



Relevance of Information and Communication Technology (ICT) – Related Programmes in Polytechnic Education: A Case of Accra Polytechnic, Ghana

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ABSTRACT

This research paper discusses and focuses on the importance of Higher National Diploma (HND) programmes in Computer Science (CS), Information and Communication Technology (ICT) and Information Technology (IT) and their relevance to Polytechnic Education in the Ghanaian community. The study is underpinned to the HND Computer Science programme in Computer Science at Accra Polytechnic, Ghana with an overview of the accreditation process, the Computer Science Department of Accra Polytechnic embarked on to satisfy programme accreditation requirements. The author also discusses the relevant and important issues in accreditation for such programmes and what training tertiary institutions in Ghana have to do to meet requirements for programme accreditation. Discussions about the challenges encountered by the stakeholders involved to approve accreditation for such programmes and future work for sustainability is also presented in the paper.

Keywords: *Higher National Diploma (HND), Polytechnic Education, Computer Science (CS), National Accreditation Board (NAB), National Council for Tertiary Education (NCTE), Tertiary Institution, Information and Communication Technology (ICT), IT*

1. INTRODUCTION

A tertiary institution is a post-secondary institution of higher or further learning, or professional studies. It is expected to provide advanced academic and/or professional instruction and conduct research. The main objective of a tertiary institution is to train people to be capable of critical thinking, acquire knowledge and skills and also to be able to undertake research that will be beneficial for the development of the community and to advance the frontiers of knowledge [1]. Information and Communication Technology (ICT) has permeated the business and academic consciousness of low-income countries. Many have established ministerial and directorate positions in CS/ICT/IT and also launched certificate programs in CS/ICT/IT [2]. In today's rapidly changing world, maintaining global competitiveness requires the talents of well-rounded, holistic individuals with technical knowledge and business acumen to address challenging issues. Ghana started running a programme in the area of computer science from one of its potential universities named Kwame Nkrumah University of Science and Technology (KNUST) which is located in a city called Kumasi. The Computer Science Department of KNUST was established in 1977 initially with a 1-year certificate course in Data Processing, which was later changed to a 2-year Diploma programme in Data Processing. Currently the programme being run is Bachelor of Science in Computer Science, which was introduced a couple of years after 1977,

first as a 3-year degree programme, and subsequently extended to 4 years, in line with other University programmes [2]. After KNUST almost all public and private universities in Ghana run such programmes at the Bachelor Degree level and not higher levels mainly because of adequate staffing to meet programme accreditation requirements.

Among the ten (10) Polytechnics in Ghana, namely: Accra, Bolgatanga, Cape Coast, Ho, Kumasi, Koforidua, Sunyani, Takoradi, Tamale and Wa Polytechnics, Koforidua Polytechnic was the first to introduce and run HND in Computer Science and HND in Networking Management in 2005 [3]. Wa, Kumasi and Accra Polytechnics followed with mounting HND programmes in ICT and Computer Science in 2008, 2010 and 2011 respectively. So among the ten (10) Polytechnics in Ghana, four (4) of them run such programmes which is a disadvantage to Ghana in terms of HND education in the areas of CS/ICT/IT. Reasons for this circumstance was sought through interview and will be elaborated in this paper.

This paper is formulated as follows: after Introduction, Background of Accra Polytechnic and Rational of HND Computer Science in Polytechnics, Problem Formulation and Research Questions is presented in Section 2, followed by Research Objectives and Research Methodology in Sections 3 and 4 respectively. Overview of the General Programme Accreditation Process in Ghana and Curriculum Development and Programme Accreditation for HND Computer Science in Accra Polytechnic are discussed in Sections 5 and 6



respectively. Challenges and Discussions are presented in Section 7. Related Work to this paper is discussed in section 8. Finally, Conclusion, Recommendation and Future Work of this research paper are elaborated in Section 9.

1.1 Background of Accra Polytechnic, Ghana

Accra Polytechnic started as a technical School in **1949** to train lower and middle level hands-on skilled manpower for industry. Later in **1957**, it was upgraded to Technical Institute and in **1963**, renamed Accra Polytechnic by the orders of the first president of Ghana, Osagyefo Dr. Kwame Nkrumah. By the Polytechnic Law, 1992 (PNDC L321), which became fully operative in the 1993/4 academic year, Accra Polytechnic was elevated and attained a tertiary status. The institution was then placed under the Higher Education Council with an autonomous status. Notwithstanding the difficulties that characterized the quick change over from secondary to a tertiary institution, Accra Polytechnic made tremendous progress in its review and expansion of curriculum to suit contemporary needs [4].

New programmes and departments were created as part of the development process. Staff have been trained and re-trained to enhance their capabilities. The polytechnic law was reviewed in **2007** and mandated the institution to award degrees as well as to produce middle level manpower with the requisite hands-on experience for the needs of commerce and industry in Ghana. Thus, the Bachelor of Technology (B-Tech) degree programmes have been introduced as a new option and to give polytechnic graduates the opportunity to upgrade themselves. Growth over the years has enabled the polytechnic to develop and improve in infrastructure, teaching and learning facilities. Presently, Accra Polytechnic offers rich curriculum in a variety of programmes and awards Higher National Diploma (HND) certificates through National Board for Professional and Technician Examination (NABPTEX), Ghana and **soon to award B-Tech degrees**. Thus, in dictates of the objectives and mission of the polytechnic, a wide range of opportunities are being provided for the Ghanaian populace and feeding of industry with the requisite skilled labour [4].

Accra Polytechnic's *vision* is to become a universally acknowledged centre of excellence for **Teaching and Research** of applied science, arts and technology and to become a distinguished partner in the provision of **Technical Vocational and Professional Skills** to the manpower for the development of Ghana. Accra Polytechnic also has a *mission* to produce skilled career focused tertiary and middle-level manpower in the areas of manufacturing, commerce, science, technology, applied social science and applied arts [4].

1.2 Importance and Rationale of HND CS/ICT/IT in Polytechnic Education

The purpose of the Higher National Diploma in CS/ICT/IT in Polytechnics is to provide the opportunity to train middle level manpower with requisite skills and knowledge in CS/ICT/IT to lead the drive for rapid modernization and industrialization as well as technological advancement. In order for Ghana to become a middle income country by the year 2020, allocation of specific manpower in specific fields needs to be effected. An important factor in developing technologies in Ghana is to have the required expertise in CS/ICT/IT. HND programmes in CS/ICT/IT aim to produce graduates with a combination of disciplines in Information Technology, Software Engineering, Computer Programming and Computer Engineering.

2. PROBLEM FORMULATION AND RESEARCH QUESTIONS

Presently HND programmes in areas of CS/ICT/IT are run by only four (4) Polytechnics in Ghana. The importance of ICT in Ghana coupled with practically oriented Polytechnic Education cannot be overlooked and raises concerns to what the other Polytechnics should do/are doing to be at par with their sister Polytechnics who are running such programmes in order to promote ICT development in the Republic of Ghana. Ghana lacks adequate number of skilful and highly qualified professionals to lead the drive for industrialization and transforming Ghana from a third world status to an industrialized one. About 95% of companies in Ghana have IT departments which require skilled labour in the areas of CS/ICT/IT. Most of the employees of these companies are university graduates from both public and private universities with a few coming from polytechnics. The practical aspect of

CS/ICT/IT runs parallel with polytechnic education and Polytechnics should give priority in running these programmes, however this has not been the case. The research questions of this research study are below.

Research Questions:

1. What can Polytechnics in Ghana that don't offer programmes in CS/ICT/IT, do to introduce such programmes?
2. How to ensure sustainability of such programmes once given accreditation and introduced?



3. RESEARCH OBJECTIVES

The main objectives of this research paper are to:

- Analyse the current state of HND programmes in CS/ICT/IT offered by Polytechnics in Ghana with a case study focus on Accra Polytechnic.
- Discuss and suggest how Polytechnics in Ghana that don't offer programmes in CS/ICT/IT can embark on such tasks.

4. RESEARCH METHODOLOGY

- **Interview:** The researcher interviewed stakeholders of most Polytechnic Computer Science Staff and Management to find out their current situation on HND CS/ICT/IT introduction and offering in their Polytechnics.
- **Literature Review:** The author adopted integrated and exploratory literature about HND programmes being run in Polytechnics of Ghana with a thorough examination in the case of Accra Polytechnic.

5. OVERVIEW OF THE GENERAL PROGRAMME ACCREDITATION PROCESS IN GHANA

Programme accreditation for tertiary institutions in Ghana is the responsibility of National Accreditation Board (NAB), National Council for Tertiary Education and National Board for Professional and Technician Examinations (NABPTEX). All of these stakeholders fall under the Ministry of Education in the Republic of Ghana. The paper presents a general overview of these stakeholders:

5.1 Stakeholders and Institutions Responsible for Programme and Institutional Accreditation

(i) **Ministry of Education (MoE) and NCTE, Ghana** - The Ministry of Education has ministerial responsibility for all levels of education in Ghana. The National Council for Tertiary Education (NCTE) advises the Minister in charge of tertiary education on matters relating to the development of tertiary education. It has a leading role in guiding and co-ordinating the tertiary education sector, and in interpreting and implementing government policy on tertiary education [5]. Tertiary institutions in Ghana come under the governance of the NCTE although they enjoy a high degree of autonomy. Governance such as funding for programmes, ensuring tertiary educational standards and quality, carry out studies of national manpower

needs, which can form the basis of tertiary planning. Generally NCTE is responsible for governance all aspects pertaining to tertiary education in Ghana and also have to give approval for a programme to be run/offered after it has been given accreditation [6].

(ii) **NAB, Ghana** - Accreditation is a system of according recognition to an educational institution for meeting satisfactory standards in performance, integrity and quality. Such an institution is normally made up of teaching staff, administrators, non-teaching academic and non-academic support staff. For any tertiary institution to be able to perform its core functions, it must have, among other things, well-qualified staff in adequate numbers, a well-equipped and well-stocked library, adequate number of classrooms, lecture theatres, laboratories, workshops, with the requisite equipment, and adequate and reliable sources of funding [1]. Simply put, the institution must have the physical, material, financial and human resources for the delivery of quality education so that students in possession of the requisite entry qualifications have a reasonable chance of entering and passing the stipulated examinations at the end of their studies [1].

(iii) **NABPTEX, Ghana**- The NABPTEX was established by the National Board for Professional and Technician Examinations Act, 1994 (Act 492) to among other things, formulate and administer schemes of examinations, evaluation, assessment, certification and standards for skills and syllabus competencies for non-university tertiary institutions. NABPTEX has taken steps to coordinate the appointment of moderators for the various polytechnics [5].

5.2 Accreditation of HND CS/ICT/IT in Ghanaian Polytechnics

Table 1: HND CS/ICT/IT Accreditation Status of Polytechnics in Ghana

POLY-TECHNIC	HND CS/ICT/IT STATUS	YEAR ACCREDITED/ NUMBER OF PROGRAMMES
Accra	HND Computer Science with Options in Hardware + Networking and Software Development	2011/ 1 Programme with two Options
Bolgatanga	No programme currently	-
Cape Coast	No programme currently	-
Ho	No programme currently	-
Kumasi	HND Computer Science	2010/ 1



		Programme
Koforidua	HND Computer Science and HND Networking Management	2005/ 2 Programmes
Sunyani	No programme currently	-
Takoradi	No programme currently	-
Tamale	No programme currently	-
Wa	HND Computer Science and HND Networking Management t	2008/ 1 Programme

Source: Interview with Accra Polytechnic Staff: 10/03/12

6. CURRICULUM DEVELOPMENT AND PROGRAMME ACCREDITATION FOR HND COMPUTER SCIENCE IN ACCRA POLYTECHNIC

6.1 Programme Objectives

On successful completion of the programme, the HND graduate in Computer Science shall be able to:

1. Have knowledge in the design and development of databases and information systems.
2. Have a good and solid grounding in computer hardware, computer software, computer programming and computer architecture and their application in the business and financial industry.
3. Apply sound engineering principles to the cost-effective production of computer-based systems.
4. Acquire the necessary skills to set up and manage an ICT outfit.
5. Install, maintain and repair computer systems.

6.2 Career Opportunities and Job Creation

The HND Computer Scientist is suitable for employment in many areas such as: Computer Science Consultancy Services, Database Administration Services, Network Engineering Services, System Analysis, Data Analysis and ICT/IT Professional Services. The HND graduate in Computer Science should be able to set up his/her own ICT/IT enterprise.

6.3 Projected Enrolment

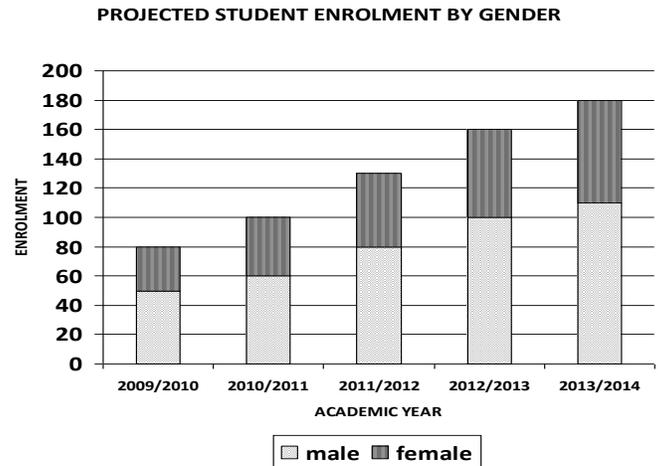


Figure 1: Projected Enrolment of HND Computer Science Programme at Accra Polytechnic

6.4 Admission Requirements

The minimum admission requirements for the HND Computer Science programme are as follows:

- (i) **General Certificate Examination (GCE) ‘A’ Level Applicants**
 - Four (4) GCE ‘O’ Level credits including English Language and Mathematics.

Passes in three subjects including A-Level Mathematics and/or Physics and any other two subjects. A pass in General Paper will be an added advantage.

- (ii) **High School Applicants**

- Passes in three (3) **Core** subjects including English, Mathematics and Core/Integrated Science.
- Passes in three (3) relevant **elective** subjects including, Physics and/or Mathematics
- An aggregate score of 24 or better.

- (iii) **Other Certificate and Diploma Applicants**

- Technician Certificate in Computer Science or Information Technology.



- City and Guilds Certificate or Diploma.
- Advanced Business Certificate Examination (ABCE).
- A certificate in Computer Science or Information Technology from a recognized higher institution.

- Four (4) GCE 'O' Level credits or four (4) High School passes including English Language and Mathematics.
- At least a minimum of three (3) years teaching experience.

(v) **Mature Applicants**

- Must be at least 25 years old.
- Must have four (4) GCE 'O' Level credits including Language and Mathematics or four (4) High School passes including English Language and Mathematics.
- Must have at least three (3) years working experience.
- Must pass a written aptitude test (English Language, Mathematics and General Paper).

A Diploma in Computer Science or Information Technology from a recognized higher institution.

(iv) **Teacher Applicants**

- Four year certificate 'A'. OR
- Three-year Post Secondary Teacher's Certificate.

6.5 Curriculum For HND Computer Science Accra Polytechnic

Note: T- Theory Hours: P- Practical Hours: C- Credit Hours

Table 2: Year One - Semester One

<u>SN</u>	<u>COURSE CODE</u>	<u>COURSE</u>	<u>T</u>	<u>P</u>	<u>C</u>
1	CSC 101	ICT Fundamentals I	2	2	3
2	CSC 103	Fundamentals of Computer Programming	2	4	3
3	CSC 105	Introductory Mathematics for Computer Science	2	1	2
4	CSC 107	Statistical Methods I	3	1	3
5	CSC 109	Circuit Theory	2	1	3
6	COS 101	Communication Skills I	2	1	2
7	AFS 111	African Studies	2	1	2
Total Credit Hours					18

6.5.1 Summary of Courses for Year One

From Table 2, CSC 101, CSC 103 and CSC 105 are introductory courses for the HND Computer Science students in the areas of learning ICT fundamentally and basically, learning the basics of computer programming

and learning mathematics to prepare for a computing and programming courses. Students will also learn more mathematics and probability in Statistics Methods I (CSC 107). Circuit Theory (CSC 109) deals with electronics and physics in computer science and ICT. CSC 101 and AFS 111 improve the English Language skills and study of



African culture respectively. The continuation of the courses in Table 2 can be found on Table 3 below.

Table 3: Year One - Semester Two

<u>S/N</u>	<u>COURSE CODE</u>	<u>COURSE</u>	<u>I</u>	<u>P</u>	<u>C</u>
1	CSC 102	ICT Fundamentals II	1	3	3
2	CSC 104	Object Oriented Software Development with Java I	2	4	3
3	CSC 106	Discrete Mathematics for Computer Science	3	1	3
4	CSC 108	Statistical Methods II	3	1	3
5	CSC 110	Introductory Electronics	2	1	2
6	COS 102	Communication Skills II	2	1	2
7	Industrial Attachment I				
Total Credit Hours					16

Table 4: Year Two - Semester One

<u>S/N</u>	<u>COURSE CODE</u>	<u>COURSE</u>	<u>I</u>	<u>P</u>	<u>C</u>
1	CSC 201	Data Structures and Algorithms I	3	1	3
2	CSC 203	Object Oriented System Analysis and Design	3	1	3
3	CSC 205	Legal and Ethical Issues in Computer Science	2	1	2
4	CSC 207	Human-Computer Interaction	3	1	3
SOFTWARE DEVELOPMENT OPTION:					
			<u>I</u>	<u>P</u>	<u>C</u>
5	CSC 209	<i>E-Commerce and Web Technologies</i>	2	4	3
6	CSC 211	<i>Introduction to Artificial Intelligence (AI) and Expert Systems</i>	3	1	3
7	CCS 213	<i>Object Oriented Software Development with Java II</i>	2	4	3
HARDWARE AND NETWORKING OPTION:					
			<u>I</u>	<u>P</u>	<u>C</u>
5	CSC 215	<i>Computer Hardware</i>	2	4	3
6	CSC 217	<i>Data Communication and Telecommunication Technologies</i>	3	1	3
7	CSC 219	<i>Routing Technology</i>	2	1	3
Total Credit Hours					20



6.5.2 Summary of Courses for Year Two

In year two (2), the students would have to choose options in the HND Computer Science programme, namely: Software Development or Hardware and Networking. The broadness of ICT, has resulted the flexibility of the HND Computer Science programme in Accra Polytechnic so that students will find it easier to have an ICT and Computer Science career focus which is not done in the universities in Ghana that offer these Programmes. As discussed earlier, the practical aspect of Polytechnic Education has to apply this technique. From Tables 4 and 5, courses 1-4 and 1-5 respectively, will be pursued by all enrolled students. Courses 5-7 and 6-7 respectively of different sets will be pursued by Students who opt for Software Development or students who opt for Hardware and Networking. Students of the HND

Computer Science programme require training and education from computer science staff as to what is entailed to choose a programme option.

6.5.3 Summary of Courses for Year Three

As depicted in Tables 6 and 7, courses 1-5 and 1-4 respectively are general ICT courses for all HND Computer Science students. The students will continue to pursue courses falling under their options. For a student to qualify for graduation and be awarded HND in Computer Science he/she has to obtain a minimum of 109 credit hours and pursue Industrial attachment during the programme.

Table 5: Year Two - Semester Two

<u>S/N</u>	<u>COURSE CODE</u>	<u>COURSE</u>	<u>I</u>	<u>P</u>	<u>C</u>
1	CSC 202	Data Structures and Algorithms II	3	1	3
2	CSC 204	Operating Systems Theory	3	1	3
3	CSC 206	Database Concepts and Technologies	3	2	3
4	CSC 208	Information Systems Development	2	1	3
5	CSC 210	Research Methodologies in Computer Science	2	1	2
SOFTWARE DEVELOPMENT OPTION:					
			<u>I</u>	<u>P</u>	<u>C</u>
6	CSC 212	<i>Numerical Methods and Computations</i>	3	1	3
7	CSC 214	<i>Object Oriented Software Development with Visual Basic .Net</i>	2	4	3
HARDWARE AND NETWORKING OPTION:					
			<u>I</u>	<u>P</u>	<u>C</u>
6	CSC 216	<i>Introduction to Computer Technology</i>	3	1	3
7	CSC 218	<i>Network Software</i>	2	3	3
8	Industrial Attachment II				
Total Credit Hours					20



Table 6: Year Three - Semester One

<u>S/N</u>	<u>COURSE CODE</u>	<u>COURSE</u>	<u>I</u>	<u>P</u>	<u>C</u>
1	CSC 301	Computer and Information Security	3	2	3
2	CSC 303	Computer Science Project I	0	6	3
3	CSC 305	Open-Source Operating System: Linux	2	4	3
4	CSC 307	IT Entrepreneurship	2	1	2
SOFTWARE DEVELOPMENT OPTION:					
			<u>I</u>	<u>P</u>	<u>C</u>
5	CSC 309	<i>Introduction to Software Engineering</i>	3	2	3
6	CSC 311	<i>Data Communications and Computer Networks</i>	3	1	3
HARDWARE AND NETWORKING OPTION:					
			<u>I</u>	<u>P</u>	<u>C</u>
5	CSC 313	<i>Network Server Concepts</i>	3	1	3
6	CSC 315	<i>Network Infrastructure I</i>	3	1	3
Total Credit Hours					17

Table 7: Year Three - Semester Two

<u>S/N</u>	<u>COURSE CODE</u>	<u>COURSE</u>	<u>I</u>	<u>P</u>	<u>C</u>
1	CSC 302	Computer Organisation and Architecture	3	1	3
2	CSC 304	Computer Science Project II	0	6	3
3	CSC 306	IT Project Management	3	1	3
4	CSC 308	Operations Research	3	1	3
SOFTWARE DEVELOPMENT OPTION:					
			<u>I</u>	<u>P</u>	<u>C</u>
5	CSC 310	<i>Introduction to Software Testing and Quality</i>	3	2	3
6	CSC 312	<i>Systems Security and Administration</i>	2	4	3
HARDWARE AND NETWORKING OPTION:					
			<u>I</u>	<u>P</u>	<u>C</u>
5	CSC 314	<i>Switching and Transmission Technologies</i>	3	1	3
6	CSC 316	<i>Network Infrastructure II</i>	3	1	3
Total Credit Hours					18



7. CHALLENGES AND DISCUSSIONS

7.1 Challenges

According to (Nyarko, 2011) [7] Polytechnics as tertiary institution in Ghana have had to face a myriad of challenges in the last decade. These include:

7.1.1 Poor Funding

The Polytechnics were upgraded into tertiary institutions without the necessary funding and other resources. Poor funding has resulted in inadequate facilities which are major requirements for practically-oriented programmes such as HND CS/ICT/IT [7].

7.1.2 Staffing

Polytechnics in Ghana have faced serious staffing problems when they were upgraded from second cycle institutions to tertiary institutions. Insufficient and unavailable qualified and professional staffing presented problems for teaching, learning and research. However, by pragmatic staff development programmes, the Polytechnics have been able to upgrade the qualifications of most of the staff. At the moment, there are several staff members on study leave in institutions both home and abroad. The situation is improving but there is still room for further improvement [7].

7.1.3 Curriculum

The development of curriculum for all the HND programmes such as computer science and others appears to be lagging behind and requires immediate attention to make them relevant and industry-friendly. This is to conform to the current thinking and the vision of the founding fathers that Polytechnic education should be career-oriented with more emphasis on the practical content of the various courses [7].

7.1.4 Poor Remuneration

This has been a recurring battle-cry for the staff of the Polytechnics. The issue of poor remuneration has remained the Achilles heel of the Polytechnic staff vis-à-vis their counterparts in analogous institutions. One can only hope that the Single Spine Salary Scheme being adopted in Ghana will be a panacea and solve the problem once and for all [7].

7.1.5 Autonomy

The Polytechnics Law, 2007 (Act 745) has granted “academic autonomy” to the Polytechnics as tertiary institutions. The question is how to give meaning to the spirit of the law. It is very unfair to deny all Polytechnics this status under the law

since a few of them at present may qualify for full autonomy [7].

7.2 Discussions

All the five challenges enumerated above are the main contributing factors to the demise of accreditation processes for HND CS/ICT/IT in Polytechnics in Ghana. Poor funding of Polytechnics needs to be solved by the Government of Ghana and the staffing situation coincides with poor remuneration for staff that will prefer to seek employment at a private or public university for greener pastures. Some staff members will also like to seek greener pastures from industry because of remuneration. There are so many situations in which lower qualified citizens in Ghana are being paid better than Master’s Degree holders of Polytechnics which is a sad incident and very deplorable for the Republic of Ghana. In the case of Computer

Science/ICT teaching staff of Polytechnics, many opt to teach in universities if a chance opens and this adversely affects accreditation for computer science programmes. Polytechnic Lecturers are paid lower than their university counterparts, so there is a temptation of Polytechnic teaching staff members of computer science departments to leave for other university computer science departments for greener pastures. Curriculum development as mentioned above and also illustrated from tables 2-7 should be embarked upon and taken seriously by the computer science/ICT Department in question. Polytechnics in Ghana that are not running HND programmes in CS/ICT/IT should opt to follow and consult the accreditation case study/issue of Polytechnics that are currently running them as elaborated in Table 1. Brief details regarding such issues are depicted below in the accreditation process for HND programme in Computer Science at Accra Polytechnic:

7.2.1 Staffing and Overview of the Department

The Computer Science Department of Accra Polytechnic was established in August 1995 and presently consists of fourteen (14) staff members. Nine (9) of the current staff are academic and six (6) are non-academic. The Computer Science Department manages four (4) laboratories within the Polytechnic namely: Computer Centre Laboratory, Electrical Block Computer Laboratory and B - Tech Block Computer Laboratories. The total number of computers within the three laboratories is approximately 260. Teaching and Learning of all courses involving Computer Science and ICT in the Polytechnic is also organized by the Computer Science Department. The Head of Department is appointed by the Rector and is responsible to him/her through the Dean of the School of Applied Sciences and Arts. He/She sees to the

organization of teaching, learning and research. He/She also sees to the maintenance of proper standards of teaching, organizes meeting with staff, supervises examination policies and ensures that academic members of staff carry out their duties in accordance with the law, statutes, policies and procedures laid down by the Council, the Academic Board, School Board and Departmental Board of the Polytechnic.

7.2.2 Physical ICT/Computing Facilities

Currently Wireless Network (Wireless Fidelity (Wi-Fi)) exists in Accra Polytechnic. Both staff and students with Wi-Fi laptops have access to the internet 24-hours.

Apart from the wireless connectivity there is also access of the internet through Local Area Network (LAN) in the various offices using network cabling, switches and routers connected to a main server.

Accra Polytechnic has three existing laboratories with the following statistics in terms of origination:

- Computer Laboratory 1 – 30 Computers
- Computer Laboratory 2 – 100 Computers
- Computer Laboratory 3 – 50 Computers
- Computer Laboratory 4 – 80 Computers

In training of students, the Computer Science Department tries its best to provide a one-to-one student to PC policy for students in order for students to have a better understanding during lecture sessions. Figure 2, shows the Wireless Access Point (AP) of Accra Polytechnic. Figures 3 and 4 respectively depict two of the computer laboratories - computer availability and seating capacities.

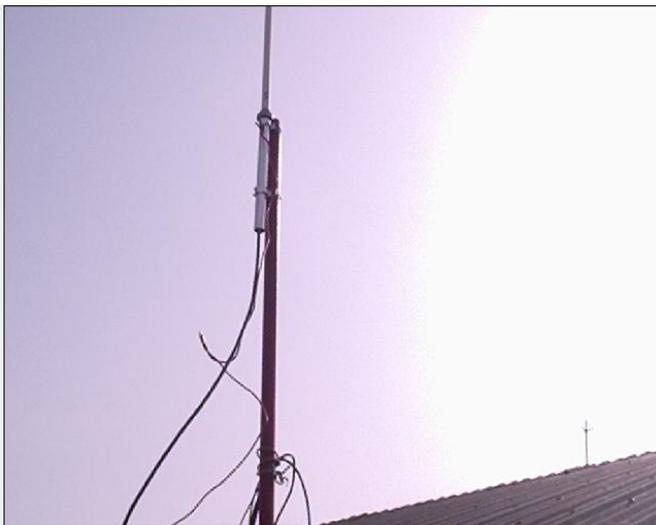
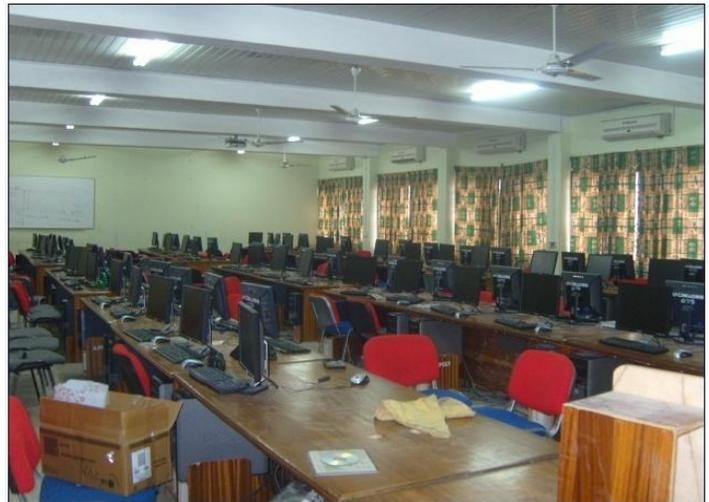


Figure 2: Wireless AP, Accra Polytechnic



Figures 3: Computer Laboratory 2, 50 Computers/Seating Capacity



Figures 4: Computer Laboratory 2, 100 Computers/Seating Capacity

In summary Polytechnics in Ghana listed on Table 1 that do not offer HND ICT-related programmes, should strive to overcome the enumerated challenges presented in section 7 and also endeavour to conform to factors such staff strength, very good physical ICT/Computing facilities as well as standard curriculum similar accreditation processes that has been done by Accra Polytechnic as enumerated in this research paper.

8. RELATED WORK

Negash et al. 2008 [8], discuss a case study about the first Information Systems (IS) PhD programme in Ethiopia. A



collaborative effort of thirteen universities around the globe. Fifteen faculty members traveled to Ethiopia to launch the programme for classes, which started in 2009. This paper depicts the programme design and program development and an outline of the overall programme. The authors share their personal experience in the development of this unique IS PhD programme.

Negash et al. 2008 [8], further discuss that Information Technology (IT) has permeated the business and academic consciousness of low-income countries. Many have established ministerial and directorate positions in IT and launched certificate programs, but advanced academic degree programs, especially PhD programmes, have lagged behind. The case study of *Negash et al. 2008* [8] depicts the launch of an Information Systems (IS) PhD programme at Addis Ababa University in Ethiopia.

9. CONCLUSION, RECOMMENDATION AND FUTURE WORK

9.1 Conclusion

In this paper, I presented the current situation of Polytechnics in Ghana that offer/don't offer HND in ICT-related programmes. As enumerated in section 1.2, it is very important for Polytechnics to realize mounting ICT-related programmes help produce abundant graduates for the development of ICT in Ghana and worldwide.

9.2 Recommendation

This paper highly recommends that, Polytechnics that don't run such programmes should strive to do so by overcoming the challenges and stumbling blocks discussed in this paper.

9.3 Future Work

In the future, Polytechnics in Ghana that don't offer HND-ICT related programmes should make an effort to do so as recommended by this paper. Polytechnics in Ghana that offer HND-ICT related programmes should make an effort to mount higher level programmes such as Bachelor of Technology (B.Tech.) in ICT related programmes in order to boost the potential of ICT and Computer science graduates of Polytechnics in Ghana. In order to sustain such programmes, Polytechnics in Ghana should update and improve the curricula through consultation of industry to acquire the requisite demand of ICT and Computer Science graduates from Polytechnics. Polytechnics should also embark on procedures to retain ICT teaching staff as well as purchasing current and standard ICT facilities and equipments.

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