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Adoption of Web Based Technology to Facilitate Industrial Attachment Schemes in Tertiary Institutions: A Case Takoradi Polytechnic, Ghana

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Abstract

It is currently no doubt globally that Information Communication Technology (ICT) inventions and innovations have become integral part of our lives and also brought about significant changes and improvement in productivity at workplaces. A number of Institutions in Africa are yet to tap into the efficient and cost saving benefits of ICT innovations. Tertiary students especially those in the polytechnics are made to undergo industrial attachment in order to equip themselves with practical oriented skills and work ethics that cannot be fully acquired in the classroom. This fits into the objective of establishing polytechnics, as other researchers have noted, as technological institutions with the responsibility for providing career-focused education and skills training in close collaboration with industry. However, the Industrial Liaison Office of various polytechnics who are to coordinate the linkage between industry and academia are overwhelmed by administrative tasks of placement of students in industry and associated supervisory duties. The authors adopted prototyping methodology to develop a Web-based Application for use by Industrial Liaison Office of Takoradi Polytechnic to help facilitate administrative processes of printing attachment letters and generating industrial attachment supervision list based on entries students fill online. Software development processes of the adopted methodology were carried out through to the final deployment stage. The Application is recommended for use by any institution which wants to use software to help facilitate their industrial attachment programme processes.

Keywords: Takoradi Polytechnic, Portal, Industrial Liaison Office, students, letter,

1. Introduction

Today's labour market reveals that industries are seeking graduates churned out from academic institutions with practically oriented employable skills. However, such demand for practical knowledge cannot be fully acquired in the classroom (Nduro, Anderson, Peprah and Twenefour, 2015). This has necessitated the need for educational institutions to modify their curriculum to adopt an approach where students can earn a blend of theory learnt in the classroom with practically-simulated work environment and industrial training experience at a real workplace environment.

Donkor, Nsoh, and Mitchual (2009) rightly acknowledged this fact by stating that technological trend keep on changing almost on a daily basis making it challenging, expensive and almost impossible for educational institutions to acquire all the necessary modern machinery and specialized equipment required for the training of their students with up-to-date practical knowhow to enable them fit effectively in industry.

Students in most tertiary institutions are made to undergo industrial attachment during their long vacation periods. Such industrial experience programmes organized by the institutions are either made mandatory or optional. This invariably exposes the students to practical training at the world-of-work. As Donkor et al. (2009) pointed out; the purpose of attaching students to industries is for them to acquire practical skills in their occupational areas and to acquaint themselves with new technologies, machines and equipment they have heard of and read about in the classroom.

Importance of technical and vocational education cannot be overemphasized, hence, the establishment of polytechnics and backed by law (Polytechnic Law, PNDCL 321, 1992 replaced by Act 745, 2007) with a mandate that is career oriented in nature (Nyarko, 2011).

It is the expectation of industry that students graduate from the polytechnics with required skill-set that the industry needs. In response to that, the polytechnics are under increasing pressure to incorporate workplace training into their curriculum to provide work place experience for learners.

Industrial attachment programs are organized for students in such institutions and are strictly supervised for which students earn academic credits for it. Nduro et al. (2015) stressed the need to bridge gap between academia and industry through collaboration or partnership, eventually reduce unemployment rate.

Takoradi Polytechnic is one of the ten tertiary institutions established in Ghana with the mandate under the law to impart students with necessary skills that will make them relevant to be absorbed into productive sectors of the economy. Enshrined in its vision is to churn out middle-level manpower and researchers to provide support for industries(Nyarko, 2011; Takoradi Polytechic- Vision Mission and goals, 2015).

All students are required to undergo industrial attachment before they graduate from the Polytechnic. The curriculum of all programs has in it incorporation of industrial training schemes for both staff and students. The Industrial Liaison Office (ILO) coordinates industrial training and attachments programmes on behalf of all departments.

Takoradi Polytechnic's Industrial Liaison Office is charged with the responsibility to coordinate industrial attachment/internship programmes and industrial visits for staff and students of the institution. The cardinal goal of the Office is to ensure a smooth transition from the theoretical knowledge acquired by students in the lecture hall into the world of work. The office is responsible for seeking placement of students in related industries or organizations to enable them acquaint themselves with current technological transformation in the work environment (15th Congregation Brochure, 2015). The office wastes no time in informing students of any opening anywhere for placement (Nduro et al., 2015).
This procedure has been eased by allowing students to search for themselves industrial places of interest which is closely linked to the program of study to do their attachment. Open letters are given to respective students to address to organisations. Organisations respond to these letters, hence acknowledging their readiness to accept students to undertake industrial attachment with them. An Assumption of Duty form (AOD) is given to students before they embark on attachment. This form contains fields that require students to indicate the exact location of their companies, and details of the Industry-based supervisor. Students are expected to assume duty and submit to the Industrial Liaison Office the form with details of the company they are serving at. The completed form must be submitted back to the Industrial Liaison Office in person or via email within two weeks of assuming duty. The forms are compiled and arranged according to geography zones and assigned academic supervisors to do follow-up visits.
Eshun (2015), in explaining the functions of the Industrial Liaison Office touched on industrial attachment processes and its duration for academic year. He noted that, the Industrial Liaison Office does coordination, assessment and evaluation of students on industrial attachment. They are responsible for arranging follow-up visits. The entire industrial attachment program duration lasts for six months during which the students are expected to acquire additional practical experience to supplement their course of study in the Polytechnic. Attachment duration is organized in two phases, that is, end of second (2nd) semester and end of fourth (4th) semester. It is a requirement for the award of Higher National Diploma (HND) and attracts a total of 4 credit hours. Competency Based Training (CBT) Civil Engineering and Fashion Design and Technology students undergo special practical industrial training , that is, during the entire fourth semester. This attracts fifteen (15) credit hours. Bachelor of Technology (B.Tech) students also undergo industrial attachment programme for the whole of third semester for a maximum of fifteen credits. Students are expected to present to their respective departments comprehensive reports after every attachment exercise for assessment and grading. Eshun (2015) reiterated that it is mandatory for every student in the institution to embark on industrial training before graduating.

1.1 Problem Statement

Generally, the processes involved in administration, coordination, and supervision of the attachment programme is cost intensive, laborious and time consuming.

Large quantities of A4 sheets are procured and used in carrying out the attachment exercise. Printout and photocopies of Attachment letters and Assumption of Duty forms are done in large quantities. These are then supplied to all departments. This has cost implications for the institution.

Again, there is inadequate space at the office to keep these piles of paper documents. The problem of storage is

compounded by the challenge of retrieving specific documents/files belonging to students. Searching for specific files is tasking.

Even though there are computers at the office to keep record of items, these computers tend to suffer from frequent breakdowns. When this occurs, the office tends to lose the data stored on these computers through virus attacks, hard disk crash, and uneven electrical outages.
A risk worth noting is that in the event of any unforeseen disaster there are no backups to recover lost information.

It takes quite some time to complete compilation of information on filled out Assumption of Duty forms submitted to the office. The processes involved include sorting the forms and rekeying of entries on the form to generate final supervision list. There is duplication of effort (rekeying) in generating supervision list for Lecturers/supervisors to use for tracking purposes.
This list is purposely compiled to be used to trace students and assist in coordination of attachment supervision.

Although some computerized system is in place, it is not greatly utilized to synchronize across all processes and operations leading to inefficiency and duplication of efforts.

The enumerated challenges above have necessitated the need for web-based online computerized system to replace the current processes and operations at the Industrial Liaison Office.
Leveraging the power of modern innovative Information Communication Technology tools, the current processes and procedures can be made more efficient.

1.2 Goals and objectives
The objectives are follows:

i. to examine the current state of operations at the Takoradi Polytechnic's Industrial Liaison Office.

ii. to identify the challenges associated with existing method of operations at the office regarding generating letters and tracking students on industrial training programme.

iii. to adopt prototyping methodology to develop a web-based application system for the Industrial Liaison office to perform their official functions such as generation of attachment letters for students, tracking location of students-on- attachment and generation of supervision lists.

1.3. Expected Outcome
With the implementation of the web based application which will become online platform for use by the Industrial Liaison office and students, administration of industrial attachment programme will become a lot faster and hustle-free. The system is expected to generate report based on the information provided by the students which can be printed out, as and when it is needed. The report generated will be in various formats such as Microsoft Excel for further analysis to be done on it.

Since the new system being developed is Web-based (online), students will be able to access the system anywhere once they have internet connectivity. Students can use the system to generate attachment letter and address it to respective companies (Gyawu, 2016).
Again, when students are on attachment they can provide relevant information relating to where they are doing their attachment. This will enable the Industrial Liaison Office to dispatch academic supervisors to their place of work.

1.4 Target Organisation
The target organization is the Industrial Liaison Office, an Administrative unit under the Office of the Rector, Takoradi Polytechnic. The Industrial Liaison Office is responsible, on behalf of the Polytechnic, for the coordinating linkage between the institution and industry. Other units within the Polytechnic can benefit from this application. Other tertiary institutions can benefit from implementation of similar systems with its stated benefits.

2. Methodology

Every software application goes through a Software engineering methodology. The type of application to be built determines the kind of methodology to be used. It should also be noted that there is no software development process without strengths and weaknesses (Simpson, Adzayao and Hebidzi, 2008). In developing the Industrial Liaison Online Portal, the prototyping model was adopted. The plan is to seek requirements from stakeholders; analyze and build a basic solution; implement and test, evaluate and maintain a check list of requirements; and finally deploy.

The diagram below summarizes our methodology in terms of application development:

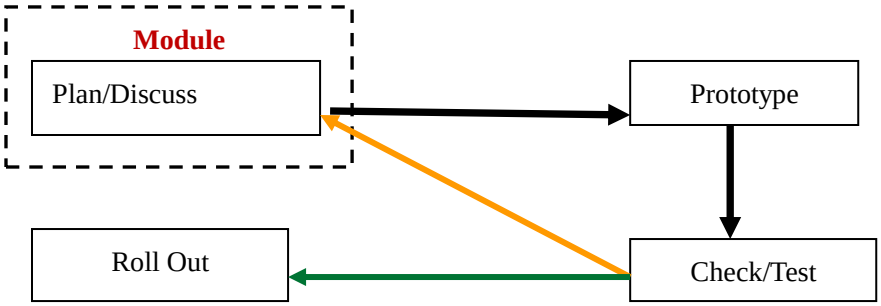

Figure 2.1 Application Development Using Prototyping

2.1 Reasons for choosing Prototyping approach

The foremost reason for choosing prototype is that, end-users can easily identify their needs and see how well the system can support their work and to determine how best it suits them. With this methodology, an initial prototype is made available to the users for them to observe in order to solicit their requirements.

Again, the feasibility of the proposed system can easily be tested using prototype. For instance, the user interface can be prototyped to see how best it suits the end user.

Moreover, the prototype can be developed quickly based on end user requirements. Errors and omissions can be pointed out and corrected easily.

2.2 Advantages in using Prototyping

A major advantage for adopting prototyping is that, users are likely to accept the system after it has been developed since they were involved in the development process.

Again, there is a clear match of the system to users' needs. This is because end users interact with the system as it is being developed to clearly identify their needs and determine if it meets their requirements (Sommerville, 2004).

Moreover, prototyping activities reduce development effort. Software engineers do not have to spend time and other resources brainstorming the exact need of the end user but rather a model of the software called prototype is built.

There are limitations to the use of prototyping approach. Rapid changes during development are to be expected. Documentations on changes made to quick fixes are often ignored by developers. The only design specification is the prototype code which is not enough for future documentation.

Secondly, organizations pressure software engineers to deliver incomplete software. Non-functional requirements which are meant to elaborate on performance characteristics of the system such as its performance, security, reliability, fault tolerance and robustness, need to be tested as part of the system development process.

However, the researchers have adopted a strategy for the limitation. Each stage of the project milestone during the development will be carefully documented. Robust security encryption algorithm was adopted to secure the application.

2.3 Requirement Elicitation

To clearly understand and to meet the scope of objectives set, an interview session was conducted to seek answers to these questions from the target group.

1. Can you give us a general overview of the functions of the Industrial Liaison Office?
2. When do students start attachment?
3. Is Industrial attachment compulsory for all categories of students?
4. What is the duration of attachment period?
5. Which forms do you use in your work?
6. Do you have a system to monitor and track the location of every student-on attachment in order to help facilitate Industrial visits and assess their performance?
7. What happens when a student does not get a place to do his/her attachment?
8. Kindly provide us with a breakdown of criteria you use in scoring students on industrial attachment.
9. Can we have sample of reports that the office eventually generates?
10. Do you have any additional information you would like us to know?
11. What do you want implemented in a computerized application for use by your office?

This resulted in follow up questions as follows:

1. Can we get a sample of letters that are given out to students to send to companies?
2. Can you brief us on the information fields found on the Assumption of Duty form?
3. Can we have a list of companies that students are allowed to do attachment at?

2.3. Technology Adopted

There are flexible core technologies which are often used for building web-based applications, depending on the requirements of the application (Magic Web Solutions, 2016). The first being Java-based solutions (J2EE) from Sun Microsystems which involves technologies such as JSP and Servlets. The second option, which is, Microsoft .NET platforms uses Active Server Pages, SQL Server and .NET scripting languages. The third option is the Open Source platform (predominantly PHP and MySQL), which is best suited to smaller websites and lower budget applications (Lam, 2011).

For the Industrial Liaison Online Portal, web-based solution was used. Open source platform (PHP and Mysql) was adopted since the technology was cost effective, platform independent, and have a number of solution-oriented programming forums for online support.

3. Results and Discussion

3.1 General Description of Requirements

Through observation, additional requirements were discovered. It was observed that the Assumption of Duty forms and student log books were grouped and parked on the floor and on top of cabinets. This brought to the researcher's notice that they needed a database system to store their information and a backup made to prevent the risk of data loss in the event of a disaster. The administrative staff at the Industrial Liaison Office were collating and keying data of students from paper files gathered unto computer system. This exercise was found to be repetitive and time consuming. In all, the researchers were able get an overall understanding of what the stakeholders wanted the system to do. At this stage the researchers discovered that the project's requirements were feasible.

A general description of the processes that goes on was noted. These are as follows:

i. Students are to obtain general letters (already stamped and signed) from the Industrial Liaison Office to be sent to industry. Addressee area of the letter is blank. Students must enter and address the letters to respective industry of choice for placement. Students are advised to identify and choose an industry that is closer to their place of residence during vacation. This is to reduce burden seeking and paying for accommodation and transportation to and from the work. Moreover, industries they choose must be related to their program of study.

ii. Every student is given a log book and an Assumption of Duty form. They are to record their daily job schedule activities throughout the attachment period in a log book. The Assumption of Duty form providing information on exact location of company, their contact details and name of their industry-based-supervisor. The form must be submitted back to the Industrial Liaison Office within two weeks of assuming duty.

iii. The Assumption of Duty forms are compiled and arranged according to regional zones and rekeyed unto the computer system. A supervisory list is then generated to enable the office dispatch academic

supervisors to these zones, namely;

(a) WESTERN REGION: Takoradi Township
(b) WESTERN REGION: Sekondi Township, Essikado, Kojokrom, VRA, Daboase
(c) WESTERN REGION: Agona Ahanta, Nzema, Tarkwa Township and Mining areas.
(d) WESTERN REGION: Bogoso, Sefwi Wiawso and Juaboso
(e) CENTRAL REGION
(f) ACCRA METROPOLIS
(g) TEMA METROPOLIS: Tema Metropolis and its environs,
(h) VOLTA REGION: Volta Region
(i) BRONG AHAFO: Brong Ahafo, Northern, Upper East & Upper West
(j) ASHANTI REGION: Kumasi Metropolis
(k) ASHANTI REGION: Outside Kumasi Metropolis
(l) EASTERN REGION: Eastern Region

Lecturers/Academic supervisors are then dispatched to various locations across the country to assess students.

3.2 Technical and Non-technical Requirements

Technical requirements were analyzed. These are basically hardware and software requirements.

Software Required:
Operating System: Windows/Linux OS
Client Software: Web Browser
Front End tools: HTML, JavaScript, CSS
Back End tools: MySql, Apache Web Server, PHP

Hardware Required:
CPU: 1GHz processor and above (32-bit (x86) or 64-bit (x64) processor)
RAM: 4GB
HDD: 20 GB
Auxiliary Hardware: Keyboard, Monitor, Mouse, Printer, USB Storage
Internet-compatible devices for students to access the Industrial Liaison Online Portal: Examples include Desktop computers, Tablets or Smartphones.

The non technical requirements (high level specifications) are as follows:

i. Automate printing of attachment letters for students to send to Industry to seek placements.
ii. Enable online submission of Assumption of Duty entries to enable ILO to have information on students' exact location. Academic supervisors can then be dispatched to these locations to supervise students.
iii. Eliminate rekeying of assumption of duty entries on paper as it has been the practice.
iv. Compute and generate report(summaries and totals) of questions answered
v. Build a database of students and their contacts.

3.3 Requirement Analysis

After the requirements have been fully gathered, they were then categorized into related subsets and explored to establish the relationship between them. It was later re-examined for consistency, omission and ambiguity based on the customers' requirement.

Validation checks were made on the requirements received from the stakeholders.

The checks were done by asking and answering the following questions:

i. is each requirement consistent with the overall objectives of the system?
ii. is the requirement really necessary or does it represent an add-on feature that may not be essential to the objectives of the system?
iii. is each requirement testable once implemented?

After further thought and analysis, no significant change in system requirement was made or noticed. Also, there were no contradictory constraints on the same system's functions.

With the knowledge and technology at hand, the system could actually be implemented without problems taking into consideration the budget and the schedule for the system development.

3.4 Data Design

The data design involved the transformation of the information gathered during the analysis into data that was required for the implementation of Online Portal. The data objects and relationship between entities were defined. This was done with using PhpMyAdmin and Microsoft Visio.

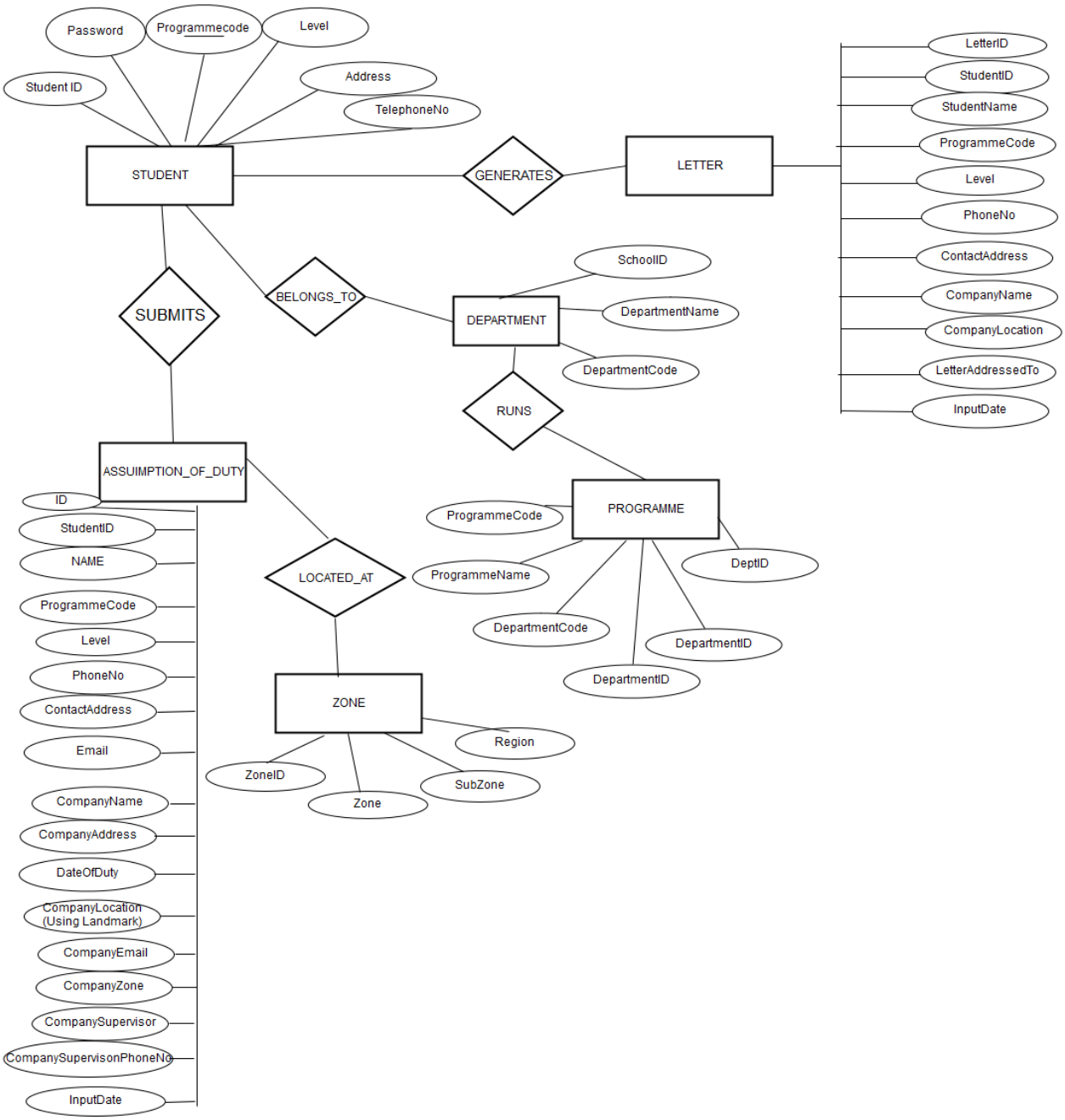

Figure 1. Entity-Relationship diagrams

The above shows entities, attributes and their relationships. The entities, here are STUDENT, ZONE, LETTER, PROGRAMME, AND DEPARTMENT.
Some of the worth noting relationships depicted are as follows.

- A Student generates a Letter
- A Student belongs to a Department
- A Student submit Assumption of Duty entries
- Assumption of Duty entries are categorised into Zones
- Department mounts(runs) Programmes

The next diagram shows database design of the Application

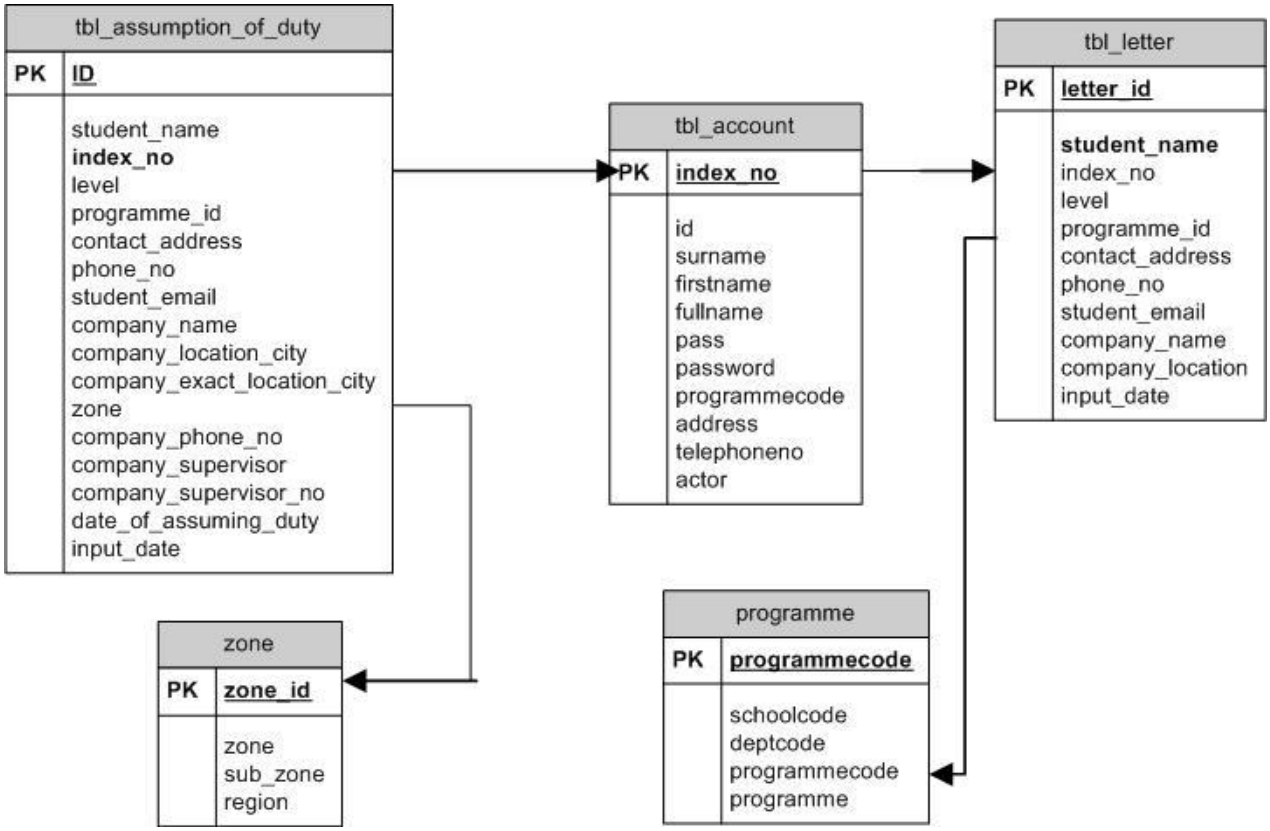

Figure 2: Database design

3.4 Architectural design

The architectural design defines the relationship between the major structural elements of the Application. In the architectural design, issues of security were considered hence a cryptographic algorithm was implemented (Elmasri and Navathe, 2011).
The diagram below depict the database schema architecture and the level of interaction between the data store, entities, data types, relationships and views for end users (students and administrators).

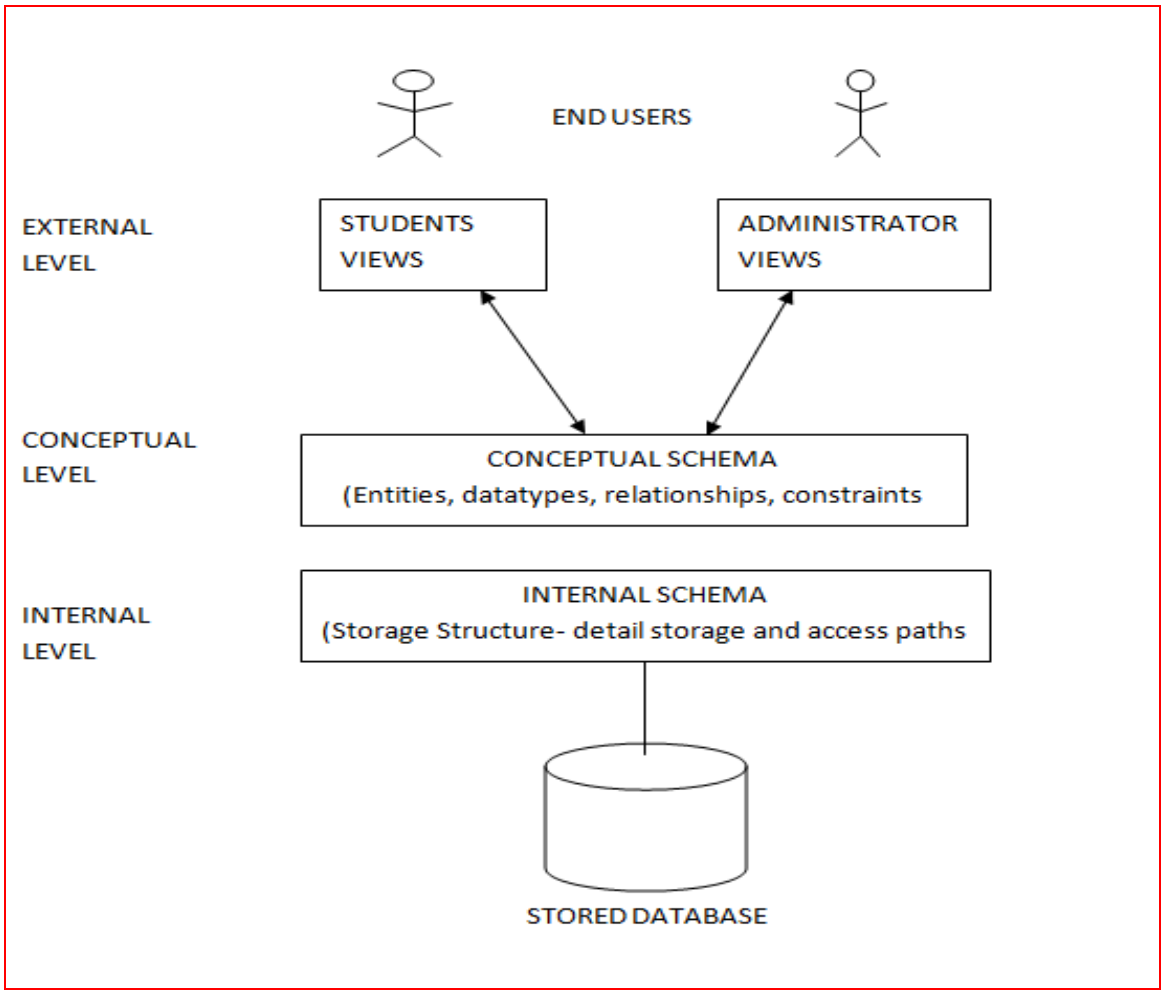

Figure 3. Three Schema Architecture of Liaison Portal. Concept adapted from *Fundamentals of Database Systems 6th Ed*. authored by Elmasri R. and Navathe S. B. (2011).Published by Addison Wesley

Use Case Design

Use case diagrams describe the actors and their interactions with the system (Shelly and Rosenblatt, 2010). The two main actors are the Students and Staff of Industrial Liaison Office. The figure below demonstrates the use-case diagram depicting student's interaction.

Level 0: STUDENT INTERACTION SUBSYSTEM

The table below describes the Use case interaction existing between the actor Student and the Subsystem of Industrial Liaison System

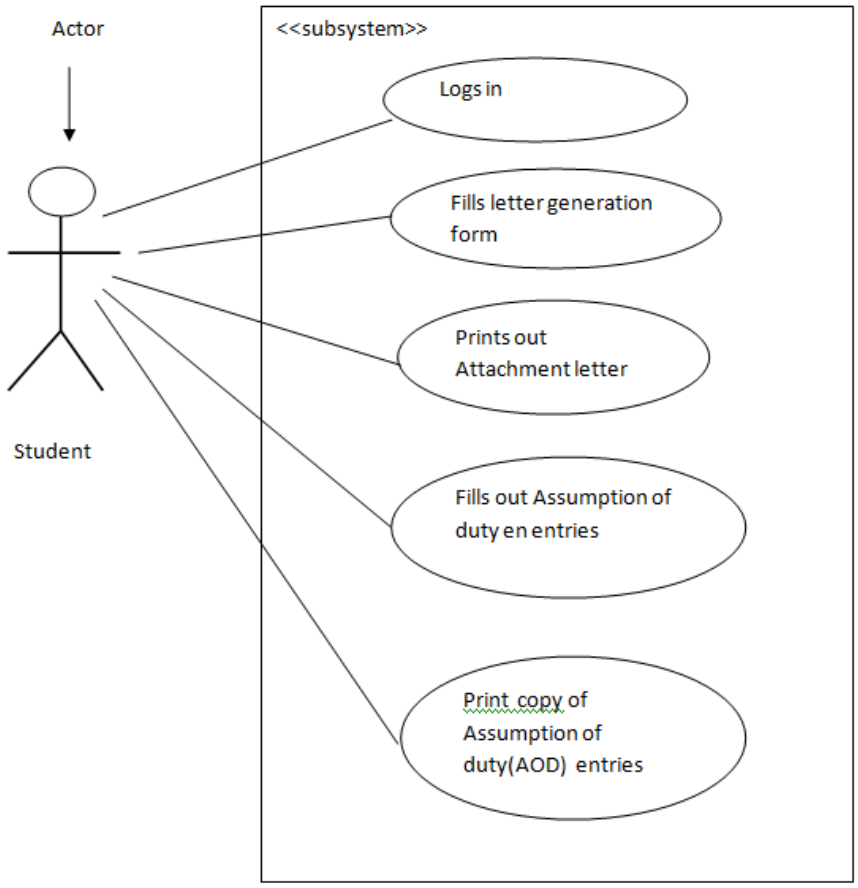

Figure 4. Use case –student activity (generating attachment letters and making AOD entries)

The table below describes the Use case interaction existing between the actor Student and the Subsystem of Industrial Liaison System.

Table 1: Use Case- Student User Activity

Use Case Name:	Student User Activity (generating letters and making AOD entries)
Participating Actors:	Student User
Flow of Events:	1. User logs in 2. System displays picture and basic biodata of student 3. User fills form 4. User enters address of company and position of whom letter is addressed to. 5. User proceeds to print out Attachment letter 6. User logs out 7. User logs in to fill Assumption of Duty Form 8. User proceeds to print out copy of entries made
Alternative flow:	1(a) User does not log in 3(a) User does not fill form 3(b) System alerts and prevents user from proceeding to the next step due to mandatory fields not filled 7(a) User does not fill Assumption of Duty Form 7(b) System alerts and prevents user from proceeding to the next step due to mandatory fields on form not filled
Entry condition:	User provides correct user-authentication, Student Index Number and Password
Exit Condition:	User prints out attachment letter User prints out prints out Assumption of Duty entries(printable format) User logs out

The next diagram depicts the actor Administrative User of the system and his interaction with the system.

Level 1: ADMINISTRATIVE STAFF INTERACTION SUBSYSTEM

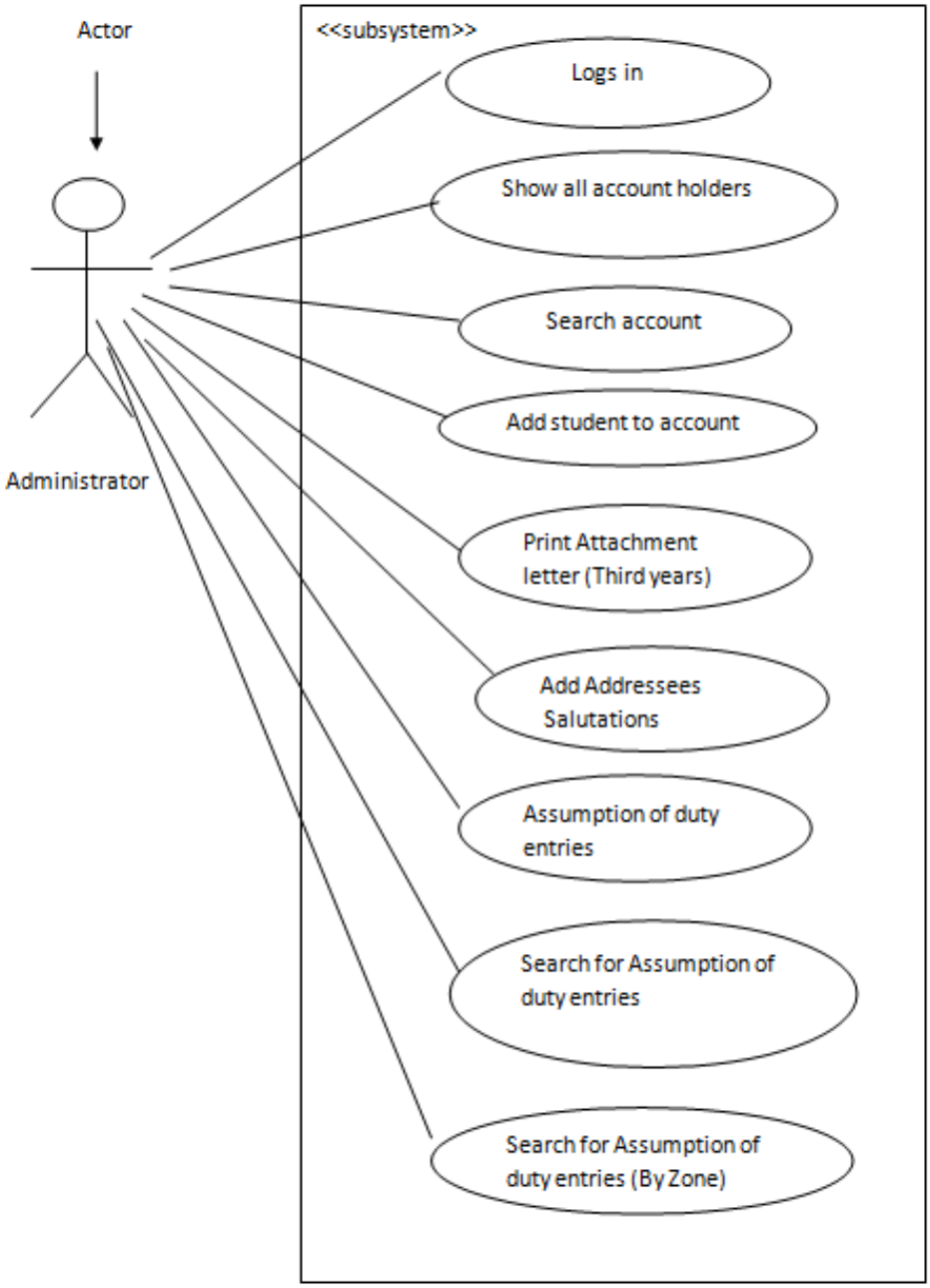

Figure 5. Use case Diagram- Administrative User activity

The table below describes the use case diagram above.

Table 2. Use Case- Administrative User Activity

Use Case Name:	Administrative User Activity (Viewing and generating reports)
Participating Actor(s) :	Administrative User
Flow of Events:	1. User logs into the system 2. User can search for student account details 3. User can add student to account 4. User can print attachment letters 5. User can add addressee salutations (e.g. The Manager) 6. User can view letter entries 7. User can view assumption of duty entries 8. User can query by Zone and download assumption of duty entries
Alternative flow:	1(a) User does not log in 1(a) User does gain access to administrative menu to perform administrative tasks 2, 3, 4, 5 , 6, 7, and 8
Entry condition:	User provides correct user-authentication, that is a valid Username and Password
Exit Condition:	User does not supply valid username and password User logs out from the system

3.5 Interface Design

Interface design describes how the software communicates with itself thus how the various links are related or dependent on each other as well as the humans who interact with the system.
Figures 6, 7, 8, 9, 10, 11 12 and 13 below show screenshots of User interfaces.
User interface elements were mostly created using Hypertext Mark-up Language (HTML), styled with Cascading Style Sheet (CSS). To ensure user validation of user inputs, a client side scripting language, that is, JavaScript was used. To ensure that the software obtains a clean and modern design, Twitter Bootstrap framework was incorporated to enhance the design.

4. Conclusion

The researchers are very pleased with the outcome of this project. All expected outcomes have been met including additional requirements which were not stated in the project objective.

5. Recommendations

The motivation for this project is to make administrative coordination of industrial attachment by the Industrial Liaison Office cost effective, effortless in terms of efficiency and also less time consuming. This Application is strongly recommended for adoption by the institution so as to obtain the benefits listed above.

The Application is also recommended for any educational Institution that wants to achieve similar benefits of using technology for receiving online submissions.

Again, the application was developed by the in-house staff of the Polytechnic. This gives credence to the fact that in-house staff have the technical competence and are able to understand the needs of the institution to be able to implement tailor-made solutions better when given the opportunity to do so.

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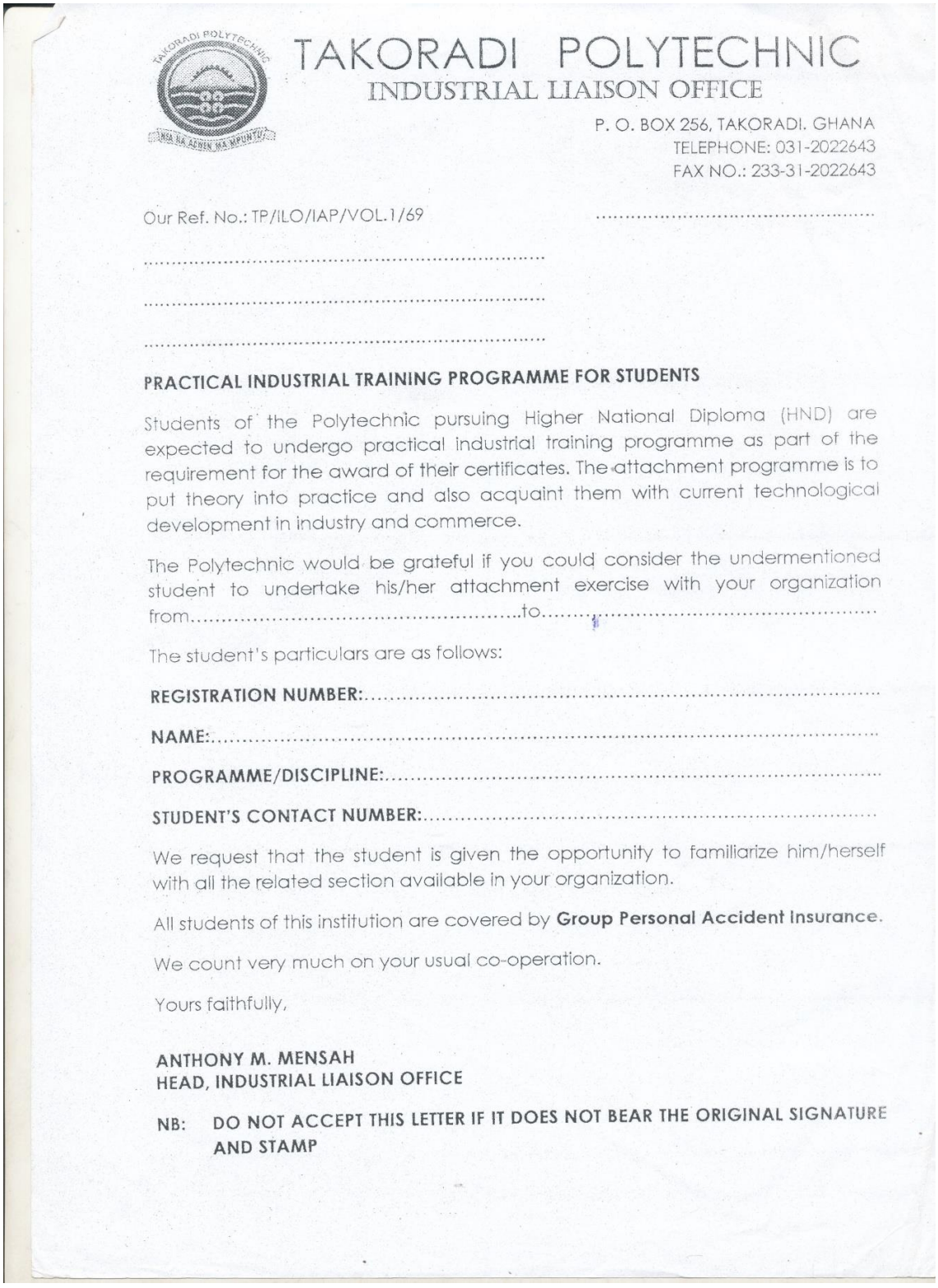

TAKORADI POLYTECHNIC
INDUSTRIAL LIAISON OFFICE

P. O. BOX 256, TAKORADI. GHANA
TELEPHONE: 031-2022643
FAX NO.: 233-31-2022643

Our Ref. No.: TP/ILO/IAP/VOL.1/69 .....

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PRACTICAL INDUSTRIAL TRAINING PROGRAMME FOR STUDENTS

Students of the Polytechnic pursuing Higher National Diploma (HND) are expected to undergo practical industrial training programme as part of the requirement for the award of their certificates. The attachment programme is to put theory into practice and also acquaint them with current technological development in industry and commerce.

The Polytechnic would be grateful if you could consider the undermentioned student to undertake his/her attachment exercise with your organization from.....to.....

The student's particulars are as follows:

REGISTRATION NUMBER:.....

NAME:.....

PROGRAMME/DISCIPLINE:.....

STUDENT'S CONTACT NUMBER:.....

We request that the student is given the opportunity to familiarize him/herself with all the related section available in your organization.

All students of this institution are covered by **Group Personal Accident Insurance.**

We count very much on your usual co-operation.

Yours faithfully,

ANTHONY M. MENSAH
HEAD, INDUSTRIAL LIAISON OFFICE

NB: DO NOT ACCEPT THIS LETTER IF IT DOES NOT BEAR THE ORIGINAL SIGNATURE AND STAMP

Figure 6. Open letter template that students fill and address to companies/organisations

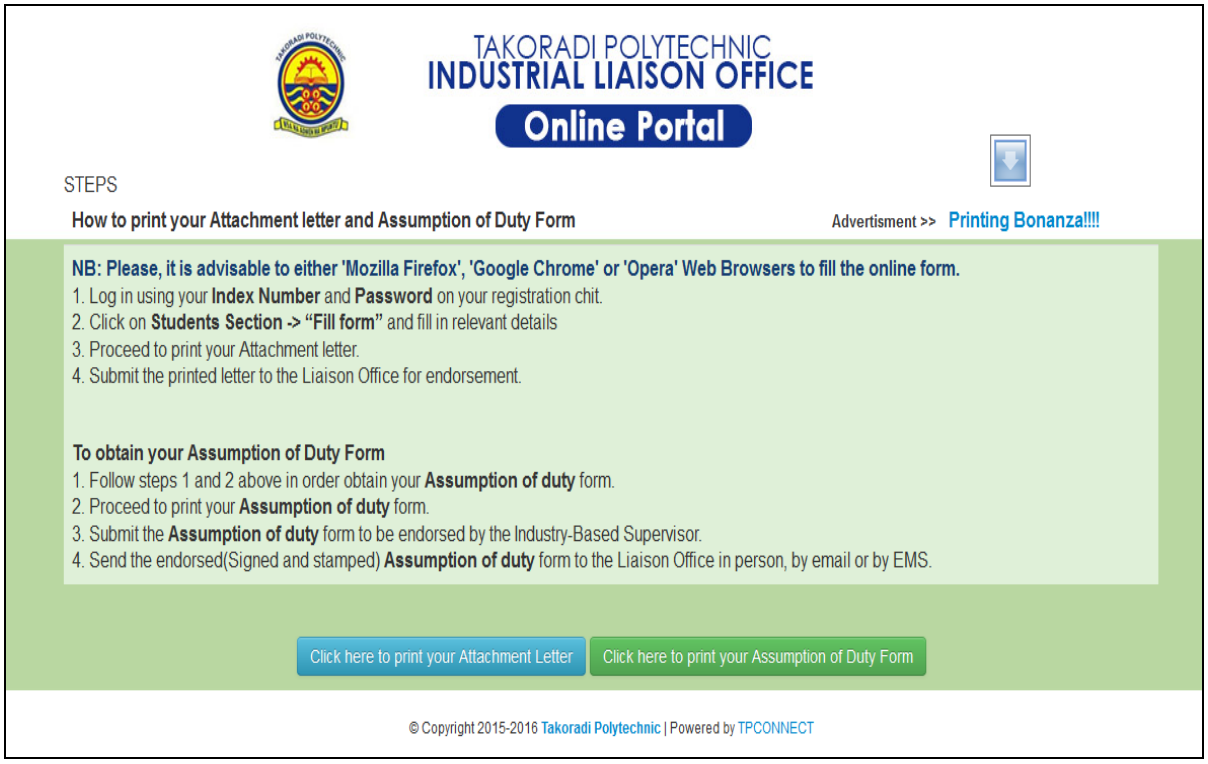

Figure 7. Front Page Dashboard of Industrial Liaison Online Portal

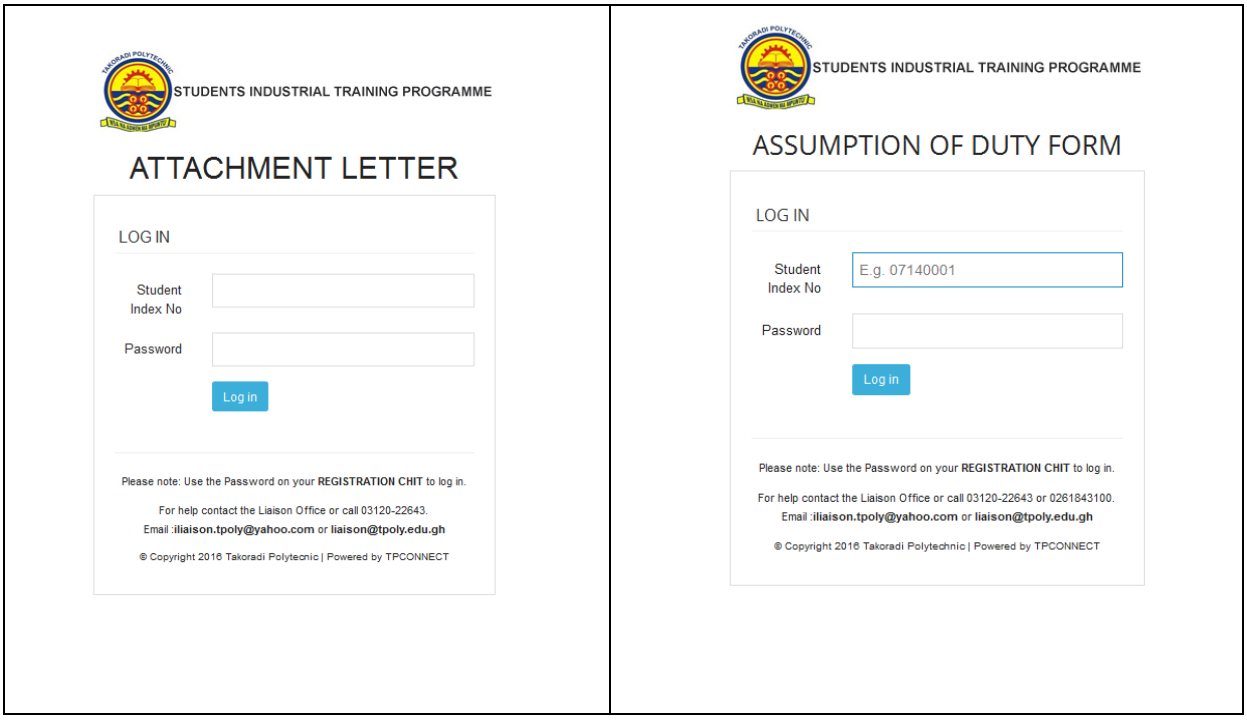

Figure 8. Attachment letter and Assumption of Duty Login Pages

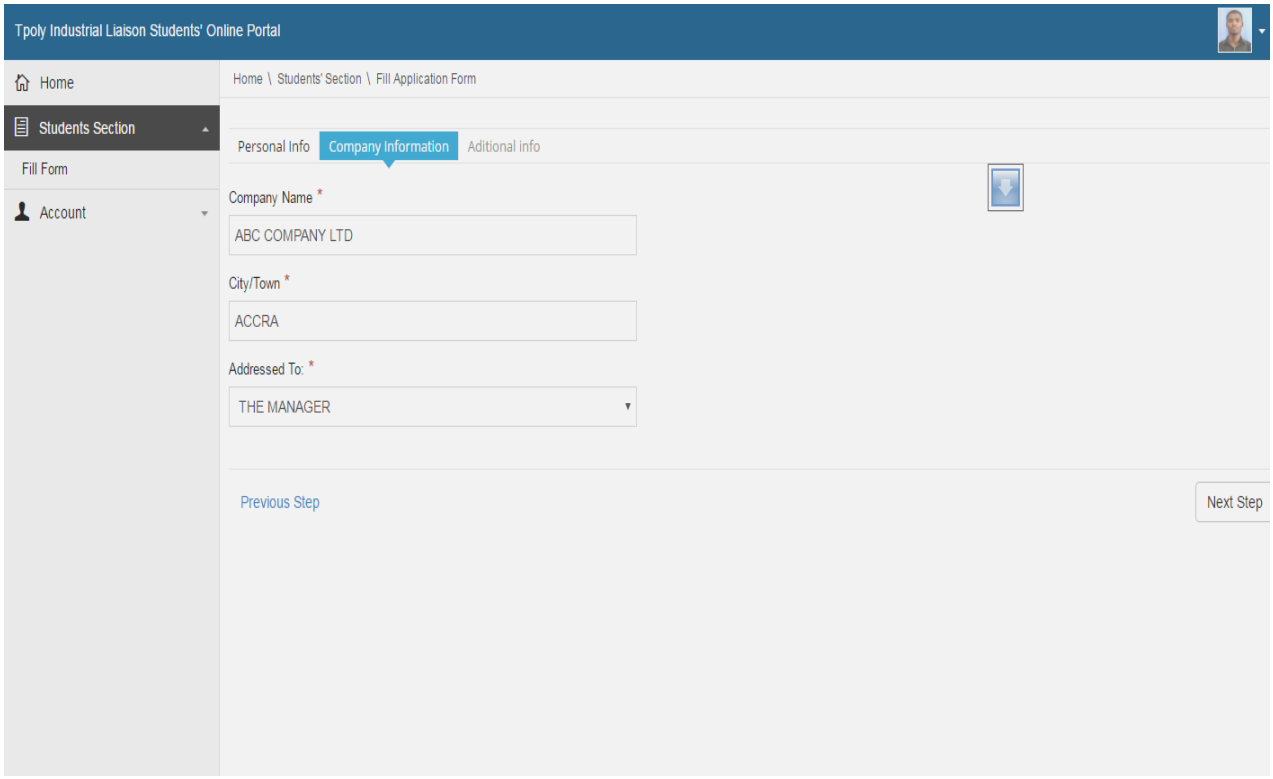

Figure 9. Form wizard section (Company Information section) student must fill.

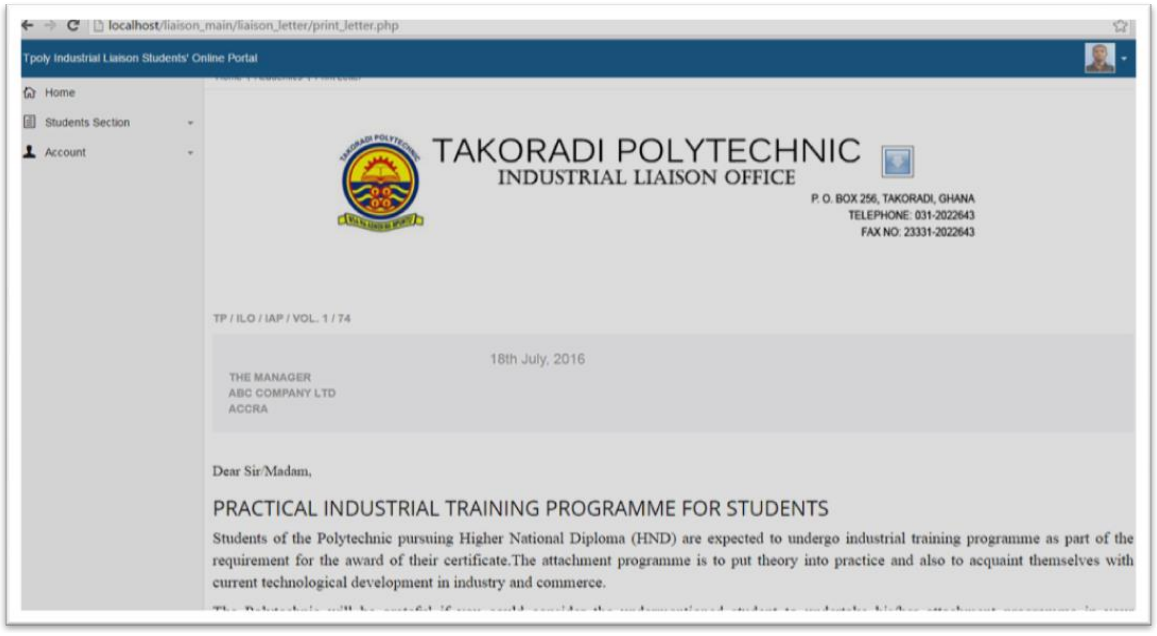

Figure 10. Preview of Attachment Letter

7/18/2016 localhost/liaison_main/liaison_letter/print_letter.php

TAKORADI POLYTECHNIC
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TP / ILO / IAP / VOL. 1 / 74

18th July, 2016

THE MANAGER
ABC COMPANY LTD
ACCRA

Dear Sir/Madam,

PRACTICAL INDUSTRIAL TRAINING PROGRAMME FOR STUDENTS

Students of the Polytechnic pursuing Higher National Diploma (HND) are expected to undergo industrial training programme as part of the requirement for the award of their certificate.The attachment programme is to put theory into practice and also to acquaint themselves with current technological development in industry and commerce.

The Polytechnic will be grateful if you could consider the undermentioned student to undertake his/her attachment programme in your organisation from **27th June, 2016** to **16th September, 2016.**

The student's particulars are as follows:

REGISTRATION NUMBER:

NAME:

PROGRAMME:

CONTACT NUMBER:

We request that the student should be made to familiarize him/herself with all the related sections available in your organisation.

All Students of this institution are covered by Group Personnel Accident Insurance policy.

We count on your usual cooperation.

Yours faithfully,

Joseph Eshun
Head, Industrial Liaison Office

Sample

http://localhost/liaison_main/liaison_letter/print_letter.php 1/2

Figure 11. Print preview of letter.

Figure 12. Administrator Interface menu buttons link users to the functionalities stated on it

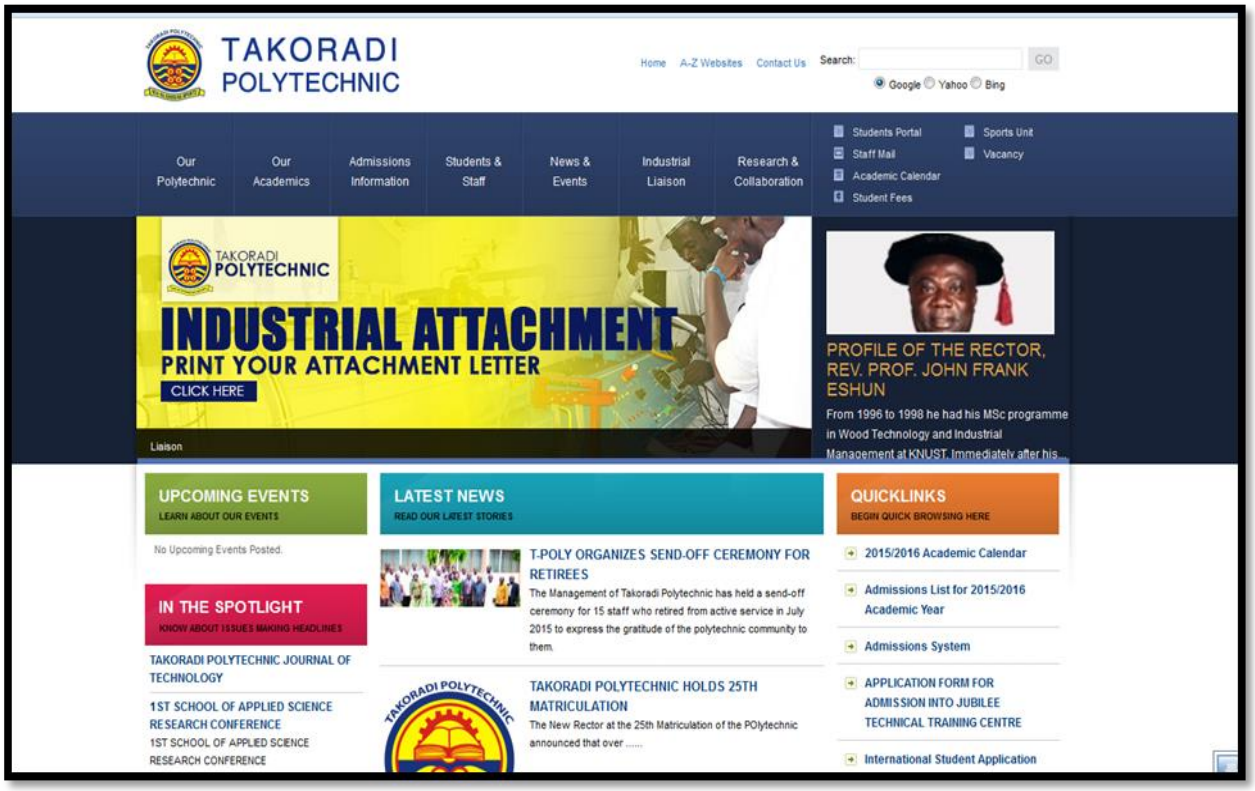

Figure 13.Front view of Takoradi Polytechnic Official Website with a link (clickable banner) to Industrial Liaison Online Portal.