

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI
INSTITUTE OF DISTANCE LEARNING

DEPARTMENT OF COMPUTER SCIENCE

**A PROPOSED FRAMEWORK / SYSTEM FOR ONLINE ASSESSMENT OF
STUDENTS ON INDUSTRIAL ATTACHMENT PROGRAM IN TECHNICAL AND
VOCATIONAL INSTITUTIONS IN GHANA: A CASE STUDY OF CAPE COAST
TECHNICAL INSTITUTE.**

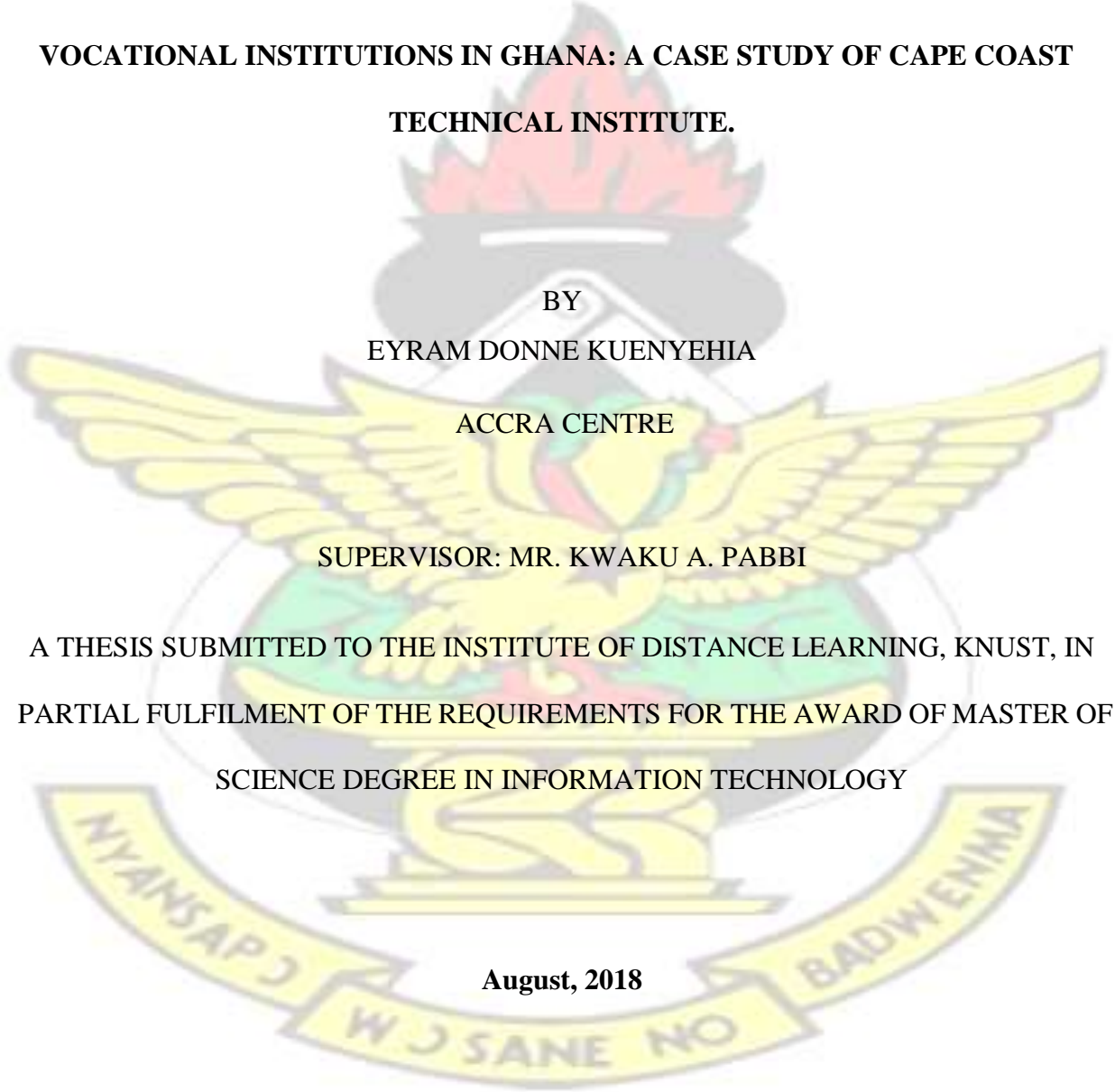
BY
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**A THESIS SUBMITTED TO THE INSTITUTE OF DISTANCE LEARNING, KNUST, IN
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF
SCIENCE DEGREE IN INFORMATION TECHNOLOGY**

August, 2018



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TECHNOLOGY**

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KNUST



DECLARATION

I hereby declare that this submission is my own work toward the MSc and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in this text.

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ABSTRACT

Assessment is a vital part of every institution, be it formal or non-formal. Students, teachers and education authorities rely on assessment to take important decisions concerning the grades and possible future of their students. Technical and Vocational Institutions as part of their curriculum engage in Supervised Industrial Attachment (SIA) programme for students. This Supervised Industrial Attachment (SIA) programme helps to equip students with the necessary knowledge and skills to buttress what they learnt at school. It also gives them the opportunity to practice on the field of work and to prepare them for the work environment. Students on Industrial Attachment are assessed on their performance in the various Industries where they are attached to.

This research analyses the processes involved in the assessment of students on Supervised Industrial Attachment (SIA), and proposes ways to improve these assessment processes to make it more effective, efficient, well-structured and secured by means of an easily accessible electronic system that runs on all android systems.

A survey was carried out with questionnaires in order to elicit from users their views, experience, and short comings of the current manual system of assessing students on industrial attachment the challenges faced with that system and the need for a new improved online computerized system which is a more efficient system and what the requirements of this proposed system should be. Some limitations of the current system of assessment from the survey showed that student's assessment report can easily get lost or damaged, student can manipulate their assessment reports, and these reports sometimes get to their institution late. There is also the case of inadequate record or lack of records on industrial attachment of previous years in the institutions. The outcome of the survey focused on students, teachers, operational managers of some Industries in Ghana, some privately-owned construction companies and tailoring shops all in Cape Coast. The outcome of the

survey revealed that most of these teachers, students and operational managers would rather prefer an online electronic computerized system to the currently used paper based manual system, which is secure, fast, convenient and easily accessible.

From the survey conducted, most of these teachers, students and operational managers have the basic knowledge in Information Technology needed to use such an online system, they all have access to internet and computers in their various institutions needed to connect to the proposed system's platform and fill out attachment assessment details and overall attachment assessment marks for the students. These marks can be accessible by both the student's institution and the industries' operational managers.

Based on these findings a prototype of the electronic / online industrial attachment assessment system was proposed, designed and developed.

There are few recommendations such as; Industrial attachment supervisors should be given inservice training on how to train students and assess them on industrial attachment, student's marks from industrial attachment should be part of the term's academic report, the online application be explored further to encompass all institutions that run industrial attachment program.

Educational institutions and ICT industries also have the opportunity to improve the system and incorporate other modules that might be needed in educational and employment industry. Furthermore, mobile friendly versions of this online assessment system can be developed as future work.

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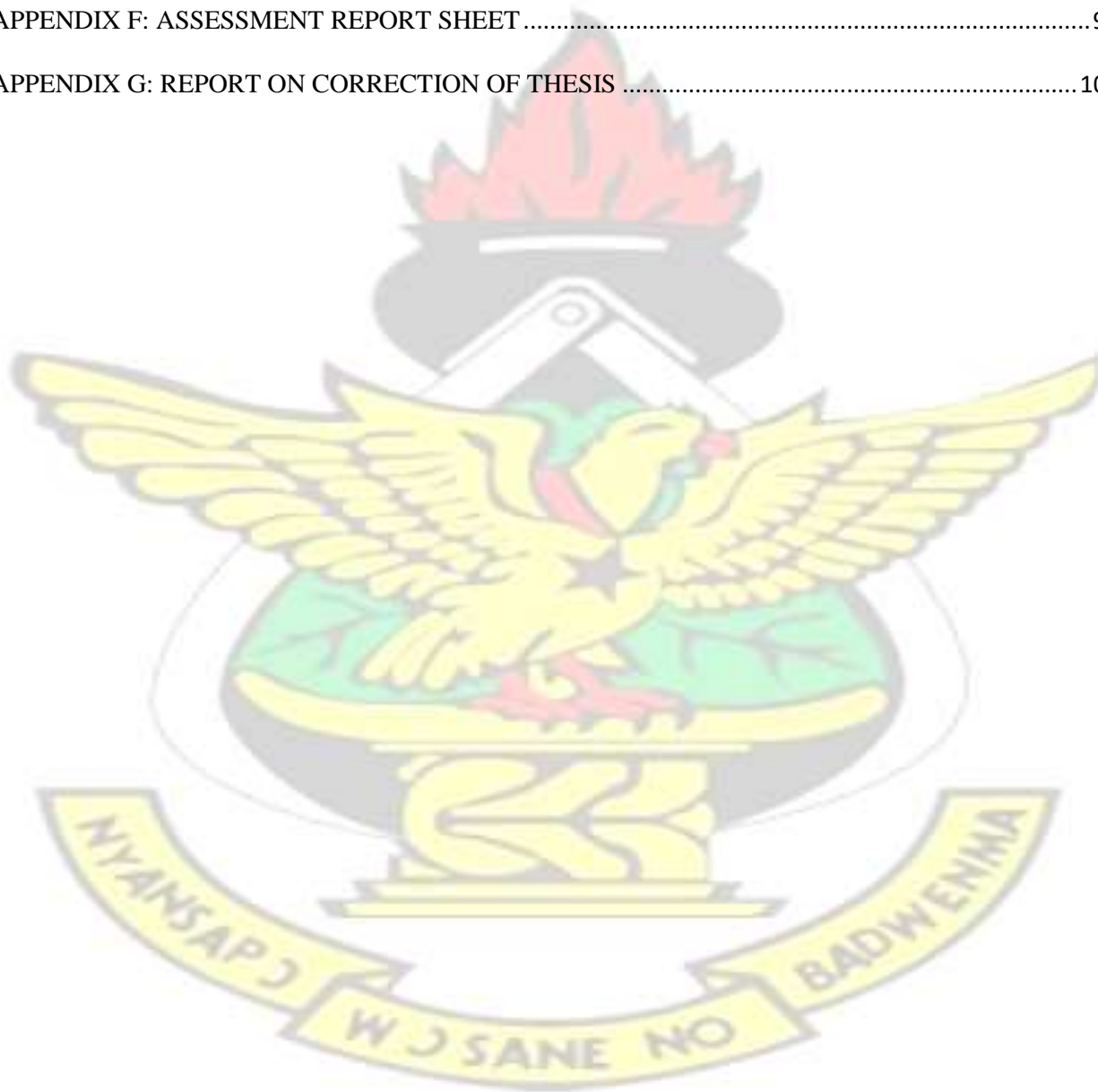
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LIST OF ABBREVIATIONS AND ACRONYMS



AE	Alternative Energy
CCTI	Cape Coast Technical Institute
EOIAAS	Electronic/Online Industrial Attachment Assessment System
ET	Electronics & Telecommunication
GSIAP	Ghana Student Industrial Attachment Program
ICT	Information and Communication Technology
ICTs	Information and Communication Technologies
MEAU	Ministers of Education of the African Union
ODL	Open Distance Learning
SIA	Supervised Industrial Attachment
TCT	Tumba College of Technology
TVET	Technical and Vocational Education & Training
TVI	Technical and Vocational Institutions
UNAM	University of Namibia

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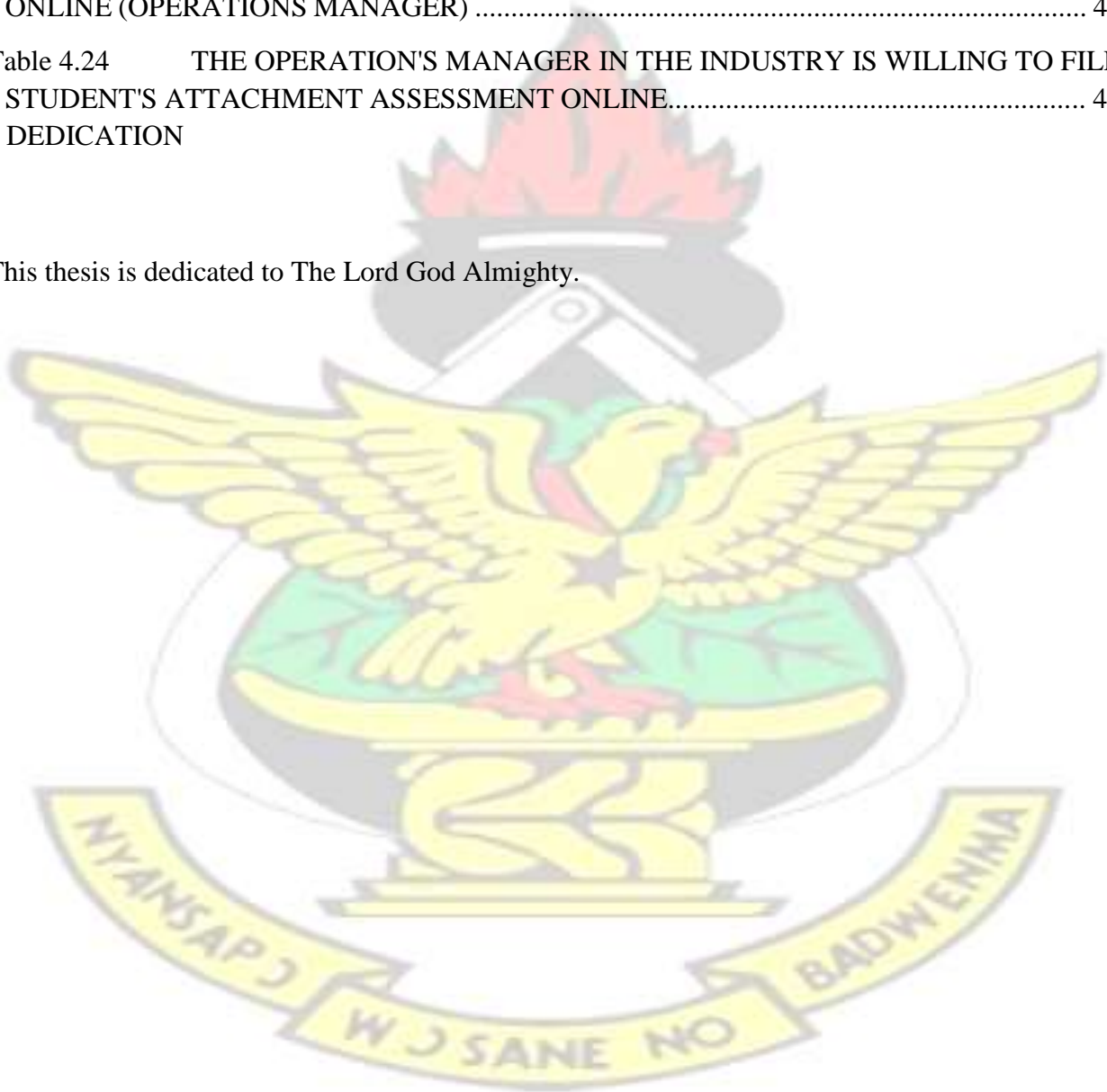
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This thesis is dedicated to The Lord God Almighty.



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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Most industries and institutions are now using Information and Communication Technologies (ICTs) in the acquisition, sharing and dissemination of information. ICTs has become a critical tool used for professional training and to acquire newest processes of data collection, data transformation and knowledge acquisition for decision making.

Information and communication technologies (ICTs) drive the new economy with human capital as its fuel and this ICT revolution makes knowledge a competitive resource. Economic prosperity depends on brains rather than brawn in this economic era, and value is created by employing knowledge in continuous learning process.

The contributions of Technical and Vocational Education and Training (TVET) to nation building cannot be overstated. Technical and vocational education is a crucial agent for industrial development and social advancement of any country. National development would simply stagnate in the absence of skilled technical manpower produced for industries, commerce and agriculture, by the polytechnics, technical and vocational institutes (Budu-Smith, 2005).

The process of globalization has not overlooked technical and vocational education as it forms part of every human endeavour. Technical and Vocational Institutions in Ghana are mandated to run a supervised industrial attachment (SIA) programme as part of their curriculum. It grants students a good opportunity to relate theory to practice and to be equipped with knowledge and skills upon successful completion of further education and in the workplace.

Technical and vocational Institutions must be responsive to rapidly changes in student and workforce needs. Technical and vocational education programs need to create simulated work environment for students to be able to relate theory to practice in schools and industrial attachment at real workplace.

The frequent change in technologies has become a burden for educational institutions as they need to procure all the necessary equipment and machine to effectively train their students. Finch and Crunkilton (1999) added more weight to this argument stating that all these highly specialized equipment is difficult to acquire by individual and institutions although they are necessary to operate quality program in these institutions. In the mist of all these difficulties there is increasing pressure on educational institutions to make workplace training part of their curriculum so as to help students acquire needed workplace skills and experience.

This paper investigates the assessment of supervised industrial attachment (SIA) program and it also focuses on proposing an electronic application that addresses challenges and threats of the manual system of assessing students on industrial attachment program and the way forward.

1.2 STATEMENT OF THE PROBLEM

Industrial attachment is highly acknowledged for integrating theory with practical experience to develop learner's professional knowledge and professional skills in Ghana (Beard, 1998). Some concerns have been raised by many organizations and employers about graduate failing to meet the employable standards as they don't have the requisite skills to function fully for efficiency. This has drawn the attention of institutions, teachers and students and other stakeholder to ensure that graduates acquire the relevant skill and experience to effectively function in the various organizations and industries they find themselves in after graduation. Many have suggested that the

problem emanates from the lack of effectiveness of student's attachment and the processes involved.

The conventional system has encountered challenges due to diversity of factors including the following; late submission of student's assessment results from the industry of industrial attachment, the authenticity of the submitted assessment results, misplacement or even damage of the assessment form, and legibility of handwriting, just to mention a few.

This study therefore, aims at investigating the processes in assessing students on industrial attachment program at Cape Coast Technical Institute. The study seeks to identify challenges in assessing students on Industrial attachment program and also the possibilities of using an electronic/online application system with secured and widely accepted electronic controls to address the above-mentioned challenges.

1.3 GENERAL OBJECTIVES OF THE STUDY

On a broader level, the aim for this study is to investigate supervised industrial attachment assessment processes in technical and vocational institutions in Ghana, as well as the design and development of an electronic/online assessment system for supervised industrial attachment.

1.4 SPECIFIC OBJECTIVES OF THE STUDY

The following are the specific objectives of the study;

- i. To investigate the present system of assessment and to find the problems and challenges ii. To investigate the successes, benefits, challenges of electronic assessment processes in Technical and Vocational Institutions in Ghana.
- iii. To design a prototype electronic assessment application that addresses the challenges identified.

1.5 RESEARCH QUESTIONS

This research strives to answer the following questions;

- i. What are the problems and challenges in the present system of assessment?
- ii. What are the challenges in using electronic industrial attachment assessment processes in Technical and Vocational Institutions in Ghana?
- iii. How would a prototype online application effectively solve the challenges identified in the assessment processes of student on industrial attachment?

1.6 PURPOSE OF THE STUDY

The educational institutions are pressurized to add to their curriculum training in the workplace so that their students can gain field experiences hence the Supervised Industrial Attachment (SIA). This study seeks to investigate the processes involved in this industrial attachment and find out the challenges of assessing students on industrial attachment program in vocational and technical Institutions in Ghana. Based on responses from users, the study also assesses the possibility of designing an electronic / online assessment application system that addresses challenges identified with the manual assessment processes.

1.7 SCOPE OF THE STUDY

This study will be limited to vocational and technical Institutions and Industries in Ghana. The target population will be limited to Teachers and Students in Cape Coast Technical Institute in Cape Coast as a case study. The Study will also include heads of departments or operation's managers of some industries in Ghana and especially in the Cape Coast Municipality.

1.8 LIMITATIONS OF THE STUDY

Most of the industries and institutions in Ghana mostly do not practice or encourage industrial attachment. Most students often find themselves rather requesting institutions for industrial

attachment for which no official introductory or acceptance letters are requested or given hence not much data from the manual system was readily available to work with.

1.9 ORGANIZATION OF THE STUDY

The study is structured into five chapters as follows:

The first chapter highlights the background of the study, discusses some of the ways ICT is used around the world, as well as the need to incorporate ICT in the daily lives and educational system for Ghanaians, similar to what other nations are doing.

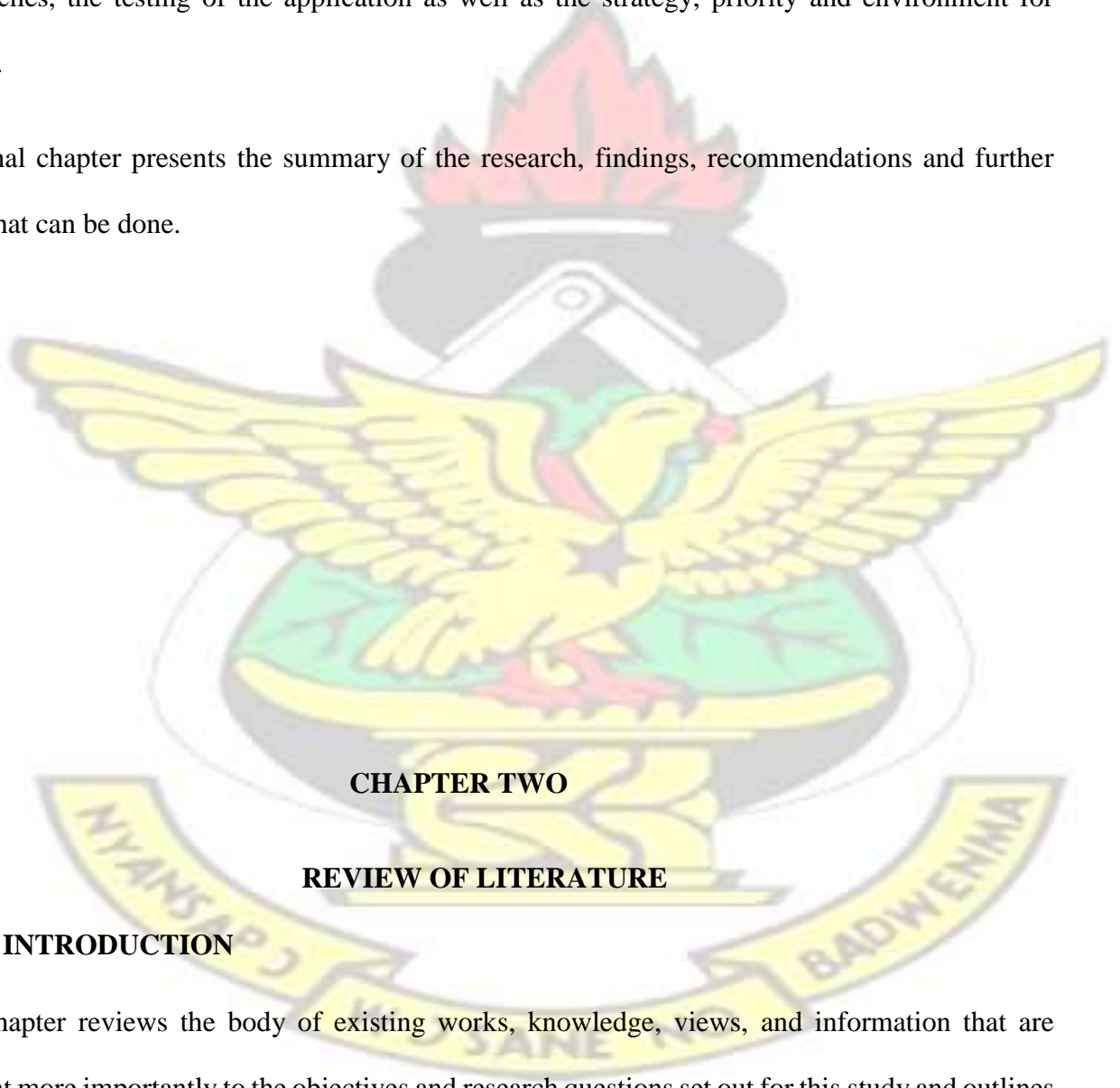
Under the Purpose of the study, the researcher tries to find out the challenges in assessing student on industrial attachment in Technical and Vocational Institutions and ways to provide an effective and efficient solution. In addition, the chapter states the targeted population and area under scope of study. The final part of the first chapter looks at the factors limiting the study.

The second chapter, forming literature review, considers some earlier work and views of other researches on ICT, importance of Industrial Attachment in some institutions around the world as well as Cape Coast Technical Institute as a case study for Technical and Vocational Institutions in Ghana. The chapter also takes a look at programs designed to help place students for attachment in Industries in the country. Furthermore, it highlights the processes and challenges of assessing students on industrial attachment.

Research Methodology, which is the third chapter states the research tools for data collection and the reason for using those tools. The chapter also states the population and sample size of the study. It further includes the method of data collection; techniques and sources of data, tools for collecting data, proposed framework, system design, system specification, simulation platform as well as limitations faced.

Data analysis and Results of Implementation which is the fourth chapter seeks to analyse the data from the respondents, discusses the outcomes and presents these outcomes in tables for easy understanding. This chapter further presents the implementation and testing stage of the research. It includes the specific technologies used for the server and client sides of the proposed application, some screen shots of the various processes of the proposed application, and explains the testing approaches, the testing of the application as well as the strategy, priority and environment for testing.

The final chapter presents the summary of the research, findings, recommendations and further work that can be done.



CHAPTER TWO

REVIEW OF LITERATURE

2.0 INTRODUCTION

This chapter reviews the body of existing works, knowledge, views, and information that are relevant more importantly to the objectives and research questions set out for this study and outlines

the scope of the study. This literature review would help put the research methodology into a better conceptual framework.

2.1 GENERAL OVERVIEW OF ICT

ICT consists of various technology tools and resources that are used in communication, creation, distribution, storing and management of information (Blurton, 1999). ICT however covers a variety of technologies and applications, that help in research and retrieval of information such as, cellular phones, network devices, radio, facsimile machine, television, satellite systems, software, video conferencing, distance learning applications, Internet access, electronic mail, online databases and library services.

The use of ICT globally covers every aspect of human life including governance, business, education, market, shares, productivity, commerce, trade, industry, agriculture and many others, (Nwosu, 2013). Recently, there has been a growing interest in how best to use computers and Internet applications to improve the effectiveness and efficiency in both formal and informal educational institutions at all levels. The general spread of ICT has resulted in the rapid advancement in social, political, technological and global economic transformation. It is also generally known that using ICT in any institution can boost the standard of teaching and learning efficiency.

The widespread advancement in ICT has changed our society from the ‘information technology age’ to a ‘knowledge age’ and has become an integral part of daily lives, with its use by students and staff of our educational institutions essentially even more of a necessity. It is therefore crucial and imperative that Technical and Vocational students use ICT as an aid in studying all their subjects, accomplishing their daily tasks and to be comfortable with the use of such new technology.

In doing this they will be comfortable at being part of the contemporary information age. (Yusuf,

2005). All over the world educational systems are under pressure to use ICTs, (Yuen et al., 2008). ICT and the information society involve acquiring, creating, sharing, delivering, disseminating, and supporting knowledge

2.2 INDUSTRIAL ATTACHMENT: CONCEPT AND RATIONALE

Industrial attachment as stated by Donkor, et al., (2009) is a structured and assessment-based program for learners to apply knowledge and skills acquired in school in a real work environment such as an organization or industry. Leong (2004) defines industrial attachment as on-the-job training where a student learns by actually doing the job using actual tools in a normal working environment. To make Industrial Attachment effective there is the need for the availability of qualified supervisors in a conducive environment for increased productivity (Abiodun,1999). Sivotwa et al (2013) also describe internship as an expert supervised process that transfers skills, knowledge, attitudes and information to learners to enhance their efficiency and effectiveness in their area of specialization. Gumbe et al., 2012 stated that according to the Industrial Training and Trade Testing Department (ITTTD) of Zimbabwe, Industrial Attachment is a process that moulds a student's knowledge, ability and understanding of information that every student requires to perform efficiently and effectively. Oguntimehin (2001) argues that if industrial attachment process is done in appropriate atmosphere, there is improvement in knowledge and skills which would lead to positive attitudes and understanding. Students would be better equipped to use tools and machines and the gap between theory and practice would be closed. In addition, the success of the Industrial Attachment program also depends largely on student's supervision by experienced and skilled supervisors (Arikewuyo, 1990).

2.3 BENEFITS OF INDUSTRIAL ATTACHMENT

Industrial attachment program cannot be taken for granted since it has a great effect on students when employed after completing school. Students need practical skills in securing and maintaining jobs, but competency is acquired on the job hence the need for students to develop these skills and competencies required. Industrial attachment is crucial in order to close the vast deference between what is in the school curriculum and what really happens in the industry. It gives students the opportunity to put into practice theoretical classroom knowledge and practical knowledge needed to execute a task. Industrial attachment also exposes students to advanced tools and equipment used in the industry which may not have being part of their curriculum. The industrial training will also help with student's readiness for the job market. The students will learn at first-hand about business problems and how best to resolve them (Haris 2013).

Leslie (1991) outlines the following benefits of industrial attachment to the students:

- i. An opportunity to examine the theoretical lessons learnt using practical approach and increase possibilities of integration.
- ii. An opportunity to acquire broader knowledge through an increase in consciousness of the available opportunities and gaining an understanding of the different areas of the industry sector.
- iii. Personal development, for instance, in communication skills, teamwork, self-discipline as well as composure and where relevant, working from home and learning to live and work independently without supervision.
- iv. Working experience of specific sector that will aid their decisions as to which sector to select on finalising the course.
- v. The opportunity to have had an exposure to the key areas of a firm's training programme; a reference that has more potential attractiveness from future employers than experience obtained from other areas.

These experiences may help students to identify quickly their ambitions and profession and also the opportunity to meet and network with industry professionals.

Furco (1996) also explained that Internship or industrial attachment engages the student in practical activities basically to equip them with hands-on experience that enriches their knowledge as is relevant to their study/course area. It also supports the intern in bridging the gap between the academic learning process in the institution and the actual reality. A Research has been carried out to find out the importance of practical experience to students however research on how the success of internship in transferring practical experiences acquired to the field of work needs follow up (Beard and Morton, 1999). Burnett (2003) stated that the best learning activities outside the classroom are through an internship attachment.

To add up to this view, Scott (1992) mentioned that for students to explore how suitable a particular job is, the best way is internship. Mohammad et al., (2004) is of the view that the engineering sector employers globally are being forced to seek competent engineers due to current economic challenges, hence the need for students to be equipped with the desired knowledge and skill by their future employers. Good qualification in academics, personal qualities, abilities and capabilities are some of the desired skills employer require new engineer to possess (Azami et al, 2009). University education develops generally the cognitive capabilities and assesses the individual's critical thinking capabilities through theory work (Holian, 2004). Majumder (2008) explains that education helps to develop a person generally and offers him/her a variety of opportunities to choose as a profession however industries mainly seek technical expertise with specific skill capable of fitting directly into the system. In addition to these, Cox and King (2006) states that employability is valued differently by different stakeholders. Employers expects new

graduates to have skill that will allow them to be absorb directly into their workforce without any further training.

An argument from Bennett (2002), however explains that employers respond more often to the changing market and hence they seek to employ workers who can quickly change and adapt to new skill and training therefore providing training to fresh graduates. There are suggestions and curricula for engineering education proposing a “new paradigm” which is “transformational and emancipatory”. It promotes critical reflection instead of being linear and prescriptive (Dehler et al., 2001).

Mafe (2010) and Munyoro et al (2016) argue that the “major benefits accruing to students who participate conscientiously in industrial attachment are the skills and competencies they acquire leading to their professional development”. These relevant operational skills become part of students on industrial attachment as life-long assets which no one can take away from them. Karisiddappa (2004) states that knowledge and skills acquired through attachment are internalized and become relevant when needed to perform jobs or functions. The student is however exposed to the environment they will eventually work in and this will enable them to see how their future professions are organized in practice. Gumbe et al (2012) state that student see industrial attachment as a way of helping them to improve their communication skills and better understanding of the operations of the organization.

Benefits of Industrial Attachment to Institutions, Organizations or Industries on the other hand according to Leslie (1991) include the following:

- i. the chance to employ intelligent, competent and willing persons
- ii. the prospect that the student will be more knowledgeable about non-line management practices, such as marketing
- iii. students

become prospective hires iv. placement can help in the graduate selection process and that experience gained on placements can reduce postgraduate training needs.

In support, the National Employer Leadership Council (1999) highlights that labour costs are reduced when students are employed after attachment which potentially increases productivity. Munyoro et al (2016) stated that, “students’ involvement imparts substantial advantages to educational institutions and their faculty members”. They explained that when there is increased contact and cooperation between the educators, libraries could enrich the input in course development and that will help the educators to be abreast with future development. There is an implied notion in industrial attachment that, whatever experience the learner gains will not be lost and benefits gained from this attachment programs among students, training institutions and industry or employers vary. Gaps are bridged between theory and practice in the case of the Industry while Institutions see the program as a means to clarify carrier objective and enhancing student’s job opportunities. (Munyoro et al, 2016).

When Industrial attachment program is successful, it generates invaluable publicity as students portray the good practices learnt bringing to bare the commitment and contribution of such industries to the local economy.

2.4 PROCESSES OF SUPERVISED INDUSTRIAL ATTACHMENT

The period for Supervised Industrial Attachment may vary depending on the Institution. According to Donkor et al. (2009), the student to undergo industrial attachment needs to go to the industrial attachment coordinator in his/her faculty for an introductory letter, fill out the detail and submit the forms back to his/her attachment coordinator before the beginning of the attachment programme. The University of Education, Winneba runs supervised industrial attachment program as an inclusive part of the curriculum for teacher education in technical and vocational program. The

supervised industrial attachment takes place between July and August for six weeks period. Students are supposed to look for an organization or industry convenient to them but must be accepted by their institution. Students on attachment are required to adhere to the industry's working hours and assessed in order to gain marks for industrial attachment work experience. Student's assessment is however based on student's performance during the industrial attachment programme after which a report on student's experience during the attachment period submitted by the student to the industrial attachment coordinator in the institution. Student's industrial attachment report must entail student's weekly activities during the industrial attachment period and it carries 60% of the total industrial attachment marks. The 40% marks is acquired through student's work performance during the industrial attachment period and assessed by the student's supervisor or operations manager in the industry of attachment. The institution assigns teachers to students in various industries and are expected to pay regular visits during the industrial attachment program. The regular visits by the teachers is to make sure students undergoing industrial attachment are engaged in work experiences relevant to their occupational area. These regular visits also help to reduce the possibilities of the industry using students for cheap labour. The visits from the institutions also help to monitor the progress of the students, meet students, share ideas and have discussions with the staff and supervisors of the industry on challenges of any of the stakeholders. Furthermore, these visits help to bridge the gap and foster good relationship between the industry and institutions, provide opportunity to develop research and help teachers to be updated with current activities in industries.

The industry assigns a staff (preferably professional in the student's area of specialization) to supervise, mentor and assess the student. The industrial attachment coordinator is a member of staff of the institution in charge of all issue concerning industrial attachment such as; record

keeping, pre-attachment orientation for students, keeps contacts with students and industry, and general communication about industrial attachment, (Donkor et al. 2009)

At the University of Namibia (UNAM), industrial training for students also runs for a minimum of six weeks. Assessment of students on industrial attachment is based on a log book of daily recorded activities of student, final report written by student, industrial training supervisor's report, Feedback Report from the industry of the student's attachment programme and a report from the visiting teacher or lecturer from the institution who was assigned to regularly visit students (<http://www.unam.edu.na/faculty-of-engineering-and-it/> Industrial Attachment). Ghana Student Industrial Attachment Programme (GSIAP), a career finder programme has been designed and officially launched in Kumasi to assist university and polytechnic students in Ghana to find and develop their professions through industrial attachment in industries and organizations in the country. This programme comes with many objectives, some of which include; expose students to world of work as they strive towards their professions, enables students to acquire the necessary work experiences in industries and organizations in Ghana, and also to put together academic and industrial experiences. GSIAP focuses initially on industrial attachment in environmental protection and sanitation. GSIAP is implemented with collaboration with the Ministry of Local Government and Rural development and supported by Zoomlion Ghana Limited. Students will benefit from training in environmental and sanitation practices and will serve as interns in public education in their communities within their district to create awareness in behavioural change and local sustainable sanitation. (Ghana News Media, 2013)

The Industrial Attachment System Operation in Tumba College of Technology (TCT) in Kigali, Rwanda requires that, the student on attachment would work in the organization or company's office for the entire duration of his or attachment programme. The student on attachment

is assigned a project to work on Alternative Energy (AE), Electronics & Telecommunication (ET) or Information Technology (IT) and directly supervised by the company's trained staff who is the Training Supervisor. The student on industrial attachment in a company is expected to abide by the company's code of ethics, dress code, and benefit from an allowance determined by the company. A staff from Tumba College of Technology (TCT), referred to as the Tumba College of Technology (TCT) Supervisor coordinates with the Training Supervisor of the company supervise, mentor and grade the student's overall performance. (Tumba College of Technology, 2009).

Furthermore, the student is to maintain a logbook in which he/she needs to document weekly summary of tasks and assignments given during attachment and vetted by the training supervisor according to the requirements and submitted together with his or her industrial attachment report. The Training Supervisor in the industry and the TCT Supervisor from the institution jointly evaluates the student and also provide the student with any help required. The student is evaluated on communicative skills, teamwork, initiative, attitude, productivity and reliability by the training supervisor. (Tumba College of Technology, 2009)

In Koforidua Technical University, all first and second year students' Industrial Attachment procedure is as follows;

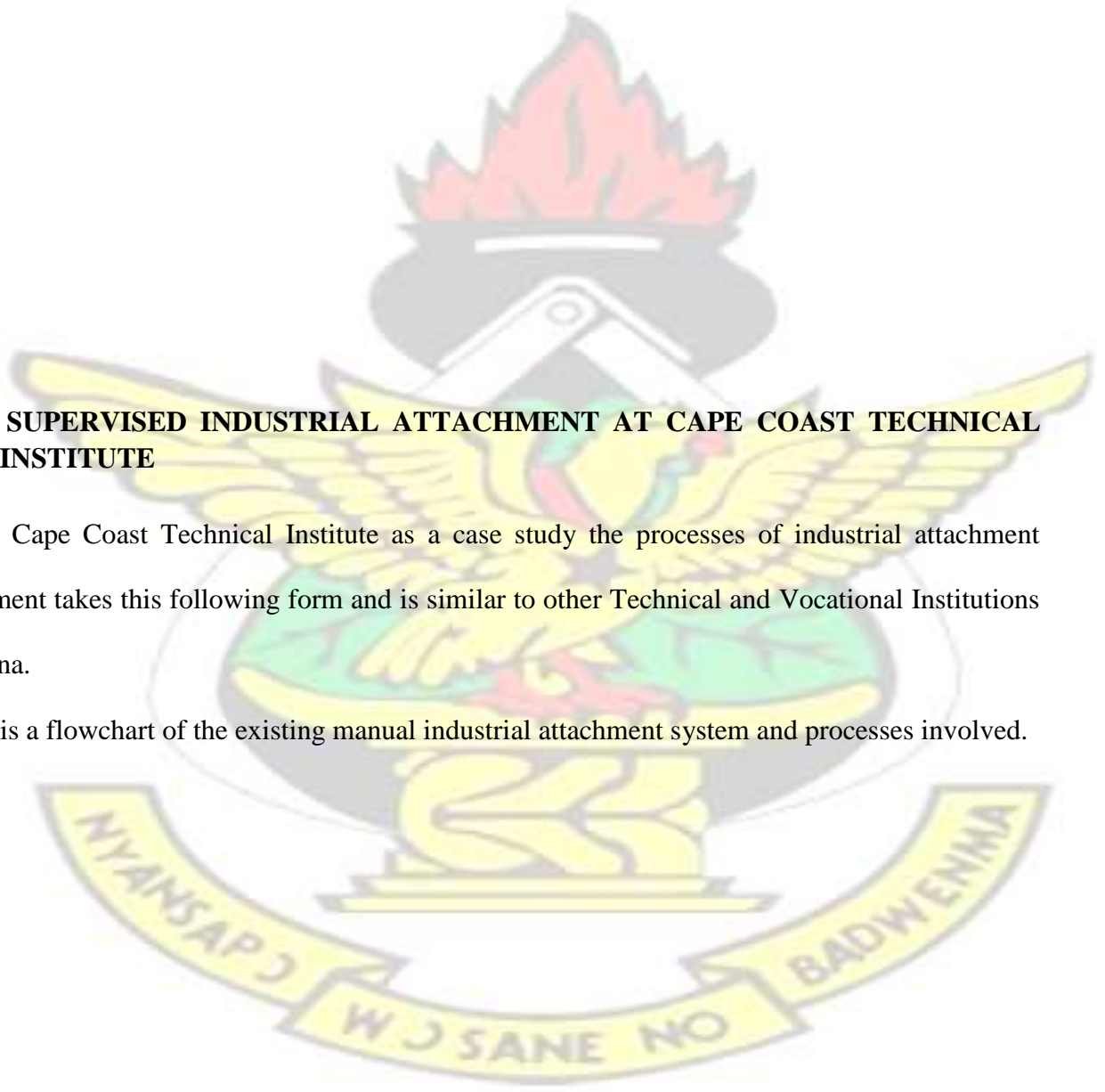
- i. Step 1: Students acquire and submit their Acceptance letters/Assurance Note from industry/organization to the Industrial Liaison office.
- ii. Step 2: Students are to purchase their log books at the Bookshop (Administration block).
- iii. Step 3: Students' Confidential Assessment Form; would be provided at the bookshop in addition to the log book.

- iv. Step 4: On assumption of duty, students will fill the Assumption of Duty Form Online at koforiduapoly.edu.gh/vira/assumption within the first week.
- v. Step 5: Lecturers / Supervisors will be sent to supervise all students on attachment at their various locations on a scheduled date.

2.5 SUPERVISED INDUSTRIAL ATTACHMENT AT CAPE COAST TECHNICAL INSTITUTE

Taking Cape Coast Technical Institute as a case study the processes of industrial attachment assessment takes this following form and is similar to other Technical and Vocational Institutions in Ghana.

Below is a flowchart of the existing manual industrial attachment system and processes involved.



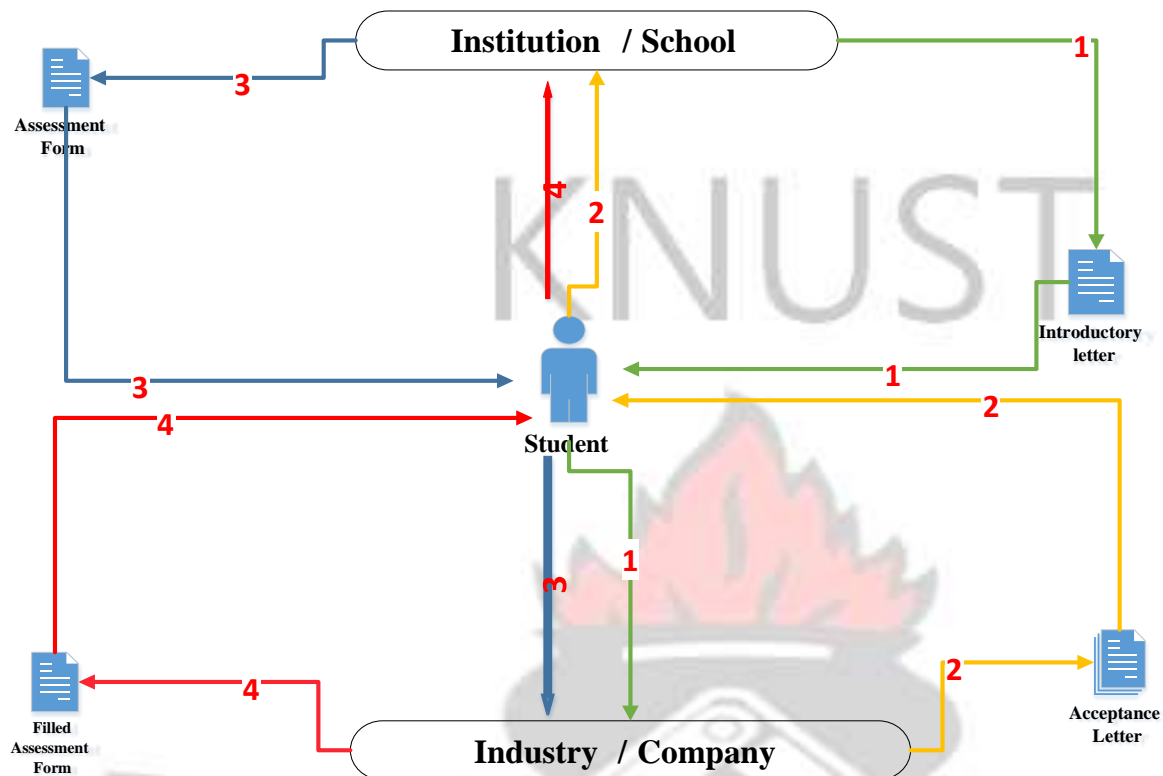


Figure 2.1 Flowchart of Existing Model

From the flowchart Figure 2.1, all processes marked “1” with **green arrow** describes the release of an introductory letter from the Institution;

- i. The student (ready for attachment) collects an introductory letter (Appendix E) from his / her institution’s attachment coordinator on the supervised industrial attachment programme.
- ii. The student then sends this letter to the Industry of his/her choice for acceptance.

The second process “2” with **yellow arrow** begins when the industry accepts the student into their attachment programme.

- i. The industry / company then issues a letter of acceptance to the student.
- ii. The student then sends this acceptance letter back to his / her institution.

The third process “3” with blue arrows begins after the institution receives the acceptance letter from the industry;

- i. The institution prepares an assessment form (Appendix F) which they require the industry / company to use to assess the student during and after his / her attachment.
- ii. This form is then sent to the industry / company through the student attachment to commence.

The fourth and final process “4” with red arrows begins when the student commences the industrial attachment programme.

- i. At the industry the Operations Manager assesses the student by selecting the required grade for each competence and writes comments on the student’s assessment report at the end of the student’s attachment period.
- ii. The Industrial Attachment Assessment Report is then signed, enveloped and given to the student to submit to his / her Institution’s Attachment coordinator for onward processing by the Institution.

Supervised Industrial attachment programme in this institution lasts for six weeks during students’ long vacation between August and September. Although it is credit bearing it is not taken too seriously by all parties involved.

2.6 CHALLENGES OF ASSESSING STUDENTS ON INDUSTRIAL ATTACHMENT

Carlson (2002) identified a few challenges facing the students on industrial attachment. He indicated that;

- i. There is stiff competition among students seeking placements from their colleagues from other universities.
- ii. In some male-dominated work environments such as engineering field there is gender bias against female students for placements since that field is male dominated.
- iii. There is no clear policy on supplementary financial support for students on attachment to help cushion their transport and related costs.
- iv. Organisations have high expectations for students who have been accepted on the attachment program in the organisation or industry.

According to Rothman (2007) and Cannon and Arnold (1998) there has being complains of industries or employers using interns as cheap labour. Supervision of interns has been a problem as there is lack of qualified staff to supervise them (Tackett et al., 2001; Gault et al., 2000). Tackett et al. (2001) also stated that students suggest that feedback from interns and industry should be carefully examined and the industrial attachment program modified accordingly. Bukaliya and Rupande (2013) further added that in industries where profit making is the primary motive, operations managers have no time to properly supervise the interns hence mentoring process is compromised hence quality work not done.

2.7 CONCLUSION

The related literature focused on Information and Communication Technology in general and its relation to education. This chapter further considered some definitions of industrial attachment, importance and benefits of industrial attachment program from various sources, some processes of supervised industrial attachment, challenges of assessing students on industrial attachment, and industrial attachment processes at Cape Coast Technical Institute.

KNUST

The logo of Kwame Nkrumah University of Science and Technology (KNUST) is centered in the background. It features a yellow eagle with its wings spread, perched on a green globe. Above the eagle is a red flame. The entire emblem is set against a white background with a faint circular border.

CHAPTER THREE RESEARCH METHODOLOGY

3.0 INTRODUCTION

This section explains the techniques employed, target population, sample used for the study, data collection methods, the data collection instruments used, data analysis methods used, model used in the existing system and a proposed framework for assessing students.

3.1 STUDY POPULATION

A survey was carried out in order to elicit from users of the current system the need or otherwise for a new system and what the requirements should be. The study focused on students and teachers of Cape Coast Technical Institute as well as managers of some Industries in Ghana such Toyota Ghana, Electricity Company of Ghana, Architectural and Engineering Services Limited, and some privately-owned construction companies and tailoring shops all in Cape Coast.

3.2 STUDY SAMPLE

The sample size for this study was hundred (100), consisting of forty (40) Teachers, and forty (40) Students from Cape Coast Technical Institute who were chosen at random as well as twenty (20) managers from some industries listed above.

3.3 DATA COLLECTION METHODS

3.3.1 SAMPLING TECHNIQUES

The simple random sampling technique and interviewing were employed so as to give each member of the sample population an equal opportunity of being part of the data collection exercise.

3.3.2 DATA SOURCE

Both primary and secondary data sources were adopted. The fundamental data sources included questionnaires administered to selected members of the population. It was collected through the use of both open-ended and close-ended questions. The secondary data was derived from journals, books, the internet, other research works and both published and yet to be circulated articles.

3.3.3 RESEARCH TOOLS

Questionnaires was the primary tool for collecting primary data. These were in two sections. Section A sought to obtain user's personal information, while section B sought the views of users on the following;

- i. Viability of industrial attachment in Technical and Vocational Institutions in Ghana.
- ii. Challenges in Electronic/online Industrial Attachment assessment in Ghana.

The questions were semi-structured; comprising both open-ended and close-ended questions. The closed ended question has options for the respondents to choose from while the open-ended questions allowed the respondent to state their own answers or opinions. Using the semi-structured questions helped in keeping the study focused on its primary objectives while allowing respondents to state their desired answers/opinions to this research. All questionnaires that were distributed were completely answered and retrieved.

Another tool used for the data collection was interviews. Interviews were used to guide respondents in answering the questions on the questionnaires.

After analysing the results of the survey and being convinced that a new electronic/online system was called for, the researcher proposed a framework for Electronic/online of students on Industrial attachment programs in Technical and Vocational institutions in Ghana and Proposed a prototype application based on the proposed framework.

Data gathered from the field survey was analyzed using the Statistical Package for Social Sciences (SPSS) software Version 21.0. This was used to analyze the data so as to get a clear picture of the various responses obtained from the administration of the questionnaire.

3.4 PROPOSED FRAMEWORK

The proposed application is called Electronic/Online Industrial Attachment Assessment System (EOIAAS) which consist of four (4) interacting components. These components are Application Server; Database Server; Mail Server; Workstation (Operations Manager); Workstation (Students). Each of these components can achieve a certain level of security, efficient memory and processor usage. It eliminates the manual process of assessment, submission, delay and lack of integrity involved in Supervised Industrial Attachment (SIA) processes.

3.4.1 SYSTEM MODEL

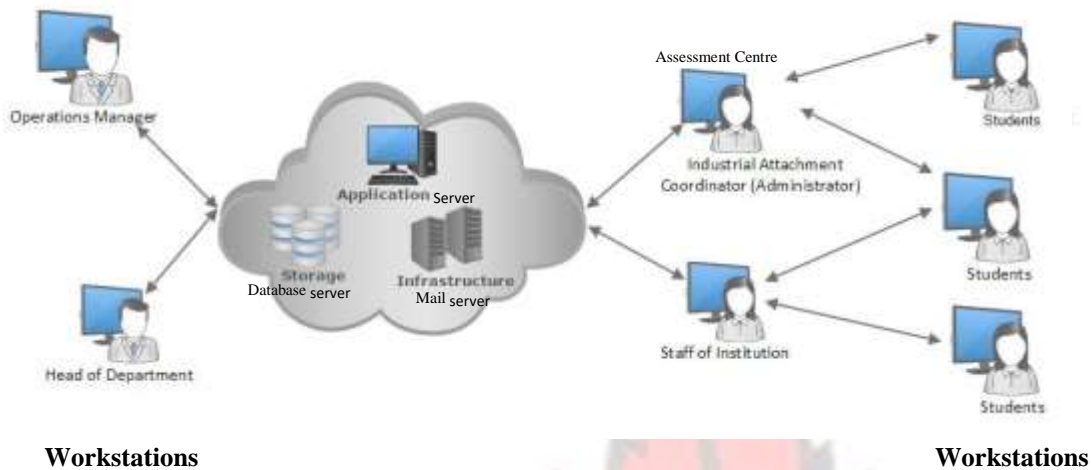


Figure 3.1 A Model of the Proposed System

From the system model, the application server runs the online / electronic industrial attachment assessment system, all data and information capturing goes on here. Students are registered onto the system by their institution's Industrial Attachment Coordinators and attachment assessment marks are also captured and recorded onto the same application by the industry's head of department or operations manager. All data captured on students, institutions and industries are recorded and stored in the database server. All outgoing information in the form of email in this model is controlled by the mail server.

After the industry has accepted a student's industrial attachment introductory letter from the institution, the attachment coordinator logs onto the system and creates a username and password and adds the students ID number, this information is then emailed to the industry's Operations Manager. The operations manager can log into the industrial attachment system, enters the students ID number and is able to view the student's record as well as grade the student during their attachment period. These grades from the student's industrial attachment is used by the staff of the institution as part of the student's overall marks for that academic period.

3.4.1.1 FUNCTIONS / ROLES OF THE INTREACTIVE COMPONENTS

1. User/Operations Manager
 - a. Log on to the system
 - b. Enter Username and Password
 - c. Select students to assess
 - d. Assess student
 - e. Submit assessment report
2. Database
 - a. Database decryption message sent to it.
 - b. Verifies User account, Username and Password of user (Operation Manager, Assessment Coordinator).
 - c. Checks selected student with his/her assessment.

3.5 SYSTEM DESIGN OF THE MODEL

The system is designed based on the Client/Server architecture that is deployed on web and database servers over the World Wide Web. This comprises of the user interface module and administrative module. A central system known as server stores all assessment records in a database which links all the individual interconnected processes within the system.

3.6 SYSTEM SPECIFICATION

The following minimum system specification are required to implement the proposed application.

- Processor: Pentium IV Intel Processor
- Processor Speed: 2.10 GHz
- Random Access Memory: 3.00GB

- Instruction Set: 32/64 – bit Operating System
- Hard Drive: 150GB
- CD ROM Drive: 52X
- USB: 2.0
- Network Interface Card (NIC)
- Operating System: Windows XP/Visa/Windows 7 Ultimate/ Windows 8 / Windows 10

3.7 SIMULATION PLATFORM

This section describes the tools for implementation, programming language and framework for the proposed application called Electronic/Online Industrial Attachment Assessment System (EOIAAS).

3.7.1 TOOLS FOR IMPLEMENTATION

3.7.1.1 APPLICATION SERVER- APACHE SERVER 2.4.9

Apache Server 2.4.9 was used. Apache httpd was launched in 1995 and was the most popularly web server since April 1995. It is a free open source cross-platform web server which was developed and is maintained by an open community of developers within the Apache Software Foundation.

This server provides a structured process for developing a high-quality application that makes features available faster than ever before. Apache supports a variety of features, many of which we implemented as compiled modules which extend its core functionalities which ranges from server-side programming language support to authentication schemes. Apache has extensive documentation, migration tool support and surety support.

3.7.2 LANGUAGE AND FRAMEWORK

3.7.2.1 PHP

PHP version 5.5.12 was used. Hypertext Preprocessor (PHP) is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML. What distinguishes PHP from others like client-side JavaScript is that the code is executed on the server (PHP) is known as a Server-Side Scripting Language. This means all of the source code stays on a server), generating HTML which is then sent to the client. The client would receive the results of running that script but would not know what the underlying code was. You can even configure your web server to process all your HTML files with PHP, and then there's really no way that users can tell what you have up your sleeve.

3.7.2.2 DATABASE AND phpMyAdmin

MySQL is a freely available open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). SQL is the most popular language for adding, accessing and managing content in a database. It is most noted for its quick processing, proven reliability, ease and flexibility of use, hence the use of MySQL version 5.6.17.

phpMyAdmin is a free and open source tool written in PHP intended to handle the administration of MySQL with the use of a web browser. It can perform various tasks such as creating, modifying or deleting databases, tables, fields or rows; executing SQL statements; or managing users and permissions. PhpMyAdmin is one of the most popular applications for MySQL databases management. MySQL in Wamp 2.5 was used.

3.7.2.3 DESIGN, LOOK AND FEEL (CSS, Google Code)

HTML (the Hypertext Markup Language) and CSS (Cascading Style Sheets) are two of the core technologies for building Web pages. HTML provides the structure of the page, CSS the (visual and aural) layout, for a variety of devices. Cascading Style Sheets (CSS) is a style sheet language used for describing the look and formatting of a document written in a markup language. CSS is a style language that defines layout of HTML documents. For example, CSS covers fonts, colours, margins, lines, height, width, background images, advanced positions and many other things. HTML can be (mis-)used to add layout to websites.

Google Code (code.google.com) is Google's site for developer tools, APIs and technical resources. The site contains documentation on using Google developer tools and APIs—including discussion groups and blogs for developers using Google's developer products. Google is an American multinational technology company specializing in Internet-related services and products. These include online advertising technologies, search, cloud computing, and software.

3.8 LIMITATION OF THE STUDY

The minor limitation of this research will be the researcher not able to use a large sample size because there are only ten regional technical and vocational institutions. Data was sampled from Cape Coast Technical Institute and some Industries. The researcher was unable to use live data and therefore depended on simulations especially at the application of the development stage. The lack of material resources also contributed highly to the study's limitation since the cost of materials (stationary, secretarial and transportation) was high.

3.9 SUMMARY

In summary, this chapter looked at the study population from where data was sourced. Forty (40) Students and forty (40) Teachers of Cape Coast Technical Institute as well as twenty (20)

Operational Managers from some Industries (Toyota Ghana, Architectural and Engineering Services Limited, etc.)

Simple random sampling technique was used. Some students were approached and briefed on the project and handed the questionnaire to complete. Open-ended and close-ended questionnaires were administered to collect primary data while the secondary data was derived from books, journals, the Internet, other research works as well as published and unpublished articles.

The data collected was then compiled and processed to get an idea on the views of the sampled respondents concerning the proposal and implementation of the Electronic Online Assessment Attached system.



CHAPTER FOUR

DATA ANALYSIS AND RESULTS OF IMPLEMENTATION

4.0 INTRODUCTION

This research was done using a sample of 100 respondents to assess electronic assessment of students on supervised industrial attachment in Technical and Vocational institution. This chapter summarized in table forms the responses obtained from questionnaires distributed to the three different groups of respondents.

4.1 PERSONAL INFORMATION OF RESPONDENT

Background information about the respondents, questions about their gender, age and educational level is presented in Appendix D. Their level of knowledge in Information Technology was asked.

Below are the results obtained.

Table 4.1 KNOWLEDGE IN IT (TEACHERS)

	Frequency	Valid Percent
HIGH	18	45.0
INTERMEDIATE	13	32.5
BASIC	9	22.5
Total	40	100.0

Source: Field survey, June, 2014

From the Table 4.1, it can be seen that all the respondents (Teachers) making up 100% have at least enough basic IT knowledge to interact with the proposed system comfortably.

Table 4.2 KNOWLEDGE IN IT (OPERATIONAL MANAGERS)

	Frequency	Valid Percent
HIGH	2	10.0
INTERMEDIATE	5	25.0
BASIC	13	65.0
Total	20	100.0

Source: Field survey, June, 2014

This group of respondents from Table 4.2 representing operational managers have majority with basic knowledge in Information Technology. Hence by this statistic, 100% of the Operational

Managers have at least basic knowledge in IT to be able to interact with the Electronic/Online assessment system with little or no help.

4.2 VIABILITY OF INDUSTRIAL ATTACHMENT

Table 4.3 INDUSTRIAL ATTACHMENT MARKS USED AS PART OF END OF TERM ASSESSMENT (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	7	17.5
AGREE	14	35.0
NEUTRAL	9	22.5
DISAGREE	6	15.0
STRONGLY DISAGREE	4	10.0
Total	40	100.0

Source: Field survey, June, 2014

From the Table 4.3, it is seen that a majority of 52.5% (Strongly Agree 17.5 + Agree 35.0) of this group of respondents (Teacher) agree that student's marks for Industrial Attachment should be used as part of their end of term reports. This will help make students and teachers take the industrial attachment processes serious and make it effective.

Table 4.4 THE INSTITUTION RECEIVE STUDENT'S INDUSTRIAL ATTACHMENT ASSESSMENT PROMPTLY (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	7	17.5
AGREE	13	32.5
NEUTRAL	7	17.5
DISAGREE	10	25.0

STRONGLY DISAGREE	3	7.5
Total	40	100.0

Source: Field survey, June, 2014

This information from Table 4.4 implies that 50% (Strongly Agree 17.5 + Agree 32.5) of this group of respondents (Teachers) are of the view that student's assessment marks for Industrial Attachment reach the school promptly. The rest of the 50% may not have detailed knowledge of whether assessment results reach the institution promptly. With the online assessment system student's result will get to the institution with seconds and hence very efficient.

Table 4.5 THE STUDENT'S INDUSTRIAL ATTACHMENT ASSESSMENT/MARKS ARE RETURNED PROMPTLY (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	1	5.0
AGREE	9	45.0
NEUTRAL	5	25.0
DISAGREE	5	25.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

Respondent in this group indicated how promptly student's industrial attachment assessment / mark were returned to the institution. This is shown in Table 4.5 and may imply that respondents have no idea of when the assessment marks reach the institution hence the 50% response.

Table 4.6 ATTACHMENT RESULTS TRUE PICTURE OF STUDENT'S EXPERIENCE (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	8	20.0
AGREE	17	42.5

NEUTRAL	8	20.0
DISAGREE	5	12.5
STRONGLY DISAGREE	2	5.0
Total	40	100.0

Source: Field survey, June, 2014

From the Table 4.6 the researcher wanted to find out whether the attachment results from the industry shows a true picture of student's attachment experience. This shows that a total of 62.5% (Strongly agree 20.0% + Agree 42.5%) of Teachers see a true reflection of student's performance in Industrial Attachment. Other Teachers may not be directly involved with the industrial attachment hence do not know or disagree with the assertion.

Table 4.7 STUDENT'S ASSESSMENT MARKS SENT TO THE INSTITUTION ARE SECURED (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	0	0.0
AGREE	8	20.0
NEUTRAL	5	12.5
DISAGREE	18	45.0
STRONGLY DISAGREE	9	22.5
Total	40	100.0

Source: Field survey, June, 2014

Respondents responded to the question 'student's assessment marks sent to the Institutions are secured'. Majority of respondents totalling 67.5% (Disagree 45.0% + Strongly disagree 22.5%) were of the opinion that student's assessment mark submitted to the institution was not secured. This is shown in Table 4.7. The results from this group of respondents implies that most of the

Teachers are aware the results submitted by their students were not very secured and may need a well secured system to work with.

Table 4.8 STUDENT’S ASSESSMENT MARKS SENT TO THE INSTITUTION ARE SECURED (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	2	10.0
AGREE	6	30.0
NEUTRAL	0	0.0
DISAGREE	6	30.0
STRONGLY DISAGREE	6	30.0
Total	20	100.0

Source: Field survey, June, 2014

From the Table 4.8, a total of 40% (Strongly agree 10.0% + Agree 30.0%) of respondent agreed that student’s assessment mark they send to the Institution is secured. 60% (Disagree 30.0% + Strongly disagree 30.0%) in total of respondents disagreed to the statement that student’s assessment marks sent to the Institution are secured. This implies that the majority of Operations Managers have doubts about the security of the assessment result sent through the students.

Table 4.9 STUDENTS CAN CHANGE THEIR ASSESSMENT MARKS. (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	20	50.0
AGREE	15	37.5
NEUTRAL	5	12.5
DISAGREE	0	0.0
STRONGLY DISAGREE	0	0.0

Total	40	100.0
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Source: Field survey, June, 2014

From the Table 4.9, a total of 87.5% (Strongly agree 50.0% + Agree 37.5%) of respondent agreed to the possibility of students altering their mark on the assessment sheet given them to submit to their Institution. 12.5% of respondents were not sure and hence remained neutral however no respondent disagreed to the possibility of students changing their marks. This implies that majority of teachers are aware student's marks are not well secured and might prefer a well secured system

**Table 4.10 STUDENTS CAN CHANGE THEIR ASSESSMENT MARKS.
(OPERATIONS MANAGER)**

	Frequency	Valid Percent
STRONGLY AGREE	7	35.0
AGREE	8	40.0
NEUTRAL	2	10.0
DISAGREE	3	15.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

From this category of respondents in Table 4.10, 75% (Strongly agree 35.0% + Agree 40.0%) of the total respondents stated that students can change their assessment marks in the process of sending assessment marks to their institution. This implies that a majority of Operations Managers see a possibility of the assessment marks being altered in transit knowing how smart students can be.

Table 4.11 ASSESSMENT FORM CAN GET LOST OR DAMAGED. (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	25	62.5
AGREE	15	37.5
NEUTRAL	0	0.0

DISAGREE	0	0.0
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

From the Table 4.11, 100% (Strongly agree 62.5% + Agree 37.5%) of the respondents agreed to the possibility of the assessment forms given to students to submit to their institution getting lost or damaged. This implies that there is a huge security problem when it comes to submission of assessment forms.

Table 4.12 ASSESSMENT FORM CAN GET LOST / DAMAGED. (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	8	40.0
AGREE	10	50.0
NEUTRAL	1	5.0
DISAGREE	1	5.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

From the Table 4.12, a total of 90% (Strongly agree 40.0% + Agree 50.0%) of respondent agreed that the assessment marks can get lost or damaged. This may make these respondents lose interest in assessing students on industrial attachment.

4.3 CHALLENGES OF FILLING ATTACHMENT FORMS

To determine the possible problems that can hinder Electronic / Online assessment of student on industrial attachment program, some closed ended questions were posed, example: "Access to internet in your Institution / Industry is high". This was to enable the researcher to measure the

level of internet and computer access for filling online assessment forms. Below are the tables of the responses received from the field survey.

Table 4.13 INTERNET ACCESS IS HIGH IN YOUR INSTITUTION

	Frequency	Valid Percent
STRONGLY AGREE	15	37.5
AGREE	8	20.0
NUETRAL	5	12.5
DISAGREE	2	5.0
STRONGLY DISAGREE	10	25.0
Total	40	100.0

Source: Field survey, June, 2014

From Table 4.13 it can be seen that a total of 57.5% (Strongly agree 37.5% + Agree 20.5%) representing majority of the respondents agreed that Internet access is high in the institution. This implies that a greater number of respondents can have access to the Internet to view student's results.

Table 4.14 INTERNET ACCESS IS HIGH IN YOUR INDUSTRY

	Frequency	Valid Percent
STRONGLY AGREE	12	60.0
AGREE	4	20.0
NUETRAL	0	0.0
DISAGREE	0	0.0
STRONGLY DISAGREE	4	20.0
	20	100.0

Total

KNUST

Source: Field survey, June, 2014

From the Table 4.14, 80% (Strongly agree 60.0% + Agree 20.0%) agreed that Internet access is high in their industry. This implies that a majority of respondents can rely on internet access which is readily available to work with.

Table 4.15 COMPUTER ACCESS IS HIGH IN YOUR INSTITUTION

	Frequency	Valid Percent
STRONGLY AGREE	16	40.0
AGREE	7	17.5
NEUTRAL	6	15.0
DISAGREE	9	22.5
STRONGLY DISAGREE	2	5.0
Total	40	100.0

Source: Field survey, June, 2014

From this group of respondents, Table 4.15 shows that a total of 57.5% (Strongly agree 40.0% + Agree 17.5%) indicated that computer access is high in their Institution, implying that the Teachers and Industrial Attachment Coordinators / Administrators can access and process student's attachment report and communicate with the Industries easily.

Table 4.16 COMPUTER ACCESS IS HIGH IN YOUR INDUSTRY

	Frequency	Valid Percent
STRONGLY AGREE	12	60.0
AGREE	8	40.0
NEUTRAL	0	0.0
DISAGREE	0	0.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

To find out about the level of computer access in the Industry, 60% of the respondents agreed while the remaining 40% strongly agreed that computer access in their Industry was high shown in Table 4.16. This shows that all the respondents were of the view that there is high level of computer access hence students can be assessed and reports submitted online promptly.

Table 4.17 ONLINE SYSTEM OF ASSESSMENT FOR INDUSTRIAL ATTACHMENT IS PREFERRED (STUDENTS)

	Frequency	Valid Percent
STRONGLY AGREE	2	5.0
AGREE	18	45.0
NEUTRAL	10	25.0
DISAGREE	8	20.0
STRONGLY DISAGREE	2	5.0
Total	40	100.0

Source: Field survey, June, 2014

From the Table 4.17, it is seen that a higher number of respondent representing 45% agreed and 5% strongly agreed that online system of assessment for industrial attachment was preferred to the manual system. The other half who disagreed might not have in depth knowledge about the online industrial attachment assessment system and therefore will need more orientation.

Table 4.18 ONLINE SYSTEM OF ASSESSMENT FOR INDUSTRIAL ATTACHMENT PROGRAM WOULD BE PREFERRED (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	12	30.0
AGREE	16	40.0
NEUTRAL	7	17.5
DISAGREE	5	12.5
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

From Table 4.18, a total of 70% (Strongly agree 30.0% + Agree 40.0%) of respondents agreed to the assertion that an online system of assessment of student on industrial attachment is preferred.

The majority of respondents (Teachers) from this statistic are in favour of the Online Assessment System. This shows that they are looking forward to the Online Assessment System.

Table 4.19 ONLINE SYSTEM OF ASSESSMENT FOR INDUSTRIAL ATTACHMENT PROGRAM WOULD BE PREFERRED (OPERATIONAL MANAGERS)

	Frequency	Valid Percent
STRONGLY AGREE	0	0.0
AGREE	4	20.0
NEUTRAL	8	40.0
DISAGREE	8	40.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

From the Table 4.19, 20% of respondents agreed but 40% disagreed that online system of assessment for industrial attachment program was preferred. The rest of the respondents representing 40% remained neutral. The percentage of respondents not in favour and neutral may

be as a result of the respondent's fear of the Online system creating additional work or responsibility for them since they may not have in-depth idea of how simple the system / process is.

Table 4.20 ONLINE ASSESSMENT INFORMATION OF STUDENT ON INDUSTRIAL ATTACHMENT CAN BE EASILY ACCESSED (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	18	45.0
AGREE	15	37.5
NEUTRAL	5	12.5
DISAGREE	2	5.0
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

82.5% (Strongly agree 45.0% + Agree 37.5%) of the respondent agreed that online assessment of students on industrial attachment can be easily accessed. Only 5% disagreed with the assertion while 12.5% remained neutral. This can be seen in Table 4.20. This implies that a majority of this group of respondents (Teachers) agree the student's online assessment can be easily accessed.

Table 4.21 ONLINE ASSESSMENT INFORMATION OF STUDENT ON INDUSTRIAL ATTACHMENT CAN BE EASILY ACCESSED (OPERATIONAL MANAGERS)

	Frequency	Valid Percent
STRONGLY AGREE	4	20.0
AGREE	8	40.0

NEUTRAL	0	0.0
DISAGREE	8	40.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

From Table 4.21, 60% (Strongly agree 20.0% + Agree 40.0%) of the respondent agreed with the view that online assessment of student on industrial attachment can be easily accessed. Majority of the respondents agreed that there is easy access to online assessment although not many of them preferred it.

Table 4.22 THE AUTHENTICITY OF STUDENT'S MARKS CAN BE GUARANTEED ONLINE (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	2	5.0
AGREE	23	57.5
NEUTRAL	5	12.5
DISAGREE	10	25.0
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

According to the respondents in this group, 62.5% (Strongly agree 5.0% + Agree 57.5%) of them agreed to the assertion that the authenticity of student's marks can be guaranteed online. This is show in Table 4.22. This implies that a majority agree that the authenticity of student's assessment marks is guaranteed online.

Table 4.23 THE AUTHENTICITY OF STUDENT'S MARKS CAN BE GUARANTEED ONLINE (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	4	20.0
AGREE	4	20.0
NEUTRAL	0	0.0
DISAGREE	8	40.0
STRONGLY DISAGREE	4	20.0
Total	20	100.0

Source: Field survey, June, 2014

From the table 4.23, the statistics show that a total of 40% (Strongly agree 20.0% + Agree 20.0%) of respondent (Operational Managers) are in agreement of the guaranteed authenticity of marks being online as against a total of 60% (Strongly disagree 20.0% + Disagree 40.0%). This may be due to their lack of understanding of the level of security of the online system.

Table 4.24 THE OPERATION'S MANAGER IN THE INDUSTRY IS WILLING TO FILL STUDENT'S ATTACHMENT ASSESSMENT ONLINE

	Frequency	Valid Percent
STRONGLY AGREE	4	20.0
AGREE	0	0.0
NEUTRAL	4	20.0
DISAGREE	8	40.0
STRONGLY DISAGREE	4	20.0
Total	20	100.0

Source: Field survey, June, 2014

From the above Table 4.24, A total of 20% of respondents agreed to Operations Manager's willingness to fill student's industrial attachment assessment form online. 60% (Strongly disagree 20.0% + Disagree 40.0%) of the total respondents however disagreed while another 20% of the respondent remained neutral. This might be due to the fear of doing extra or complicated work

which they don't have full knowledge of. They may have full understanding and see the simplicity of it when they are orientated on the entire system.

4.4 RESULTS AND IMPLEMENTATION

4.4.1 INTRODUCTION

The main purpose of this research was to study the existing assessment system and to provide a modern computerized approach for assessing students. This approach aims to be more secure, fast and easily accessible.

The various methods, tools and applications used in the research for implementation are dealt with in this chapter. Also, a discussion on the implementation and various use case scenarios and tests that were carried out.

4.4.2 USER INTERFACE (UI)

The Graphic User Interface (GUI) consists of a Client-Side GUI, and a Database.

4.4.3 CLIENT-SIDE GUI

Client-side GUI has been created for the following:

1. Contact form – for users to contact the Institution
2. Login form – for users to log in
3. Add students, and companies for Industrial attachment
4. Assess students, and view assessed students report
5. Submit student's industrial report to institution

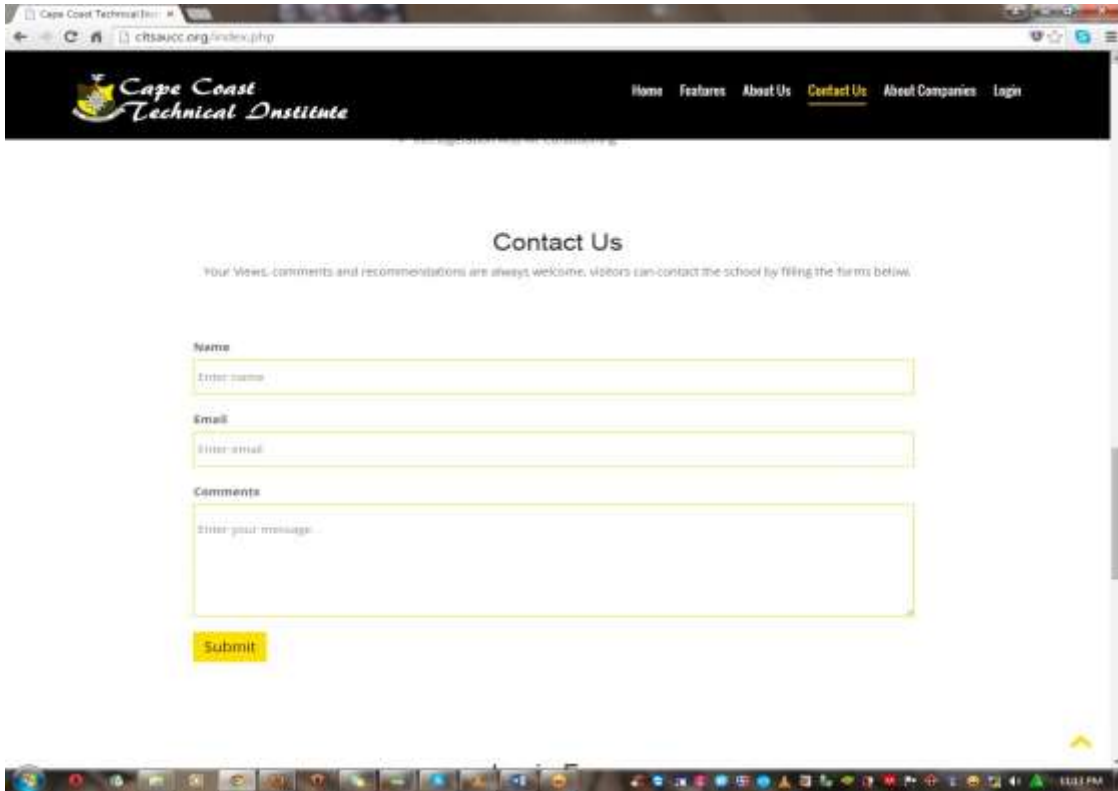


Figure 4.1 Contact Form

The Contact Us form shown in figure 4.1 allows users and visitor to communicate with the Institution through emailing by typing their name, email address, comment and recommendations in the form provided and clicking on the 'submit' button.



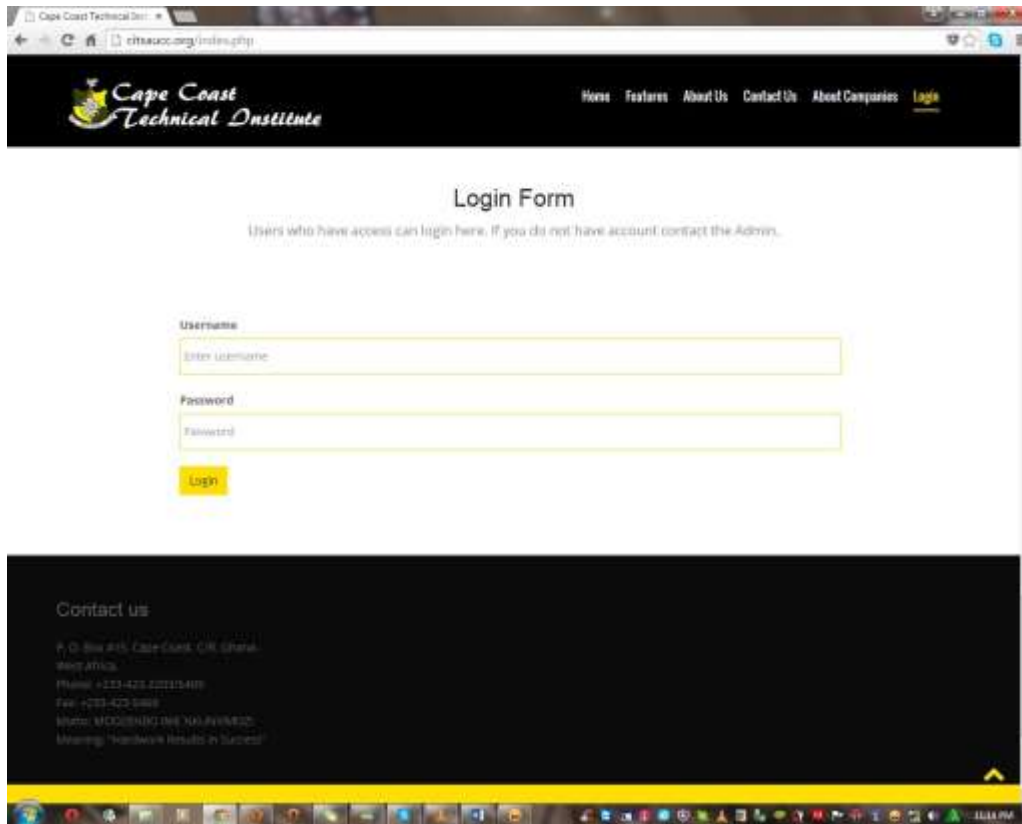


Figure 4.2 Login Form

The Login Form in Figure 4.2 allows the assessing Officer (Operations Manager) of the industry or the Administrator of the Institution to access the platform by properly authenticating their access. The Operation's Manager receives a username and password from the Administrator of the Institution upon accepting the student for attachment. The Operations Manager enters his username and password and then clicks on the "LOGIN" button to get authenticated to use the platform.

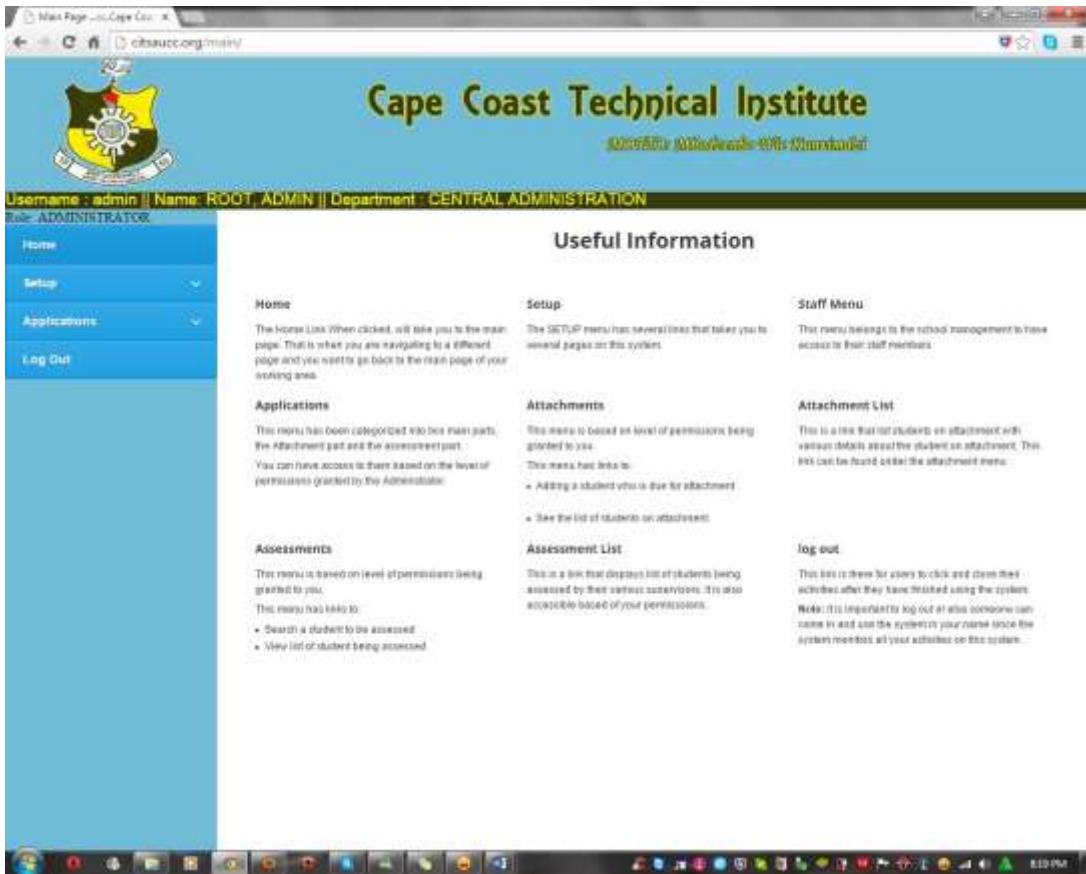
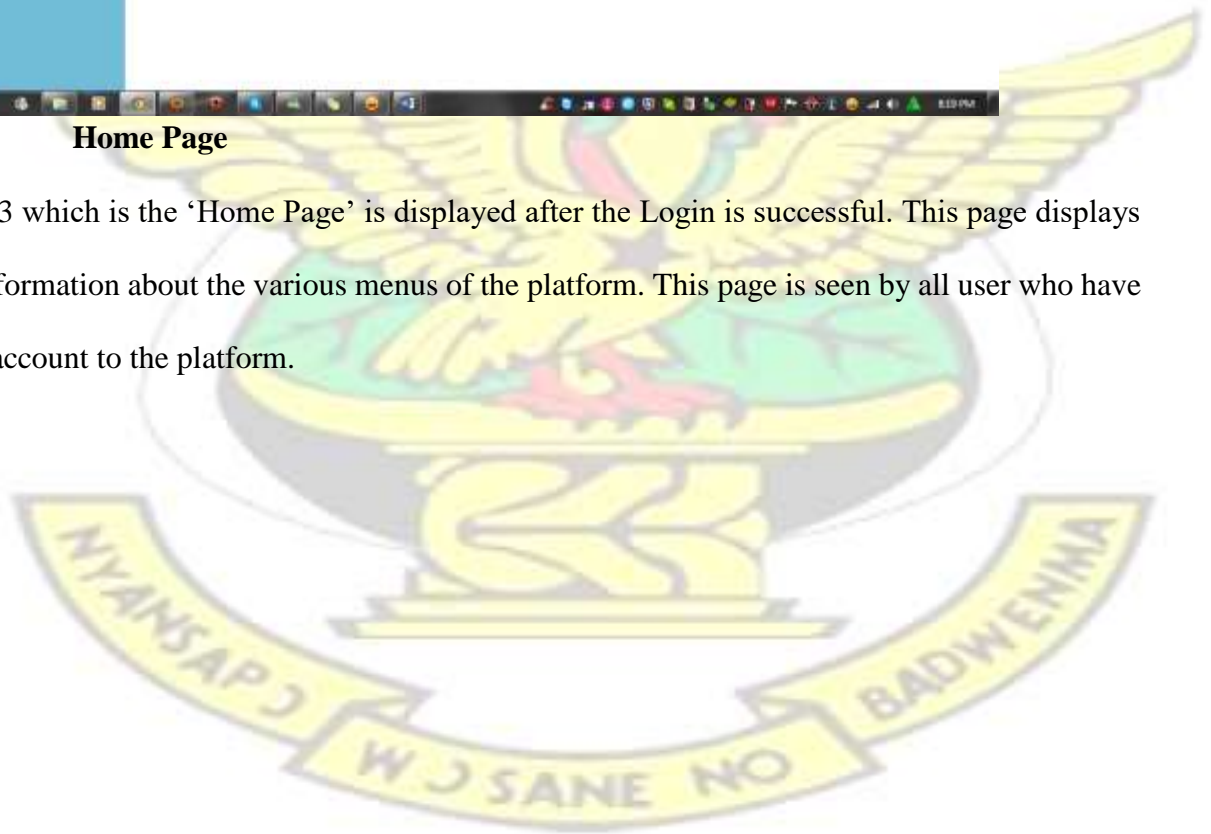


Figure 4.3 Home Page

Figure 4.3 which is the 'Home Page' is displayed after the Login is successful. This page displays useful information about the various menus of the platform. This page is seen by all user who have a Login account to the platform.



The screenshot shows the website interface for Cape Coast Technical Institute. At the top, the logo and name are displayed. Below that, a navigation bar shows the user's login information: Username: admin, Name: ROOT, ADMIN, Department: CENTRAL ADMINISTRATION. A sidebar menu on the left includes options like Home, Setup, Students Menu, List of Students, Companies Menu, Applications, and Log Out. The main content area displays a table with the following data:

No	Student No.	Name of Student	Gender	Date of Birth	Programme	Form
1	AT/MCS/14/0001	ARRAR, FELIX OBFENU	MALE	1995-09-09	AUTO MECHANICS	FORM 2
2	VT/CAT/14/0001	ADDAE, MARY	FEMALE	1995-05-04	CATERING	FORM 2
3	ET/ENG/14/0001	ADDISON, ROGER JUNIOR	MALE	1998-12-23	ELECTRICAL ENGINEERING	FORM 2
4	VT/CAT/14/0002	AKOTO, NAOMI OSEI	FEMALE	1995-08-22	CATERING	FORM 2
5	VT/CAT/14/0003	ASANKRISHN OPOKU, SARAH	FEMALE	1995-07-17	CATERING	FORM 2
6	VT/FSD/14/0001	AWONU, GIFTY	FEMALE	1998-09-15	FASHION DESIGNING	FORM 2
7	ET/ENG/14/0004	ANTHONY, JOSEPH	MALE	1995-09-04	ELECTRICAL ENGINEERING	FORM 2
8	ET/ENG/14/0005	APPAH, SAMUEL PRINCE	MALE	1998-06-25	ELECTRICAL ENGINEERING	FORM 2
9	VT/FSD/14/0002	ARTHUR, SARAH	FEMALE	1997-06-21	FASHION DESIGNING	FORM 2
10	ET/ENG/14/0006	AYANMADAH, SAMUEL KTDOW	MALE	1997-03-03	ELECTRICAL ENGINEERING	FORM 2
11	MC/ENG/14/0001	BUEKINAW, EDWARD	MALE	1997-05-23	MECHANICAL ENGINEERING	FORM 2
12	MC/ENG/14/0001	DAVIS, ALBERT	MALE	1998-06-28	MECHANICAL ENGINEERING	FORM 2
13	ET/ENG/14/0001	DONACH, EVARIS	MALE	1998-06-08	ELECTRICAL ENGINEERING	FORM 2
14	ET/ENG/14/0001	ESHIN, SAMPOON	MALE	1997-04-30	ELECTRICAL ENGINEERING	FORM 2
15	ET/ENG/14/0002	FRIMPONG, PAPA ADDO	MALE	1997-09-18	ELECTRICAL ENGINEERING	FORM 2
16	PD/PDC/14/0001	HUGHES, WILLIAM D. B.	MALE	1998-09-03	PAINTING AND DECORATION	FORM 2
17	BS/BCT/14/0001	KATTAH, EMMANUEL BODU	MALE	1996-09-02	BUILDING AND CONSTRUCTION TECHNOLOGY	FORM 2
18	VT/FSD/14/0004	OPOKU, FELICIA	FEMALE	1998-10-15	FASHION DESIGNING	FORM 2
19	PE/PDS/14/0001	OFWEY, PETER	MALE	1994-04-02	PLUMBING AND GAS	FORM 2
20	ET/ENG/14/0008	SAAH, DAVID	MALE	1998-11-22	ELECTRICAL ENGINEERING	FORM 2
21	VT/FSD/14/0003	SARFI, MOHAMMED	MALE	1992-12-01	FASHION DESIGNING	FORM 2

Figure 4.4 Setup Menu – List of Students

The setup page as shown in Figures 4.4 and 4.5 has two menus: Student Menu and Company Menu. The student menu when clicked brings a drop down menu which is 'List of students'. List of Students displays a database of students on attachment.

When the menu 'company menu' is clicked a drop down menu: 'List of Companies' is dropped. The Administrator clicks on the 'List of Companies' to view a database of companies that have registered to assess student(s) in their industry. Only the administrator can view this page.

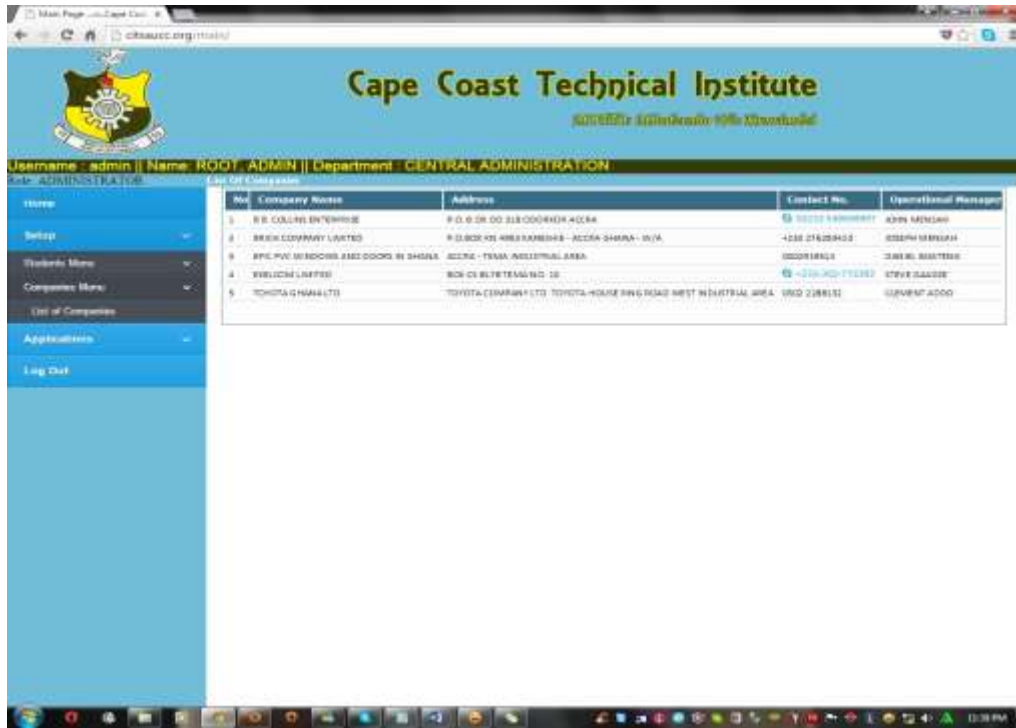


Figure 4.5 Setup Menu – List of Companies

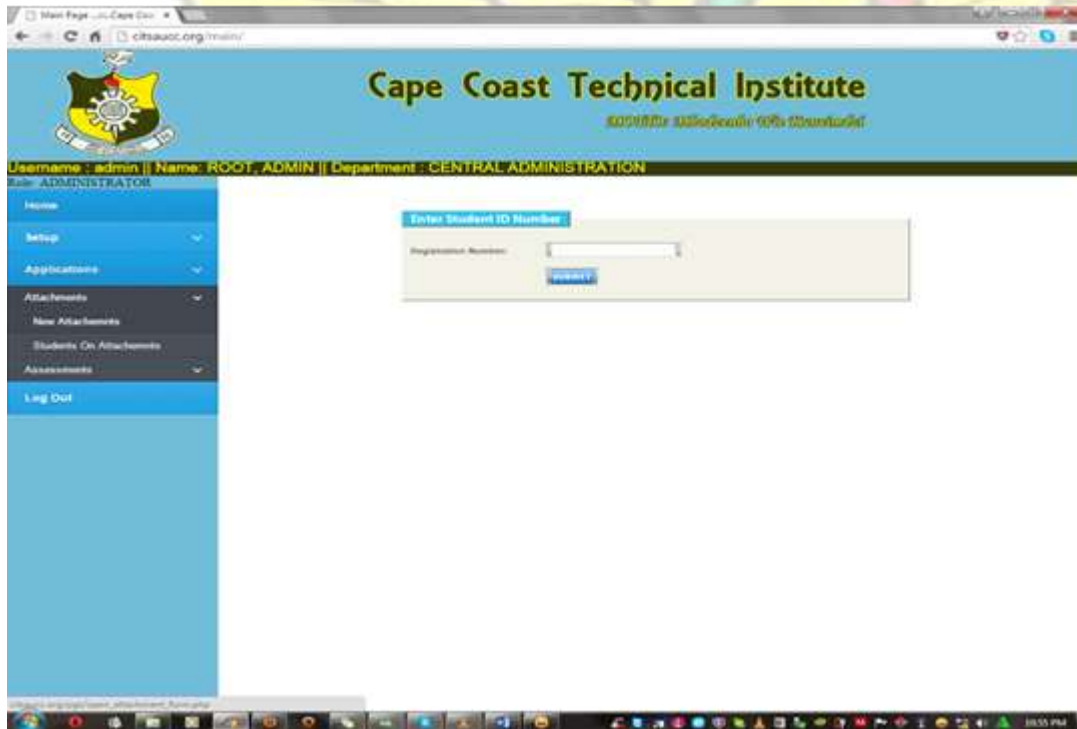


Figure 4.6 Application Menu – Student ID Entry Page

The Application Menu contains sub-menus; “Attachment, Assessment” when the Administrator clicks on the Attachment menu button, “ New Attachments” and “Student on Attachment” submenus are displayed. New Attachment button when clicked allows the Administrator of the Institution to register a new student into the attachment system by typing in the student’s identification number (student id number) and clicking on the “submit” button to display the student’s details as shown in Figures 4.6 and 4.7. “Student on Attachment” button however displays list of students in the database undergoing attachment or have completed their attachment and can only be viewed by the Administrator as shown in Figure 4.8.



Figure 4.7 Application Menu – Student Attachment Details Page

No	Student No.	Student Name	Programme	Company Name	Date Started	Date Ended	Attachment Status
1	VT/DT/14/0001	MARY ADOM	CATERING	EVELCOM LIMITED	2019-10-18	2019-12-18	PENDING
2	VT/F&D/14/0003	SARAH ARTHUR	FASHION DESIGNING	BRIGH COMPANY LIMITED	2019-09-14	2019-12-18	COMPLETED
3	ET/ENG/14/0006	SAMUEL NYOM AGANORAH	ELECTRICAL ENGINEERING	BRIGH COMPANY LIMITED	2019-09-15	2019-12-18	COMPLETED
4	ET/ENG/14/0007	SAMPSON ESHUN	ELECTRICAL ENGINEERING	BRIGH COMPANY LIMITED	2019-09-18	2019-12-18	COMPLETED
5	PS/PG/14/0001	PETER OTWEY	PLUMBING AND GAE	EPC PVC WINDOWS AND DOORS IN GHANA	2019-02-09	2019-10-30	COMPLETED
6	MC/ENG/14/0003	EDMUND SUDDMAN	MECHANICAL ENGINEERING	EPC PVC WINDOWS AND DOORS IN GHANA	2019-09-18	2019-12-11	COMPLETED
7	MC/ENG/14/0001	ALBERT DAVIS	MECHANICAL ENGINEERING	EPC PVC WINDOWS AND DOORS IN GHANA	2019-02-28	2019-10-30	COMPLETED
8	ET/ENG/14/0006	DAVID SAH	ELECTRICAL ENGINEERING	EVELCOM LIMITED	2019-02-28	2019-10-30	ACCEPTED

Figure 4.8 Students on Attachment List

Enter Student ID Number

Registration Number:

Figure 4.9 Assessment login

The figure 4.9 is displayed when the Administrator or Operations Manager clicks on “Assess a student” or “View Assessment” sub-menus under Assessment Menu. To assess a student, the Operations Manager click on “Assess a Student” and then types in the student’s id number, and clicks on the “submit” button.

This leads the Operations Manager to Figure 4.10 where he/she goes through the sixth step from ‘Clearance to Head of Department’ to Assess a student and submit his/her report as shown in Figures 4.9 to 4.12



Figure 4.10 Assessment Details Form

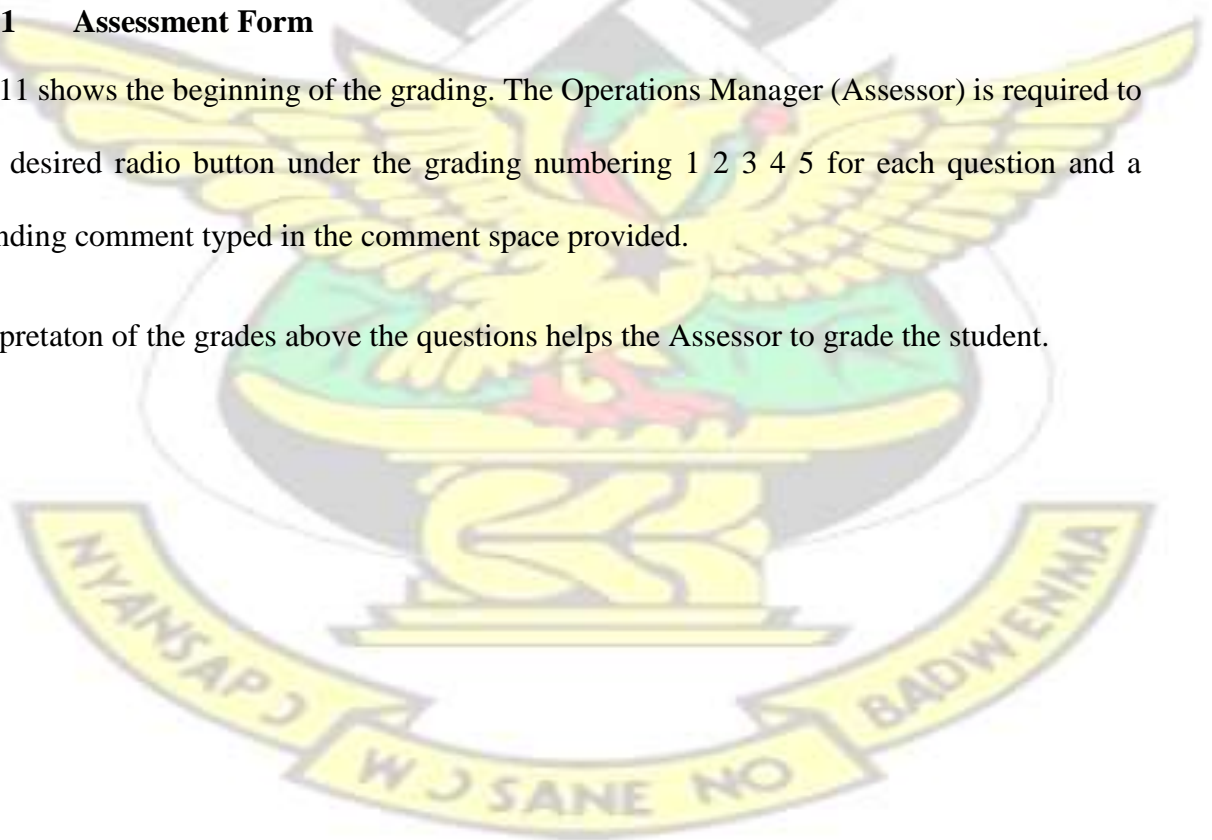
From Figure 4.10, the Operations Manager is required to type in the date the student commenced the attachment program, the date completed, the total number of working days made by the student, number of days he/she was absent with permission and the number of days absent without permission. The “Next” button is clicked at the right bottom corner to proceed with the assessment.



Figure 4.11 Assessment Form

Figure 4.11 shows the beginning of the grading. The Operations Manager (Assessor) is required to click the desired radio button under the grading numbering 1 2 3 4 5 for each question and a corresponding comment typed in the comment space provided.

The interpretation of the grades above the questions helps the Assessor to grade the student.



At the “step 6” The Operations Manager fills in the spaces provided by typing in the name of the officer who assessed the student, his/her rank and date of completing the assessment. If he/she wants to go back to correct any mistake or view what he/she has done, he/she clicks on the “Back” button. If not, he/she click on the “Submit” button which sends the report to the institution.

No	Student No.	Student Name	Programme	Date Started	Date Expiry	Status	View
1	84/ENG/14/0001	ALBERT DAVIS	MECHANICAL ENGINEERING	2015-08-18	2015-12-31	COMPLETED	View Report
2	84/ENG/14/0002	EDMUND RUCKMAN	MECHANICAL ENGINEERING	2015-08-18	2015-12-31	COMPLETED	View Report
3	87/ENG/14/0003	SAMPSON ZISHUM	ELECTRICAL ENGINEERING	2015-08-18	2015-12-31	COMPLETED	View Report
4	87/ENG/14/0004	SAMUEL NTOH ASANGOM	ELECTRICAL ENGINEERING	2015-08-18	2015-12-31	COMPLETED	View Report
5	87/DES/14/0005	SARAH ARTHUR	FASHION DESIGNING	2015-08-14	2015-12-31	COMPLETED	View Report

Figure 4.14 Assessed Students List

The operations Manager can view the list of students he/she has assessed by clicking on the “view Assessment” menu button on the left as shown in figure 4.14.

To view a student’s assessment report, the Operations Manager / Administrator can click on “View Reports” under the “View” column on the List of assessed students seen in figure 4.14.

When “view report ” is clicked the student’s report is displayed as shown in figure 4.15.



Figure 4.15 Assessment Report Form

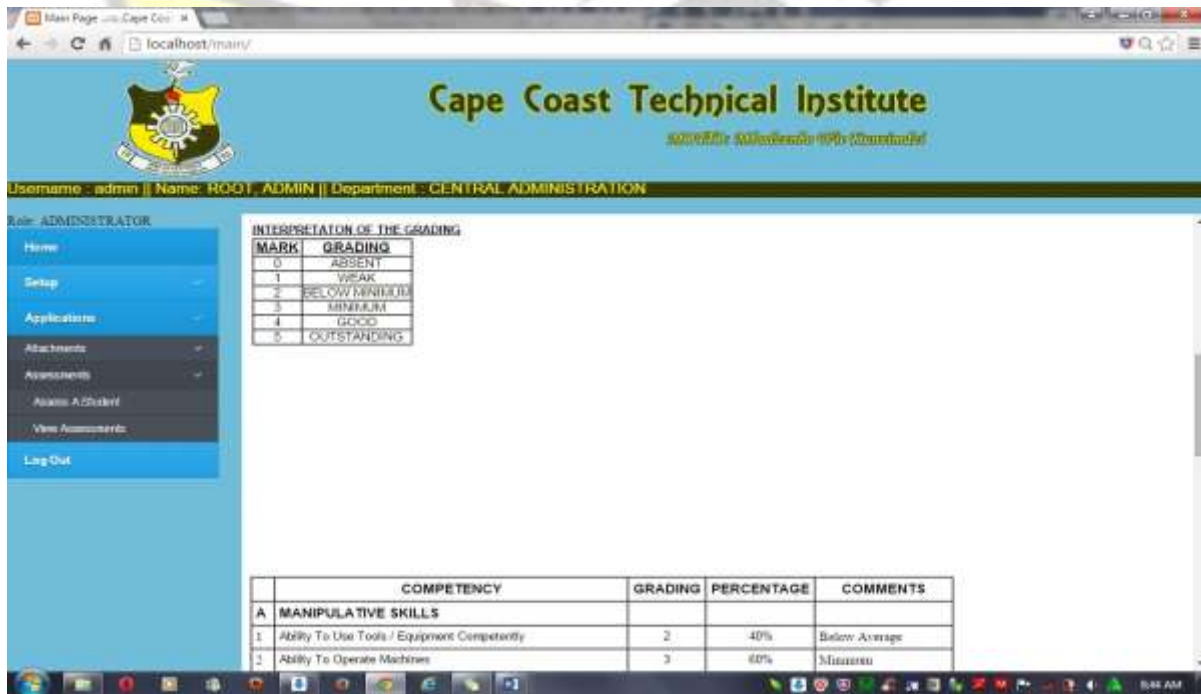


Figure 4.16 Assessment Report Form (continued)



Figure 4.17 Assessment Report Form



Figure 4.18 Assessment Report Form(continued)

Figures 4.15, 4.16, 4.17 and 4.18 shows the long report of a student assessed in Industrial Attachment. At the bottom of the last page as shown in Figure 4.18 the printer symbol can be clicked to print a copy of the Attachment report and signed for the student. An electronic copy is also submitted to the Institution when the print button is clicked.

4.4.2 DATABASE TABLES GUIs

The following database tables have been created in MySQL server for maintaining, verifying user details and for processing transaction.

User Account Table

The User account table helps maintain and manage the accounts of the Administrator and the Operations Manager to the system. It contains details such as user ID, member ID, username, status, and password, and role ID. This is shown in the table 4.21.

userid	memberid	username	password	status	roleid
000000001	000000001	admin	a10ac3540ba90abbe95e057208f3e	ACTIVE	ADMIN
000000002	000000002	manager	a10ac3540ba90abbe95e057208f3e	ACTIVE	COMP
000000003	000000003	jojojojo	a10ac3540ba90abbe95e057208f3e	ACTIVE	COMP

Figure 4.19 User Account Database

Figure 4.19 shown contain a list of students on industrial attachment program. The table contains the student ID, registered number, title, last name, first name, middle name, gender, form, program ID, and the course being pursued in the Institution.

student_id	registered_number	title	last_name	first_name	middle_name	gender	form	program_id	course
000000001	VTEGAT140001	MISS	AIZAB	MARY		F	FRS1614	2	CATERG
000000002	VTEGAT140002	MISS	AMOTO	RAHM		F	FRS1614	2	CATERG
000000003	VTEGAT140003	MISS	AMAHYAWH	SHAHY		F	FRS1614	2	CATERG
000000004	VTEGAT140004	MISS	AMOKAF	GHY		F	FRS1614	2	FSDGN
000000005	VTEGAT140005	MISS	ANTHER	SARAH		F	FRS1614	2	FSDGN
000000006	VTEGAT140006	MR	BARBI	BERHAWEL		M	FRS1614	2	FSDGN
000000007	VTEGAT140007	MR	DAVIS	ALBERT		M	FRS1614	2	MURTG
000000008	VTEGAT140008	MR	DEWONH	EVANH		M	FRS1614	2	ETENG
000000009	VTEGAT140009	MR	PHAPONG	PAPA	ADOO	M	FRS1614	2	ETENG
000000010	VTEGAT140010	MR	ADOSHON	RODRI	JUDOH	M	FRS1614	2	ETENG
000000011	VTEGAT140011	MR	ANTHONY	JOSEPH		M	FRS1614	2	ETENG
000000012	VTEGAT140012	MR	ANTHAY	SAMUEL	FRANCE	M	FRS1614	2	ETENG
000000013	VTEGAT140013	MR	ABIMOH	SAMUEL	NYOH	M	FRS1614	2	ETENG
000000014	VTEGAT140014	MR	SARAH	DANIEL		M	FRS1614	2	ETENG
000000015	VTEGAT140015	MR	SARAH	DAVID		M	FRS1614	2	ETENG
000000016	VTEGAT140016	MR	ABIMAN	EDOC	EDENH	M	FRS1614	2	ATROG
000000017	VTEGAT140017	MR	BLACKMAN	EDMUND		M	FRS1614	2	MURTG
000000018	VTEGAT140018	MR	PERSEUS	WILLIAM	D.W.	M	FRS1614	2	ETENG
000000019	VTEGAT140019	MISS	OPORU	ELIANA		F	FRS1614	2	FSDGN
000000020	VTEGAT140020	MR	ETOHY	PETIE		M	FRS1614	2	PEROC
000000021	VTEGAT140021	MR	KATLAN	EMMANUEL	SEGAJ	M	FRS1614	2	ROCTG

Figure 4.20 Students List Database

company_id	company_name	company_addr	company_address	company_contact	operation_manager	operation_number	registerd_status
000000001	ACCRA - TEMA INDUSTRIAL AREA	03101914	ACCRA - TEMA INDUSTRIAL AREA	SAMUEL BOA DEDU	027220000	GR	1
000000002	ACCRA - TEMA INDUSTRIAL AREA	03101914	ACCRA - TEMA INDUSTRIAL AREA	STEVE DANIEL	+233 270 200 4	GR	1
000000003	ACCRA - TEMA INDUSTRIAL AREA	03101914	ACCRA - TEMA INDUSTRIAL AREA	JOSEPH WENDAH	+233 270 200 4	GR	1
000000004	ACCRA - TEMA INDUSTRIAL AREA	03101914	ACCRA - TEMA INDUSTRIAL AREA	JOHN BERMAH	00231 54000 00	GR	1

Figure 4.21 Companies Database

Figure 4.21 contains company's IDs, company name, phone number, address, location, operation Manager's name and cell number, regional ID and status of the companies in the database.

assessment_id	student_id	statement_id	grade	percentage	comment
1	1	1	100	100	VERY GOOD
2	1	2	100	100	EXCELLENT
3	1	3	100	100	OUTSTANDING
4	1	4	100	100	GOOD
5	1	5	100	100	VERY GOOD
6	1	6	100	100	EXCELLENT
7	1	7	100	100	OUTSTANDING
8	1	8	100	100	VERY FUNCTIONAL
9	1	9	100	100	VERY WELL
10	1	10	100	100	OFFERED WORK
11	1	11	100	100	VERY INTERESTING TOP
12	1	12	100	100	VERY GOOD
13	1	13	100	100	ABOVE BENCHMARK
14	1	14	100	100	EXCELLENT
15	1	15	100	100	VERY VERY GOOD
16	1	16	100	100	BRIGHT FUTURE
17	1	17	100	100	VERY GOOD
18	1	18	100	100	OFFERED PERFORMANCE
19	1	19	100	100	GOOD
20	1	20	100	100	VERY GOOD
21	1	21	100	100	GOOD
22	1	22	100	100	VERY GOOD
23	1	23	100	100	GOOD
24	1	24	100	100	VERY GOOD
25	1	25	100	100	GOOD

Figure 4.22 Assessment Database

The Assessment table contains the assessment ID, student ID, statement ID, grade, percentage grade and comment as shown in Figure 4.22.

user_id	user_name	address	operation	activity	session	ip_address	global_time
1	Admin	192.168.1.100	login	User Logged in successfully	12345678901234567890	192.168.1.100	2015-03-12 10:45:30
2	Admin	192.168.1.100	logout	User Logged out successfully	12345678901234567890	192.168.1.100	2015-03-12 10:46:30
3	Admin	192.168.1.100	login	User Logged in successfully	12345678901234567890	192.168.1.100	2015-03-12 10:47:30
4	Admin	192.168.1.100	logout	User Logged out successfully	12345678901234567890	192.168.1.100	2015-03-12 10:48:30
5	Admin	192.168.1.100	login	User Logged in successfully	12345678901234567890	192.168.1.100	2015-03-12 10:49:30
6	Admin	192.168.1.100	logout	User Logged out successfully	12345678901234567890	192.168.1.100	2015-03-12 10:50:30
7	Admin	192.168.1.100	login	User Logged in successfully	12345678901234567890	192.168.1.100	2015-03-12 10:51:30
8	Admin	192.168.1.100	logout	User Logged out successfully	12345678901234567890	192.168.1.100	2015-03-12 10:52:30
9	Admin	192.168.1.100	login	User Logged in successfully	12345678901234567890	192.168.1.100	2015-03-12 10:53:30
10	Admin	192.168.1.100	logout	User Logged out successfully	12345678901234567890	192.168.1.100	2015-03-12 10:54:30

Figure 4.23 User Login/Logout Log

The Figure 4.23 shown above contains a log of user's login and logout, user's ID,username, login ID,session, IP address and global time.

4.5 TESTING

When a software is being developed, at any stage of the developing cycle errors are likely to occur. During the testing phase of the project life cycle, the application is subjected to a variety of test scenarios known as test cases. The output is then evaluated to determine whether or not the application is performing as expected.

Testing is a process of identifying errors or bugs within the application by performing some predefined tasks using various input variables.

In the case of this project, two distinct testing approaches were considered: i.e. the Functional, also referred to as the Behavioral / Black Box Testing and the Structural / Clear or White Box Testing. In the behavioral testing, the structure, design or implementation of the program is not known or taken into consideration. These tests are done from the user's point of view and helps in exposing discrepancies in the specification thereby allowing for an objective perspective and avoiding developer bias.

The tests take the following format:

- i. Condition: Describe the rules and regulations of using the system
- ii. Input criteria: Specifies all correct input parameters
- iii. Input: Defines the data acceptable

iv. Result: Displays the expected outcome(s)

4.5.1 BLACK BOX TESTING

- i. Test case for ‘**System should be up and running for an Operations Manager to be able to access it.**’

Conditions: “The system must be under running state for the Operations Manager to be able to logon.

Input Option: Any Operations Manager can connect to the system, which is not running.

Input: Operations Manager “A” wants to access the system.

Result: Error message “System is at the moment down” is out result displayed.

- ii. Test case for ‘**an Operations Manager wants to logon twice to the same system.**’

Conditions:” An Operations Manager cannot be logged on more than once into the system”.

Input Criteria: allow any Operations Manager to logon into the System more than once

Input: Operations Manager ‘A’ is already logged on and wants to logon again.

Result: Error message “You are already logged on into the System” is displayed

- iii. Test case for ‘**An Operations Manager should be disconnected from the system, when the program session expires or is terminated abnormally.**’

Conditions:” An Operations Manager has to be logged off when the application is no longer receiving response or is shut down abnormally” **Input Criteria:** Take any Operations managers.

Input: Shut down the program.

Result: The particular Operations Manager is logged out of the system.

4.5.2 WHITE BOX TESTING

The approach is also known as Clear Box Testing. Here testing is done on the software or system itself as well as its internal structures. These are used to design test cases that the programmer uses to determine possible inputs and expected results of the system.

In verifying the code, the objective was to find any part of the code that could cause an undesired, unexpected result. Such errors can be traced to inputs (usually, provided by the user), formatting and processing of data to produce program output, and program output formatting. Testing was done mainly from the end-user’s point of view.

Plan:

1. Programmer must have a deep understanding of the system to know what kind of test cases to create.
2. Lay out all the basic information, requirements, functional specifications and design.
3. Perform risk analysis by capturing the wrong information. Note down the results of capturing such incorrect input.

4. Fix all identified errors and make recommendations on future projections.

Some of the test case are listed below:

- i. Test case for **when a “stress test (wrong data type is entered into a data fields or huge amounts of data is dumped into the database to observe how the system will behave)” is done on the system.”**

Condition: “The required data type must be captured into a field.”

Input Criteria: An Operations Manager captures wrong data type in a data field

Result: Error message ‘Please enter..... (with Required Data type specified)’ is displayed.

- ii. Test case for **“Logging in with a wrong username”**

Condition: “Operations Manager can only log in with an existing username that meets the maximum character length”

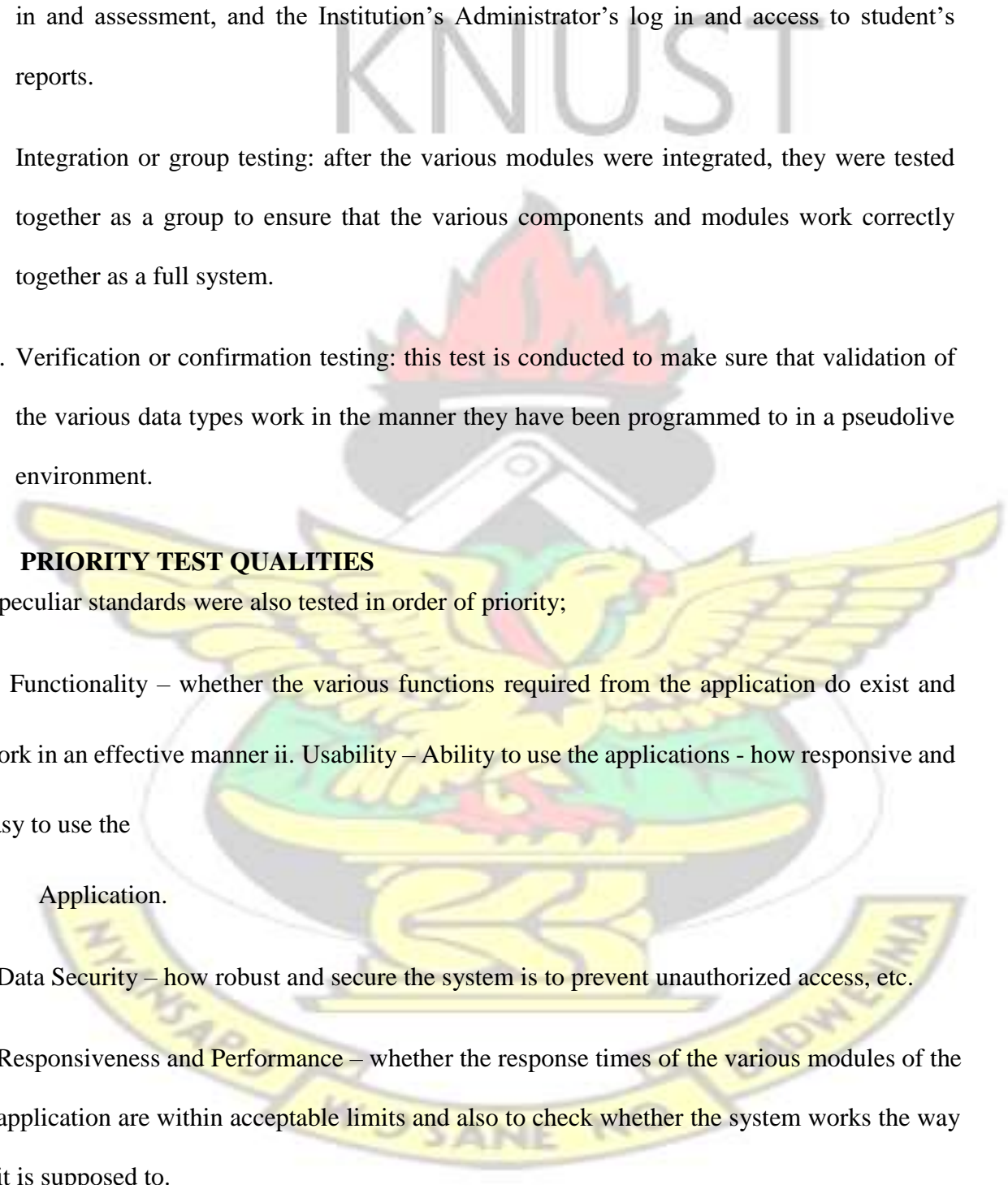
Input Criteria: An Operations Manager inputs characters that are over the required predefined character set into a data field.

Inputs: Data field with the longest allowable number of characters is 50.

Result: The Data field truncates the rest of the characters when the maximum allowable character is captured.

4.5.3 TESTING STRATEGY

Other testing strategies were adopted, this includes the following;

- 
- i. Program testing: Each module of the program that makes up the secure online assessment Application was tested with real required data. These include the Operations Manager’s log in and assessment, and the Institution’s Administrator’s log in and access to student’s reports.
 - ii. Integration or group testing: after the various modules were integrated, they were tested together as a group to ensure that the various components and modules work correctly together as a full system.
 - iii. Verification or confirmation testing: this test is conducted to make sure that validation of the various data types work in the manner they have been programmed to in a pseudolive environment.

4.5.4 PRIORITY TEST QUALITIES

Some peculiar standards were also tested in order of priority;

- i. Functionality – whether the various functions required from the application do exist and work in an effective manner
- ii. Usability – Ability to use the applications - how responsive and easy to use the Application.
- iii. Data Security – how robust and secure the system is to prevent unauthorized access, etc.
- iv. Responsiveness and Performance – whether the response times of the various modules of the application are within acceptable limits and also to check whether the system works the way it is supposed to.

4.5.5 System Specifications

Hardware and Software Specifications The

test environment will consist of:

- Processor: Intel Core i3, i5, i7 and Pentium Series
- Processor Speed: 2.20 GHz Dual
- Installed Random Access Memory: 3.00 GB to 10.00 GB
- System Type: 32/64 – bit Operating System
- Hard Disk Drive(HDD): 150 GB to 2 TB
- CD ROM Drive: 52X
- USB: 2.0 to 3.0
- Network Interface Card (NIC)
- Operating System: Windows XP/Visa/Windows 7 Ultimate/ Windows 8 and 10

4.6 SUMMARY

In summary this chapter discussed the findings of three group of respondents (Students, Teachers and Operational Mangers) in relation to the challenges of manual / traditional system of assessing student of supervised industrial attachment program. It further discussed the success, benefits, challenges and threats of the proposed electronic / online assessment of students on supervised industrial attachment program.

Generally, it can be deduced from the survey that the traditional system of assessing students on industrial attachment was not very effective and hence needed a more efficient and effective system like the Electronic / Online Industrial Attachment Assessment System.

From the survey, a greater number of respondent had at least basic knowledge in computer literacy and could interact with the system. The survey showed that student's assessment report was not

received promptly in the institution and attachment reports did not really show a true picture of student's industrial attachment experience. Attachment report from the industry were not very secured due to the method of submission to the Institution. Some Operational Managers think that filling student's attachment report manually take much of their time. A greater number of Students and Teachers preferred the electronic system of assessment to the manual/traditional system and they also agreed that the online system can be accessed easily. A majority of the respondents stated that the authenticity of student's marks can be guaranteed online. A larger number of teachers wanted students to be able to view their industrial attachment assessment marks before it is submitted to their institution. A few of the Operations Managers however were not willing to fill student's attachment assessment online which may be due to their wrong perception of the use of computers and its simplicity which can be corrected when they are oriented about the process of the online system.

Statistical Package for Social Sciences (SPSS) was used to transform data and representation in tables and percentages for better understanding.

Developing tools for this application also include Apache Server, PHP, and MySQL for database management.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

The emergence of Information Technology (IT) has brought about better and easier ways of doing things. Information Technology has been applied in almost every area of education and more needs

to be done. ICT is used in teaching and learning and even assessing learners in the various levels of education.

There is therefore a need to use Information and Communication Technology as a tool to provide system solutions that will replace manual paper work systems such as this one that assesses students on industrial attachment programme in Technical and Vocational Institutions in Ghana. This Electronic / Online Industrial Attachment Assessment System begins with Technical and Vocational Institutions and can be used by Polytechnics, Universities and all other institutions that run industrial attachment program.

5.1 SUMMARY

The researcher explored the problems faced by the manual method of assessing students on industrial attachment and proposed an online/electronic assessment system called the Electronic/Online Industrial Attachment Assessment System (EOIAAS).

The Electronic/Online Industrial Attachment Assessment System is a design based on Client/Server architecture that is accessible with any web client. The system includes two main parts, user interface module and administrative interface module.

The proposed online system is more reliable, easy to use and secured. Assessing students and submission of assessment report is all done electronically without a third party.

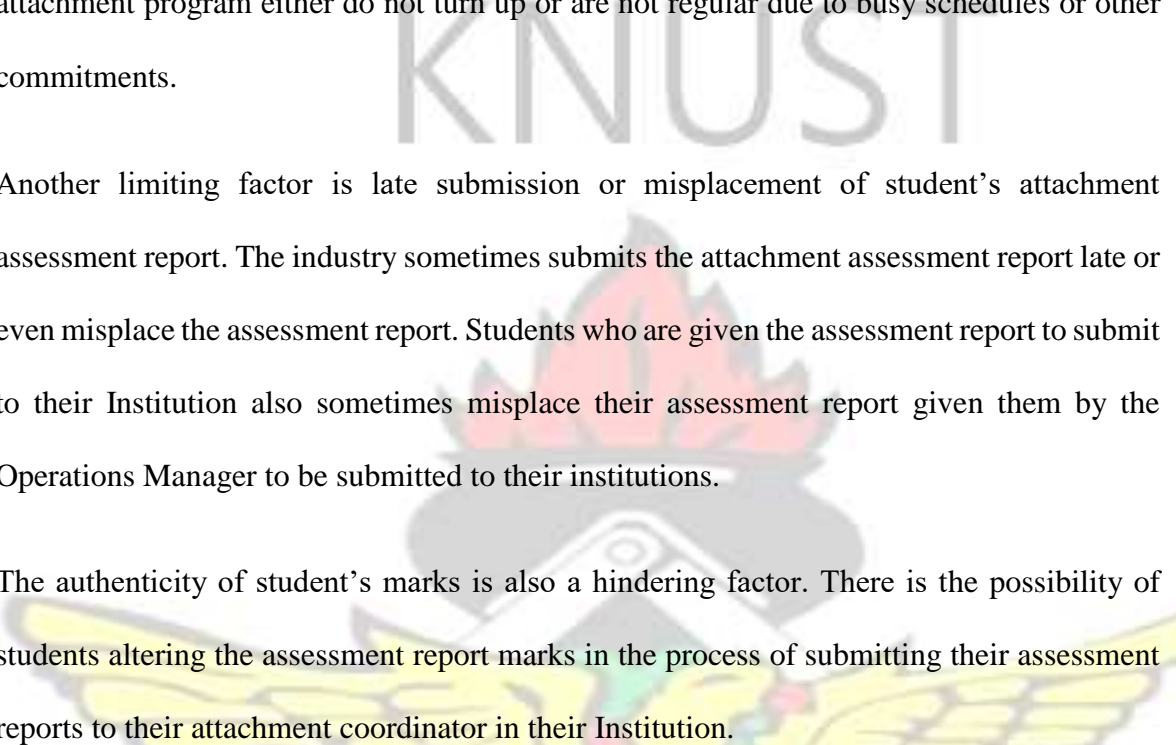
In this study, the performance of the new proposed system was tested and the result of the test revealed that the institutions are aware of their student's progress in any organization after completion of their industrial attachment. Overall marks awarded are also captured and can be viewed only by both the organization and the student's institution with the student's identification number.

Test case was run for an Operations Manager to be able to access the system. If an Operations Manager “A” wants to access the system which is not running, this error message is displayed “*System is at the moment down*”. If the operations manager wants to log on twice, the error message “*You are already logged on into the System*” is displayed. When an Operations Manager captures wrong data type in a data field error message ‘*Please enter..... (with Required Data type specified)*’ is displayed. Data field with the longest allowable number of characters is 50. An Operations Manager may inputs characters that are over the required predefined character set into a data field. Data field truncates the rest of the characters when the maximum allowable character is captured

5.2 CONCLUSION

At the end of this study, it was observed that industrial attachment plays a significant role in acquiring relevant knowledge and skill in all levels of education, and therefore has great benefits to Students, Teachers, Industries and the country as a whole. However, in Ghana, there are factors constraining the effectiveness of Industrial Attachment. These factors make the participants of the attachment program approach it with less seriousness and as a mere formality.

Some of these limiting factors include;

- 
- i. Lack of good supervision of students on Industrial Attachment program. Teachers or supervisors assigned to monitor student's attendance and progress during the industrial attachment program either do not turn up or are not regular due to busy schedules or other commitments.
 - ii. Another limiting factor is late submission or misplacement of student's attachment assessment report. The industry sometimes submits the attachment assessment report late or even misplace the assessment report. Students who are given the assessment report to submit to their Institution also sometimes misplace their assessment report given them by the Operations Manager to be submitted to their institutions.
 - iii. The authenticity of student's marks is also a hindering factor. There is the possibility of students altering the assessment report marks in the process of submitting their assessment reports to their attachment coordinator in their Institution.

These factors are but a few that contribute to the challenges institutions face in using the student's marks obtained from industrial attachment as part of their end of term academic report.

5.3 RECOMMENDATION

There is the need for the institution, Industry and Students to take Industrial Attachment programme more seriously for effectiveness and maximum benefit.

Industrial supervisors should be given regular in-service training by their organizations on how to coach students on industrial attachment programme.

Student's marks from Industrial attachment programme should be part of the term's academic report so that parties involved would be more serious in playing their part in industrial attachment programme.

Government and stakeholders can also streamline this Online application to be used as a mandatory tool for Industrial Attachment programs in Technical and Vocational Institutions at all levels within the country. The state should also provide logistics and administrative support to firms that offer attachment places to students.

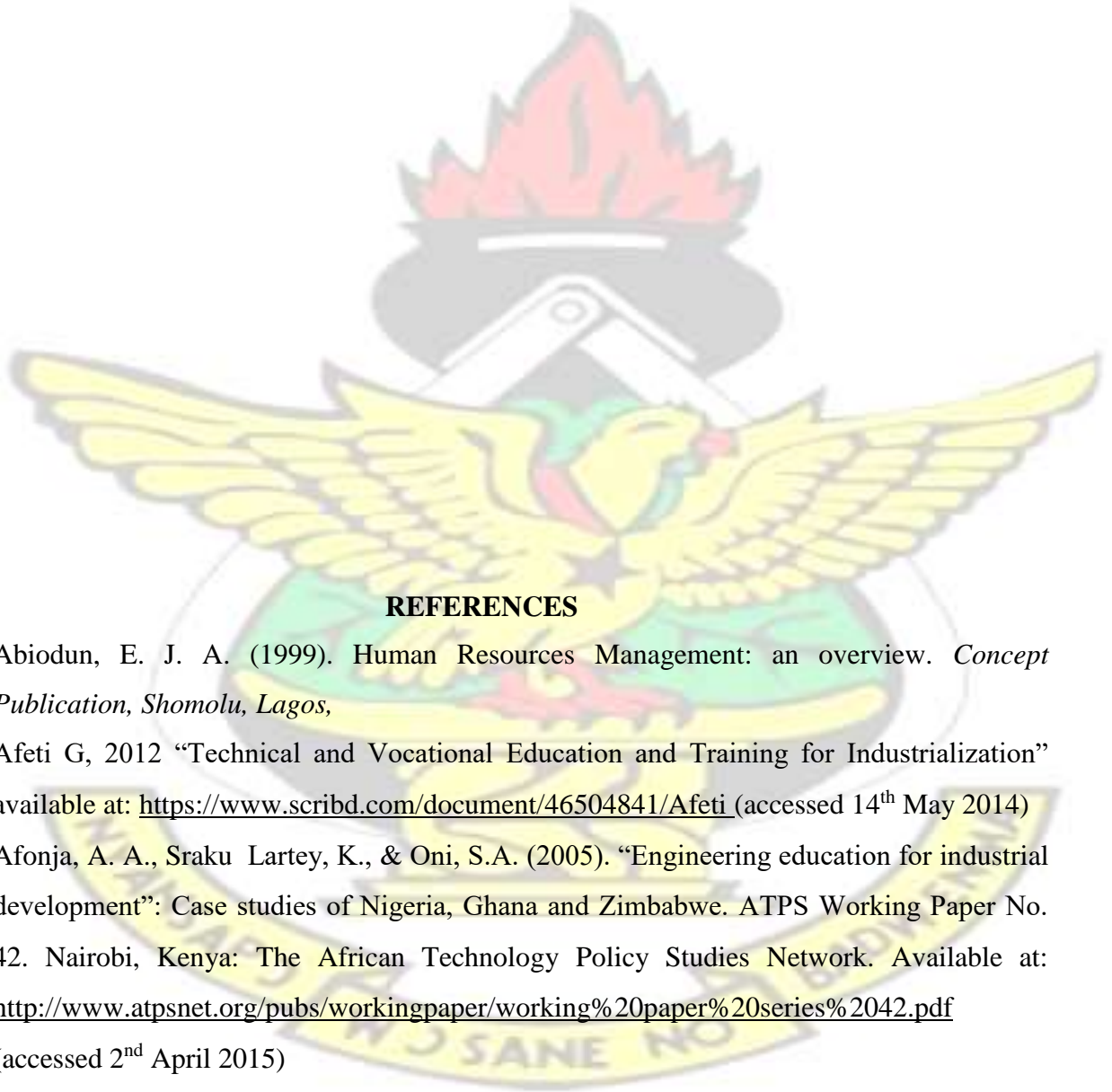
Thus, policy directive can make it necessary for it to be used as a system of assigning students to institutions and for institutions to grade students. This would go a long way in making sure that credibility is brought into the hitherto manual system of accessing students on attachment and a reason to make industrial attachment a mandatory prerequisite for employment in Ghana.

5.4 FUTURE SUGGESTED RESEARCH AREAS

Educational institutions and ICT industries will also have the opportunity to improve upon this system to incorporate other modules that may be useful to both the educational institute and the employment industry.

Given that it's a web-based application, mobile friendly versions can be developed and also improvements can be made in terms of meeting the web content accessibility guidelines (WCAG 2.0).

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QUESTIONNAIRES

Electronic assessment of students on industrial attachment program in Technical and Vocational Institutions in Ghana: a case study of Cape Coast Technical Institute.

APPENDIX A: Student's copy

Dear Participant, this questionnaire is part of a Master's Thesis to investigating the process of electronic assessment of students on industrial attachment program in technical and vocational institutions in Ghana.

The questionnaire will provide me with the relevant information that I need to complete the research.

The answers are completely confidential and anonymous. Thanks in advance for your time and effort!

Tick [√] where appropriate. Or **Bold** your selection if you are answering electronically.

Personal information

1. Gender: Male Female

2. Age group:
 18 – 29 30 – 39 40 – 49 50years and above
3. Educational level of respondent:
 First Year Second Year Third Year N/A
 Other (Please Specify)
4. How do you classify your knowledge in Information Technology?
 Basic Intermediate High Not at all

SECTION B

How viable is industrial attachment in Technical and Vocational Institutions in Ghana.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5. Industrial Attachment program is profitable					
6. Industrial Attachment program should be continued					
7. Student's mark for Industrial Attachment are used for their end of term assessment/report					
8. The Institution receives Student's Industrial Attachment assessment /marks promptly from the Industry					
9. Attachment results show a true picture of student's attachment experience					

Challenges in Electronic / Online Industrial Attachment assessment in Ghana

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
10. Access to Internet is high					

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APPENDIX C: Manager's Copy

Electronic assessment of students on industrial attachment program in Technical and Vocational Institutions in Ghana: a case study of Cape Coast Technical Institute.

Dear Participant, this questionnaire is part of a Master's Thesis to investigating the process of electronic assessment of students on industrial attachment program in technical and vocational institutions in Ghana. The questionnaire will provide me with the relevant information that I need to complete the research.

The answers are completely confidential and anonymous. Thanks in advance for your time and effort!

Tick [√] where appropriate. Or **Bold** your selection if you are answering electronically.

Personal information

1. Gender: Male Female
2. Age group:
 18 – 29 30 – 39 40 – 49 50 - 59 years old 60 year and above
3. Educational level of respondent:
 University Graduate Professional Certificate
 Polytechnic / HND Vocational / Technical
 Senior High School Middle School / JSS
 N/A

Challenges of filling Industrial Attachment assessment form

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16. Assessment form questions are different to understand					
17. Filling the assessment forms consumes too much time.					

Challenges in Electronic / Online Industrial Attachment assessment in Ghana

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
18. Access to Internet is high					
19. Access to Computer is high					
20. Online system of assessment for industrial attachment program would be preferred					
21. The authenticity of student's marks can be guaranteed online					
22. Online assessment of student on industrial attachment can be easily accessed					
23. Students should be allowed to view their performance in Industrial Attachment before mark are submitted to their Institutions					
24. The Operation's Manager in the industry is willing to fill student's attachment assessment form online?					

25. Are there any other barriers to the successful application of electronic assessment and monitoring of students on industrial attachment?

[] YES

[] NO

26. Please state them;

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APPENDIX D: RESULT OF SURVEY

Summarized in table forms are the responses obtained from questionnaires distributed to the three different groups of respondents

PERSONAL INFORMATION OF RESPONDENT

In order to get some background information about the respondents, questions about their gender, age, educational level and level of knowledge in Information Technology were asked. Below is the result obtained.

AGE OF STUDENTS

AGE	Frequency	Valid Percent
18-29	40	100.0

Source: Field survey, June, 2014

AGE OF TEACHERS

AGE RANGE	Frequency	Valid Percent
18 – 29	2	5.0
30 – 39	10	25.0
40 - 49	17	42.5
50 - 59	11	27.5
Total	40	100.0

Source: Field survey, June, 2014

AGE OF OPERATIONAL MANAGERS

AGE RANGE	Frequency	Valid	Percent
40 - 49	8		40.0
50 - 59	8		40.0
60 - 69	4		20.0
Total	20		100.0

Source: Field survey, June, 2014

EDUCATIONAL LEVEL OF TEACHERS

	Frequency	Valid %
UNIVERSITY GRADUATE	26	65.0
POLYTECHNIC / HND	11	27.5
PROFESSIONAL CERTIFICATE	3	7.5
Total	40	100.0

Source: Field survey, June, 2014

EDUCATIONAL LEVEL OF OPERATIONAL MANAGERS

	Frequency	Valid Percent
UNIVERSITY GRADUATE	8	40.0
PROFESSIONAL CERTIFICATE	8	40.0
JHS / MIDDLE SCHOOL	4	20.0
Total	20	100.0

Source: Field survey, June, 2014

KNOWLEDGE IN IT (TEACHERS)

	Frequency	Valid Percent
HIGH	18	45.0
INTERMEDIATE	13	32.5

BASIC	9	22.5
Total	40	100.0

Source: Field survey, June, 2014

KNOWLEDGE IN IT (OPERATIONAL MANAGERS)

	Frequency	Valid Percent
HIGH	2	10.0
INTERMEDIATE	5	25.0
BASIC	13	65.0
Total	20	100.0

Source: Field survey, June, 2014

VIABILITY OF INDUSTRIAL ATTACHMENT

INDUSTRIAL ATTACHMENT MARKS USED AS PART OF END OF TERM ASSESSMENT (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	7	17.5
AGREE	14	35.0
NEUTRAL	9	22.5
DISAGREE	6	15.0
STRONGLY DISAGREE	4	10.0
Total	40	100.0

Source: Field survey, June, 2014

FILLING STUDENT'S INDUSTRIAL ATTACHMENT FORM IS DIFFICULT (OPERATIONAL MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	3	15.0
AGREE	5	25.0

NEUTRAL	0	00.0
DISAGREE	6	30.0
STRONGLY DISAGREE	6	30.0
Total	20	100.0

Source: Field survey, June, 2014

THE INSTITUTION RECEIVE STUDENT'S INDUSTRIAL ATTACHMENT ASSESSMENT PROMPTLY (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	7	17.5
AGREE	13	32.5
NEUTRAL	7	17.5
DISAGREE	10	25.0
STRONGLY DISAGREE	3	7.5
Total	40	100.0

Source: Field survey, June, 2014

THE STUDENT'S INDUSTRIAL ATTACHMENT ASSESSMENT/MARKS ARE RETURNED PROMPTLY (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	1	5.0
AGREE	9	45.0
NEUTRAL	5	25.0
DISAGREE	5	25.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

ATTACHMENT RESULTS TRUE PICTURE OF STUDENT'S EXPERIENCE (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	8	20.0

AGREE	17	42.5
NEUTRAL	8	20.0
DISAGREE	5	12.5
STRONGLY DISAGREE	2	5.0
Total	40	100.0

Source: Field survey, June, 2014

**STUDENT'S ASSESSMENT MARKS SENT TO THE INSTITUTION ARE SECURED
(TEACHERS)**

STRONGLY AGREE	0	0.0
AGREE	8	
NEUTRAL	5	20.0
	18	12.5
DISAGREE	9	45.0
STRONGLY DISAGREE		22.5
Total	40	100.0

Frequency Valid Percent

Source: Field survey, June, 2014

**STUDENT'S ASSESSMENT MARKS SENT TO THE INSTITUTION ARE
SECURED (OPERATIONS MANAGER)**

	Frequency	Valid Percent
STRONGLY AGREE	2	10.0
AGREE	6	30.0
NEUTRAL	0	0.0
DISAGREE	6	30.0
STRONGLY DISAGREE	6	30.0
Total	20	100.0

Source: Field survey, June, 2014

STUDENTS CAN CHANGE THEIR ASSESSMENT MARKS. (TEACHERS)

Frequency Valid Percent

STRONGLY AGREE	20	50.0
AGREE	15	37.5
NEUTRAL	5	12.5
DISAGREE	0	0.0
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

STUDENTS CAN CHANGE THEIR ASSESSMENT MARKS. (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	7	35.0
AGREE	8	40.0
NEUTRAL	2	10.0
DISAGREE	3	15.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

ASSESSMENT FORM CAN GET LOST OR DAMGED. (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	25	62.5
AGREE	15	37.5
NEUTRAL	0	0.0
DISAGREE	0	0.0
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

ASSESSMENT FORM CAN GET LOST / DAMAGED. (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	8	40.0
AGREE	10	50.0

NEUTRAL	1	5.0
DISAGREE	1	5.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

CHALLENGES OF FILLING INDUSTRIAL ATTACHMENT ASSESSMENT FORM

ASSESSMENT FORM QUESTIONS ARE DIFFICULT TO UNDERSTAND. (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	4	20.0
AGREE	0	0.0
NEUTRAL	0	0.0
DISAGREE	4	20.0
STRONGLY DISAGREE	12	60.0
Total	20	100.0

Source: Field survey, June, 2014

FILLING THE ASSESSMENT FORM CONSUMES TIME. (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	0	0.0
AGREE	8	40.0
NUETRAL	0	0.0
DISAGREE	8	40.0
STRONGLY DISAGREE	4	20.0
Total	20	100.0

Source: Field survey, June, 2014

CHALLENGES INTERNET ACCESS IS HIGH IN YOUR INSTITUTION

	Frequency	Valid Percent
STRONGLY AGREE	15	37.5
AGREE	8	20.0
NUETRAL	5	12.5
DISAGREE	2	5.0
STRONGLY DISAGREE	10	25.0
Total	40	100.0

Source: Field survey, June, 2014

INTERNET ACCESS IS HIGH IN YOUR INDUSTRY

	Frequency	Valid Percent
STRONGLY AGREE	12	60.0
AGREE	4	20.0
NUETRAL	0	0.0
DISAGREE	0	0.0
STRONGLY DISAGREE	4	20.0
Total	20	100.0

survey, June, 2014

Source: Field

COMPUTER ACCESS IS HIGH IN YOUR INSTITUTION

	Frequency	Valid Percent
STRONGLY AGREE	16	40.0
AGREE	7	17.5
NEUTRAL	6	15.0
DISAGREE	9	22.5
STRONGLY DISAGREE	2	5.0
Total	40	100.0

Source: Field survey, June, 2014

COMPUTER ACCESS IS HIGH IN YOUR INDUSTRY

	Frequency	Valid Percent
STRONGLY AGREE	12	60.0
AGREE	8	40.0
NEUTRAL	0	0.0
DISAGREE	0	0.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

ONLINE SYSTEM OF ASSESSMENT FOR INDUSTRIAL ATTACHMENT IS PREFERRED (STUDENTS)

	Frequency	Valid Percent
STRONGLY AGREE	2	5.0
AGREE	18	45.0
NEUTRAL	10	25.0
DISAGREE	8	20.0
STRONGLY DISAGREE	2	5.0
Total	40	100.0

Source: Field survey, June, 2014

ONLINE SYSTEM OF ASSESSMENT FOR INDUSTRIAL ATTACHMENT PROGRAM WOULD BE PREFERRED (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	12	30.0
AGREE	16	40.0
NEUTRAL	7	17.5
DISAGREE	5	12.5
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

ONLINE SYSTEM OF ASSESSMENT FOR INDUSTRIAL ATTACHMENT PROGRAM WOULD BE PREFERRED (OPERATIONAL MANAGERS)

	Frequency	Valid Percent
STRONGLY AGREE	0	0.0
AGREE	4	20.0
NEUTRAL	8	40.0
DISAGREE	8	40.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

ONLINE ASSESSMENT INFORMATION OF STUDENT ON INDUSTRIAL ATTACHMENT CAN BE EASILY ACCESSED (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	18	45.0
AGREE	15	37.5
NEUTRAL	5	12.5
	2	5.0
DISAGREE		
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

ONLINE ASSESSMENT INFORMATION OF STUDENT ON INDUSTRIAL ATTACHMENT CAN BE EASILY ACCESSED (OPERATIONAL MANAGERS)

	Frequency	Valid Percent
STRONGLY AGREE	4	20.0
AGREE	8	40.0
NEUTRAL	0	0.0
DISAGREE	8	40.0
STRONGLY DISAGREE	0	0.0
Total	20	100.0

Source: Field survey, June, 2014

THE AUTHENTICITY OF STUDENT'S MARKS CAN BE GUARANTEED ONLINE (TEACHERS)

	Frequency	Valid Percent
STRONGLY AGREE	2	5.0
AGREE	23	57.5
NEUTRAL	5	12.5
DISAGREE	10	25.0
STRONGLY DISAGREE	0	0.0
Total	40	100.0

Source: Field survey, June, 2014

THE AUTHENTICITY OF STUDENT'S MARKS CAN BE GUARANTEED ONLINE (OPERATIONS MANAGER)

	Frequency	Valid Percent
STRONGLY AGREE	4	20.0
AGREE NEUTRAL	4	20.0
	0	0.0
	8	40.0
DISAGREE		
STRONGLY DISAGREE	4	20.0
Total	20	100.0

Source: Field survey, June, 2014

THE OPERATION'S MANAGER IN THE INDUSTRY IS WILLING TO FILL STUDENT'S ATTACHMENT ASSESSMENT ONLINE

	Frequency	Valid Percent
STRONGLY AGREE	4	20.0
AGREE	0	0.0
NEUTRAL	4	20.0
DISAGREE	8	40.0
STRONGLY DISAGREE	4	20.0
Total	20	100.0

Source: Field survey, June, 2014

ARE THERE ANY OTHER BARRIERS TO THE SUCCESSFUL APPLICATION OF ELECTRONIC/ ONLINE ASSESSMENT AND MONITORING OF STUDENTS ON INDUSTRIAL ATTACHMENT (TEACHERS)

	Frequency	Valid Percent
NO	23	57.5
YES	17	42.5
Total	40	100.0

Source: Field survey, June, 2014

BARRIERS TO SUCCESSFUL ONLINE ASSESSMENT APPLICATION (TEACHER)

	Frequency	Valid Percent
POWER OUTAGE	2	5.0
VIRUS CORRUPTING THE DOCUMENTS	2	5.0
ICT ILLITERACY AMONG OPERATIONAL MANAGERS	4	10.0
LACK OF COMPUTERS AND INTERNET FACILITIES	9	22.5
NO RESPONSE	23	57.5
Total	40	100.0

Source: Field survey, June, 2014

ARE THERE ANY OTHER BARRIERS TO THE SUCCESSFUL APPLICATION OF ELECTRONIC ASSESSMENT AND MONITORING OF STUDENTS ON INDUSTRIAL ATTACHMENT (OPERATIONAL MANAGERS)

	Frequency	Valid Percent
NO	10	50.0
YES	10	50.0
Total	20	100.0

Source: Field survey, June, 2014

WHAT ARE THE BARRIERS TO SUCCESSFUL APPLICATION OF ONLINE INDUSTRIAL ATTACHMENT ASSESSMENT OF STUDENTS (OPERATIONAL MANAGERS)

	Frequency	Valid Percent
POWER OUTAGE	2	10.0
VIRUS CORRUPTING THE DOCUMENTS	1	5.0
ICT ILLITERACY AMONG OPERATIONAL MANAGERS	2	10.0
LACK OF COMPUTERS AND INTERNET FACILITIES	5	25.0
NO RESPONSE	10	50.0
Total	20	100.0

Source: Field survey, June, 2014



APPENDIX E: INTRODUCTORY LETTER

CAPE COAST TECHNICAL INSTITUTE

*In case of reply the number
and date of this letter
should be quoted*



(INDUSTRIAL LIASON COMMITTEE)

P.O BOX A 155
CAPE COAST
GHANA - WEST AFRICA

TEL: +233-042-32203

Our Ref.....

Your Ref.....

.....
.....
.....

Dear Sir/Madam,

INDUSTRIAL ATTACHMENT

This letter is to introduce our student whose name appears below for industrial Attachment Training in your Establishment.

NAME OF STUDENT	COURSE
.....
.....
.....

The institute programme requires that each student(s) be attached to an Establishment during vacation to enable them undergo practical skills training in their field of Specialization.

For this vacation, our attachment programme begins from.....to.....

In view of this, we will be grateful if you would consider our student(s) for the attachment training programme in your Establishment.

During this period, students are to be assessed by their mentors in the Establishment.

Attached to this letter, is an Assessment Form for your completion, and we shall be grateful if you could return it to the Institution.

We appreciate your co-operation and count on your support in this regard.

Thank you.

Yours faithfully,

INDUSTRIAL RELATION CO-ORDINATOR

*DO NOT ACCEPT THIS LETTER IF IT DOES
NOT BEAR THIS ORIGINAL BLUE STAMP*

APPENDIX F: ASSESSMENT REPORT SHEET

CAPE COAST TECHNICAL INSTITUTE

In case of reply the number should be quoted

P O BOX A155
CAPE COAST
GHANA-WEST AFRICA

TEL: +223-3321-322230 / 35466

Our Ref: Date:

Your Ref:

INDUSTRIAL ATTACHMENT REPORT SHEET

[1] Name of Student:
Surname First Name Middle Name

[2] Department:

Please clear him/her as requested below

[3] Date commenced attachment: Date ended:

[4] Number of working days made by Student on attachment:

[5] Number of days absent from work with permission:

[6] Number of days absent from work without permission:

DIRECTION: Pease indicate by cycling the grade, which measures the student performance in the areas stated below.

INTERPRETATON OF THE GRADING

<u>MARK</u>	<u>GRADING</u>
0	ABSENT
1	WEAK
2	BELOW MINIMUM
3	MINIMUM
4	GOOD
5	OUTSTANDING

APPENDIX F: ASSESSMENT REPORT SHEET

	COMPETENCY	GRADING	COMMENTS
A	MANIPULATIVE SKILLS		
1	Ability to use tools / equipment competently	0 – 1 – 2 – 3 – 4 – 5 -	
2	Ability to operate machines	0 – 1 – 2 – 3 – 4 – 5 -	
B	SAFETY		
1	Awareness of safety precautions	0 – 1 – 2 – 3 – 4 – 5 -	
2	Adherence of safety precautions	0 – 1 – 2 – 3 – 4 – 5 -	
3	Adherence to environmental rules	0 – 1 – 2 – 3 – 4 – 5 -	
4	Ability to follow instructions	0 – 1 – 2 – 3 – 4 – 5 -	
C	ATTITUDE TO WORK		
1	Attendance at work	0 – 1 – 2 – 3 – 4 – 5 -	
2	Punctuality	0 – 1 – 2 – 3 – 4 – 5 -	
3	Desire to work	0 – 1 – 2 – 3 – 4 – 5 -	
4	Willingness to accept new ideas and suggestion	0 – 1 – 2 – 3 – 4 – 5 -	
5	Enthusiasm to work	0 – 1 – 2 – 3 – 4 – 5 -	
6	Perseverance	0 – 1 – 2 – 3 – 4 – 5 -	
7	Initiative	0 – 1 – 2 – 3 – 4 – 5 -	
8	Adherence to the vales and regulations of the organization	0 – 1 – 2 – 3 – 4 – 5 -	
9	Ability to work independently without supervision	0 – 1 – 2 – 3 – 4 – 5 -	
10	Ability to complete work on schedule	0 – 1 – 2 – 3 – 4 – 5 -	
D	HUMAN RELATIONS		
1	Relationship with colleagues	0 – 1 – 2 – 3 – 4 – 5 -	
2	Relationship with superiors	0 – 1 – 2 – 3 – 4 – 5	

		-	
3	Relationship with subordinates	0 – 1 – 2 – 3 – 4 – 5	
4	Emotional control	0 – 1 – 2 – 3 – 4 – 5	
	MAXIMUM TOTAL 100%		

HEAD OF DEPARTMENT

Name:

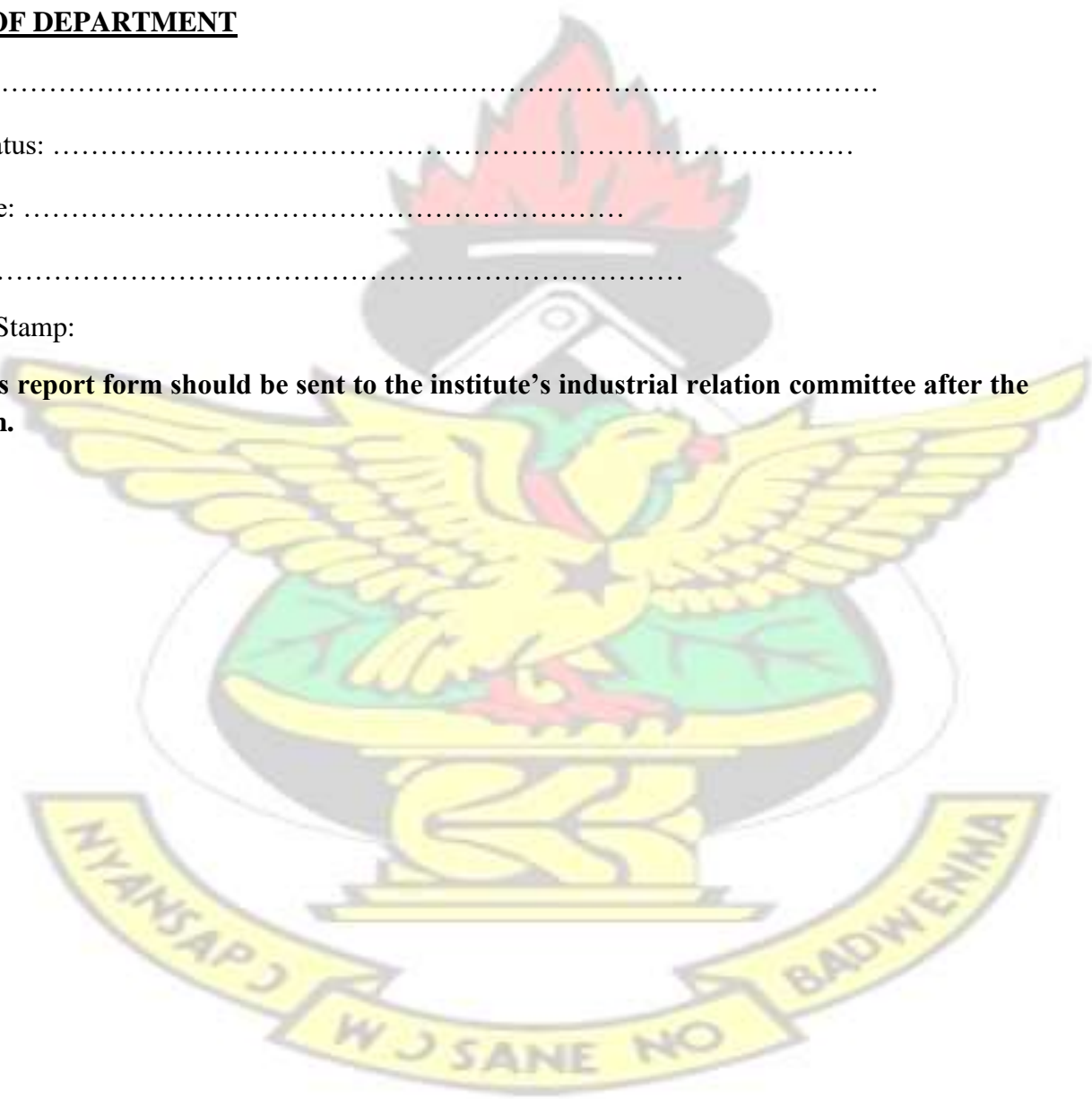
Rank/Status:

Signature:

Date:

Official Stamp:

NB: This report form should be sent to the institute’s industrial relation committee after the program.



APPENDIX G: REPORT ON CORRECTION OF THESIS

KNUST

