2nd, 2013). NCTE's required documents to seek for accreditation at the time, included the qualifications of teaching staff, senior teaching staff to oversee the implementation of the curriculum; available teaching and learning resources; and student/teacher ratios.

Moderating Proposed HND Curricula for Accreditation

The first step after submitting the requisite documents for accreditation was the subjection of the proposed curriculum documents to a vetting process by a panel constituted by NAB. This NAB vetting panel comprised of at least three members drawn "... from academia...; the professional association, maybe GhIE (*Ghana Institute of Engineers*) or a practicing engineer; somebody from the industry... as required by NCTE... "(Paul, interviewed on Feb., 2nd 2013). The rationale for the choice of membership into the vetting panel, Paul further explained, was to ensure that the curriculum document satisfied the requirements of key stakeholder institutions and groups in accordance to the norms set by the National Council for Tertiary Education (NCTE) (Oto, interviewed on Sept., 5th, 2012).

Of the documents submitted for vetting, the content of knowledge, facilities, teacher qualifications, admissions criteria, and students' handbooks were among the critical information assessed for accreditation. In terms of the content of knowledge, its sequence, depth, gaps and facilities for its delivery were assessed (Paul, interviewed on Feb., 2nd 2013). Rules and regulations pertaining in each polytechnic institution, as outlined in students' handbooks were also assessed by the vetting panel. The vetting panel authenticated all the information provided by visiting each polytechnic institution before

concluding on the recommendations to offer to NAB to decide on accreditation or not. The vetting panel's reports attached to the curriculum proposal were then returned to NAB for a decision.

Accreditation Decisions

The decision to accredit or not accredit a tertiary institution and a programme of study is usually informed by the proof of having satisfied the NCTEs minimum requirements (Paul, interviewed on Feb., 2nd 2013). In some instances, evidence of procuring or having procured some material resources were overlooked in the decision to accredit a polytechnic institution. This was done in anticipation that such material resources would be available within some few weeks into the initial semester. It was therefore anticipated that the absence of the material resource for the first few weeks would not have any negative impact on the students enrolled in the programme of study.

Facilitating the Delivery of the HND Curriculum

Following the accreditation of the programmes, the process of designing the curriculum at the national level continued with other activities that sought to enable the polytechnics to implement the objectives outlined in the curriculum documents. These activities mainly comprised of resourcing the polytechnics, examining and certifying students from the HND programmes and re-assessment for re-accreditation after having offered the programme for a stipulated number of years.

Resourcing the HND Programmes

Following the submission of proposals to NAB for accreditation, another proposal seeking for support to implement the curriculum was submitted to NCTE. As noted earlier, besides setting the national norms for tertiary

educational institutions, NCTE also advises the Minister of Education on allocations to the various tertiary institutions. Consequently, proposals submitted to NCTE usually sought for resource support to develop the programmes in the polytechnic institution. Information in the reports, Pat, an official of NCTE indicated, is used to advise the Minister of Education on the state's funding of public tertiary institutions (Pat, interviewed on July, 2nd, 2012). The criteria used to advise the Minister of Education, included:

- (1) programme's relevance or fit into national development plans;
- (2) science and technology bias;
- (3) targeted market, as in "criteria for admissions" and "the sector that is intended to employ graduates from the programme";
- (4) possible duplicity of programme in other institutions;
- (5) staffing;
- (6) teacher/student's ratio and;
- (7) Sustained funding for the programme, aside from government support (Pat, interviewed on Feb, 7th, 2013).

Reports on having satisfied the NCTE's requirement for funding and recommendation to fund, thus, informed the Minister of Education to allocate funds to the various tertiary institutions, including the polytechnics.

In a 2013 communiqué however, NCTE directed that NABPTEX's approval and the government of Ghana's funding support to the various public tertiary institutions should be sought before applications for NAB's accreditation (NCTE, 2013). In other words, the pre-2013 arrangement of applying for accreditation and notifying NABPTEX and NCTE was reviewed to ascertain the approval and support of the two bodies before seeking for

accreditation. Pat explained that, the earlier process challenged the government's ability to resolve too many fiscal issues concurrently. The current directive thus enables the NCTE to verify the objectives of proposed programme in relation to government's areas of interest, especially in prioritizing areas of funding (Pat, interviewed on Feb, 7th, 2013).

Examinations and Certification of the HND Programmes

Apart from funding, the accreditation of the two HND programmes implied NABPTEXs readiness to examine and certify students of the teaching programmes. To discharge this mandate, NABPTEX has been requiring polytechnic institutions to submit examination questions with their marking schemes at the beginning of every semester. These questions and their marking schemes are then distributed to, mostly, academics from the universities for a vetting process that assessed the appropriateness of the questions to its different levels and allocated weights to expected answers. The reports from moderation, attached to their questions and marking schemes are then returned to the polytechnics for the necessary corrections to be made before its usage for end of semester examinations.

Each polytechnic institution then organizes its own examinations with its vetted set of questions; after which lecturers marked the examination scripts of the questions they personally set and assign grades. Students' examination reports are then submitted to NABPTEX; which in turn prepares students' certificates upon their completion of their course of study from their individual polytechnic institutions.

Mid-term Assessment

After three years into running the reviewed curriculum, teams of experts from NAB re-visit the polytechnic institutions to assess the performance of the programmes. This accreditation visit, Paul (interviewed on July, 2nd, 2012), the official from NAB asserted, was referred to as mid-term assessment. This mid-term assessment is more vigorous than the first assessment to introduce the programmes into the polytechnic institutions, since NAB usually expects improvement in facilities beyond the minimum requirement satisfied at the initial accreditation period. The team of experts for the mid-term assessment therefore assesses the performance of the polytechnics through students' performance reports, which usually includes among others, students' semester examination results and project work; staff research and publications, the adequacy and quality of the teaching staff and staff attrition; reports on the conduct of examinations; and availability of teaching and learning resources, placing more emphasis on resources that might have been absent at the start of the programme. Mid-term assessment for accreditation for the electrical and mechanical engineering programmes were simply meant to verify, among others, the availability and improvement in facilities and the performance of the HND programme after having gone through its first full cycle of three years to determine the continuation or discontinuance of programme offering.

Re-assessment for Accreditation

On either the fifth or sixth year of running the 2002 and 2000 HND electrical and mechanical engineering programmes, NAB required the various polytechnic institutions to undertake another re-assessment for re-accreditation. Apart from the indicators that were used to assess the

polytechnics in the first and mid-term assessment, this fifth-year re-assessment also sought to identify and address gaps in the curriculum after having run its full cycle. in other words, the team of experts looked once again at:

... the content and; the type of questions they set; marking scheme ... the grading system; then ... the quality control prevailing. We assess the students' guide ... whether there are ... laws which address conflict between either student/student, staff/student and so and so forth... the course content, yes, we go through critically...before accreditation (Oto, interviewed on Sept., 5th, 2012)

Records on entry characteristics of students admitted into the programmes; students/class/space; teacher/student; student/equipment ratios; staffing; teacher attrition; research output by lecturers; student enrolment; reports on the conduct of examinations; the benefits of programmes to graduates in tracer studies; objectives for the programme; curriculum content; student project work; field trips reports and; other extra curricula activities are among the information the teams of expert assess to recommend the re-accreditation of programmes (Paul, interviewed on Feb., 2nd 2013).

In the absence of a revised curriculum after its fifth or sixth year of running the electrical and mechanical engineering HND programmes, re-assessment has been repeated after every five years for polytechnics running the programmes. The delay in the revision of the HND electrical and mechanical engineering curricula, participants from the polytechnic lecturer category and supervisory agencies assert, has been partly due to the intention of introducing the competency-based training (CBT) at all levels of Ghana's TVET sector. After having piloted the CBT in some programmes in the

polytechnics for seven years, NABPTEX is in the process of organizing a curricular review of all HND level programmes (NCTE, 2014).

Other Uses of Assessment Reports

Apart from being used to re-accredit tertiary institutions, assessment reports, have also been used to inform revisions to existing policies such as the national norms for the tertiary education sector and the withdrawal of accreditation permits. In terms of policy for instance, Paul recalled one instance where assessment reports necessitated the consideration of TI graduates for admission into the HND Engineering programmes. According to Paul, (interviewed on Feb., 2nd 2013), the national norm of not considering TI graduates for admissions into the polytechnics was reviewed after several assessment reports emphasized the difficulty of the polytechnics to attract secondary SHS leavers; whereas the TIs who were in line with the polytechnics with regard to TVET training were not considered at all for admissions. Consequently, after about a decade into the upgrading of the polytechnics to the tertiary level, TI graduates began to be considered for admissions into HND Engineering programmes.

As noted earlier, the report from assessment determines either the accreditation or non-accreditation of an institution and its programme. In cases of non-accreditation for minor errors or omissions in proposals, NAB usually meets with defaulting polytechnic institutions and NABPTEX officials to rectify anomalies before accreditation is re-considered. Dialoguing, Paul explained, had usually been preferred by NAB in accordance with its facilitatory role than enforcing its sanctioning role. The NAB had therefore sought to continue in its moral duty to aid public tertiary educational

institutions to make education accessible to all Ghanaians. In recent times, however, Paul (interviewed on Feb., 2nd 2013) asserted that the accreditation board has assumed a tougher stance with regard to its sanctioning powers following the abuse of tertiary institutions on their political links.

In relation to its moral duty to aid the government to make education accessible to the citizenry, NAB had in the past found herself in a dilemma in the execution of her role as an enabling agent of government, as well as having the powers to sanction public tertiary institutions for lacking resources the government should have provided. According to Paul (interviewed on Feb., 2nd 2013), since it is the government's responsibility to provide tertiary education all other efforts were considered as complementary. Any frustration that is experienced by a tertiary institution in the process of seeking accreditation was formerly misconstrued as frustrating government's efforts to make education accessible. Moreover, refusal to re-accredit on condition of, for instance, under-resourcing was considered as an indirect indictment on the government for failing to fulfill its obligation, as well as limiting access to tertiary education. In the words of Paul, "for public institutions... if you say, don't admit and the people too are out there, you'll find the people on the street, and they become a social problem; so we try to advise (*the tertiary educational institutions* to) ... reduce the intake" (Paul, interviewed on Feb., 2nd 2013). The relationship between the NAB, public tertiary educational institutions and the government was, according to Paul, like "a chicken and egg situation"; where caution was exercised in the dealings between the two.

In instances where NAB had had no other choice than to sanction, the political machinations of some tertiary educational institutions had usually

come to the fore. Paul for instance complained that, “You sanction a polytechnic and, before long you’ll find their MPs or regional ministers and chiefs coming in a trail” (Paul, interviewed on Feb., 2nd 2013). Recounting one instance Paul said, a tertiary institution had been asked to cease admissions after flaunting an earlier directive to reduce intake in order to address serious resource challenges that had impeded the success of the programme for the first cohort. This tertiary institution in question ignored the directive and began to admit more students than directed. The NAB decided to withdraw its accreditation to the tertiary institution and to make the case public in order to have the students withdraw from the programme. To the dismay of NAB, one top man in government invited officials of NAB and called for the report on the issue and “when the report got to him (*the top government official*), he said...what!!! You want me to go and tell my people that they should stop admissions?” (Paul, interviewed on Feb., 2nd, 2013). The NAB was, thus, asked to rescind its decision. Such episodes, Paul stressed, weaken the sanctioning powers of the NAB and it had in the past, discouraged the institution from sanctioning tertiary institutions.

In some instances, however, sanctions, backed by political will had proved beneficial, especially for the tertiary institutions. Paul (interviewed on Feb., 2nd 2013) for instance, mentioned a minister who had re-directed authorities from a tertiary institution back to the NAB without intervening. This action of the Minister had some positive consequences for both the tertiary institution and the NAB. First, the endorsed action of the NAB by the Minister encouraged the board not to hesitate in issuing more sanctions where necessary. Second, the government, supported by other stakeholders quickly

made resources available to provide the requisite structures and equipment to commence intended programmes. According to Paul, “Now, it’s (*that particular school in the tertiary institution in question*) one of the best ... schools, because they started well” (interviewed on Feb., 2nd 2013).

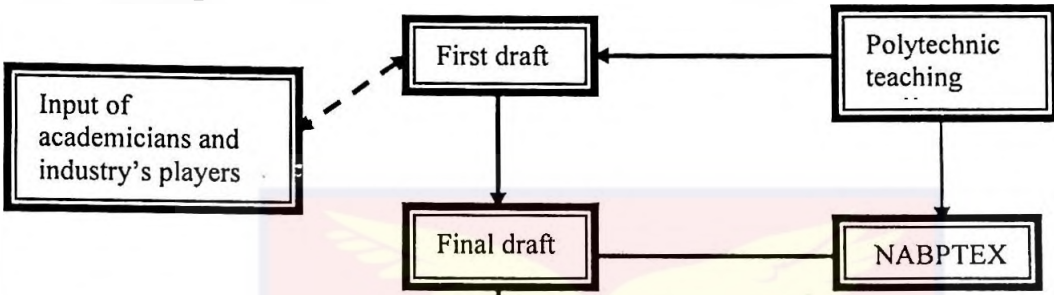
Currently, the NAB is alleged not to hesitate in sanctioning tertiary institutions for failing to meet standards. For example, in response to the common excuse of some teaching and learning materials are on the seas at the time of seeking for accreditation, Paul said:

Now we tell them that, wait, when they come we’ll check and accredit you. Library books, they’ll say, it’s in their boxes... we tell them to shelve them before we’ll check before accreditation. And we let it be at their cost, so that they’ll take their time to do things (Paul, interviewed on Feb., 2nd 2013)

Tertiary institutions are, therefore, currently obliged by the NAB to exhibit the requisite resources before initial accreditation is even granted, so as to avert the unpleasant show of political influence over sanctions issued after an assessment. The cost of having accreditation teams on campuses to assess facilities to inform accreditation decisions is thus currently made to be borne by the educational institutions, so as to curtail the frequent application for accreditation without the requisite requirements in place. Another strategy employed by the NAB, Paul (interviewed on Feb., 2nd 2013) asserted, has been the frequent publication of accredited institutions and their programme offerings, as well as institutions whose accreditation have been withdrawn. Processing for accreditation thus concludes the curriculum design and development process at the national level. Figure 7 illustrates the various

activities with their corresponding curriculum planners in different stages in the curriculum design and development process employed for Ghana's HND Electrical and Mechanical Engineering programmes.

Stage 1: Design



Stage 2: Development

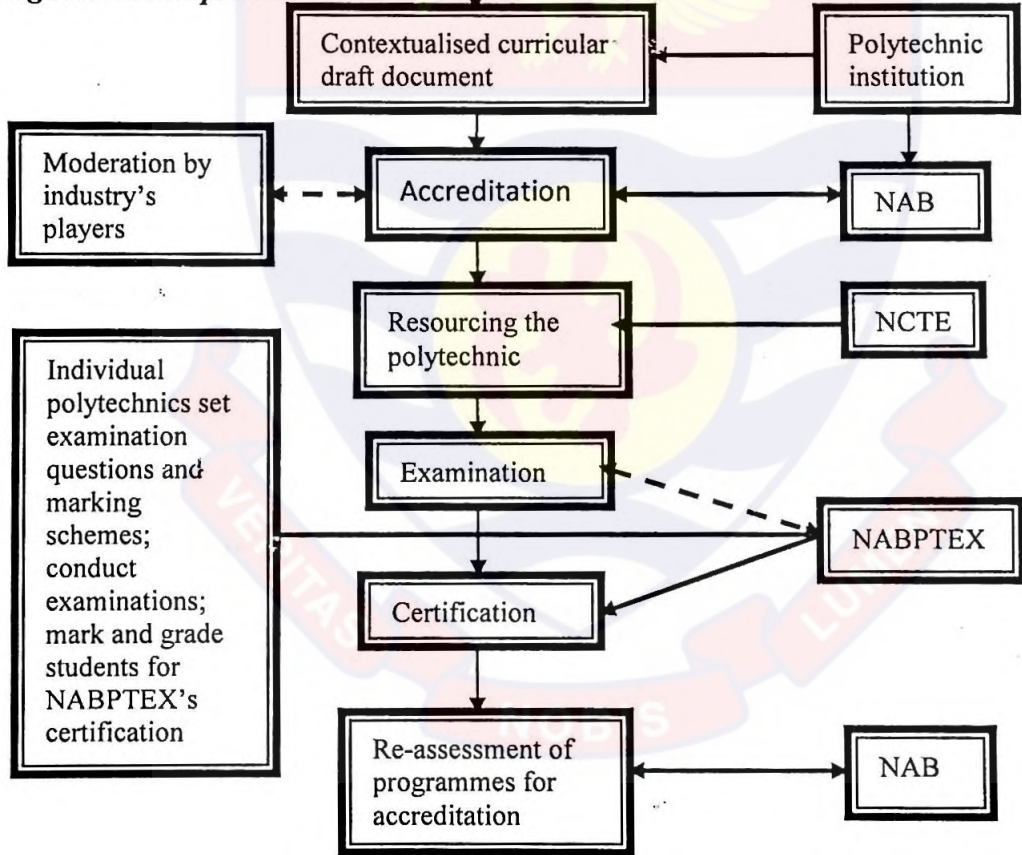


Figure 7: Process of designing and developing Ghana's HND electrical and mechanical engineering curricula.

Source: Authors construct from reports on documentary analysis and interview data

Figure 8 depicts a collaborative curriculum process that has the two major stages of design and development. The main contributors in the design stage are, NABPTEX, polytechnic teaching staff, academics from the university and employers or the professional body. The main activity undertaken at the design stage is the construction of the curriculum draft document.

The development stage sees the contributions of industry's players, polytechnic teaching staff and all supervisory institutions, except COTVET. Unlike the design stage, the development stage is quite elaborative in its activities. Commencing from the contextualization of the curriculum documents to the needs of each polytechnic institution, the development of the curriculum continues with accreditation processes, application for state funding, and organizing examinations towards the nationally recognized HND qualification. The curriculum process then concludes with mid-term assessment of the programme in its third year and re-assessment after programme's fifth-year of running.

Emerging issues from findings on the process of designing and developing the HND electrical and mechanical engineering curriculum

This section of the study has provided accounts on the process employed to design and develop the curriculum in use for HND Electrical and Mechanical Engineering programmes in Ghana's polytechnics. Individual stakeholder groups and the distinctive roles they play in the curriculum process at the national level have been accounted for. From the findings, contributors to the design and development of the curriculum comprise the three supervisory bodies of NABPTEX, NAB, and NCTE; teaching staff from the polytechnic institutions; academics from the university; professional body;

and the industry. The student is, however, excluded from the design and development of the curriculum at the national level. A pattern that commences with the construction of the curricula draft and concludes with re-assessment for accreditation thus characterizes the process employed to design and develop the HND curriculum of the electrical and mechanical engineering programmes.

In terms of roles in the curriculum process, NABPTEX organizes its design and development by drawing on representations from the various stakeholder groups and institutions to work on specific tasks in the curricular process. For example, whereas the polytechnic teaching staff constructed the first draft of the curricular document, set examination questions and marking schemes to examine students and grade students for certification; NABPTEX organizes the curriculum project, disseminates the curricula draft document to the academic and industry players and vet examination questions set by polytechnic lecturers and certify polytechnic student upon their graduation. The industry's players moderate the curriculum documents to establish its responsiveness to different stakeholder needs in order to inform accreditation decisions; and moderate questions and their marking schemes to ascertain standards in examinations in the polytechnic institutions. Table 6 outlines the specific roles individual stakeholder groups played at the design stage and are still playing to develop the HND Electrical and Mechanical Engineering curriculum in Ghana's polytechnics.

Table 6: Stakeholder Groups/Institutions and the Roles they play to Design and Develop the HND Electrical and Mechanical Engineering Curricula

Stakeholder Group/Institution	Specific Roles
NABPTEX	<ul style="list-style-type: none"> -convenes polytechnic lecturers to construct first curriculum draft -copies given to industry's players and Academics for inputs -re-convenes and tasks polytechnic teachings staffs to conclude on draft documents, taking into consideration, comments from the academics and industry's players -receives final curriculum draft document -Disseminate copies of reviewed curriculum draft document to polytechnic institutions -receives and moderate questions and marking schemes from the polytechnics for each end of semester examination -certifies successful students
Polytechnic lecturers	<ul style="list-style-type: none"> -construct draft and conclude curriculum documents -Enact curriculum at the institutional level -set examination questions and marking schemes -organizes examinations, mark and grade students
Academics	<ul style="list-style-type: none"> -Tasked by supervisory bodies to assess curriculum documents and moderate examination questions as to: <ul style="list-style-type: none"> -Ascertain the appropriateness of the content of knowledge curriculum draft -Vet questions and marking schemes submitted to the NABPTEX by individual polytechnic institutions -Tasked by the accreditation board to assess the polytechnics <ul style="list-style-type: none"> -For initial accreditation -Mid-term reviews after third year of running programme -re-assessment at the fifth or sixth year or the Programme

Professional bodies/industry

- © University of Cape Town <https://intec.edugate.unlwi> draft document
- For initial accreditation
 - Mid-term reviews after third year of running programme
 - Re-assessment at the fifth or sixth year of programme

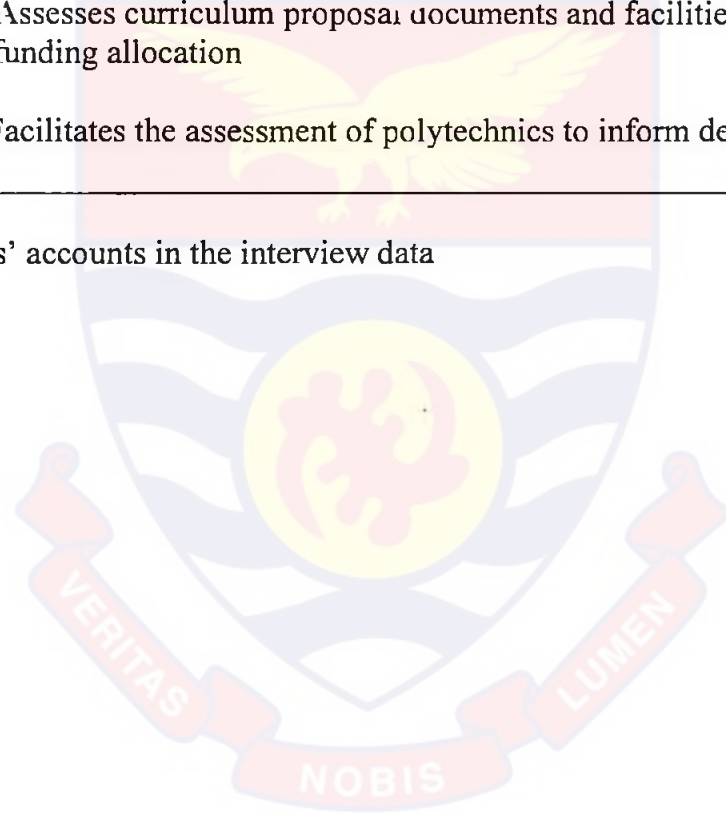
NCTE

- Assesses curriculum proposal documents and facilities in order to advise the Minister of Education on funding allocation

NAB

- Facilitates the assessment of polytechnics to inform decisions to accredit or not accredit programmes

Source: Authors construct from participants' accounts in the interview data



In terms of the process of designing and developing the curricula of the HND electrical and mechanical engineering programmes, the findings reveal a chronological, but slightly complex pattern a two-stage process, designing and developing, characterizes the process employed of designing and developing Ghana's HND Electrical and Mechanical Engineering curricula. The first stage commenced with the construction of the first draft, after which inputs from the academics and industry's players were sought to conclude the curriculum document for submission to NABPTEX.

The second stage of the curriculum process, otherwise referred to as "development stage"; involved the accreditation of institutions and programmes and NCTE recommendations to fund programme, NAB and NABPTEX's monitoring of the quality of the programme, NABPTEX's organization of examinations and the certification of polytechnic graduates, and NAB's re-assessment of polytechnic institutions and programmes for programme continuation after the third year and re-accreditation from the fifth year concluded the second stage.

Strategies to Enhance the Relevance of the HND Mechanical and Electrical Engineering Curricula

To address Research Question 3, this section of the chapter presents the strategies participants suggested to enhance the relevance of the HND Mechanical and Electrical Engineering curriculum through its process of design and development at the national level. Participants' recommended strategies were related to both research question one and research question two. The most critical strategies that polytechnic lecturers and academics from

the universities proffered were convergence and dissemination of information at the national level and recruiting part-time lecturers from the industry.

In relation to the strategy of convergence, polytechnic lecturers and academics indicated in the interviews that convergence of key stakeholders at the stages of drafting the initial curriculum document or after the dissemination of the first draft to the academics and industry players would benefit the curriculum process. According to both polytechnic lecturers and academics, convergence before the stage of seeking for accreditation will enable deliberations for consensus. Ato, for instance indicated that, until NABPTEX ceases to be just a conduit to disseminate the curriculum draft and seek to bring designers together, the multi-stakeholder curriculum intended for the HND level will not be realized. (Ato, interviewed on Sept., 3rd, 2012).

Information flow between stakeholder groups was another strategy proposed to improve the curricula design and development process. According to the polytechnic staff, there had been some decisions that directly affect the operations of the polytechnics, yet neither were they invited to contribute nor were they informed, until they sought the services of the supervisory agencies. Polytechnic lecturer and academic participants therefore recommended feedback to contributions to the design of the curriculum in order to, (i) facilitate familiarisation with the standards of different stakeholders, and (ii) assess performance in terms of curriculum design projects. Ben on page 171, for instance, wished for feed back to his work, in order to ascertain the appropriateness of work done. Moderators and polytechnic lecturers also sought for feedback, in order to ascertain the extent to which their comments on curriculum draft documents were considered feasible or not.

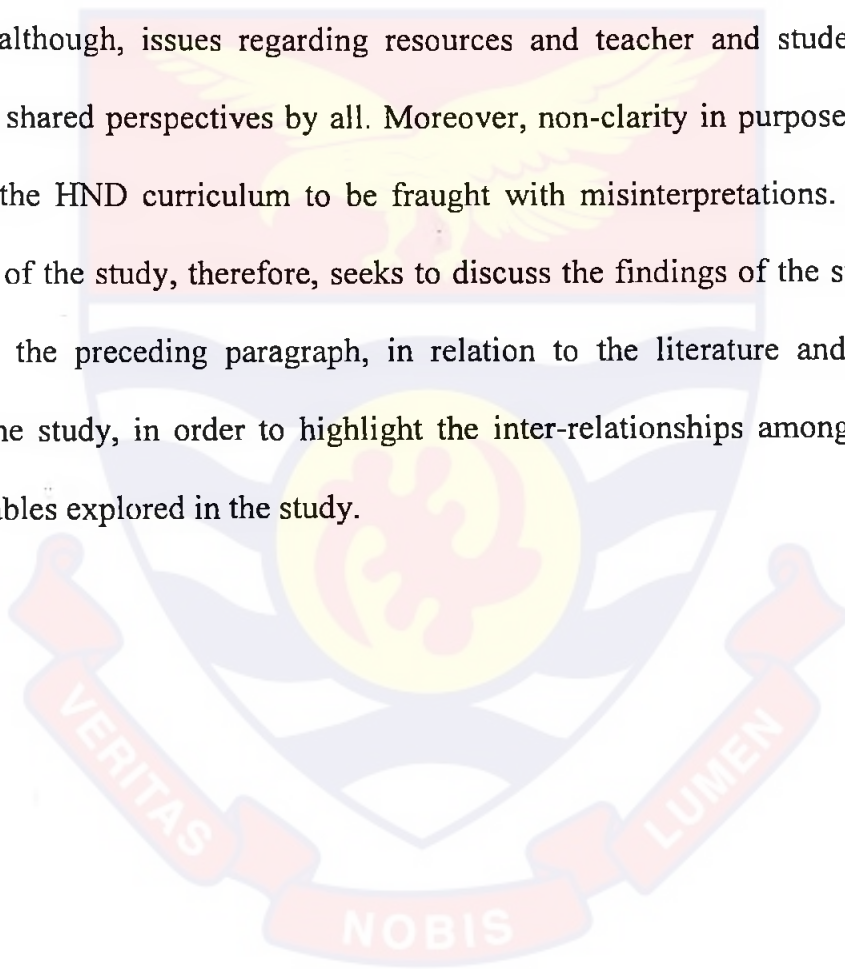
At the national level, efforts to address the resource challenges of the HND Engineering programmes, some participant from the supervisory agencies intimated, has been the intention to introduce CBT into the HND curriculum. The CBT, Ray claimed, will afford the HND student with the requisite practical opportunities, with its intended longer stay on the field (interviewed on Feb., 8th, 2013)., Sid and Sena from a different supervisory body, however, indicated that, until the issue of resourcing is addressed, CBT will just bring a change to the content of the curriculum document without necessarily providing the needed environment, for especially, practical work; the latter situation, the current system finds itself.

At the school level, one of the major strategies recommended by some lecturers to address out-dated knowledge and under-resourcing is the employment of part-time lecturers to render technical expertise and updated knowledge from the industries to the polytechnic students. These part-time lecturers are also able to influence their management in the industries to permit students to undertake more field trips than the full-time teaching staff. Some student participants have sought to improve their overall curricular practical experiences by accessing HND workshops after-classes and on weekends, as well as, taking up apprenticeships sessions in small-scale private set-ups.

Summary of Findings

This chapter has presented data to address the three research questions in this study. Whereas the first section focused on the stakeholders' perspectives on the relevance of the HND Electrical and Mechanical Engineering curriculum; the second section explored the process by which the curriculum

for the two programmes of study were designed and developed. Stakeholders' doubts about the relevance of the HND Electrical and Mechanical Engineering, the data has shown, is largely due to the under-resourcing of the polytechnics, teacher and students' quality, limited collaboration among stakeholder groups and the society's misconceptions about the sector. Stakeholder participants, however, do not ascribe to the same composite of elements to inform their perspectives on the relevance of the HND engineering curriculum, although, issues regarding resources and teacher and students' quality were shared perspectives by all. Moreover, non-clarity in purpose has also caused the HND curriculum to be fraught with misinterpretations. The next chapter of the study, therefore, seeks to discuss the findings of the study presented in the preceding paragraph, in relation to the literature and the context of the study, in order to highlight the inter-relationships among the various variables explored in the study.



CHAPTER SIX

ATTAINING RELEVANCE THROUGH THE DESIGN AND DEVELOPMENT OF THE TERTIARY TVET CURRICULUM IN GHANA'S HND ELECTRICAL AND MECHANICAL ENGINEERING PROGRAMMES

Relevance should be ... a “transformative experience” where students are empowered and transformed by what they have come to know (Darby-Hobbs, 2011; p.19)

Introduction

Relevance in education, the quote above indicates, should be a transformational experience for the student, where in the case of the tertiary TVET, knowledge and skill acquired must necessarily lead to social development if relevance is aimed at (Darby-Hobbs, 2011; Maclean, 2007; Ng'ethe et al., 2008; Powell & Snellman, 2004; Redclift, 2005). The attainment of relevance in this study is however not for the student alone, but other stakeholders who invariable affect or are affected by the curricula's outcome through the student's training. Relevance is therefore based on a conglomeration of factors, which in the case of the tertiary TVET curriculum, may include the process, resourcing, pedagogic decisions and the disposition of stakeholder institutions, as well as that of their individual members. It is against this background that the study explored the concept of relevance, the emergence of the tertiary TVET with its developmental and educational theories and Walker's adapted deliberated model.

The major finding of this study is that, the process employed to design and develop Ghana's HND curriculum is collaborative, but the less or non-

convergence of different stakeholder groups and institutions impedes efforts to attain relevance in the sector's curriculum. From the concept of relevance and Walker's adapted model for the tertiary TVET, the representation of different stakeholder groups/institutions is critical to the definition of a concurred need to pursue (Giora, 1997; Hirst, 1986; Marsh & Willis, 2007). It is against this major finding that, this chapter begins the discussion of the study by the process employed to design the HND curriculum.

Designing and Developing Ghana's HND Electrical and Mechanical Engineering Curricula

Composition of Stakeholders in the Design and Development of the HND Curriculum

Generally, the process employed to design and develop Ghana's HND curriculum assumes a collaborative approach as it seeks to draw on different stakeholder groups and institutions (URC, 1991). The involvement of different stakeholders seems to fit Walker's model and the nature of the tertiary TVET intents for a socially responsive and deliberative curriculum design and development (Marsh & Willis, 2007; URC, 1991). Just like Walker's, Ghana's polytechnics' practice seek to develop a curriculum that embodies the needs, intentions, experiences and expertise of its key stakeholders (NCTE 1988; URC, 1991). The involvement of persons with diverse expertise and experiences in the design and development of the HND curriculum is fundamentally aimed to offer an education that would satisfy both TVET and academic purposes in the society (Hannay, 1989; John, 2011; MacLean, 2007; Marsh & Willis, 2007; Walker, 2003). In other words, collaboration seeks to

adequately plan and provide for the holistic resolution of needs identified in the society (John, 2011; Peach, 2010; Walker, 2003).

Two critical stakeholder groups, the polytechnic student and COTVET were to have been represented in the curriculum design process. The absence of the latter group, as explained in Chapter Four, was due to their non-existence at the time of designing the curricula; but, the absence of the former appears to follow the norm in curriculum design practice, where teachers and educational authorities exclude student based on the conviction that, students are not professionally placed to make any meaningful contribution to the exercise (Diamond, 2008; Marsh & Willis, 2007). The student participants in this study however expressed their awareness of issues pertaining to their context training; a consideration that might have informed Diamond (2008) advocacy for students' representation on curriculum design projects. Hussain, et al. (2011) on the other hand, do not necessarily argue for the representation of the student in curriculum design project, but rather emphasizes on in-depth researches into the curriculum phenomenon to inform curriculum reviews or overhauls.

The organizers of the HND curriculum design project's invitations to individuals who are members of the stakeholder groups/institutions however do not guarantee the standards of the various stakeholders. This is because, invitations to stakeholder groups/institutions will enable the institution to select whom they deem fit to represent them; and such a representative would be obliged to work within the standards of his/her institution than that of a member who is invited without recourse to the mother institution.

Process Employed to design and develop the HND Curriculum

Generally, the design and development of the curricula of Ghana's HND Electrical and Mechanical Engineering programmes seem to adopt a two-staged process of design and development. The platform stage in Walker model seems to be generally omitted in the model employed. From the study's findings, apart from the 1992 curriculum design project that saw the convergence of different stakeholders to deliberate on what to pursue for the HND level and to conclude on the content of the curriculum, subsequent curriculum design projects seem not to have had any activity or stage that can be likened to Walker's platform stage. Participants in the study generally said that the curriculum project commenced with the construction of first drafts of the curriculum documents by polytechnic teaching staff, although participants from one supervisory institution and Kojo, the polytechnic administrator on curriculum projects, indicated the possible occurrence of the platform stage, since some consultations are made to inform the guidelines from the supervisory bodies. The involvement of the polytechnics and other non-governmental stakeholder groups could however, not be verified since no one recalled to have participated in such an activity or could access a report related to the platform stage. The involvement of different stakeholders in activities preceding the curriculum design stage could therefore not be ascertained. This situation generally suggests that either there was no platform stage or different categories of stakeholders or representatives of stakeholder institutions and groups were drawn upon.

The omission of the platform stage suggests several limitations to the attainment of relevance in a deliberatively intended curriculum; critical among

which is, the benefits of the chaos for consensus, and concerted need to pursue in the curriculum design process (Hannay, 1989; John, 2011; Marsh & Willis, 2007; Walker, 2003). According to John (2011), Marsh and Willis (2007) and Ross and Hannay (1989), in as much the platform stage does not always lead to consensus, it is critical to the curriculum design process since it is the only stage that permits curriculum designers to express their sentiments about the project before proceeding to the stages of deliberation and designing. The omission of the platform stage, therefore suggests that the needs of the stakeholders, as defined by the stakeholders, might not have been considered critical to the curriculum of intent.

In the second instance, where different categories of stakeholders or representatives of stakeholders might have been drawn upon for the platform stage and the design, Hannay (1989); John (2011); Marsh and Willis (2007); and Walker (2003) recommend the use of the same representatives of stakeholders in all the stages of the curriculum design process. From the study, it is obvious that the use of different categories or representatives of stakeholder groups can cause delays in the curriculum project, since different set of stakeholders or representatives of stakeholders would require extra time to read and comprehend reports left by those who worked on the platform stage. Failure to understand the background of such reports has the potential of causing curriculum designers to divert from the intended purpose.

The omission of the platform stage in the process employed by Ghana's polytechnics also might have culminated in the curriculum designers working with a pre-defined need. This situation seems more likely, especially where each category of stakeholders that contributed to the design of the curriculum

worked on specific task, a situation I refer to as “work-in-isolation”. For instance, whereas the polytechnic teaching staff constructed the first draft of the curriculum document, the industry’s players vetted the curriculum draft document. Each category of stakeholder relied on guide-lines from the supervisory bodies to execute their task. From the findings of the study, a situation of pre-defined need presents two possibilities of either, relying on existing strategies or the failure of curriculum designers to eventually owe the curriculum they worked on. In relation to the former, the study’s findings revealed that the same need had underpinned both the curriculum of 1992 and that of the HND 2002 Electrical Engineering Syllabus and the 2000 Mechanical Engineering Syllabus (NCTE, 1998; URC, 1991). This suggests a less or non-departure from the status quo; a situation that would fail the tertiary TVET to thrive on emerging ideas to remain significant to the society (Maclean, 2007; Park, 2005). In deliberative curriculum, a pre-defined need is at variance with Walker’s tenet that asserts that every curriculum project should be considered as unique in order to forego existing solutions to generate appropriate resolutions (Hannay, 1989; John, 2011; Marsh & Willis, 2007; Walker, 2003).

Beyond the issues raised at the platform stage, is the issue of convergence which transcends to all the stages in the curriculum design process. The process employed to design and develop the HND curricula of interest in this study seems to have been devoid of the convergence of representations from all stakeholder groups. Apart from instances where two of three of representations from the categories of stakeholders meet, like the vetting of the curriculum draft document by the academics and

professional/employer body, the design and development of the HND Electrical and Mechanical engineering curriculum of 2000 and 20002, respectively, did not record of an instance where representative of all stakeholders converged to work on an issue or a stage. Convergence is critical to the formation of a concerted path pursue for any socially-intended curriculum, since it is the only means by which stakeholders can make known their positions, and become aware of resolutions they can access from other stakeholders (Evan & Freeman, 1993; Giora, 1997; Greisdorf, 2003; Hussain et al., 2011; Maclean, 2007; Maclean et al., 2013; Marsh & Willis, 2007).

In contrast to the general benefits of convergence to socially-intended curriculum, the study has also revealed that, contending interests do not always culminates in consensus, especially when one group withdraws. This was, for instance, the case when some academics were reported to have withdrawn from the 1992 curriculum design project, after some complaints that their (academics) inputs were not being considered. This situation resulted in less academic content in some HND curriculum, and eventually becoming the reason against which some HND qualifications were not listed as a criterion for membership into the professional body and admissions into the university. The withdrawal of disgruntled stakeholders may lead to gaps in the content of curricular document, and may also create hindrances in the progression of graduates from the sector.

Consequences of the exclusion of some stakeholders, the Platform Stage and Convergence in the curriculum design and development process

Major consequences of the exclusion of some stakeholders, the platform stage and convergence, the study has revealed, has caused detachment,

indifference and harmonization. A sense of detachment from Ghana's HND Electrical and Mechanical Engineering curricula is apparent among some stakeholders, especially from the non-supervisory stakeholder groups. In the absence of contributing to the definition of the needs for the HND engineering curriculum and converging to settle differences in opinions, some stakeholders, especially from the polytechnic teaching staff and academics categories consider their contributions as "service" to the supervisory institutions or authorities of the polytechnic institutions. Contributors to the curriculum design process would therefore prefer to work within guidelines, than to query a document that would not result in any change. It was against such situations that an academic indicated he attached less commitment to the vetting of polytechnic curriculum documents after observing that the vetting was more of a process than a cause for reviews.

The exclusion of some stakeholders has also resulted in doubts over the appropriateness of conclusions in the HND curriculum, and eventually fostered an attitude of indifference to the sector in general. For instance, the exclusion of the professional body from the design of the HND curriculum was cited to be the major cause of some members' lack of interest in the affairs of the polytechnics. The exclusion of the professional body in the design of the HND curriculum is therefore considered as the lack of their standards in the sector's curriculum. This has ultimately resulted in the lack of harmonization between the HND engineering qualifications and other types of tertiary education and entry levels in the professional body. This situation contravenes Lattuca and Creamer's (cited in Briggs, 2007) argument that a

deeper sense of ownership by all contributors is one of the benefits attained from a deliberated curriculum.

Considerations into the design and development of the HND curriculum

Need, as the trigger and yardstick

According to Giora (1997); Hirst (1986); Webb (1976), “need” gives impetus to the activities of man, as well as the yardstick against which output from a process is measured. Generally, the need that characterized the tertiary TVET is the bridging of the gap between academic knowledge and the needs of the society (Atchoarena, 2009; Maclean, 2007; Ng’ethe et al., 2008; Powell & Snellman, 2004; URC, 1989). The dominance of economic growth-based approaches to development of the 1960’s to 1990’s however informed considerations into the definition of social needs for the tertiary TVET (Sant’Ana, 2008). As such, the development of the tertiary TVET from the 1960s, first gave consideration to the potential of the sector to develop skills that could lead to economic growth (Unterhalter, 2008). Emerging models of development consequently informed extensive curricular focus in the Western and Asian-Pacific nations to give considerations like, behaviours for sustainable development and obligations to authorities to provide the facilitate to enable the individual’s access to, what Sen, refers to as, effective freedoms (Fien & Guevara, 2013; Longworth, 2003; Redclift, 2005; Robeyns, 2003; Sant’Ana, 2008; Sen, 2005; Tikly, 2013; Unterhalter, 2008).

Ghana’s HND Electrical and Mechanical Engineering curriculum have however, continued to be defined by the 1983 World Bank and IMF’s Structural Adjustment Programme (SAP) that advocated the development of skills to fill middle-level gaps in the industry (Akyeampong, 2007;

Bawakyillenuo et al., 2013; HND Electrical Engineering Curriculum, 2000; Mechanical Engineering Curriculum, 2002; URC, 1998; 1991). The perspectives of stakeholders, the study's findings revealed assessment beyond the skill development focus the HND engineering curriculum. Thus, whereas the documented needs for the HND continue to reflect the skill for development intent of the 1990's, stakeholders' perspectives reflect needs beyond skills to include the cognitive and affective domains. There is therefore a gap between documented need and stakeholder perspectives, thus resulting in contradictions in the expectations of the polytechnic HND engineering graduate.

Theoretically, in spite of the proportions of knowledge, stakeholder participants have expected the HND curriculum to employ a combination of the behaviourist and constructivist traditions, instead of dominance of the former (NCTE, 1998, 2004). In terms of educational competences, most stakeholders of Ghana's HND engineering curriculum therefore expressed relevance in relation to, apart from the hands-on-training, cognitive skills, critical analysis, life-long learning, reflexivity and self-motivation (Doolittle & Camp, 1998; Maclean, 2007; Peach, 2010). There was therefore disagreement over the proportions and appropriateness of knowledge in the HND curriculum. For example, the study's findings revealed that, whereas participants from the university and professional body claim that less theory, especially in mathematics and science, characterizes the HND Engineering curricula; participants from the polytechnic lecturers, students and supervisory institutions had claimed otherwise in this study. This issue of proportions and appropriateness of knowledge was a major reason for the URCs

recommendation of a collaborated stakeholder curriculum design for the HND level programme (URC, 1992). <https://ir.ucc.edu.gh/xmlui>

In terms of knowledge, the tertiary TVET sector is thus expected to extend its coverage and to be delivered in different levels like elsewhere, the tertiary sector offers programmes up to the doctorate level. Thus, the reference to the HND level as the highest in the tertiary TVET questioned the, (1) commitment of the government of Ghana to develop TVET and; (2) knowledge-base of planners of the polytechnic policy (Preamble to Mechanical and Electrical Engineering syllabi; URC, 1992). Moreover, the continuous reliance on a more than 20 years developmental agenda begs the question of whether the HND polytechnic's curriculum seeks to be progressive when Ghana has subsequently adopted several developmental agendas to include, Vision 2020 and Ghana Shared Growth (Akyeampong, 2007; Bawakyillenuo et al., 2013; Bloom et al., 2005; Nordensvard, 2013; Republic of Ghana, 2012; Winkle et al., 2002). This situation is not in consonance with the tertiary TVET expected continuous definition of needs identified in the society to inform revisions in curriculum (Maclean, 2007; Olssen & Peters 2005). It against this background that the study advocates for a combined ideologies and approaches for the HND engineering level.

Traditions in the context of designing the HND curriculum

Underneath all the ideologies and activities of the tertiary TVET is the tradition that pertains in the context of operation. The present study suggests that traditionally, there exists a two-image perspective for the TVET sector in the Ghanaian context. The first image is the indigenous informal system that considers TVET as a critical condition for adulthood and, thus, must be

acquired by all before puberty (Mbiti, 1999; Okrah, 2003; Sackey, 2006).

TVET in the indigenous society was, thus, not attached to any social class system, as everyone, regardless of their social status, acquired some skills for livelihood. Within the formal settings in Ghana, this conventional social preference for TVET, failed to maintain its hold as the West African's encounter with the Europeans from the pre-colonial eras saw the subjection of the black man to hands-on training to serve the white man. Ghana's second imagery of TVET, has thus considered the TVET sector as an education for the lower or lesser in a class-based society (Lewis, 2009). It was in the light of these two imageries, that the government of Ghana spearheaded the diversification of the tertiary education sector.

The emergence of the tertiary TVET sector in Ghana, through the IMF and the World Bank's recommendation (Girdwood, 1999: URC, 1988), therefore questions the readiness of the Ghanaian context to commit and develop the sector. A contradiction in aspiration was thus evident for the Ghanaian government, especially when it sought to catch up with the elite society in Europe through the development of grammar/academic type of education, whilst the IMF and the World Bank encouraged the development of TVET at all levels of the education system. The issue of image, had therefore not been addressed when the tertiary TVET was introduced into the nation's tertiary educational system.

A common trait in the imagery of TVET in Ghana has, however, been the role of authorities in the society. In the first imagery, considerations to some skills to constitute part of the conditions for conferring the status of adulthood on the young adult, was ascertained by authorities before processing

initiates for puberty rites (Mbiti, 1999; Okrah, 2003). In the second imagery, African educated elites, who led the struggle for independence, made efforts to ensure the provision of mostly grammar/academic education, in order to quickly bridge the gap between the educated elites in Europe and Africa (Graham, 1976).

Yet, from inception, the commitment of Ghana government to develop the TVET in general has been questioned in several ways, especially in the areas of policy, resource provisions and the needed environment to support and patronize innovations from the sector (Girdwood, 1999; NCTE, 1998, 2001; Nsiah-Gyabaah, 2005; Nyarko, 2011; Owusu-Agyeman & Oosterkamp, 2009; Republic of Ghana, 2004, 2006, 2007, 2008, 2009, 2010). Such laxity in the government's commitment to develop the tertiary TVET sector has mostly impressed the society to continue to adhere to the notion that the tertiary TVET is none other than, a shadow of the academic universities. The re-orientation of the authorities in the society towards the tertiary TVET, thus, presents a better opportunity for the society to develop an appropriate image for the sector.

Relevance

From the study, the concept of relevance in relation to the design of the HND Electrical and Mechanical Engineering curriculum exudes appropriateness in the selection of its elements to permit harmonization to underpin expressions of relevance. It is against this background that Hirst (1986), Giora (1997), Medin, Coley, Storms and Hayes (2003), and Lavrenko (2004), consider the concept of "relevance" as a layered notion that represents a generative process, as well as, a criterion for measuring or evaluating a

phenomenon. © [University of Cape Coast https://ir.ucc.edu.gh/xmlui](https://ir.ucc.edu.gh/xmlui) Both categories are, however, arrived at following the observance of the harmonious interplay among selected elements constituted in a context of interest. The participants' satisfaction to express relevance, as pointed out by Hannay (1989), John (2011) and Marsh & Willis (2007) is, however, expressed either, within the process or at the end of the curriculum cycle.

This section of the chapter, therefore, discusses stakeholder participants' impressions about the attainment of relevance from the interplay of elements constituted in the process of designing and developing Ghana's HND Electrical and Mechanical Engineering curricula. The attainment of relevance from the tertiary TVET curriculum, the study has shown is dependent on the harmonious interplay between defined needs and selected elements constituted in its context of operation. The discussion in this section is has therefore been guided by the defined needs underpinning Ghana's HND engineering programmes and the elements selected to address defined needs.

Summary

From the foregoing discussion, this chapter of the study concludes that, Ghana's tertiary TVET has been confronted with a two-dimensional challenge to its attainment of relevance. First, its context of operation has failed to be re-oriented to commit to developmental aspirations that can facilitate the tapping of skills; and (2) the polytechnics have failed to acknowledge changes and gaps in the society to review the purposes in their curriculum and operations. In other words, the constancy that has characterized the needs underpinning Ghana's tertiary TVET is not consistent with the changing and turbulent needs of the society that seeks to develop. With stakeholder participants' expressed

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dissatisfaction with Ghana's HND engineering curriculum, a state of oblivion
to the needs of stakeholders is implied in the continuous reliance on out-dated
purposes and non-oriented TVET society.



CONCLUSIONS, IMPLICATIONS FOR POLICY AND PRACTICE, AND REFLECTIONS

The philosophy behind Ghana's TVET system is the creation of intellectually, spiritually, emotionally and physically well-balanced individuals with the requisite knowledge, skills, values and aptitude for self-actualization for socio-economic development and political transformation of the country (Nsiah-Gyabaah, 2005; p.12).

Conclusions

The study has provided data for the process employed to design and develop Ghana's polytechnic HND 2002 Electrical and 2000 Mechanical Engineering curricula, stakeholders' perspectives on the relevance of the two engineering programmes of concern and strategies to enhance relevance in the sector's curriculum. In relation to the notion of a relevant tertiary TVET curriculum, participants' perceptions generally revealed a strong bias towards the position of non-relevance. Fundamental to the issues referred to, in order to, buttress stakeholder's general position was, the flawed policy that underpinned Ghana's tertiary TVET sector in the polytechnics. Within the polytechnic policy were identified ambiguities that left supervisory bodies, for instance, to find it difficult to determine the path to pursue for the polytechnics; and gaps in the relationship between the polytechnics and the industry and other stakeholder institutions.

In terms of the concept of relevance, the study has revealed that stakeholder groups do not ascribe to the same reasons and factors to underpin their perceived relevance of the sector's curriculum. This implies that

expressions of relevance cannot be underpinned by the same set of elements for every stakeholder group; especially where experiences, knowledge, interest and expertise in the subjective aspect of man are characterized by differences (Greisdorf, 2003; Lavrenko, 2003). It is against this background that Walker's model advocates for convergence for deliberations to attain consensus. Ghana's polytechnics have, for instance, continued to adhere to behaviourist practices from inception, whereas, most stakeholders' desires for the sector resonates with the employment of mixed educational philosophies as advocated by (Peach, 2010). This contradiction between stakeholders' expectations and practices in the polytechnics could have been resolved, if convergence for deliberation for consensus had been employed for Ghana's HND level. Pre-determined indicators by consensus are therefore critical to the attainment of expressions of relevance in the affirmative.

The study has also shown that the susceptibility of the subjective aspect of assessors of relevance to changes in emotions, knowledge, experiences and facts can either advance or frustrate the affirmative expression of relevance even when all the objective indicators have been addressed. In the context of the present study, relevance becomes a vague concept among different groups unless assessed by a concerted defined needs and processes, or more appropriately, all the constituting elements are held constant.

In relation to the tertiary TVET, the study has shown that, the purpose of introducing the TVET tradition into the academic tradition was not seek to relegate the knowledge and skills in either of the two, but to seek for complementariness to resolve different aspect of needs in the society. the decoupling of, especially, the core aspects of academic knowledge and skills

from TVET knowledge and skills, thus, only serves to limit each tradition's complementarity to bridge the gap between knowledge and the society. For instance, academic knowledge without TVET confines the former to its disassociation from the society, while TVET without academic content presents the society with individuals who lack the competence, attitudes and character to engage in the search for social problems and their resolutions, generate and articulate ideas, and critical about the impact of their actions or work on the context of application. Thus, discussions on the incompatible thesis between academic and TVET traditions that fostered entrenched positions for advocates remained a puzzle throughout the course of undertaking this study. In sum, a tertiary TVET system that does not seek to develop the academic aspect of the student, presents nothing, but a lame education to its clients.

Study's Implications for Policy and Practice

Policy

In terms of policy, the study has revealed that the ambiguity and gaps in Ghana' Polytechnic policies of 1992 and 2007 have challenged, among others, stakeholders' determination of some activities to develop the sector. Ghana's TVET policy, especially for the polytechnics must, therefore, be juxtaposed with policies of other sectors so that, relationships between the polytechnics and other stakeholder institutions will be well defined to guide the activities of stakeholder groups. For example, for the relationship between the polytechnics and the industries, government policies can cover areas such as industrial attachments; sponsorship of educational programmes; research collaboration for innovations; polytechnic/industry collaboration on the commercial

production of innovations from the polytechnics; and incentives for realizing expectations in government's policies.

The study has, also, shown that contributing stakeholder institutions to the design and development of the HND curriculum do not have institutional policies concerning their relationship with the polytechnics. This situation has permitted the two scenarios whereby, individual members in stakeholder institutions contribute to the design of the HND curriculum without the knowledge of their mother institution, and representatives of stakeholder institutions work without necessarily adhering to standards of the institutions they are expected to represent. It is therefore recommended that each stakeholder institution or group should be encouraged to have a policy in relation to the HND polytechnic curriculum. The policy should outline, among other things, the standards of stakeholder institutions in relation to the HND level and the contributions or support the institution or group can make to develop the HND curriculum. This institutional policy of stakeholder institutions and the polytechnics must however fit into the overall polytechnic policy and government's supervisory bodies' frameworks.

Apart from the recommended policies in the paragraphs above, the thresholds, in terms of proportions of TVET and academic knowledge and skills for the HND sector also emerged as one area to be addressed at the national level. Currently, COTVET's eight-stage qualification framework for Ghana's TVET sector has addressed the major ambiguity of whether the HND level is either synonymous to the polytechnic tertiary or one of the levels of programmes to be developed in the Ghana's polytechnics. The study, has however, shown that it will be expedient to determine the actual content in the

proportions of knowledge and skills each level in the tertiary TVET sector possess. One of the benefits of clarifying the content in the proportions of knowledge and skills, will be the clarity that will go with the notion of middle-level” manpower for the HND engineer, in order to make both the employer and the HND graduate define their expectations from each other. In the case of the HND graduate, this will also enable him/her to have fore-knowledge of what is accessible, particularly in terms of further education or career progression.

Another benefit of clarifying the content in the proportions of knowledge will be the prevention of duplicating knowledge with its attendant waste of time for HND graduates who seek for further education. In other words, the confusion surrounding the tertiary TVET graduate in relation to accessing further education in different types of tertiary educational institutions, progression at the workplace and in professional acumen can be resolved with clearly defined content of knowledge for the different levels in the TVET system.

Practice of Designing and Developing the HND Electrical and Mechanical Engineering Curriculum

In relation to the practice of designing and developing the HND Engineering curriculum, recommendations were made in relation to Walker’s platform into the process, reviewing the composition of contributors to the design of the curriculum, revision to the type of collaboration practiced, uniformity in the content of knowledge for the HND qualification, among others.

HND electrical and mechanical engineering programmes

In relation to the process of curriculum design for Ghana's HND Engineering programmes, the incorporation of Walker's platform stage, the study suggests, should be considered. From the study, the absence of Walker's platform in the process employed to design the HND engineering curriculum has had the consequences of having curriculum planners who fail to own the curriculum document, because of disagreement about the content of the curriculum. In addition to the platform in Walker's model, was the consideration to the convergence of key stakeholders throughout the platform and the design stages in the curriculum process. The incorporation of the platform and convergence of stakeholders should aim to enable the construction of a curriculum that commences with a concerted foundation to inform the selection of requisite elements that will facilitate harmony to attain relevance.

Inclusion of HND Polytechnic Student in Curriculum Design Projects

In relation to the composition of curriculum designers for the HND curriculum, the inclusion of its key beneficiary, that is the student, should be considered. This particularly critical for Ghana's polytechnics, since the HND student has formed perspectives about the education he/she is being offered. This leads to the next recommendation of extending the sources of data used to inform the design of the HND.

Extension of Data into the Curriculum Phenomenon

The findings of the study revealed that students' industrial attachment reports has never been considered as source of the data used to inform the

design of the HND curriculum, although they offer up-to-date data on the student and happenings at the work place. Beyond the statistics of the ratios of students to resources used in the polytechnic, industrial attachment reports, as described by student participants in this study, can also provide data on the cognitive, affective and interests of the student in the curriculum phenomenon. Moreover, since industrial attachment report have constituted part of the exercises culminating in the graduation of the student, its consideration as data to inform curriculum design will constitute less cost for the polytechnics and their authorities.

Stakeholders in the curriculum design process

In addition, to demanding institutional policies from contributing stakeholder groups to the HND curriculum (See page 293), the standard of work contributed by stakeholder representatives, the study recommends, should be verified by their mother stakeholder institutions. In effect, the current practice of government's supervisory institutions inviting individuals to represent their mother stakeholder institutions on curriculum issues should be reconsidered. Rather, invitations to contribute to curriculum project for the HND level should be addressed to the various stakeholder institutions, but, not known members of stakeholder institutions. This will enable individual stakeholder institutions to appoint representatives with the surety of adhering to the standards of the mother institution, and also enable continuity in case of the withdrawal of a representation. The challenge of individuals contributing to the designing of the HND curriculum based on their whims and caprices will also be addressed.

In the light of the above, the study recommends the chronicling of the activities undertaken in the curriculum design process. Such a report should inform stakeholder institutions of activities undertaken to arrive at conclusions reached in each curriculum project; the context within which compromises to institutional standards are made; processes employed to attain some requirements; and the verification of the involvement of stakeholder representations. The chronicling of the process should also aim to make stakeholder representations in the design of the HND curriculum, proactive instead of passive or indifferent, and to avoid instances like Ben's sole designing of a syllabi. Report from the curriculum project should also be considered as part of the documents submitted to NAB for accreditation and NCTE for government's funding. In a nutshell the chronicling of the process can easily offer information to authorities to inform decision concerning accountability measures.

Ideological underpinnings and curriculum content for the HND curriculum

From the study, the growth-based economic approach and the behaviourist tradition that have characterized Ghana's HND curriculum have failed to permit the achievement of the purpose underpinning the sector. A paradigm shift has thus been required in these ideological underpinnings in Ghana's HND curriculum, in order to be considered as relevant by stakeholders. For, inferences from stakeholders' submissions in this study suggest the expectation of the holistic development of the HND polytechnic student. Against this background, the attitude and generic competencies and skills of the HND student is expected to be developed, apart from skills to facilitate the economic wellbeing of the HND graduate. This demands equal

attention to knowledge and skills from both TVET and academic traditions. © University of Cape Coast <https://ir.ucc.edu.gh/xmlui>

The provision for each aspect is expected to the holistic development of the student as both the TVET and the academic content equips the students with cognitive skills and competencies for effective performance.

Against this background the academic content of the HND curriculum, particularly of the generic courses in the polytechnics, such as Communication Skills and African Studies, should be given more credit hours in order to aid students with weak backgrounds in the core areas enhance their performance in the elective courses. In addition to this, remedial classes for prospective students with weak backgrounds in the core subjects should be a condition for admissions into the polytechnics.

Harmonizing the HND Electrical and Mechanical curriculum

In order to bring harmony to the HND curriculum towards the nationally awarded qualification, stakeholders recommended that (1) NABPTEX should ascertain that the curriculum content for each HND programme is the same in every polytechnic institution. To this end, (2) NABPTEX should be in total control of examinations for HND level programmes. This implies that the setting of examination questions and marking schemes should be done by NABPTEX for all HND programme. The teaching staff in the polytechnics, as recommended by Tete, can, however, continue to contribute questions. The NABPTEX is then expected to collate the questions and select the same set of questions for every semester's examinations in all polytechnic institutions offering the programme of concern, whilst, teachers continue to mark the scripts but, preferably, not the scripts from their own polytechnic institutions.

For the effective delivery of the HND curriculum, stakeholders also suggested considerations to training in philosophy or psychology of education, curriculum planning, and membership with the professional body as part of the requirement to teach in the polytechnics. The recommendation of training in philosophy or psychology of education and curriculum design is based on the conviction that every teaching staff is a potential contributor to the design of the HND curriculum. Also, the lecturer will be equipped with the different pedagogic skills to effectively deliver the content of the tertiary TVET curriculum by employing the different pedagogic approaches. Moreover, training such training has the potential to improve teacher/student relationships, since the lecturer's work will be guided by ethics in teaching. In-service training can, thus, be organized for teachers without the requisite background in psychology or philosophy of education and curriculum design, but are already in employment. Membership with the professional body, on the other hand, will ascertain teacher's expertise for the delivery of engineering curriculum, as well as, to adhere to standards of the professional body are inculcated in students before graduation. The confidence of the professional body in the polytechnics will also be built when a closer relationship between HND lecturers and the former is fostered.

Resource Provision

The under-resourcing of the polytechnics has persisted from its inception, and this has contributed to the inability of the polytechnics to provide the requisite resource to deliver the content of the curriculum. One critical recommendation made is, therefore, the reduction in the duplication of

HND programmes in the polytechnics, in order to enable the government concentrate resources in few polytechnic institutions that can offer the programme, than permit all polytechnic institutions to offer all programmes and remain under-resourced. It was therefore recommended that NABPTEX/NAB/NCTE should strictly adhere to the criterion of providing evidence of having the comparative advantage to offer a programme before granting accreditation. Also, consideration to government/industry partnerships for some programmes is also recommended to address the under-resourcing of HND programmes.

HND engineering curriculum and the society and the industry

In order to bridge the gap between tertiary education and the needs of the society in Ghana's HND engineering programmes, attention to the socialization of the sector emerged as a major area that can facilitate the development of the sector. From the study, Ghana's tertiary TVET in the polytechnic HND sector seems to be detached from the society. Social needs, not only for those which are related to the industry, can constitute part of students' assignments or project work in order to inculcate in students the purpose of their type of education in relation to developing the physical aspect of the society.

Regular exhibitions and fairs of innovations by polytechnic students and graduates also emerged as one of the means of socializing Ghana's HND engineering curriculum. Award schemes, from both government and the industry, can thus be given to motivate HND student and graduate to be more innovative to resolve social problems. Such exhibitions and fairs also have the potential to build the confidence of employers and investors in locally created

innovations. © University of Cape Coast <https://ir.ucc.edu.gh/xmlui>
and distinction between the university and polytechnic education. Aspiring students can make informed choices, following attendance to such fairs, as to the type of education to pursue. At such fairs, aspiring students can interact with lecturers and students to learn about what happens in the polytechnics. Moreover, it will also build the confidence of the polytechnic institutions, in terms of increasing enrolment and developing programmes in anticipation of meeting the needs of the society.

In order to promote the development of innovative skills in tertiary TVET students/graduates, contributions to social development is recommended to be considered as a criterion for the admission into engineering programmes beyond the HND level. Innovations in the area of designs and output that utilize materials from the local context should be given priority in this instance into Bachelor and Master's degree level engineering programmes. Such a practice will be a means to encourage and compel HND Engineering graduates to pursue further studies not necessarily to receive higher salaries, but to contribute to the resolution of at least one social problem in the society.

Students' support service

First, the polytechnics and their supervisors should find ways of opening up to the general public, such that students and parent will be abreast with programme offerings and their potentials for career development will be made public. In other words, the students should have prior orientation of HND programmes before they seek for admissions, and not the conventional orientation that is offered after enrolment.

Introducing students into the polytechnics should be oriented to know the benefits and limitations of the qualifications of their intended programmes. This, according to one representative from the Engineering body, will inform the expectations of students, as the full awareness of their entry and exit points, and the line of progression is gained. Scholarships and funding should be made accessible, such that students will be able to explore and build their ingenuity. There should be regular interactions with the society to find problems that require resolutions that the student can apply the knowledge and skill acquired.

Limitations of the Study

First, a major aspect of the research, that is the design and development of the current curriculum used by the HND Electrical and Mechanical Engineering occurred in the past; thus, the retrospective turn this study assumed. The study therefore acknowledges that the process might have changed for recent curriculum project, thus, the findings in this study are for the Mechanical and Electrical Engineering programmes which are yet to be reviewed. Second, the study drew on participants from different stakeholder groups, yet the study cannot claim to have captured all the perspectives of the membership of each group.

Third, most of the student cohort drawn upon for the study were students from the pre-2007 technical school that has been phased off. The situation of these students that is the relationship between their backgrounds and their programme offering may not be applicable to their juniors. For instance, the revision of the TI subjects to include the core subjects of Mathematics, English and Science may have resolved the issues these students claimed to

have affected their performance at the polytechnic curriculum during their initial semesters.

Fourth, apart from the non-polytechnic institutions, findings related to the internal activities of the study's two participating polytechnics cannot be claimed to be the situation in all the polytechnic institutions in Ghana.

Suggestion for Further Research

From the discussions on the findings of the study, further explorations into the following are recommended.

- (1) Academic and TVET content of knowledge and skills for each level in Ghana's TVET system, in order to enable digression into different type of education after graduation, as the interest of the student may require.
- (2) Relationship between students' educational backgrounds at the secondary level and their performance in their polytechnic programmes.
- (3) Differences in the performance of polytechnic rectors from the academic and TVET streams. Such a research should aim to settle some participants' argument that the development of the TVET aspect of polytechnic HND curriculum has been stifled by the domination of rectors with backgrounds in the academics.
- (4) Similar to research recommendation (2), studies into the performance of lecturers with no backgrounds in TVET in the polytechnics is also recommended.

(5) Research process employed to formulate policies for Ghana's polytechnics. This is to explore whether the process is all stakeholder inclusive or not.

(6) Utilizing students' industrial attachment reports as a major source of data for the curriculum phenomenon.

Contributions to Research

As part of contributing to academic research, the study has firstly, explored the concept of tertiary TVET, delving into its emergence to derive its implications for the sector's curriculum design and development. This fundamental in the sector, seems to have been considered as given, as most studies in the sector covered dimensions that mostly looked at process in the sector.

Secondly, the study has applied the concept of relevance, which the literature revealed, had been mainly applied in the information technology sector, to the process of curriculum design and development. With regards to social issues, the study has shown that, relevance can become a vague concept if it is not guided by pre-determined indicators for success. Yet, it does not mean emerging subjective elements should be ignored, but must be attended to, since relevance is a collective affirmative judgment of the attainment of some objectives.

Reflections

This section of the chapter covers my impressions on the various issues encountered during the course of this study. This study began with an intention to explore the relevance of the HND Engineering curriculum. However, my engagement with the literature and some stakeholders created

the awareness that the study could not be undertaken without interrogating the process employed to design and develop the sector's curricula. I have therefore learnt that one of the benefits of consulting others, prior to research studies, is the focusing of research interest.

Subsequent to the above, too many variables presented themselves to be explored in this study. This presented a major challenge of establishing their relationships and establishing their usefulness for the concerns of the study. Each variable was, however, studied in order to establish the relationships therein.

In the area of concepts, the issue of relevance within the curriculum was problematic, in the sense that, most studies in curriculum were related to educational quality. No curriculum related study provided a comprehensive framework to explore the notion of relevance in terms of curriculum design and development. Search into the concept of relevance and curriculum design and development process however presented similarities that made it difficult to find different purposes for. There was therefore the temptation to forego one, most preferably, the concept of relevance. Yet, a critical look revealed that the concept of relevance filled some gaps that were inherent in Walker's model. For instance:

(1) the need to commence every purposeful activity with the definition of a "need" that is able to determine subsequent activities in the process of addressing the "need";

(2) the idea of harmonization, which served to enable explorations into the appropriateness of activities and their consonance with each other; and

(3) Expression of relevance can be made in relation to process and the evaluation of output to pre-determined objectives.

The above emerged more prominently in the concept of relevance than in Walker's model. The similarities and differences between the concepts of relevance and Walker's Naturalistic model eventually informed a framework that was considered most suitable to address the concerns of the study.

The cyclical nature of curriculum designs and the constant revision required in the tertiary TVET to enable the addressing of emerging change, suggests that issues of relevance are opportunities for curriculum designers and planners to review the system. Moreover, output from the curriculum is more as a result of designing and developing the curriculum than the limitation of the student.

Lastly, fieldwork revealed differences in the posture of different categories of participants. As compared to other categories of stakeholders, each elite category of participants, which comprised of the supervisory and professional bodies, academics from the universities and polytechnics, did not hesitate to question and express their sentiments about the work I was undertaking. Thus, whereas the students just participated in the study as required, most elite interviewees offered suggestions on how I should conduct the study. Those who held onto the incompatible thesis like the university 'don' who promised to make "nonsense" of my methodology were listened to, but not necessarily heeded onto, since their background in quantitative research failed to permit them to consider qualitative research as authentic and objective. Generally, however, the study afforded me the opportunity to

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acquire skills in critically accessing information before use and being
meticulous in the presentation of, especially, what counts as facts.



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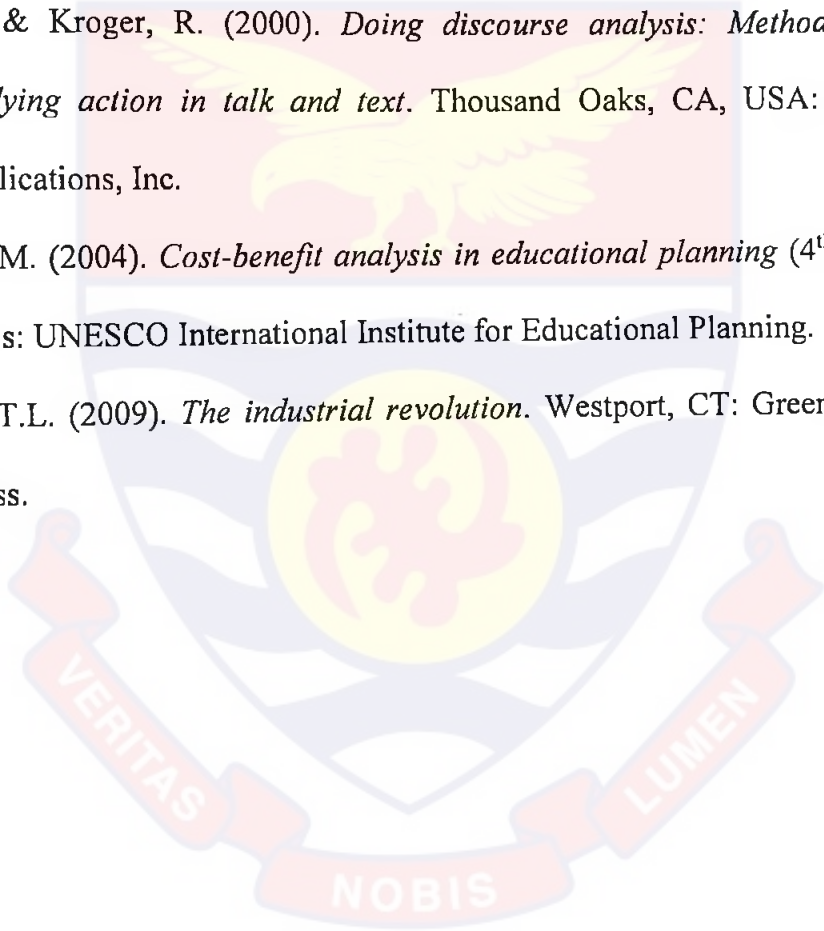
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APPENDICES

APPENDIX A

Protocols to Access Study's Sites

A. Documents to gain UCC IRB's permit to conduct the study

Research Protocol

This document summarises my research interest and outlines the role your institution is expected to play in this research project. This research study is being conducted for the purpose of a thesis in partial fulfilment for the award of a PhD degree by the University of Cape Coast. The purpose of the research is to explore stakeholders' perspectives on the design and development of the curriculum for Ghana's polytechnic HND programmes. The overall aims of the research are to provide; i) to explore what stakeholders construe as relevant polytechnic education; ii) to describe the process followed in designing and developing the curriculum for Ghana's polytechnic HND Mechanical and Electrical Engineering programmes; and iii) to explore the relation between the notion of relevant polytechnic education and the process adopted in designing and developing the curriculum for the HND Mechanical and Electrical Engineering programmes.

In other words, the study aims to construct a document that will inform the enhancement or aversion of some practices in curriculum design and development activities at the national level for Ghana's polytechnic institutions. Guided by the principles of curriculum designing and development in Ghana's polytechnics, I intend to engage stakeholder participants in interview sessions to understand what they construe as relevant polytechnic education. From your outfit, I will like to interview

1. Mechanical and Electrical engineering polytechnic graduate employees on the relevance of their polytechnic education to their current jobs.
2. Employer or supervisor on the work output of selected polytechnic graduate employees. I will appreciate copies of documents to support claims will be most welcomed

Copies of documents to support claims made in the interview sessions will be most welcomed.

For further details please contact

Researcher: Clara Araba Mills

Institute of Educational Planning and Administration

University of Cape Coast

Cape Coast

Tel: 020- 9048794

Email: gernii@yahoo.com

Supervisor

Dr. A.L. Dare

Institute of Educational Planning and Administration

University of Cape Coast

Cape Coast

Tel: 03321-30571

Email: kasoadare@yahoo.com

B. Letters to gain permit to gather data from participating institutions

IEPA UNIVERSITY OF CAPE COAST
INSTITUTE FOR EDUCATIONAL PLANNING AND ADMINISTRATION
FACULTY OF EDUCATION

Tel. No. : 03321-30571
Fax No. : 03321-30588
E-mail : iepa@ucc.edu.gh

University Post Office
Cape Coast
Ghana

Our Ref. EP/153.1

April 12, 2012

THE EXECUTIVE SEC.

NCTE

ACCRA

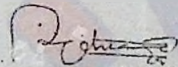
LETTER OF INTRODUCTION

The bearer of this letter, Ms Clara Araba Mills is a graduate student of the Institute for Educational Planning and Administration of the University of Cape Coast. She requires assistance to undertake her research as a requirement of Ph.D degree programme at the University.

Ms. Mills has chosen your outfit as one of her project sites. We are by this letter introducing her in order for you to kindly accept her and offer any assistance she may require.

We appreciate your co-operation and support.

Thank you.


for Prof. George K.T. Oduro
DIRECTOR

Institute of Educational Planning and Administration
University of Cape Coast
Cape Coast

25th April, 2012

NATIONAL COUNCIL FOR
RESEARCH
30 APR 2012
P. O. BOX 113, ACCRA

THE EXECUTIVE SEC
NCTE
ACCRA

Dear Sir,

Consent to Conduct Research In Your Institution

I wish to apply for your consent to collect data from your institution as part of my PhD graduate research work.

I have chosen your institution as one of my major study sites for my research work. I require a letter from your institution that states your consent to allow me collect data from your outfit. This letter will be submitted with other documents to the Institutional Review Board (IRB) of the University of Cape Coast before I will be permitted to proceed with my field work.

Attached is an introductory letter from my institution and an outline of the role your institution is expected to play in my research project. I hope my application will be given the necessary consideration.

Yours Faithfully



CLARA ARABA MILLS

① Araba Mills
Ms B. N
Accepted 1/4/12
Mat
22/4/12

② Hoed
See accept

MA
18/5

C. Permit to undertake study in selected study sites

NATIONAL COUNCIL FOR TERTIARY EDUCATION

(NCTE)



REPUBLIC OF GHANA

*In case of reply the
number and date of
this letter be quoted.*

My Ref. No. *NCTE/2012/74/1*
Your Ref. No.

P. O. Box MB 28
Accra - Ghana

May 23, 2012

Clara Araba Mills
Institute of Educational Planning and Administration
University of Cape Coast
Cape Coast

Dear Sir,

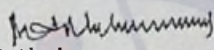
Re: Consent to Conduct Research in Your Institution

Your letter dated 25th April, 2012 on the above subject refers.

We would be pleased to have you use the National Council for Tertiary Education as one of the major study sites for your PhD graduate research work.

Thank you.

Yours faithfully,


N.A. Abrahams
Head, Corporate Affairs
For: Executive Secretary

COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING
(COTVET)

In case of reply the number and date of this letter should be stated



Minister's Branch Test Office

P.O. Box ME 551

Accra

Tel. No: 0302682944

Fax: 0302 682950

REPUBLIC OF GHANA

21st May, 2012.

Ref. No: COTVET/C-OS/05/12

Ms. Clara Arala Mills
I E P A
University of Cape Coast
Cape Coast

Dear Clara.

RE: Consent to Conduct Research in Your Institution

I write to acknowledge receipt of your letter dated 25th April, 2012 indicating your interest to collect data from our institution for your PhD research work. By this letter, we consent to your request and will be ready to offer you the necessary assistance.

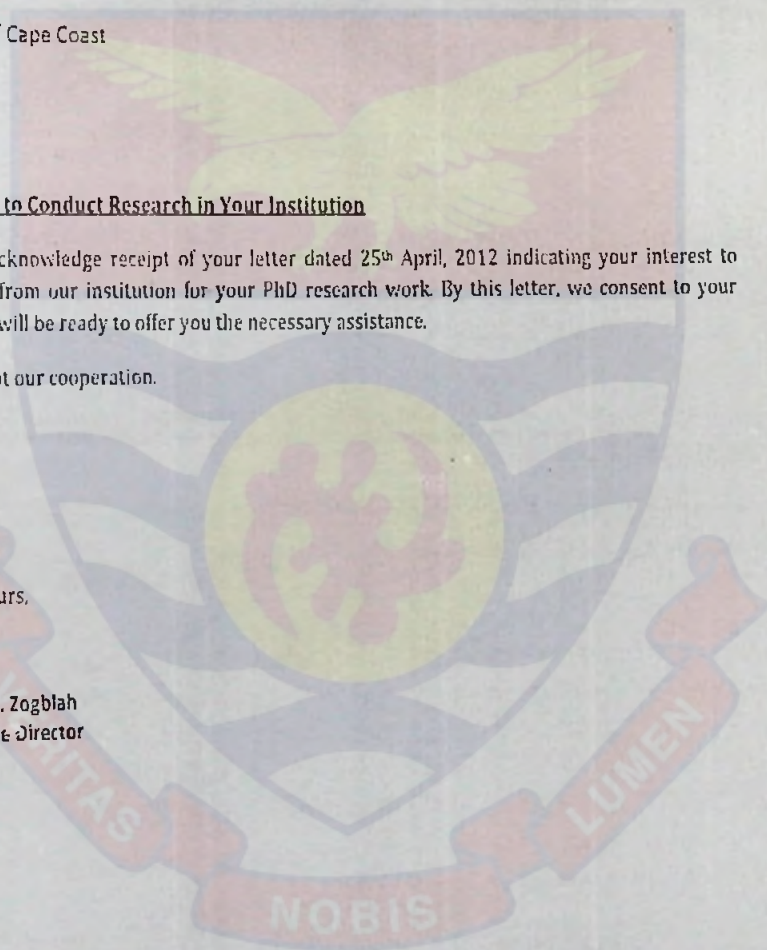
Please, accept our cooperation.

Thank you

Sincerely yours,

Signed

Theophilus T. Zogblah
For: Executive Director





GHANA INSTITUTION OF ENGINEERS

Engineers Centre, 13 Continental Road, Roman Ridge, Accra, P.O. Box AH 7042, Accra-North, Ghana
Telephone Nos : +233-302-760867/8, +233-28-9673964, +233-28-9529403, Fax: +233-302-772005
Email: secretariat@ghie.org.gh, ghiacentre@yahoo.com, Website: www.ghie.org.gh

GhIE/CMT/ADM/GEN/20/158

April 25, 2012

The Dean of Graduate Studies
University of Cape Coast
Cape Coast

TO WHOM IT MAY CONCERN

This is to confirm that the Ghana Institution of Engineers (GhIE) has received an application from Ms Clara Araba Mills of the Institute of Educational Planning and Administration, Cape Coast requesting for information from the Ghana Institution of Engineers (GhIE) to help her in her field work.

We will do our best to provide her with the necessary information that she may require.

Ing. Joseph K. Buckson, FGhIE
Executive Secretary

President: Ing Prof Samuel K Ampadu FGhIE

Executive Secretary: Ing Joseph Kenneth Buckson FGhIE

KUMASI POLYTECHNIC

Rector:
Telephone No:
03220 22387 / 03220 22388
Fax: 03220 22387
Residence:

P. O. Box 854
Kumasi, Ashanti
Ghana, W Africa



Our Ref: 442TJ1

Your Ref:

30th April, 2012

Clara Araba Mills
Institute of Educational Planning and Administration
University of Cape Coast
Cape Coast

Dear Madam,

RE: CONSENT TO CONDUCT RESEARCH IN YOUR INSTITUTION

Your letter on the above subject refers.

We write to inform you that permission has been granted for you to collect data from our institution as part of your PhD research work.

You could contact the Human Resource Office under the Main Registry for further assistance.

Yours faithfully,

JENKINS A. ASAAH
SENIOR ASSISTANT REGISTRAR (HR)
FOR: REGISTRAR



KOFORIDUA POLYTECHNIC

(OFFICE OF THE REGISTRAR)

P. O. Box KF 981,
Koforidua, E/R,
Ghana, West Africa

Tel: (+233)-3420-21817 (+233)-3420-22890 (+233) 3420-24993 Tel/Fax: (+233)-3420-21817
Email: registrar@koforiduapoly.edu.gh Website: www.koforiduapoly.edu.gh

Our Ref: **KPRO/12/129/12**

Your Ref:

Date: **20TH APRIL, 2012**

The Director
Institute for Educational Planning and Administration
University of Cape-Coast
Cape-Coast.

RECEIVED FOR THE REGISTRAR
KOFORIDUA POLYTECHNIC
18.4
8/5/12

Dear Sir,

RE: CONSENT TO CONDUCT RESEARCH IN YOUR INSTITUTION

We refer to your letter referenced EP/153.1 dated 12th April, 2012 on the above subject in respect of Ms Clara Araba Mills please,

We write to inform you that your request has been approved. Thank you for choosing our institution as one of your research sites. Please don't hesitate to contact us for any assistance needed.

By a copy of this letter, the Deputy Registrar (Academic) is requested to assist Ms. Mills during the period of her research.

We look forward to seeing you soon.

Thank you.

Yours sincerely,

Mary Abena Agyepong (Mrs.)

REGISTRAR

Cc: Rector
Vice Rector
Finance Officer
Deputy Registrar (Academic)

APPENDIX B

A. Consent Contract Form for Participants

Title: An interrogation of the design and development of a relevant curriculum for Ghana's polytechnic HND programmes: key stakeholder's perspectives

Principal Investigator: Clara Araba Mills

Address: Institute of Educational Planning and Administration (IEPA)

University of Cape Coast

Tel: 033-213-0571

This research study is being conducted for the purpose of a thesis in partial fulfilment for award of a PhD degree by the University of Cape Coast. The purpose of the study is to explore stakeholders' perceptions on the relevance of Ghana's polytechnic education through the process employed to design and develop curriculum for the sector. The overall aim of the research is to provide objective information to help stakeholders realise the possible relationship between what they connote as a relevant HND Electrical and Mechanical Engineering education and the process they contribute to, in order to design and develop the curricula for the two programmes of interest in the study. The study further aims to chronicle the curriculum process, in order to highlight gaps that need to be addressed to enhance the relevance of the HND polytechnic curriculum.

To find answers to some of the research questions, you are invited to participate in the interview sessions of this project. If you accept, you will be required to participate in several interview sessions that will initially cover between 3 to 5 days. The number of days for each participant will depend on

the depth of information received and first interview session will last between 40- 60 minutes. Subsequent interview sessions will however be determined by the information sought and it can be held over the telephone, depending on the preference of the interviewee. The conditions, risks and safeguards for this project:

1. There is no more than a minimal risk of taking some time off your free period to take part in the study.
2. Your complete confidentiality is assured. Your identity will not be revealed in the transcription or in the final analysis. Codes will be assigned to your name.
3. Your participation in this research is voluntary. You can withdraw at any point of the study for any reason, without penalty.
4. You are free to refuse to answer any question at any time.
5. The data from this research will be owned by the University of Cape Coast and will be available to the researcher and research supervisors.
6. Excerpts from the interview transcripts may be made available for your revision.
7. Questions related to this research should be addressed to the researcher or to the Dean of Graduate Studies and Research, chairperson, University of Cape Coast's Institutional Review Board at the school of Graduate Studies and Research.

Your signature on this consent form shows that you have been informed about the conditions, risks and safeguards of this project.

Contacts for additional information

Should you require any explanation in relation to the research, please contact the following addresses below:

Dr. A. L. Dare

IEPA

University of Cape Coast

Cape Coast

Kasoadare@yahoo.com

Prof. Leon Tikly

GSoE

University of Bristol

United Kingdom

Leon.Tikly@bris.ac.uk

Your rights as a participant

This research has been reviewed and approved by the Institutional Review Board of the University of Cape Coast (UCCIRB). If you have any questions about your rights as a research participant you can contact the IRB office between the hours of 8:00 and 4:30 p.m. through the landlines 033-213-5351/028-9670793 (4) or email: irb@ucc.edu.gh. You may also contact the Chairman, Prof. Albert A. Addo-Quaye through mobile number 024-318-9593 when necessary.

I..... (Full name) have read the information provided and agree to participate in the research interviews for **Clara Araba Mills**.

Signature of Participant.....

Date.....

APPENDIX C

Tools for data collection

Questionnaire for Polytechnic students

This is an academic study that seeks to explore the polytechnic student's perception on the relevance of the HND Mechanical and Electrical Engineering programmes run in Ghana polytechnics. This questionnaire is a preliminary survey to select participants to be interviewed for the main study. The researcher is interested in students who have undertaken their full six months industrial attachments and are willing to share their experiences, both on the polytechnic campus and during industrial attachments. Please be assured that no one will have access to identity details except the researcher. Your contact details will be used to contact you if you are selected for the interview.

Background details of respondent

1. Please provide your contact details in the following

Name:

Telephone No.:

Email address:

Educational at the secondary level:

2. Please tick against the most applicable in the following;

Senior high school

Technical institution

Secondary technical

Relevance of polytechnic HND programme

3. *Please fill in the boxes below the names of the industries you had your six months industrial attachments; the period you spent in each setting; and the focus of each industry.*

Name of industry	Period of engagement	Focus of industry

4. *In what ways was your polytechnic training relevant to the department you were assigned to during your industrial attachments*

.....

.....

.....

.....

.....

.....

.....

5. *In what ways did your polytechnic training proved challenging during your industrial attachments*

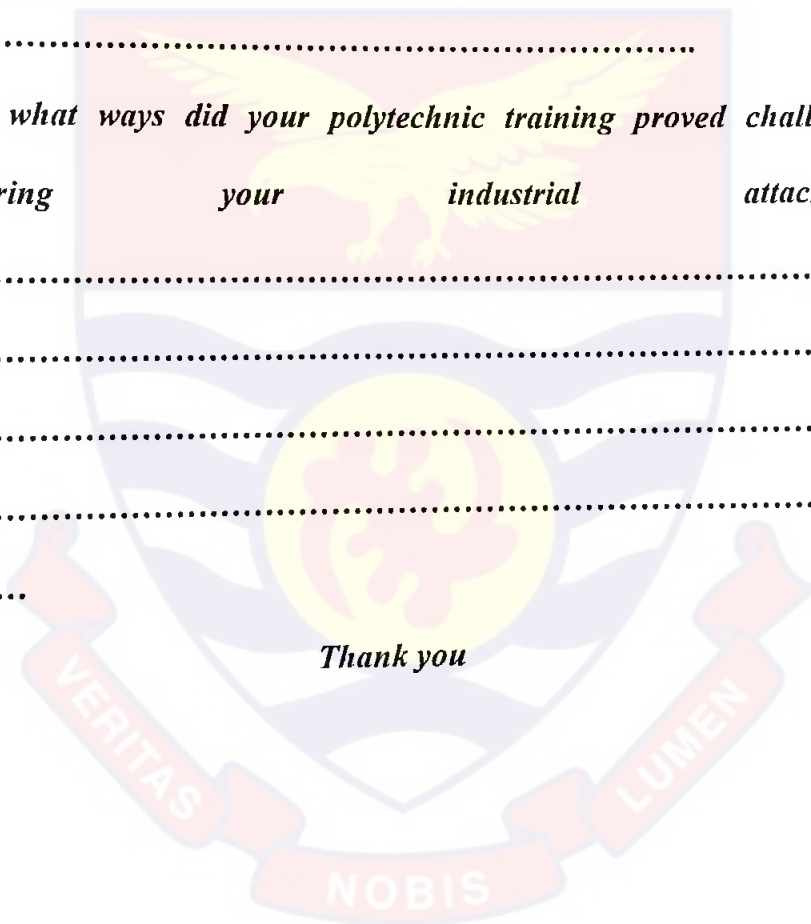
.....

.....

.....

.....

.....



Thank you

Focus group interview Guide for polytechnic students

Ice breaking Activity

1. Introduce yourself and encourage interviewee to introduce him/herself.
2. Explain the purpose of the study and introduce consent contract for signatures to be appended.
3. Seek participant's consent before using a voice recorder

Relevance of the polytechnic curriculum

4. What informed your enrolment into your current polytechnic programme? (**Probe:** educational background and expectations prior to your enrolment into the polytechnic).
5. Based on your experience(s) during industrial attachment, would you say your polytechnic education has met your expectations? (**probe:** in what ways? In what ways do you share your experience(s) with your institution?).
6. Is there any other issue you will like to share?

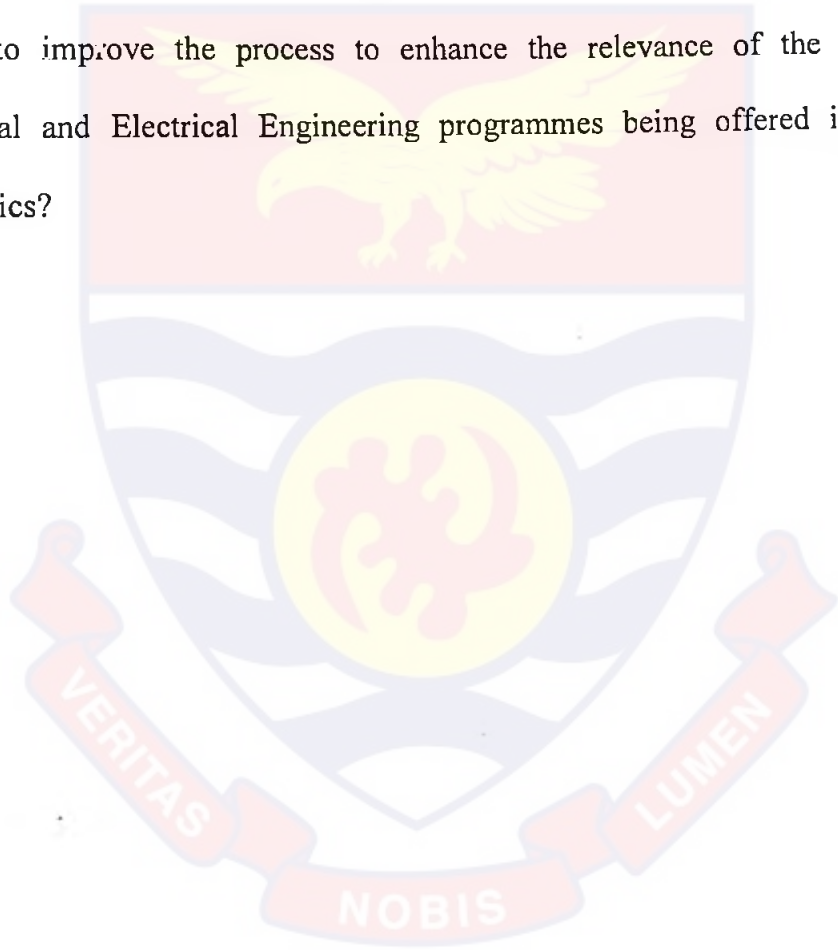
A. Interview Guide for Supervisory bodies

1. Ice breaking activity
2. Introduce study and consent contract
3. Why was Ghana's polytechnics upgraded to tertiary status?
5. What is the meaning of the purpose that established Ghana's HND level programmes?
6. What is a relevant HND polytechnic curriculum?
 - Objectives (curricular content & resources)
 - Subjective (ideologically and tradition?)

7. What was the process followed in the design and development of the current curriculum in use in for HND Mechanical and Electrical Engineering programmes being offered in the polytechnics?

- Reason for review
- Composition of curriculum designers and developers
- Roles played by different stakeholder groups and institutions
- during the designing and the development of the curriculum

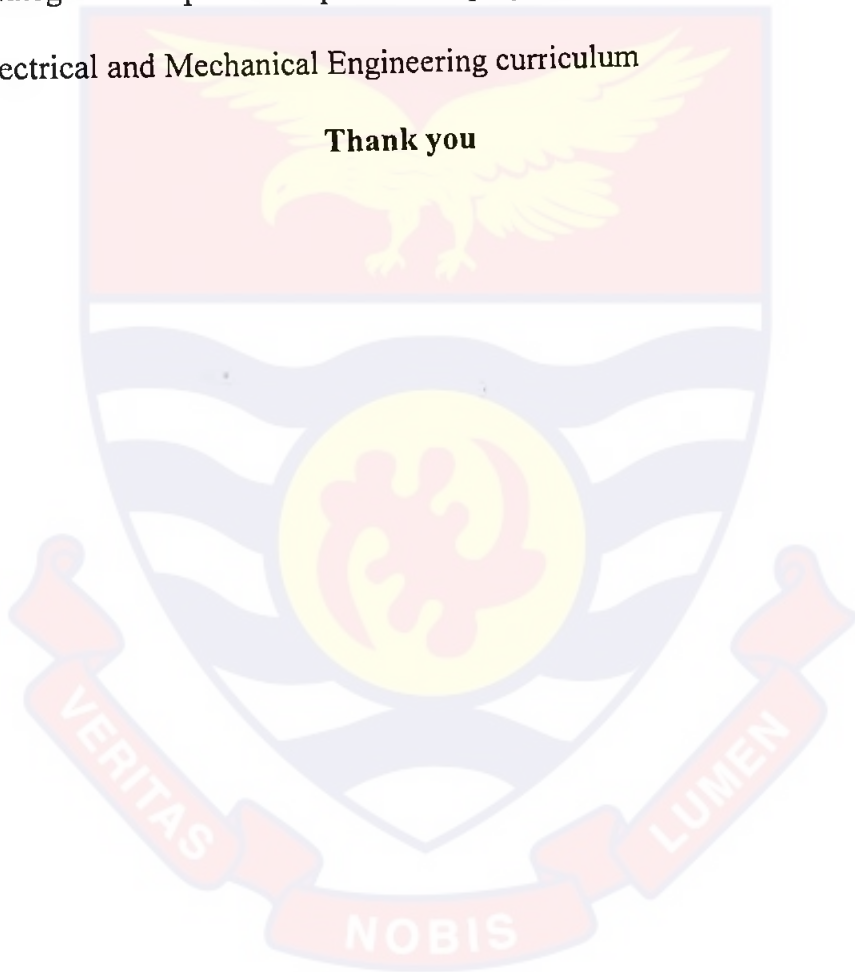
8. How to improve the process to enhance the relevance of the HND Mechanical and Electrical Engineering programmes being offered in the polytechnics?



INTERVIEW GUIDE FOR NON-STUDENT PARTICIPANTS

1. Ice breaking activity
2. Introduce study and offer consent contract for participant to append his/her signature
3. Process employed to design and develop Ghana's HND Electrical and Mechanical Engineering curriculum
 - i. Trigger(s) for revision
 - ii. Process
4. Stages and corresponding activities in the process to design and develop the curriculum
 - i. Design stage
 - a. Composition of stakeholders
 - b. Roles undertaken by each stakeholder group
 - c. Process(es) employed at the design stage
 - d. Challenges confronted at the design stage
 - ii. Development stage
 - a. Composition of stakeholders
 - b. Roles undertaken by each stakeholder group
 - c. Process(es) employed at the development stage
 - d. Challenges at the development stage
5. Relevance of the HND Electrical and Mechanical Engineering curriculum
 - i. What indicators inform expressions of relevant HND polytechnic curriculum?
 - ii. Purpose (needs) underpinning the HND polytechnic curriculum

- a. Interpreted from the polytechnic policy documents and;
 - b. Perspective of respondent's stakeholder institution
- iii. Process of attaining relevance in the HND curriculum
6. Relationship between the process employed to design and develop the Electrical and Mechanical Engineering programme and stakeholders' perspectives on the relevance of the sectors' curriculum
7. Strategies to improve the process employed to design and develop the Electrical and Mechanical Engineering curriculum



Thank you

Appendix D:

Excerpts of Transcribed Interviews

AMech (3/11/2012)

(KUMS 1; KUMS 2; KUMS 3; KUMS 4; KUMS 5)

Researcher: - Can you please introduce yourself?

KUMS 1

KUMS 2

KUMS 3

KUMS 4

KUMS 5

Researcher: - And you are all third year students?

Unison: - Yes

Researcher: - Are you offering the same programmes

Unison:- No

KUMS 2:- The same department but different sections

KUMS 1:- Automobile

KUMS 2:- Same automobile

KUMS 3:- Plant

Researcher: - ok, eh... , I'll like to know why you opted for these programmes in the polytechnic?

*KUMS 2:-*I offered intermediate automobile engineering at my second cycle level; that's the technical school at Accra. I became interested in automobile because of how engines and things have been put together. .. that's why I entered into automobile engineering.

KUMS 1:- At the secondary level... when I completed KTI, I wanted to go to the university but you don't have the subjects that will help you get into the university; unless you come here to do the access course, which makes the whole engineering programme difficult.

Researcher: - Why?

KUMS 1:- Even before you get access to do the HND, you'll have to pass through the access course before you get into the HND...

Researcher: - What's the content of the access?

KUMS 1:- that's the pre- HND... you'll do the English, maths, science and afterwards, when you pass then you get yourself involved with HND... but meanwhile...

Researcher: - So you... you did not do the technician 1, technician 2...

KUMS 1:- No, if you like you go and do that but when you go and do that at the industry, they'll tell you that they don't even know the technician course that you're doing here... so you don't even have to waste your time doing that... so you have to, I think eh... in Ghana here, it's only the HND, SSS and the university that are recognised. When you're doing the technical course, they don't even recommend that for their kids... their up/coming kids... they don't even recommend... that's the technical school; they use it for the drop-outs,... meanwhile its' tough for drop-outs

Researcher: - Is that so... I concluded that you must do the technician course before you can do that access courses

KUMS 1:- That's one, it's a choice... at first, we were not even allowed to do the HND that was why you had to do the technician 1 and 2... but when they'd introduced that pre-HND, that gave us the chance to do that pre-HND before entering the HND

Researcher: - Ok...

KUMS 3:- Can I say something to what she just said?

Researcher- Ok

KUMS 3:- In mechanical engineering, if you want to... from KTI, I mean technical institute, if you want to ignore the access, then you have to do MET, that is mechanical technician and we have EET, that is electrical technician. So if you want to ignore the access, that's the English maths and science, it means you can't do the HND.

Researcher: - hmmm, so those doing the technicians (*courses*) meaning they did not=

KUMS 1:-Qualify...

KUMS 3:- Ok, thank you... I completed KNUST senior secondary school and I did science... Ok, actually, it wasn't my intension to come to Kumasi polytechnic or to go to polytechnic. I was to go to KNUST that was my choice

from scratch, but due to my result... I had 17, that time the... for mechanical engineering, the cut-off was 12; that time 12 plus, it's like protocol that you'll get, so I tried my best, so I wrote one NOVDEC, attached to my result, still it remained where it is, so I decided to... I mean I preferred to do mechanical engineering, so I had to apply to A poly ...

Kum 3:- Ehhh, madam, please let me come in again; I'll say no, I will go to the university. Why should I waste my time and come to the polytechnic and offer HND and after that, go to the university for the degree, and wasting my time! If all things being equal, if I had AAAA, I wouldn't even waste my time and buy the form, ... poly form or any other form! It wasn't my dream, I had never even dreamt of it! It an accident!

Researcher:- It an accident?

Kum 3:- Yeah, it an accident, why should I waste my time doing HND for three years, after that, do degree for three years and and... it's even costly! It's a cheat and those stuff, so I had to do it once and for all, so the university will be ...

Kum 4:- Madam, what my brother is just saying, because he is not interested in the practical aspects, he wants the theoretical aspects, that's why he is saying, he may not allow his child to...

Kum 1:- who told you that! [you don't know what you're saying...]

Kum 3:- Ehhh, madam, please let me come in again; I'll say no, I will go to the university. Why should I waste my time and come to the polytechnic and offer HND and after that, go to the university for the degree, and wasting my time! If all things being equal, if I had AAAA, I wouldn't even waste my time and buy the form, ... poly form or any other form! It wasn't my dream, I had never even dreamt of it! It an accident!

Researcher:- It an accident?

Kum 3:- Yeah, it an accident, why should I waste my time doing HND for three years, after that, do degree for three years and and... it's even costly! It's a cheat and those stuff, so I had to do it once and for all, so the university will be ...

Kum 4:- Madam, what my brother is just saying, because he is not interested in the practical aspects, he wants the theoretical aspects, that's why he is saying, he may not allow his child to...

Kum 1:- who told you that! [you don't know what you're saying...]

Kum 3:- Am offering plant, as plant engineer am at my final year, I don't know anything about plant. If you ask me to go to a company, to stand in front

of a faulty plant to fix it, I can't! they will teach but you can't feel like this, this, this is that, this is that. You know, due to the attachment that we went that I mean disclosed certain things to us but here they say practical, but sometimes they say practicals and we may have to go to KNUST to do the practicals, you're saying universities don't do practicals but sometimes]

Kum 1:- We don't even have the equipment for that...

Kum 3:- we polytechnics move to KNUST for practicals. The concern is that, the government and those on top their eyes are not on the polytechnics

Kum 1:- nor the technical schools

Kum 3:-... both our lecturers and then ... you see, the students and the certificates ... everything, that's it, so the problem is from the up there! We don't have anything, anything, they don't appreciate polytechnic... that's what I know; and for I think at first, it was meant for technical, it wasn't meant for SSS

Kum 1:- Secondary school

Kum 3:- It was meant for technical students, but this time due to serious students, that's why the secondary schools are coming in to overtake the technical students at polytechnic ... that's what I know and what I...

Researcher:- So, ehh... if you're saying they don't recognise the polytechnics, they don't care about the polytechnics... if you had the chance to have your degree at the polytechnic, would you go for that?

Kum 3:- Actually, after HND, I've to travel to do my masters straight away

Researcher:- you mean outside? Why?

Kum 3:- Waste... this time I envy these people, the university since I didn't go there, I don't want to go and I mean, I have to...

Researcher:- You envy them?

Kum 3:- Like this time I don't want to go there again since ...

Researcher:- Have they bored you?

Kum 3:- Seriously!

Researcher:- Why have they bored you?

Kum 3:- hmmm, the reason is that...

Kum 3:- Yeah, yeah...

Researcher:- And if you enjoy protocol for a long time it doesn't help

Kum 3:- It doesn't...

Researcher:- So don't let them bore you ehh... you should get bored with the protocols

All:- Hahahahahahaha

Kum 5:-Madam I, otherwise I would have said that I wouldn't take it if I get the chance here, but I haven't regretted to come in to pursue my education here but, although am proud of it, because when I came in here, I wasn't able to identify motto from a turbine... I have been to the mining sector twice and right now I can repair a lot of pumps and for that matter am proud of what I've been taught here. For that matter if I give birth, although I will further my education, I wouldn't like my child or for that reason to be enrolled in the polytechnic. Am saying this because, I've given birth and I don't want the child to be like me and I wouldn't like my child to go further and end-up where the father is.

Kum 5:-Yeah... here, it's all that general, theoretical, like what we're doing here, it all that theoretical and let say 30% practical, unless you go to the industrial **Kum 2:- Kum 2:-** No...

Researcher:-They use it for the semester?

Kum 2:- Yeah...

Researcher:-So for that particular one, it will be for that semester

Kum 5:-Nooo ... it will be one pamphlet plus another half of it

Researcher:-For one semester?

Kum 5:-Yeah... which the tech people... the so called engineers, while we're the technicians... they're using it for only one semester... so how come we the... if you know that we're not all that good... could you imagine a lecturer can tell you "*mo de moabonn ooo!*" (*You are not clever at all*). Is it fair to tell a student that "*moabonn ooo*" is not but they used to... but am proud that am here, it's left with let say 7 months for me to go...and I thank God that...

site to see it yourself. But am proud that I was here.

Kum 5:-Madam, we do more theory than the practical. Even the practical we have to do it as written. We don't do the practical as the practical that, this is my practical work, mark it for me, NO! The practical has been set as a theory question, so if a practical has been set for me as a theory question meanwhile, I claim myself that am a practical oriented person, why should I allow my son

to come there? And madam, this is another aspect, this one I am pouring out everything...

Researcher:- Yes pour

Interview with Tete from the professional body

Researcher: - What role does GhIE play in designing the polytechnic curriculum?

Eng: - That's a good question ... ehm... at the moment... to be very frank with you. Let me go back a little bit. You see...

Researcher: - Yes

Eng: - You see, when the polytechnics were set-up; they were set-up to do something called higher national diploma exam. And that exam was supposed to be the same for all of them.

Researcher: - Ok

Eng: - So for instance, if you are doing Engineering Building or whatever, they write the same exam. But I think it was not formulated well, then one or two polytechnics started off. And they started awarding their own certificates

Researcher: - Ok

Eng: - They call it HND; Accra calls it HND; Kumasi also calls it HND but they never wrote the same exam

Researcher: - Mmhmm

Eng: - So because they never wrote the same exam, it is difficult to say it is a national diploma; a national diploma means that it is uniform;

Researcher: - Ok

Eng: - so in the first place, there was a flaw

Researcher: - in the starting?

Eng: - In the starting. As at now the flaw is still there. It has not been resolved. So the problem that the institution has always had is how to normalise this flaw. So normally when they bring their curriculum

Rr: - You mean the Institution, engineering institution?

Eng: - the GhIE has always been asking all the institutions like COTVET; NTCE, all those institutions, we are supposed to come together and normalise

it. But a lot of politics goes into it. One party comes; one party ... we started this ... and these people are awarding this degree ... and all that, so it makes it difficult for these people to come together. Then when may be the institution tells NABPTEX or whatever to come and sit-down and we normalise it; before you realise they have awarded another; they've given the chance to another polytechnic to maybe start another ... a new programme. So we started with two, before we realise, five polytechnics were running the same programmes without our contribution; so it looks like the institution right now is not involved in the curriculum. but they do send us copies of the curriculum anyway; but we don't have an input anyway, we're suppose to have an input, to tell them that what they doing is right and; we always have a problem with the polytechnics when they finish school and they want to join the institution. We have a problem because some of the modules and courses we expect them to do is not part of their curriculum. So I used to be the chairman for the polytechnics and it has been one of the biggest problems

Rr: - Chairman for the polytechnics?

Eng: - yes at the institution we have different departments; I was the chairman for polytechnic affairs for two years. And I can tell you that this is some of the frustrations that you can come across. You take the curriculum of Kumasi; you take the curriculum of Accra, there is so much difference. Everybody is developing and doing his own thing. And what they are doing is not in line with what the institution actually wants, and that's the biggest problem we have. I don't know whether I've answered your question but this is the brief behind the whole thing.

Rr: - Hmm, so

Eng: - Everybody is awarding their own certificate and they don't involve us

Researcher: - Not in anyway?

Eng: - No, not in any way, some ... for instance, when i was the chairman, I went around collecting their curriculum, but we didn't have a file with their curriculum on it, no, no. They are all developing and as at now that we are sitting, another polytechnic is developing their own thing and they take it to ... I've forgotten those people who give the approval ... what is their name. Yes ... those people. They just award the thing without informing us and then once a while when there is problem then they write to us.

Researcher: - but they say they do involve professionals...

Eng: - Professional but not us; may be other professional but not us; the institution they are very strict; you know recently we had the Melcome going down; a lot of people don't involve us in anything, they say we make things difficult so they don't involve us. because when we go we want to make sure

that things are streamlined, they are done properly... everybody wants to do it the haphazard way that we are used to all these while, so that's the reason, so I think; there is a problem in the institution now; when the polytechnics are students we have more membership than those who are BSCs... when they finish school, the thing reverses and then you see more BSc coming to join than the membership then the polytechnics go away; because the modules they do and everything they do don't conform to what the institutions wants and the institution now is thinking of developing some modules so that when they finish they come and write those modules, they pass and they give it to them; and even that one, we've not been able to achieve it.

Researcher: - So does that mean you currently don't register the polytechnics?

Eng: - We do register them, but when you register them they climb through a longer ladder than the BSCs and most of the time, it's very frustrating for them and so most people come and when they think of the ladder then they say "ohh ten fifteen years, I'll not make it" and they find themselves ... they go else where

Researcher: - Where?

Eng: - There are so many splinter groups coming-up every day, you see some 20 people forming a group, 20 people forming a group but our institution is the main recognised institution. We have an act, a legislative act so we are more recognized than any other institution.

Researcher: - Hmmm, that's interesting

Eng: - I can tell you a lot about the discourses as well if you want me to

Researcher: - Yeah, am really interested

Eng: - Now let me tell you something... you see when KNUST in Kumasi, at the moment they are producing if am not mistaken, about 400 engineers a year; that means civil, mechanical, electrical and those, it keeps fluctuating go up and down, 600, 400, 500, it depends on the year. So let take it averagely 500. Now the way the polytechnics are coming up, it looks like now there is competition between the polytechnics. They are not been regulated by anybody, once it is set-up, the dean or director or whoever is there is always looking out making a name and they keep one developing courses (programmes). This year they develop administration then tomorrow they develop this, so you go to a polytechnic today, they are doing accounting and whatever, the next time you go they are doing engineering. And you see, when you are doing engineering, you need to have engineering lecturers, you need to have the right people there, the people who are lecturing they don't even qualify, they are not even members of the institution. GhIE, you need to write an exams, pass before you are accepted and given a number, so for you to

even qualify to teach there you must be tested here; most of them don't pass through our hands and not that they have had experience in other universities or whatever, no experience. So it's like somebody comes from Russia and he says I have masters in so and so brrrg! Somebody comes from Nigeria; he says I have BSC and they brrrg! They recruit anyhow. And you see, when they are going to get their accreditation they use the names of solid people, get the accreditation and other people go in to teach. That is one of the big problems and at the moment the number of students that are coming out of the polytechnics is about 20 times what KNUST is producing, you see? They have about 4000; ... am talking about engineers alone, not the other disciplines, engineering alone. And the 4000 that comes out, when they come out and you interview him, they know nothing! The way they develop the modules, it's not even in tune with the industries; we are in the industries; right now that I'm coming, am coming from Sekondi, I'm building a bridge ...

Researcher: - Yeah

Eng: - yaa, that's my project. I have designed a new one and we're constructing it, so I'm just coming from there. We are in the industry, we know what the job is; if am recruiting right now, the I have to recruit somebody from HND, then it's like I have to forget that he has gone to school before and start everything from scratch. The little, little principles that you expect the person to know, the person knows doesn't know. I have been fighting for them at the institution seriously, for us to accept them; let them write the module; let them build their confidence -up; let them feel like engineers. Let us not look at the way it is being ran and say they have messed it up so we should leave them. No! Some people get good grades and go to the polytechnics we must find a way of bringing them back into the system. But at the institution also, we have some people who are so conservative; they don't want those people close to us; because they think in the first place, "what is being done is wrong... this is not alright... blaa..., no they don't come to us!" but I am working with some of them and I know that when they come, they don't know anything and when they stay with you for one year, because they are already naturally smart; some of them are naturally smart; if somebody is science biased and he is good to teach the person is not difficult

Researcher: - Mhmm

Eng: - Right? So when you take them one year, two years, you see that they are able to...

Researcher: - Pick-up?

Document	Rationale for Selection
<i>Policy Documents/Reports</i>	
URC report (1989)	This document is a report on the familiarisation visits members of the URC undertook to tertiary institutions in Ghana. The visits was aimed at enabling the URC to appraise the tertiary education sector, in order to recommend accordingly.
URC report (1991)	This document is the report by the Universal Rationalization Committee's report (URC) that was constituted to investigate and recommend the diversification of Ghana's tertiary education sector. Prominent among the recommendation was the upgrade of the existing post-secondary polytechnics to tertiary status to facilitate the offering of tertiary TVET oriented programmes. This document also contains the context and the objectives that established Ghana's tertiary Polytechnics and guidelines for the design and development of the polytechnic HND curriculum.
Polytechnics Act 321, 1992	This policy document upgraded Ghana's polytechnics to tertiary status to offer Tertiary TVET oriented programmes.
Polytechnics Act, 745, 2007	This policy document extended the mandate of Ghana's polytechnics to offer degree programmes and have the autonomy to issue their own certificates
Technical report series: evaluation of the policy objectives of the reforms to the tertiary education system (NCTE, 1998)/	Six and ten years following the passage of the White paper on reforms to Ghana's tertiary sector, these two reports were carried out to assess the achievement made regarding the objectives outlined in the reforms to Ghana's tertiary education sector.

Technical Committee's report on polytechnic education in Ghana (2001)

The Report of The Education Reform Review Committee (2002)

White paper on the report of the education review committee's report (2004)

Institutional Documents/ Guidelines

Minimum requirements for admission to tertiary education institutions (NCTE, 2013)

Report of the Technical Committee on Conversion of the Polytechnics in Ghana to Technical Universities (Ministry of Education, May 2014)

Purpose/objectives of syllabus for Electrical/Electronic Engineering HND programme (200) and; Purpose/

This reform offers a review of the performance and recommendation to improve Ghana's education sector.

This White Paper presents a concise form of government's intention in relation to recommendations made in the report of the Educational Reform Review of 2002

This outlines the admission requirement into tertiary institutions. It reveals the differences between admissions into the conventional and TVET tertiary institutions.

This document outlines the conditions within which Ghana's polytechnics could be converted to universities

The purpose aspect of these syllabi reiterates the purpose that set-up the polytechnics as tertiary institutions

objectives of syllabus for
Mechanical Engineering
HND programme (2002)

Other Texts

Speech by a member of
GhIE (2005)

This is a speech that offers the perspective of a senior member of the professional body selected to participate in this study on the performance of the polytechnics so far.

Admission of TVET graduates
into tertiary institutions:
Recognition of the core
examination results of
(TVET) institutions (2012)

This is a letter to the supervisory institutions by the Association of headmasters of Technical institutions on the refusal of some tertiary institutions to admit their students following a review to incorporate the core subjects of English, Mathematics and Science into their curriculum to enable them enroll into tertiary institutions right after their exit from the secondary level. This offers information on one of the major challenge that had confronted the TVET secondary sector

Newspaper reports

Excerpts of newspaper reports that offers information on antecedents to the upgrade of the polytechnics as tertiary institutions. Information includes the first result of the first cohort from the new education system and how it influenced the admissions requirement into the polytechnic HND programme and the reaction of the conventional tertiary institutions to admit students from the first cohorts.

APPENDIX F

Excerpts of Transcribed Documents

DOCUMENT ONE: URC Report (1989)

Excerpt One

The exposition in this section constitutes a summary of the information gathered by members of the committee during their familiarisation visits to a number of third cycle institutions in the country. Among the institutions visited were the country's three universities... as well as the polytechnics.

These visits were undertaken primarily to enable the committee appraise the current state of affairs in the institutions. In essence, members of the committee were particularly interested in finding out... the problems the institution face in their effort to deliver quality education to students.

An important ... concern related to the nature of research initiated by these institutions in support of national development.

Another important area pertains to the prospects of making sound tertiary education available to an increasing number of students now, and in the foreseeable future, and the role that those institutions are expected to play in realising this objective.

Excerpt Two

The polytechnics visited are:

- a. Kumasi Polytechnic
- b. Accra Polytechnic
- c. Takoradi Polytechnic

Currently, the polytechnics are being managed as any secondary cycle institution by the GES. The polytechnics find this anomalous since they claim that they should be regarded as third cycle institutions.



DOCUMENT TWO: URC Report (1991)

Excerpt one

Executive summary of the final report of the university rationalization study

1. That as reflected in UNESCO definitions, higher education be regarded as consisting of all post-secondary education;
2. That the existence of a multiplicity of entry points into current post-secondary institutions with these institutions operating in largely uncoordinated parallel systems had led to frustration of students, waste of resources and the inability of the system to produce enough numbers of required mix of manpower;
3. That given the reforms at 1st and 2nd cycle sectors of the economy of the demand for access to higher learning would far exceed the original maximum projection of 5%. (p. 5)

Excerpt two

Specialisation for various institutions:

Polytechnics

Principles to guide the design of courses in polytechnics and professional institutions have been given. They include:

- a. The adoption of the semester and course credit system.
- b. The cooperation between university and non-university institution institutions in the design and alignment of courses to make easy for graduates with advanced standing from non-university institution to enter appropriate university to complete degrees in a shorter period.
- c. The formulation of well-defined guidelines for the proper implementation of the essential practical component of the courses (p. 22).

Excerpt three

The Role of Professional Bodies

i) In recommending that external examinations should begin to be phased out immediately, the URC recognized the role of professional bodies in setting standards, accrediting courses, etc. It is however the recommendation of the URC that to facilitate adequate training of critical manpower at a faster rate, practices such as those perpetuated by the institute of bankers whereby all but bank employees are prohibited from pursuing courses in banking should come and that the polytechnics and universities should take up much of the pre-service training for these professionals in close collaboration with the professional bodies concerned (p. 23).

Excerpt four

i) The transfer within five years of all non-degree courses from the universities to the polytechnics and the regional colleges of applied arts, science and technology (p. 24).

Excerpt five

III A Technical Examination Board.

a) A National Board of Technical and Professional Examination should be established to take over from the Technical examinations Unit of the GES to conduct and oversee the examination organised for institutions which would become members of the tertiary Education system. The board would therefore operate under the general supervision of the Division of Higher Education of MOEC.

b) The Board should participate in the examination of candidates in the non-university sector of the tertiary education system to ensure the

maintenance of appropriate standards and to ensure that equivalence within and between institutions exist.

c) It is recommended that in establishing the National Board of Technical and professional Examination knowledgeable persons in the academic areas concerned and in the operations of examination should be consulted as well as the relevant professional bodies.

d) Before approval is given for a programme to be accredited there should be visitation to the institution by a panel with expertise and user interest in the programme. Such a panel would include members of the appropriate professional bodies as well as a representative of the ministry of education and culture.

e) During the visitation by the panel the institution concerned as well as the department in which the programme is studied should be required to offer all the help and the facilities to enable the panel to do its work thoroughly (p. 48).

Excerpt six

a) National development is considered as the capacity of a nation to improve and sustain growth in all facets of national life. Manpower development as a catalyst of national development entails all processes by which the individual is equipped with knowledge, skills and the right attitude to change and improvement of society; is able to contribute to his own well-being and quality of life, and subsequently to economic and social advancement of the nation. The country requires competent and experienced people for development. Such people must be well educated and trained.

b) It is the contention of the URC that tertiary education must focus more and more on the practical realities of life in its environment, but at the same time serve as a vehicle for the preservation of knowledge about the past and advancement of knowledge. The crux of the matter is that tertiary education must be made functional for national development. It should be vocationalised; it should pay attention to what is fine in our inheritance; and it should redirect its educational programmes towards necessary modernization (p. 84).

Excerpt seven

It is necessary to stress here that while in Ghana people regard higher education as education after the second cycle because of the historical development of education in the country the words post-secondary education are used in two senses. In some situations people use the words to mean education after advanced level of the General Certificate of Education (GCE). In other circumstances, they are used to mean education after the ordinary level of GCE. (p. 87).

Excerpt eight

Recommendations

- a) In the process of upgrading the potential institutions these institutions restrict themselves in the first instance to the designing and teaching of courses leading to a certificate in diploma until their academic standards are firm;
- b) The design of courses for these institutions should be a cooperative effort involving the institutions, the universities, the professional bodies, employers and other organizations under the auspices of the Board of

Accreditation and the Technical and Professional Examinations Board with the practical components of the course being integrated in a work study programme; and

c) Courses should be designed to reflect local conditions and realities and examinations for these courses localized with the professional bodies concentrating on the supervision and moderation of the practical and professional contents of training undertaken through work-study in institutions designated by the professional bodies (p.161).

Excerpt nine

Principles to guide the design of courses

- a. The institutions should train students mainly for the award of Diplomas in the various subjects. In this connection the duration of the courses should be at least three years.
- b. The non-university institutions and the universities should cooperate in the design of courses so that the courses of non-university institutions would be aligned with university programmes. This should make it possible for students with advanced standing from the polytechnics and professional institutions to enter the appropriate university to complete the degree in a shorter period, of say two years.
- c. It is anticipated that in the process of upgrading the courses initially in the polytechnics and professional institutions subject panel should be used. The representation on the subject panel should include user agencies. Professional bodies, the universities and the institutions so that the outcomes in review of existing courses and the development of new courses will meet

acceptable standards of all interested parties. However the content of the courses must be related to the needs of the country.

d. The practical component of the courses and their assessment must be viewed as required aspect of the training programmes. This being so well defined policies and guidelines must be formulated for their implementation. In the first place practical work and assessment of students' performance should contribute to the overall assessment and certification of the students. In the second place, the organization of practical work and its content should be based on the recommendations of user agencies. In this connection since industry views break in schooling for a year to enable students acquire practical experiences in industry is not useful, the practice should be discontinued until the academic institutions and industries have worked out acceptable and relevant detailed programmes for the full year practical training. In the interim the long vacation periods of should be used to enable students acquire practical experiences in industry or commerce or elsewhere. The institutions must cooperate with the user agencies to ascertain the effectiveness of the programme (p. 175).

DOCUMENT THREE: Polytechnics Act, 321, 1992

1. Aims and objectives of a polytechnic

- (a) To provide tertiary education through full-time courses in the field of manufacturing, commerce, science, technology, applied social science, applied arts and any other areas that may be determined by the authority responsible for higher education;
- (b) To encourage study in technical subjects at tertiary level; and
- (c) To provide opportunity for development, research and publication of research findings.

2. Function of a polytechnic

For the purposes of achieving its aims and objectives, a polytechnic

- (a) May award the certificates and diplomas that are agreed upon by its Council with the National Board of Accreditation and the National Technical Professional Examinations Board;
- (b) May award degrees subject to the conditions that the authority responsible for higher education shall direct;
- (c) May make provisions for the general welfare, recreation and social needs of staff and students; and
- (d) Do any other acts which are incidental to the performance of its functions.

DOCUMENT FOUR: Polytechnics Act, 745, 2007

Purpose: to revise the law relating to polytechnics and to provide for connected purposes

A polytechnic is a body corporate with perpetual succession and a common seal and may sue and be sued in its corporate name (p.3)

Status of a polytechnic

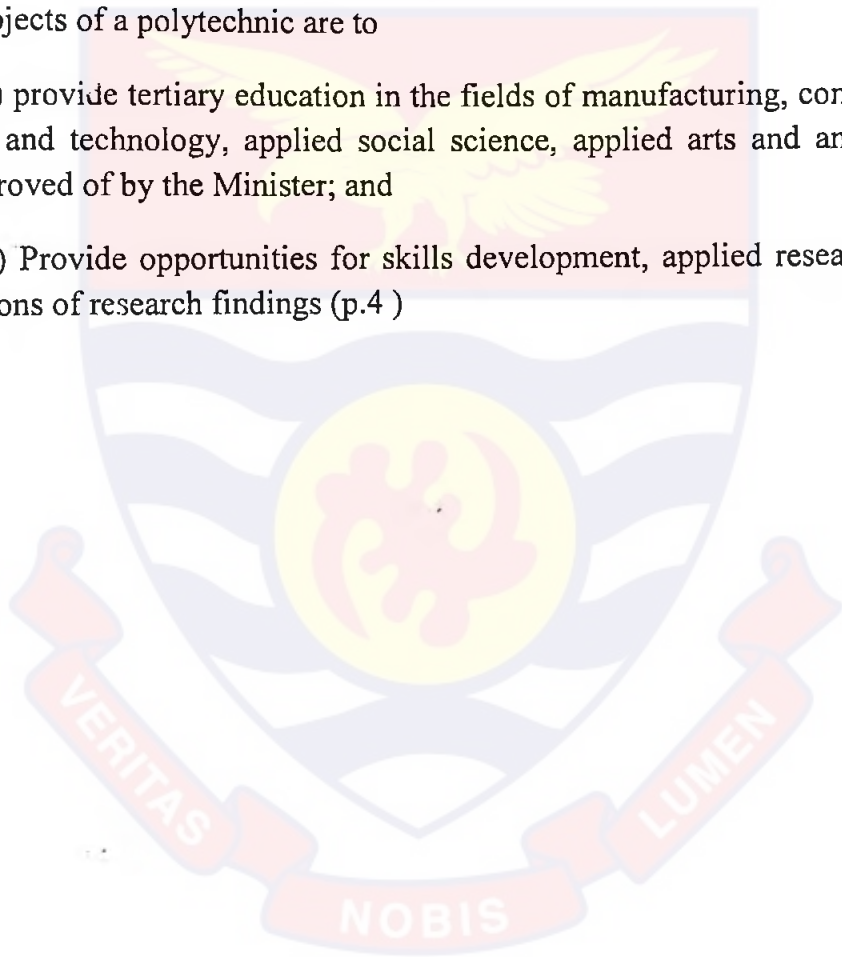
3 (1) A polytechnic established under this Act is a public tertiary institutional

(2) Subject to this Act, a polytechnic has academic autonomy.

4. The objects of a polytechnic are to

a) provide tertiary education in the fields of manufacturing, commerce, science and technology, applied social science, applied arts and any other field approved of by the Minister; and

b) Provide opportunities for skills development, applied research and publications of research findings (p.4)



DOCUMENT FIVE: Status of a Polytechnic

3. (1) A polytechnic established under this Act is a public tertiary institution

(2) Subject to this Act, a polytechnic has academic autonomy.

4. The objects of a polytechnic are to

- (a) Provide tertiary education in the fields of manufacturing commerce, science, technology, applied social science, applied arts and any other field approved of by the Minister and
- (b) Provide opportunities for skills development applied research and publication of research findings

Powers of a Polytechnic

5. A Polytechnic may

- (a) Award Higher National Diplomas, diplomas and other certificates accredited by the National Accreditation Board;
- (b) Award degrees subject the conditions that the Council of that polytechnic may determine;
- (c) Make provision for the general welfare, recreational and social needs of polytechnic staff and students; and
- (d) Exercise powers that are incidental to the performance of the object and functions of a polytechnic under this Act.

Academic Board of Polytechnic

13. There is established by this Act for each polytechnic an Academic Board.

Composition of Board

14. The Board of a polytechnic consists of

- (a) The Rector who is the chairperson,
- (b) The Vice Rector

- (c) The heads of academic divisions and departments of that polytechnic and
- (d) Any other person prescribed in the statutes of that polytechnic

Functions of a Polytechnic Board

15. The Board of a polytechnic shall

- (a) Determine the criteria for the admission of students
- (b) Decide matters that relate to the award of scholarships at that polytechnic;
- (c) Determine the content of curricula;
- (d) Determine academic standards, validation and review of courses;
- (e) The assessment and examination of students; and
- (i) The award of qualifications and honorary academic titles;
- (ii) The assessment and examination of students; and
- (iii) The disciplines of students'
- (f) Determine the appointment of internal and external examiners;
- (g) Regulate and assess the development of academic work and activities of that polytechnic;
- (h) Consider the resources required to support the academic activities of that polytechnic;
- (i) Collaborate with
 - i. Industrial and commercial institutions to promote the entrepreneurial development of the students; and
 - ii. Other tertiary institutions; and
 - iii. Report back to the Council of that polytechnic on matters referred to it by the Council.

(2) Without limiting the scope of subsection (1), the Board of a polytechnic shall advise its Council generally and in particular on academic masters of that polytechnic and shall perform other functions conferred on it by statutes of the polytechnic or as the Council may refer to it.

Sources of Funds of a Polytechnic

28. The funds of a polytechnic consist of

- (a) Subvention approved by Parliament,
- (b) Fees paid by course participants
- (c) Fees, charges and dues for services rendered by or through the polytechnic
- (d) Interest from investment
- (e) Gifts
- (f) Endowments
- (g) Grants and
- (h) Moneys, from any other sources approved by the Council of that polytechnic.

DOCUMENT Six: Technical Report Series: Evaluation of the Policy Objectives of the Reforms to the Tertiary Education System (NCTE, 1998)

Excerpt one: *Policy objective 1*

- a) To establish an integrated and co-ordinated tertiary education system comprising all post-secondary pre-service training institutions under the general supervision, direction and control of the Ministry of Education (p.xii).
- b) To realize this objective, NCTE was instituted to under Act 454 of 1993 to advise the minister on tertiary education development issues, which includes funding and conditions of service of staff. NCTE is also required to recommend national norms and standards on unit costs and accommodation and to monitor policy implementation by the tertiary institutions.
- c) Based on the above objective, the universities ceased to be the only tertiary institutions as the polytechnics were upgraded to tertiary institutions. It was however observed that the first polytechnic law was implemented without adequate provision of laboratory, classroom space and qualified teaching staff. These limitations in the development of the polytechnics, put the quality of polytechnic programmes into disrepute.
- d) The RECAAST concept of having regional colleges of Applied Arts and Science has so far not been implemented.

Excerpt two: *Policy objective 2*

- a) “to ensure that tertiary education is co-ordinated with all other sub-sectors of the education system and over all national development and education policies and priorities) (pxiii).

- b) This objective has not been implemented since no official mechanism has been put in place for its implementation. There is no formal link between GES (body in charge of pre-tertiary education); NCTE (body in charge of tertiary education).
- c) A blue print on government's priority areas for development is also lacking.

Excerpt three: *Policy objective 3*

- a) "to make tertiary education more cost effective and able to provide quality education for increasing number of students through increased efficiency in the utilization of space, resources and personnel" (p.xiii).
- b) High student enrolment has been achieved, but funding has been declined).

Excerpt four

Policy objective 10

- a) "To ensure an overall balance between the supply of trained personnel from the institutions and labour market demand" (p.xix).

Excerpt five

- a) The government granted the polytechnics to offer B.Tech degree programmes in 2001.
- b) Industrial attachment/long vacation training should form an integral part of the student's training.
- c) Tertiary institutions should encourage the involvement of practitioners/industrialist in both curriculum design and teaching (p.xxxi).

Excerpt six

a) *the problem encountered by the polytechnics as tertiary education institutions has been well documented in other reports. A common challenge identified in all the documents was the fact that the polytechnic law was enacted without the requisite and adequate facilities in place, especially in terms of institutional managerial skills, infrastructure, equipment, quality and quantity of staff. This has eroded any confidence the public might have developed for the polytechnics, prior to their upgrade.

Excerpt seven

a) From a student population of 1,689 in 1993/1994 academic year. Increases in enrolment were a result of the opening of two more polytechnics, Sunyani and Koforidua in 1996.

Excerpt eight

a) In the absence of laboratories, polytechnic students are sent to UST to access their workshops during vacations. Although, due to the population of students who are taken to UST for their lab and workshop practice, not all students are able to access the facility. More, a huge cost is incurred per student in accessing UST laboratory and workshops. Eg, Ho polytechnic pays 6.8million cedis for each group of students who are taken to access the labs and workshops for two weeks.

DOCUMENT SEVEN: GoG (2002). White Paper on the Report of the Education Reform Review Committee

Excerpt one

1.2 ...the government of the NPP shares with the people the passionate interest in education, and the anxiety to bring about constant improvements in its availability and relevance, as evidenced by the large number of Review Committees, Commissions etc. on education, dating back to colonial times. But government is also painfully aware of the failure of many of the attempts to reform the public system of education. There has been continuing aim to make education more relevant to the world of work after school, to rural development and modernization of the predominantly agriculture-based economy, to the need to promote national and cultural identity and citizenship. However results have been mixed. And more recently there has been almost unanimous agreement that under the latest 1987 reforms public education in Ghana has failed to meet expectations in terms of its coverage, quality, equitableness and economic utility. (p.1)

Excerpt two

1.4 The Dzobo Review Committee of 1974 introduced the concept of “comprehensive” Junior Secondary Schools to teach academic and practical skills to all pupils. ... since the latest reforms began in 1987, the country has faced the spectre of a large number of late teen-age school leavers the majority of whom are deficient in basic numeracy and literacy skills (p.1), as well as purported craftsman and technical skills, and therefore ill-prepared for either formal secondary cycle education of good standard, or for a life of work and of continuous learning for self-improvement (pp. 1-2).

Excerpt three

5.0 THE FUTURE DIRECTION OF EDUCATION IN GHANA....

5.2 Essentially, the education process should lead to improvement in the quality of all Ghanaians by empowering the people themselves to overcome (p.3) poverty, to raise their living standards to the levels that they can observe through the global interchange of images, information and ideas. They should be equipped to create, through their own endeavours, the wealth that is needed for a radical socio-economic and political transformation of this country. To this end, greater emphasis than hitherto needs to be, and will be placed on Technical, agricultural and vocational; education and on structured Apprenticeship training (p. 3-4).

Excerpt four

6.3 A fundamental weakness of the current basic education system is that too many subjects are taught at the primary and JSS levels, poorly taught at that, owing to shortages of qualified teachers and materials. The result is that by the end of it pupils of average ability are unable to acquire sufficient grounding in basic literacy, numeracy and social studies. This weakness does not enable the pupils to move either to SSS levels of learning and attainment at internationally competitive standards or immediately into the world of work as promised by the 1987 reforms. ..

6.4 The records indicate that on average, the survival rate from primary grade 1 to primary grade 6 has been only 79.9%, 80.8% for boys and 78.9% for girls... The transition between primary grade 6 and JSS 1 has also less than satisfactory, at 91.4%. The survival rate from JSS grade 1 to JSS grade 3 has

also hovered around 88.2%-86.8 for girls. This means that one out of every eight pupils who entered through JSS stage was failing to complete it. (p.4).

Excerpt five

But even for those who did manage to complete the JSS grade the transition rate to SSS 1... only 40% of JSS graduates managing to gain admission into SSS. The 60% of students who are now dropping out between JSS 3and SSS1... they are the youth of average ability who, if properly nurtured, could constitute the high-productivity spearhead of a dynamic economy.



DOCUMENT EIGHT: Report of the Technical Committee on Conversion of the Polytechnics in Ghana to Technical Universities (Ministry of Education MAY 2014)

2.0 Overview of polytechnic education in Ghana

Although the then technical institutions at Accra, Takoradi and Kumasi were re-designated as polytechnics in 1963, they continued to operate essentially as non-tertiary, second-cycle institutions, offering mostly advanced craft courses and a few technician-level courses until 1992. Tamale and Ho technical institutes were similarly elevated to polytechnic status in the mid-1980s followed by Sunyani and Koforidua polytechnics in 1997. Cape Coast Polytechnic was the first polytechnic which was actually planned and established as a polytechnic in 1986; however, like all the other polytechnics, it did not gain tertiary status until 1992....

The Polytechnics Act, 1992 (PNDCL 321) elevated the polytechnic to the status of public tertiary institutions. The upgrading of the polytechnics conferred on them the authority to award Higher National Diplomas (HND) and other certificates. Since then the institutions have had their mandates strengthened and expanded under a new Law, the polytechnic Act, 2007 (Act 745) to offer qualifications in a wide range of applied arts and science disciplines at sub-degree, degree and postgraduates degree levels. Specifically, the mission of the polytechnics is to, among other things, provide:

- i. Tertiary education in the fields of manufacturing, commerce, science, technology, applied social science, applied arts and any other field approved by the Minister of Education.

- ii. Opportunities for skills development, applied research and publication of research findings.

... The BTech programmes were expected to deepen the practical orientation of the HND qualification and provide HND graduates with advanced technical knowledge and skills as well as offer them a more logical avenue for academic and professional progression. The running of degree programmes was also expected to improve the public image of the polytechnics. In 2012, 97% of polytechnic students were enrolled in HND programmes, 2% in BTech programmes and the rest in Technician Certificates courses. ...

(p.3)

... The available statistics show that about 60% of polytechnic students are enrolled in business and management programmes, although the majority of the courses on offer are in the field of science and technology. ... the available statistics show indicate that against a norm of 60:40, the science/humanities ratio in the polytechnics which was 55:45 in 1996/1997, very close to the national norms, steadily dropped over the years to 30:70 in 2007/2008, then to 24:76 in 2009/2010 before improving rather insignificantly to 33:67 in 2010/2011. In 2012/13, the science/humanities ratio was 37:63 for a total student population of 53,078.

Polytechnic education emphasises the application of knowledge rather than the search for new knowledge. The thrust of polytechnic training is, therefore, on the acquisition of the relevant skills required to perform specific professional tasks without ignoring the underlying theoretical knowledge necessary for a proper understanding of the tasks to be performed.

2.1 Lessons Learnt In Upgrading the Polytechnics To Tertiary Status

The ... approaches to the upgrading of the polytechnics did not specify any criteria or qualifying benchmarks (in terms of physical, human and academic resources required) for elevation to polytechnic status. Nor was any provision made for them to be mentored over a period of time by well-established tertiary institutions. The absence of a clear transformation strategy was one of the critical flaws of the polytechnic upgrading process, the ramifications of which are still evident in the polytechnic system today.

... During the first few years of their upgrading, not a single year passed without one form of agitation or other by the students, the teachers or the non-teaching staff. There were demonstrations and boycotts of lectures by students to back their demands for recognition of the Higher National Diploma, avenues for academic progression and appropriate placement of polytechnic graduates in the Public Service. ... much of the discontent and agitations witnessed in the polytechnics in the early years could be attributed to the absence of a clear mandate and a common understanding among all stakeholders of the role of the polytechnics in national development.

... Indeed, there are still some people at decision-making levels in the country today who do not understand the philosophy and orientation of polytechnics education. The polytechnics are often regarded as junior universities. Even some polytechnic students subscribe to this notion. (p. 5)

Other difficulties faced by the polytechnics in the early years included poor funding, inexperienced management staff and a sluggish administrative system. Inadequate funding was a particularly serious problem for the polytechnics, which felt marginalised in the allocation of government

resources vis-à-vis the universities. Throughout the 1990s, government expenditure per university student was twelve times the amount spent on a polytechnic student.

... by far the greatest challenge facing the polytechnic is their ability to recruit and retain qualified staff with relevant practical or professional; experience. This is because the type of skilled professionals that the polytechnics require is also highly sought after by the industry. In this regard, the polytechnic are unable to compete for staff with the industry which is able to offer better remuneration packages.



DOCUMENT NINE: Minimum Requirements for Admission to Tertiary Education Institutions

NATIONAL COUNCIL FOR TERTIARY EDUCATION

In case of reply the

P.O. Box MB 28

Number and date of

This letter be quoted

My. Ref. No:

Your Ref.

Dear Sir/Madam,

MINIMUM REQUIREMENTS FOR ADMISSION TO TERTIARY EDUCATION INSTITUTIONS

The National Council for Tertiary Education, National Accreditation Board and the National Board for Professional and Technician Examination in consultation with representation from Public and Private Universities, Colleges of Education and Polytechnics have reviewed the minimum requirements for admission to Tertiary Education Institutions.

Kindly find attached a copy of the minimum entry requirements.

Yours faithfully,

Prof. Mahama Duwiejua

Executive Secretary

DISTRIBUTION

Minister of Education

Deputy Minister of Education, Tertiary

Executive Secretary, National Accreditation Board (NAB)

Chairman, National Accreditation Board (NAB)

Executive Secretary, National Board for Professional and Technician Examination (NABPTEX)

Chairman, National Board for Professional and Technician Examination (NABTEX)

Chairman, National Council for Tertiary Education (NCTE)

Executive Secretary, Council for Technical and Vocational Education and Training (COTVET)

Chairman, Council for Technical and Vocational Education and Training (COTVET)

HEADS OF ALL Accredited Tertiary Education Institutions

B. MINIMUM REQUIREMENTS FOR ADMISSION TO DIPLOMA

PROGRAMMES

3. Science and Technology Programmes

i. SSCE Candidates: Passes (A-D) in five (5) subjects comprising three core subjects, English Language, Integrated Science and Mathematics, plus two (2) elective subjects.

ii. WASSCE Candidates: Credit Passes (A1 –C6) in five (5) subjects three core subjects, English language, Integrated Science and Mathematics, plus two (2) elective subjects.

E. ACCESS COURSE FOR ADMISSION TO HND SCIENCE AND ENGINEERING PROGRAMMES

The National Board for Professional and Technician Examinations and polytechnics will organize access course for SSCE/WASSCE holders who could not obtain the grades required for direct entry into tertiary institutions, to

foster their enrollment in Higher National Diploma Science and Engineering programmes.



**DOCUMENT TEN: Purpose in Ghana's HND Engineering syllabi
Syllabus for electrical/electronic engineering department**

Preamble:

One of the objectives of the Economic Recovery Programme (ERP) is to attract and retain foreign investment and foreign participation in industry (manufacturing, food processing) etc. it behoves the nation therefore to have in place a cadre of very skilled and dedicated technicians to meet, maintain and sustain the needs, demands and challenges of the industrial environment which will be created as a result of this ERP.

Another goal is to boost and promote small-scale industry and private enterprises.

Products of the polytechnics are therefore not only being prepared for industry, but also to be equipped with skills to create and develop their own enterprises after graduating from the polytechnics.

To meet these and other requirement, demands and challenges in the future envisaged for the nation on the industrial scene on our way to industrialization, it will be necessary to emphasized wherever possible in any combination of course offerings by Polytechnic students, the acquisition of the following skills:-

- i. a very high level of occupational/practical skills
- ii. entrepreneurship skills
- iii. business management skills, and
- iv. to some extent an ability to innovate and adapt existing technologies.

In addition, to prolong the life of equipment, instruments, machines, structures and infrastructure in the country, course in which aspects to maintenance (routine/preventive) and repair are vital and should have their curricula oriented and structure to highlight these aspects.

In the light of the foregoing, students opting for Electrical Engineering should study both Electrical Engineering and some courses in Electronics engineering. The courses in Electronic Engineering should have a strong as in Power Electronics, computer and Micro process or Controllers. Besides Electrical Power, Engineer requires courses in Thermodynamics (heating and coding), Fluid Mechanics (Hydraulic and Pneumatic systems) and Mathematics. It is strongly being recommended that there should be courses in Business, Entrepreneurship and Maintenance for ail technical students in the polytechnics.

In order to emphasize and encourage close working relationship between industry and the polytechnics, the organization of laboratory classes and project work should be geared to industrial practices. In particular, project assignments should be worked out in collaboration with industry as far as possible and in some instances efforts should be made to convert some projects into income generating ventures as their ultimate goal. (p.1)

Rational for the subject

The rational for the programme is to provide students with broad technological and basic Managerial skills required for the installation, operation, maintenance and repair of domestic and industrial electrical equipment.

NEED ASSESSMENT SUMMARY

Major need to be addressed:

1. Need for technological skill development; provision of qualified manpower and expertise required for the smooth and rapid expansion of electrical energy and technology to all parts of the country.
2. Installation, operation, maintenance and repair of domestic and industrial electrical equipment
3. Meeting future manufacturing needs of the country
4. Contributing to the total economic and industrial development of the country
5. Enhancing national self-reliance in modern technology

OBJECTIVES

The syllabus objectives are to enable students to:

- a) Acquire knowledge and understanding of the concepts and principles of electricity and electronics;
- b) Acquire the proper techniques in the use of tools and equipment;
- c) Apply their knowledge in the correct use of electricity to promote safe working procedures and safety precautions
- d) Develop skills in the use of appropriate tools and electronic instruments in measurements, trouble-shooting and repairs;
- e) Acquire the ability to prepare lay-out, install and commission industrial equipment and electrical services. *(-document is not dated, however, if it is the first syllabus that was drawn in 1993, then it is definitely old for this 21st century; but if it was formulated in 2002, it is also old, but not forward looking. For, it still referred to ERP, which was a vision*

espoused in the 1980's, what about after the ERP? Or we never intended to overcome or emerge from that period? ERP is more of short term/medium term; what about the long-term?

- focus is on the industry- fundamentally reveals an alignment with the growth-based approach to)



DOCUMENT ELEVEN: Speech Written by a Member of GhIE (2005)

It is no wonder that it is only in the engineering programme that there is so much confusion about job placement and recognition.

Unlike their counterparts who run the Accounting and Business programmes, and who right from day one have a hands-on practical training programmes, the engineering student must initially go through a theoretical course in science which is the backbone of engineering. During this period of study the engineering students do laboratory work during which theory is practically verified and the students get the opportunity to get a feel of tools, equipment and machinery they may work with in their practice of engineering.

Without any equipment (apart from a computer) their counterparts mentioned above go through their programmes and are readily employed in a ready market.

Following from above one can easily appreciate the need of having the right infrastructure to train the engineering technician.

- i. Lecturers (not tutors)
- ii. Well equipped laboratory ie workshops
- iii. Library well stocked with relevant technical books and scientific technological and engineering journals.

There is a polytechnic in every region of this country but how many can boast of having the above infrastructure? Perhaps none.

ADMISSION REQUIREMENTS

Most polytechnics these days admit students straight from the SSS level. We all know the tools/equipment imported to give them basic training in

craftwork have either all (*been*) stolen or they idle at the various schools for lack of specialists to handle them.

At the inception of the HND course in Engineering (old scheme) students who were admitted to go through the engineering programmes had already gone through basic craftwork by sitting exams for the Ordinary Technician Diploma (OTD) or the Ordinary national Diploma (OND) see attached diagrams A1, A2 & table B1.

What do we see these days. The raw (no technical background) SSS students, who may not have gained admission to say KNUST finds his way into the polytechnic.

For three years he is taken through theory with no opportunity of accessing any workshop/laboratory to do practical work and also no opportunity to undergo any structures training programme in industry and comes out as an HND graduate.

Let nobody be deceived that such a person could be employed by engineering organisation either in this world or hereafter.

Polytechnic Engineering Education

It must 'e understood once and for all that the polytechnic education must place the graduates at the middle-level manpower slot.

To achieve this, their training must be focused in this direction. The course offered must be practically oriented and structured to meet the needs of industry.

It is worthy of note that the GhIE is currently assessing the course structure for engineering HND courses for the polytechnics at their own instance.

This opportunity must not be missed and once and for all the bull must be grabbed by the hands for what we all know to be wrong must be corrected.

National policy on industrial attachment/ job placement

Industry is ailing. There are many which are gradually dying. Government is called upon here and now to institute an audit (technical) into all our existing industries to establish the state of their health and relevance to our economy and after identifying their problem find solutions. We hear of government only institution forensic audits into organisations just to unearth fraud. Let us unearth the ailments assailing our industries also.

The government is again called upon to have a national Policy on industrial attachment (apprenticeship) in place for the benefit of engineering students and the nation as large. A Bill on this must be approved by parliament to make it mandatory for industry to accept engineering students in their establishments for structured training programmes which must be assiduously monitored by their lecturers. Through dedication to duty and performance at their various places the question of job placement may be put to rest.

Incentives

Industry like any legal person will not readily accept such a mandate but industry could be cajoled by way of granting incentives and blanket insurance cover to meet any exigencies.

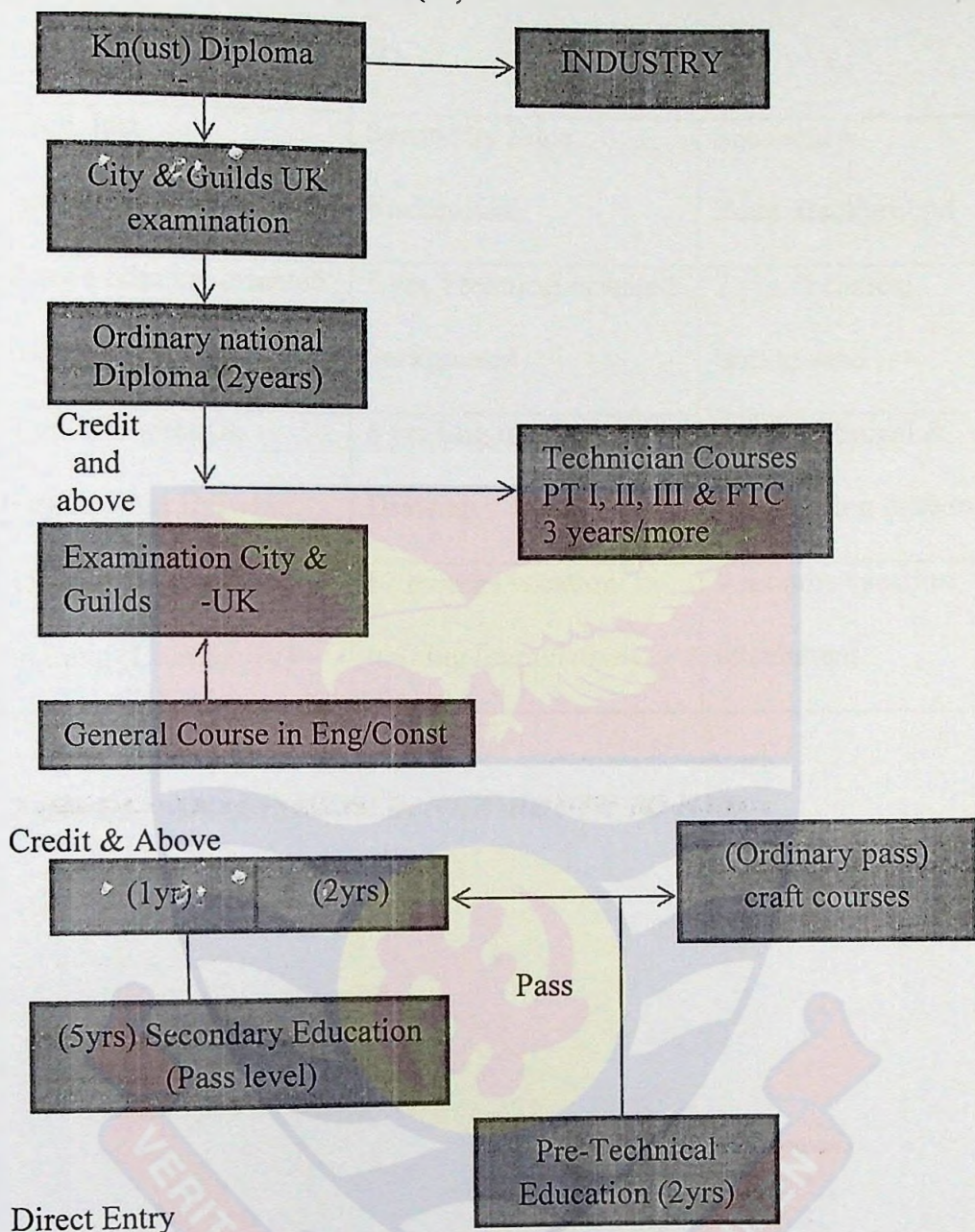
Conclusion

Ghanaian, it is time to call a spade a spade and not a digging tool. There are real and serious problems with the training of engineering students at our polytechnics. Ad-hoc solutions are worthless. Enough time has been wasted. Let us waste any more time. We should even decide to suspend further

training of such students until the right infrastructure is laid. We should prepare our minds to accept a limitation on the intake of engineering students by the polytechnics. Small may be beautiful.



2.0 SCHEMATIC DIAGRAM (a1)



Direct Entry

3.0 Schematic Diagram (A2) [SSCE]

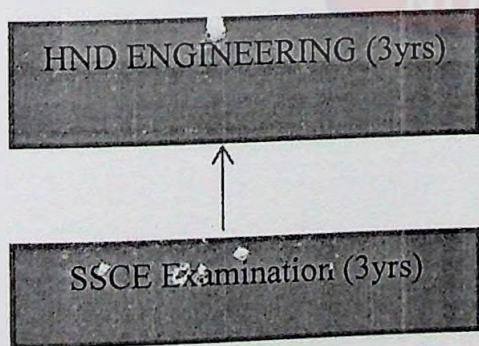


Diagram A2

SYSTEM SSCE/HND

Tech. Inst. Background	Secondary Educ. Background	Secondary Educ. Background
8 yrs Technical oriented background	5 yrs Technical oriented background	2 yrs Technical background
7 yrs Technical & Engineering Drawing	4 yrs Engineering Drawing	2 yrs Technical & Engineering drawing
15- months vacation training (Cumulative)	12 months vacation training (cumulative)	9 months vacation attachment

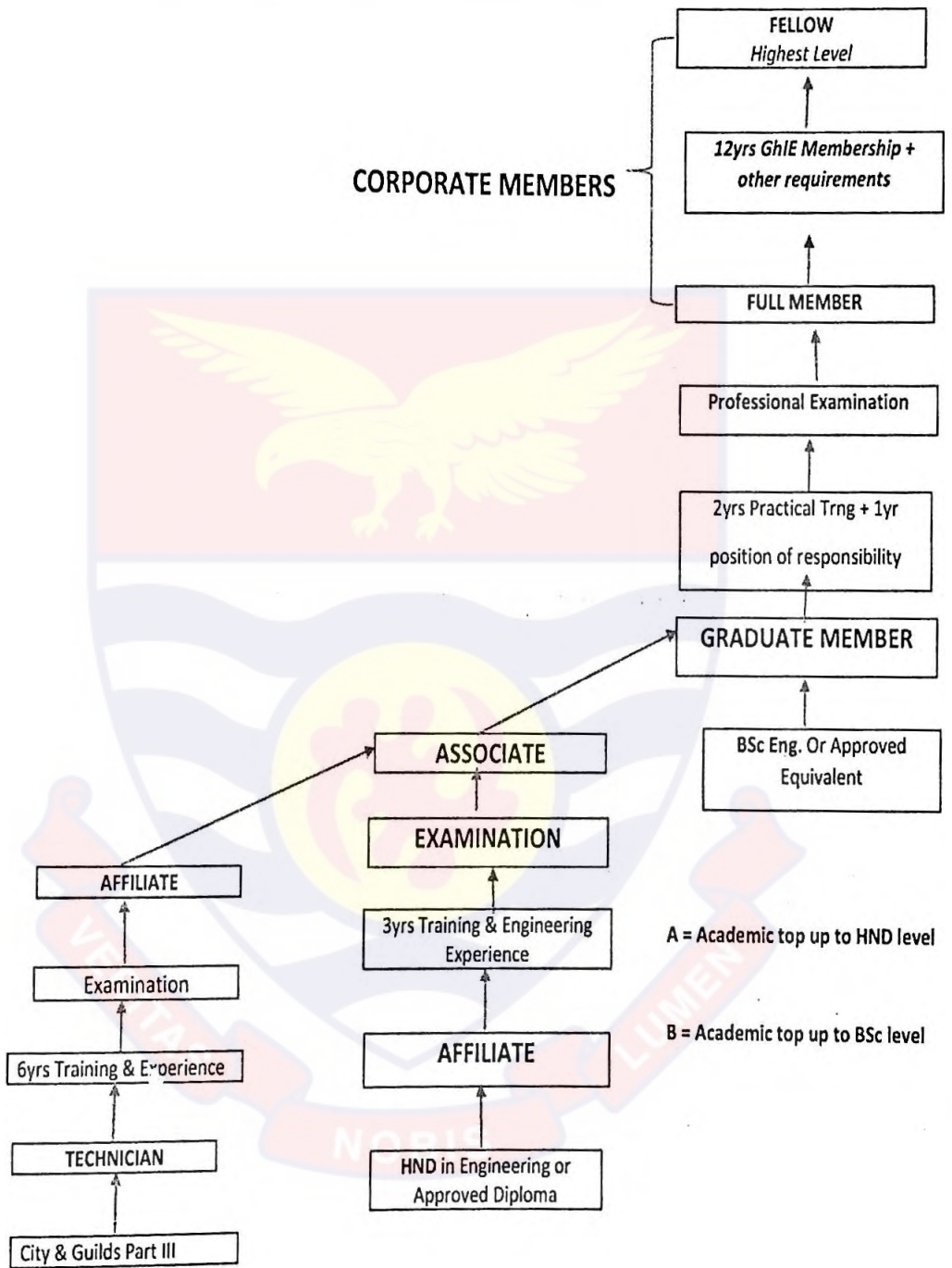
Table B1 ANALYSIS- OLD/ NEW ROUTE TO HND



DOCUMENT TWELVE: ROUTE TO MEMBERSHIP

THE GHANA INSTITUTE OF ENGINEERS

ROUTE TO MEMBERSHIP



DOCUMENT THIRTEEN: Letter of complaint

THE EXECUTIVE SECRETARY

NATIONAL ACCREDITATION BOARD

ACCRA

Dear Sir,

ADMISSION OF TVET GRADUATES INTO TERTIARY

INSTITUTIONS: RECOGNITION OF THE CORE EXAMINATION

RESULTS OF (TVET) INSTITUTIONS

We wish to draw your attention to a setback facing graduates of second cycle TVET institution of this country. These graduates continue to be discriminated against in assessing tertiary education because of the Core subjects which are basic entry requirements to tertiary institutions.

As you are aware, TVET institutions have been reformed since 2007 to study English Language, Mathematics, Integrated Science and Social Studies as examinable subjects. This was to offer the opportunity to interested and qualified TVET graduates to proceed for higher education at the Polytechnics, Colleges of Education and Universities. The first batch of candidates of this intervention wrote the examination organized by the National Board for Technician and Professional Examinations (NABPTEX), on behalf of the Council for Technical and Vocational Education and Training (COTVET) in 2011.

Information we have from some of our graduates who have attempted seeking tertiary education, however, is that some tertiary institutions are not recognizing the core subject results issued by NAPBTEX and therefore denying them admission. This phenomenon, we believe, continues to exist

either because some higher institutions are not aware of the introduction of these subjects in TVET institutions, or they have simply refused to recognize the worth of these qualifications.



DOCUMENT THIRTEEN: Newspaper Reports

Excerpt One

Ghanaian Times Newspaper, 7th July, 1993

There were initial difficulties during the take-off of the SSS programme in 1991 due to the late arrival of text-books and other equipment. There were also technical difficulties ... this has left some of the final year SSS students not to adequately prepared for the SSSCE” (p. 3).

Daily Graphic 23rd Nov. 1993

First SSCE written in November

April 1994 was stipulated month of the release of the first SSCE result

By: Janet Quainoo

Excerpt Three

Daily Graphic 21st Mar, 1994

There was the fear that the SSS will lower academic standards and in the long-run deteriorate labour efficiency and consequently impacting negatively on production

By Daniel Buor (p. 5)

Excerpt Four

People's Daily Graphic 21st May, 1994

Varsity entrance examination off

Harry Sawyer at a parliamentary briefing indicated that the SSS examination has been called off due to the short fall in the number of passes who can seek for admission. Following the Nov/Dec, 1993 SSS examination only 1,656 students, representing 3.93% of 42, 105, passed in all nine subjects. Principals

of the polytechnics agree to organize bridge courses for the partially successful students. *(Deborah Fynn and Joe Okyere) (p.1)*



APPENDIX G

Samples of Documentary Analysis

Title of document: - Technical Report Series: Evaluation of the Policy

Objectives of the Reforms to the Tertiary Education System

Author/ year of publication: - NCTE (1998)

Type of document: - Report

Purpose of the document and Author's position: - Document reports on the achievements of the objectives that underpinned Ghana's tertiary education reform. This review was undertaken in order to forestall hindrances to the realization of the aims of reforming the tertiary education sector. The author, NCTE is mandated to access information on Ghana's tertiary education sector to advice the Minister of education.

Audience for whom the document was written: - policy makers and tertiary institutions

Context of documents: - NCTE was established as part the reforms to the tertiary education sector. Politically, Ghana had transited from a 13 year military rule into a democratic dispensation in 1992. The same faces however remained in power until 2000. Civil society's influence on decision making was minimal during the revision of Ghana's education system, although some level of tolerance to civil society was evident from 1992 onwards.

Economically, the nation was under the World Bank and IMF Structural Adjustment Programmes that sought to address the economic crisis that had plagued the nation for over a decade.

Key points raised in document: -Reports on the realization of key objectives outlined in the reforms to Ghana's education tertiary education sector. Objectives 1, 2, 3 and 10 of the report were considered relevant to this study.

Objective 1,

-The author reiterates the integrating and coordinating purpose that underpinned the reforms to Ghana's tertiary education sector.

-Indicates that intensions relating to the non-university tertiary institutions have not been fully realized, the regional colleges of applied arts (RECAAST), which was to be established alongside the tertiary polytechnics, had not come into fruition.

-The implementation of the polytechnic law of 1992 was realized within a context of "adequate provision of laboratory, classroom space and qualified teaching staff" (p. xii). Consequently, the review notes that the quality of polytechnic programmes has been put into disrepute.

Policy objective 2

Reiterating the integrating and coordinating purpose that underpinned the reforms to Ghana's tertiary education sector again, the review indicates that the absence of an official mechanism has prevented the realization of this objective. The evidence given is

-The lack of a formal link between GES (body in charge of pre-tertiary education) and; NCTE (body in charge of tertiary education).

-A blue print on government's priority areas for development is also lacking.

Policy objective 3

- This aimed to "to make tertiary education more cost effective and able to provide quality education for increasing number of students through

increased efficiency in the utilization of space, resources and personnel” (p. xiii). Achievement then included:

- High student enrolment has been achieved,
- funding has remained a challenge

In policy objective 10

“Sought to establish linkage between education and society “to ensure an overall balance between the supply of trained personnel from the institutions and labour market demand” (p. xix).

Reflections/Conclusion

From the documents, there was little to show after six years of the implementation of reforms to Ghana’s tertiary education sector. From the context, the nation undertook the reforms to her educational sector as a key measure to address the economic crisis that beset her. Within the context of a military-transitioned-democratic dispensation, the desire to implement policies to win the people votes is a possible context that may override the passage of thoroughly considered polices implemented within the context of the realities on the ground. Openness to ideologies, especially from those perceived to be in opposition may therefore not be tolerated under a government that used to be a military regime. Intolerance to contrary opinions may also suggest an aura of the haphazard.

This situation may foreground the lack of a blueprint on government’s priority areas that already held dire consequences for the development of the sector. The lack of a blueprint on government’s priority areas will naturally be evident in the operations of government agencies; thus the lack of coordination among government agencies may be due to the lack of a roadmap

to follow. Already faced with scarce resources, intentions to increase enrolment in education in general, required prudent use of resources, if any success was to be chalked. Thus, in the presence of lack of prioritizing and scarce resources, a challenge to the sector that was mainly due to inadequate resources was not out of place.

Coordination, especially among government agencies to enable the education system to achieve its aim of providing progression and harmonization and social development.

This suggest that in as much as resources maybe in scant supply, a lack of blueprint on the part of government indicates a worsened financial situation, which would be accentuated by increasing cost of providing tertiary education as a result of the increases in students' enrolment figures.

Title of document: - Guidelines for Requesting NCTE's Support for Introducing New Programmes in Public Tertiary Education Institutions

Author/ year of publication: - *National Council for Tertiary Education (2013)*

Type of document: - Government institutional guidelines

Audience for whom the document was written: -tertiary institutions

Purpose of the document and Author's position: - Author has the mandate to gather information from the various tertiary institutions, in order to advice the minister of state accordingly on issues of funding for the tertiary education sector. This document (guidelines) was therefore developed to clarify the respective role of these two supervisory bodies. The purpose of these

guidelines for mounting of new programmes in tertiary education institutions is to prevent duplication of effort at both the system and institutional levels.

Context of writing The NCTE has been operating in a society that has been under a democratic dispensation for 21 years. Ghana's education sector, especially the tertiary level, had continued to be fiscally challenged. The Act establishing the NCTE enjoins the Council to advise the Minister on the development of institutions of tertiary education in Ghana. The Council is therefore required to enquire into the financial needs of institutions of tertiary education, and advice the Minister accordingly. NCTE mandate is fulfilled within the context of collaborating with other state institutions mandated with different oversight responsibilities over the tertiary education sector.

Outline of key points in document: -

1. NCTE's support for new programmes should precede the process leading to programmes accreditation, an exercise which is within the remit of the NAB.
2. NCTE's support for commencement of new programmes is not accreditation.

Specifically, NCTE aims to

1. Ensure that the objectives of new academic programmes align with national development objectives;
2. Determine whether or not public funds should be expended on the programme; and
3. Ensure that the programme aligns with the mission of the institutions.

(p.1)

National relevance

Public institutions requiring government support for new programmes should:-

1. State the objectives and the intended outcomes of the new programmes: the institution should describe what the programme is intended to achieve, as well as the knowledge, skills and competencies that would be acquired by students after graduation.
2. Demonstrate the relevance of the programme to national development by linking the programmes to national development objectives. The institution should link the programme to development programmes enunciated by the government, and where applicable, the institution should link the programme to the skill needs of the institution's "catchment area".
3. Describe the inadequacies in skills in a particular sector which necessitates the mounting of the new programme;
4. Demonstrate how the new programme will assist in overcoming the challenges in that sector.

Emerging issues and conclusion

Line 1 & 2, suggest that there was previously a lack of clarity on the process or requirement or the role of NCTE in the process of seeking for accreditation; line 3 suggests that there might have been instance of educational programme's non-alignment with national developmental plans in the past; line 4 suggests the need to prioritize funding and most probably in relation to the national developmental objectives required in line 3. Line 5 implies that there probably had been institutions that had sought accreditation or offered programmes that were not in alignment with the objective of their educational institution. More specifically,

institutions had to link their programmes to the needs of their catchment area and; point 7 & 9 demands institutions to provide a rationale for seeking for accreditation.

The content in the documents therefore generally suggests non-clarity of the role of NCTE in the process of gaining accreditation and a context of disorderliness preceding the time of issuing this guideline. This implies 20 years of operating a system in such a context. The release of the document suggests the introduction of a new order in programme accreditation.

Title of document: - Polytechnics in Ghana: Syllabus for Electrical/Electronic Engineering Department

Author/ year of publication: - No date/Author (gained from the polytechnic institutions and they all claimed to have picked it from NABPTEX following the review of the syllabus in 2002)

Type of document: - syllabus

Audience for whom the document was written: - polytechnic institutions

Purpose of the document and Author's position: - purpose, course content and objectives underpinning HND Electrical and Mechanical Engineering programmes

Time/context of writing: - the context of ERP, as provided in the preamble to underpin the introduction of the programmes, refers to the World Bank's economic recovery programmes that commenced in 1983 to address a near two decade of economic crisis. The objective of

mounting the programme was not only to equip students with skills, but skills for self-employment.

Preamble: One of the objectives of the Economic Recovery Programme (ERP) is to attract and retain

foreign investment and foreign participation in industry (manufacturing, food processing) etc. it behooves the nation therefore to

have in place a cadre of very skilled and dedicated technicians to meet, maintain and sustain the needs, demands and challenges of

the industrial environment which will be created as a result of this ERP.

Another goal is to boost and promote small-scale industry and private enterprises.

Products of the polytechnics are therefore not only being prepared for

industry, but also to be equipped with skills to create and

develop their own enterprises after graduating from the polytechnics.

To meet these and other requirements, demands and challenges in the

future envisaged for the nation on the industrial scene on our way to

industrialization, it will be necessary to emphasize wherever possible in

any combination of course offerings by Polytechnic students, the

acquisition of the following skills:-

- i. a very high level of occupational/practical skills
- ii. entrepreneurship skills
- iii. business management skills, and
- iv. to some extent an ability to innovate and adapt existing technologies.

In addition, to prolong the life of equipment, instruments, machines, structures and infrastructure in the country, course in which aspects to

maintenance (routine/preventive) and repair are vital and should have their curricula oriented and structure to highlight these aspects.

In the light of the foregoing, students opting for Electrical Engineering should study both Electrical Engineering and some courses in Electronics engineering. The courses in Electronic Engineering should have a strong as in Power Electronics, computer and Micro process or Controllers. Besides Electrical Power, Engineer requires courses in Thermodynamics (heating and cooling), Fluid Mechanics (Hydraulic and Pneumatic systems) and Mathematics. It is strongly being recommended that there should be courses in Business, Entrepreneurship and Maintenance for all technical students in the polytechnics.

In order to emphasize and encourage close working relationship between industry and the polytechnics, the organization of laboratory classes and project work should be geared to industrial practices. In particular, project assignments should be worked out in collaboration with industry as far as possible and in some instances efforts should be made to convert some projects into income generating ventures as their ultimate goal (p.1).

Rational for the subject

The rational for the programme is to provide students with broad technological and basic Managerial skills required for the installation, operation, maintenance and repair of domestic and industrial electrical equipment.

NEED ASSESSMENT SUMMARY

Major need to be addressed:

1. Need for technological skill development; provision of qualified manpower and expertise required for the smooth and rapid expansion of electrical energy and technology to all parts of the country.
2. Installation, operation, maintenance and repair of domestic and industrial electrical equipment
3. Meeting future manufacturing needs of the country
4. Contributing to the total economic and industrial development of the country
5. Enhancing national self-reliance in modern technology

OBJECTIVES

The syllabus objectives are to enable students to:

- a) Acquire knowledge and understanding of the concepts and principles of electricity and electronics;
- b) Acquire the proper techniques in the use of tools and equipment;
- c) Apply their knowledge in the correct use of electricity to promote safe working procedures and safety precautions
- d) Develop skills in the use of appropriate tools and electronic instruments in measurements, trouble-shooting and repairs;
- e) Acquire the ability to prepare lay-out, install and commission industrial equipment and electrical services.

(-the date of the document is not visible; it is faded actually since it is a photocopy the department is using. Participants from the polytechnic and supervisory institutions however claimed it was constructed in 2002. Hmmm, if the date of construction is actually in 1993, when the first syllabus was drawn, then it is an antiquated document, too old for

this 21st century. A syllabus constructed in 200 is equally old; whichever date is the correct one, the document fails to meet the needs of the current generation, since it referred to the ERP, which was a vision espoused in the 1980's. Ghana has had several visions in subsequent years and the document has not been reviewed? Or perhaps we never intended to overcome the period that necessitated the ERP?; but in any case the ERP was of short term/medium term plan which did well to reveal a generational need, yet it was an inappropriate vision to underpin an educational provision. The objective of the syllabus should have focused on the generational need of filling the middle-manpower level in the industries, than just to fill the gap at the time of the ERP. Has any study been conducted to know whether the gap has been filled and thus the programme is no longer needed or the rate of supplying labour must be increased or reduced to address the needs of the current generation? More importantly, what is Ghana's long-term vision about her middle-level manpower?

- focus is on the industry- fundamentally reflects the growth-based approach to development)

Emerging issues: - whether the document was prepared in 1993 or 2002, the context provided in the preamble suggests that no progress has been made from the 1980s and 1990s economic challenges or no vision had emerged for the 21 century to underpin the construction of a new syllabus. This suggests a society that may not be experiencing evolutions in technology or in terms of development.

APPENDIX H

Themes and Supportive Evidence

Generated themes and key supporting evidence

Connotations of a tertiary TVET

HND purposed to provide an aspect or the totality of Ghana's tertiary TVET needs

- i. Polytechnics upgraded to tertiary status to develop TVET at the tertiary level
- ii. HND as a resolution to the gap of middle-manpower in the nation's workforce
- iii. Continuity after HND in higher programmes to be developed in the polytechnics or transition to do university degree

Interpreting the HND within the polytechnic

- i. HND indicated as the first tertiary programme in the tertiary upgraded polytechnic
- ii. Polytechnics to dwell on programmes mainly for the award of diploma

Polytechnic Act 321, 1992

- i. Reiterates the focus of polytechnic on tertiary TVET programmes
- ii. Provides for continuity in the polytechnics, but on some conditions
- iii. Participants' interpretations in relation to issue of relevance

Polytechnics operating in a defeated mandate, for pursuing to develop other levels of programmes, instead of focusing on “original” mandate of training for middle level manpower

Participants indicate that there are ambiguities in the sector’s policy.

- i. Reflection of the lack of a national policy on education
- ii. Lack of a comprehensive policy for TVET

Ghana’s posture to the academic and TVET traditions

Antecedents to the introduction of the HND and Ghana’s academic and TVET traditions

Merger between academic and TVET traditions

Implied connotations in the merger of academic and TVET traditions

- i. Multi-disciplinary perspective*
- ii. Multi-stakeholder involvement*
 - a. participation*
 - b. Collaboration*
- iii. Proportions and appropriateness of knowledge from the academic and TVET traditions*

Resourcing the polytechnic HND

- i. Resourced in relation to disciplines drawn upon
- ii. Quantity of teaching force
- iii. Quality of teaching force
- iv. Academically biased
- v. Less or virtually no orientation for practical work
- vi. Lack professionalism in teaching and engineering
- vii. No standard in qualifications used to employ

Different academic entry characteristics

- i. Three streams of secondary school candidates
- ii. SHS; STS and; TI
- iii. Advantages and challenges peculiar to each stream
- iv. Different methods in curricular content delivery
- v. Behaviourist tradition
 - a. In class
 - b. Examination questions
- vi. Practicals
 - a. Less practicals due to inadequate facilities
 - b. Industrial attachment

Difficulty in ascertaining uniformity in curriculum content and assessment

Students access to all activities challenged for lack of insurance and protective clothing

“National” in the HND curriculum

Uniformity in *curricular* content

Uniformity in examination questions and weighting

Effects

Policy agencies

- i. Policy agencies challenged in direction to pursue
- ii. Lack of partnership between government and industry

Curriculum designing

- i. Inhibit the setting of concerted proportions
 - a. In the national curriculum

- b. Permitted disparities in curriculum for the same programme in different institutions
- ii. Use of credible, but not teaching staffs of the polytechnic to access accreditation Inadequate resourcing limits
 - a. frequency of curricular reviews
 - b. engaging participation from all stakeholder groups/institutions

Curriculum delivery

- i. Over-reliance on conventional approaches (behaviourist)
- ii. Unable to detect anomalies in curriculum
- iii. Indifferent to students performance
- iv. Resourcing

Students

- i. Polytechnic students progression, especially after school
- ii. Demoralisation of students
- iii. High attrition to other careers by the polytechnic graduate

