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RESEARCH ARTICLE

EFFECTIVENESS OF INFORMATION TECHNOLOGY APPLICATION IN TAMALE POLYTECHNIC

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ABSTRACT

Despite its strategic intentions about information technology, Tamale Polytechnic and perhaps many of the other polytechnics in Ghana continuously handles many of its processes manually. Hence there were general delays in administrative processes, in admission processes and in results processes in Tamale Polytechnic. The study assessed the extent of IT application in Tamale polytechnic. Data were mainly primary type and obtained through questionnaire. Both descriptive and quantitative methods of data analysis were used. The study found very low rates of IT related training programs organized in Tamale Polytechnic, low supervision of technical IT support staff, high rate of hardware and software break downs and poor data disaster recovery programs and a number of problems associated with IT lessons in Tamale Polytechnic. Respondents were comfortable with their existing knowledge in computers and applied them intensively. Also there is general lack of supervision of technical IT support staff leading to high hardware and software breakdowns. And finally IT lessons in Tamale Polytechnic faced some challenges that needed to be addressed in order to build students' confidence in learning IT.

INTRODUCTION

Information Technology (IT) is the foundation on which many organizations and institutions run, and its failures can have a profound effect on business performance. If the IT services do not accomplish the enterprise business, goals and objectives, it can be costly. An IT effectiveness assessment can addresses this extremely important issue. Achieving Information Technology (IT) effectiveness in government offices in Ghana today should be the concern for all. This is because the bureaucratic structure, perceived laxity in the workplace and perceived problems associated with accountability and responsibility relationships are likely to inhibit the effectiveness of IT applications in many organizations. IT presents many opportunities to organizations that effectively use it. How IT is applied within the entity will have an immense impact on whether the entity will attain its vision, mission or strategic goals. This paper presents a framework for the evaluation of IT effectiveness in Tamale Polytechnic incorporating all the main stakeholders. The educational system in Ghana continues to change today; hence, educational institutions need to confront many issues to remain effective and efficient. For instance liberalizing entry and encouraging private educational institutions and investors into the educational industry has increased competition in the industry.

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The heightened competition has led to a strategic rethink by educational institution to remain competitive and gain advantage over their competitors. As results, many schools and other educational institution are making significant investments in IT to align business strategies, enable innovative functional operations and extend their student base. Also many tertiary institutions have introduced or modified their IT courses to augment the existing programs with the aim of gaining competitive advantage. Despite its strategic intentions about information technology, Tamale Polytechnic like Ho Polytechnic (Amegahsie-Viglo, 2010) and perhaps many of the other polytechnics in Ghana continuously handles many of its processes manually. For instance, the process of admission of applicants, payment of fees, registration, results of students, etc are all processed manually, which cause a lot of problems to students and the institution. There are general delays in administrative processes, in admission processes and in results processes. It is on these bases that the researchers sought answers to the following questions

- To what extent was Tamale polytechnic effective in using IT to solve operational problems?
- To what extent was Tamale Polytechnic effective in meeting its students IT needs?

Research objectives

The main objective of the study is to assess the effectiveness of IT application in Tamale polytechnic. Specifically study considers the following objectives

- To determine the intensity of use of IT in Tamale Polytechnic
- To assess the degree of comfort in the use of IT by management and staff of Tamale polytechnic
- To assess the effectiveness of IT related training to management and staff of Tamale polytechnic
- To assess the factors influencing IT effectiveness in Tamale polytechnic
- To determine students perceptions towards the effectiveness of IT education in Tamale polytechnic.

The study is relevant not only to Tamale polytechnic in designing or modifying IT policies but also to all the Polytechnics in Ghana in their quest to position themselves well in the tertiary educational system in the world. The outcome of the study also reflects the immersed contribution of IT in increasing productivity. It is also relevant to IT professional who may partner with institutions with IT needs.

Information technology in organizations

The IT departments in many organizations are involved in the development, implementation and maintenance of numerous information technologies with the aim of meeting the needs at all levels within the organization (Worral *et al*., 1998).Oz (2006) identified several trends that account for the importance of the use of IT in business and concluded that organizations that failed to use IT to meet their business objectives would lag behind. This is true to all organizations including educational institutions. Therefore educational institutions are required to constantly upgrade their hardware, software, and the skills of their employees to remain competitive (Oz, 2006). Other researchers (Trice and Bayer, 1993; Dewett and Jones, 2001; Gupta *et al*., 2007, Amegashie-Viglo, 2010) recognized the benefit of IT in organizations as follows:

- IT offers substantial information efficiencies and synergies to an organization.
- IT allows access to prior knowledge and enables the employees to search for and absorb new knowledge that is relevant to a problem at hand.
- IT facilitates efficient communication—the ability to communicate more easily and less expensively across time and geographic location.
- IT also improves the decision-making efficiency including the ability to store and retrieve large amounts of information more quickly and inexpensively.
- IT stimulates cultural values that support efficiency and innovation.

Effectiveness of IT in an organization

Worral *et al.* (1998) recognized that organizations that are characterized with high degree of decentralization, the evaluation of effectiveness of IT should focused on the users of the system so that the aggregate measure of the performance of individual systems is the measure of the overall effectiveness of IT in the organization.

Gupta *et al.* (2007) also designed a model that examines the effectiveness of IT in organization. The critical variables in the model that influence IT effectiveness in organization are:

- The involvement of top level management - Top management involvement in the IT-related projects provides guidelines and directions for the IS professionals and users. The model however recognized further that top management may lack the necessary training and understanding of IT systems and this presents problems in the IT effectiveness in organization.
- IT Management - IT management is very useful in taking timely decisions and resolving problems associated with the information systems. Gupta *et al.* (2007) however noted that the committee system of managing in government organizations lack the urgency required in moving along with fast changing technologies that require fast decision making.
- User satisfaction - The model further established that the involvement of user in system development influences user satisfaction since this create opportunity to build user expectation in the system and eventually user satisfaction with IT use lead to the enhancement of organizational productivity, efficiency and accuracy of reports.
- Training and communication - Training and education in computer-related software, proper maintenance, proper documentation, and support from the vendor increased IT effectiveness. Training also enhanced the system utilization and users' commitment. Also communication about the intent and benefits of new IT system is required if the organization do not want to meet resistance from unions and their members.
- Management of organizational culture - To ensure IT effectiveness in an organization, the organization's culture and the structure of information flow must be managed effectively. These require flexibility of culture to allow easy interplay with new technologies. The IT professionals are also affected by the culture of the organization, mostly by the formal structure of the organization, work processes, and general organizational behavior. The management of the organization plays an important role in establishing and shaping the culture of the organization.

METHODS

Tamale Polytechnic is the area of the study and the target population is the entire academic and administrative staff and third year HND students of Tamale Polytechnic. The list of the various categories of the population was obtained from the Registrar's office. The academic staff is made up of various categories of status, but for the purpose of these studies they are collectively referred to as teaching staff. The administrative staff is made of Principal Officers, the registry and other support staff of the polytechnic. Tamale Polytechnic is one of the Tertiary Institution in Ghana. It dates back as far as 1950, when it was established as a Trade School. It was converted to a Technical Institute in 1963, and in 1984, it was upgraded to the status of a non-tertiary polytechnic with responsibility to offer Advanced/Craft, Technician and Diploma programmes.

In 1993, the Polytechnic was further upgraded to the level of a tertiary institution with five others in the country, namely, Accra; cape coast; Kumasi; Ho; and Takoradi as part of the educational reforms which the PNDC Government were pursuing. This necessitated the promulgation of PNDC Law 321, which authorized the Polytechnic to offer Higher National Diploma (HND) programmes. It is therefore the mission of tamale polytechnic to train highly skilled, career focused, professional middle level manpower through the provision of programmes in several disciplines.

Presently the departments of Accountancy, Marketing, Secretaryship and Management studies form the School of Business whilst the engineering School is comprised of the department of Agricultural Engineering, Mechanical Engineering, Industrial Arts and Building Technology. In the school of Applied Sciences there are the departments of Statistics, Hospitality, Careering and Institutional Management (HCIM), Fashion and Design, Languages and Liberal studies and computer departments. Staff population is 280 on average with student numbers ranging on average between 2500 and 3000.

Research Design

For the purpose of complementarities both qualitative and quantitative research designs were used for the study in order to measure overlapping but different phenomena (Crump and Logan, 2008). Hence probability and non-probability sampling methods (Bryman, 2008; Curvin and Slater, 2002; Fisher, 2007; Jankowicz, 2000**)** were used for the study. Purposive and quota sampling methods were used to choose 30 administrative and teaching staff who consisted of 11 administrators/ secretaries, 7 lecturers, 5 heads of departments, 2 finance staff, 2 deans, 2internal audit staff and 1 library staff, The researchers reasoned that these categories of respondents are those whose work are more related with IT or required the use of IT in the polytechnic. To ensure representation from various categories of teaching and administrative staff quota sampling (Bryman, 2008) was use to complement the purposive sampling method. Simple random sampling method was further used to choose 70 final year HND students for study. These categories of respondents studied all the required IT programs in their respective programs and are ready for certifications. The overall sample size was limited to 100 respondents in view of the fact that the research group was working within the constraints of semester time frame. Data were analyzed using tables, column charts and measures of central tendencies. This research used a previously validated self-completion questionnaire (Worral, Remenyi and Money 1998; and Kaleem, 2005), but slightly modified to suit the purpose of this study. The questionnaire was extensive and comprised the background of respondents, indicators of intensity of use, and comfort in use of IT by staff, IT related training indicators, factors influencing IT effectiveness and perception of students toward IT lessons.

RESULTS

All the hundred questionnaires distributed were duly completed and collected. The data generated from the staff were mainly on use of IT in Tamale Polytechnic and the data from the students were to assess, based on the students' opinion, the effectiveness of computer lessons as a course in Tamale Polytechnic.

The characteristics of respondents

The first part of the questionnaires elicited information about the respondents such as their area of responsibility in the organization and their years of service with the Polytechnic. Also information about the students' respondents regarding various programs they offer was gathered.

Teaching and administrative Staff

The first category of respondents was administrative and teaching staff and the researchers referred to them as category A respondents. Almost 37% of these respondents occupied various levels of administrative positions ranging from the Registrar through Assistant Registrars to typists (see Table 4.1). Finance staff, internal audit staff and Deans had the same number of representation of almost 7%. The rests of the respondents were lecturers constituting 40% with HODs inclusive and 3% representation from Library.

Table 4.1. Position/occupational distribution of respondents

Occupation	Number	Percentage (%)
Administration Staff	11	36.67
Finance staff	2	6.67
Internal Audit staff	2	6.67
Library staff	1	3.33
Heads of Academic Departments	5	16.67
lecturers	7	23.33
Deans	2	6.67
Total	30	100

Source: Field survey, 2013.

Table 4.2 indicates the number of years worked by the category A respondents in Tamale Polytechnic. Most of the respondents worked within the range of 3-6 years, followed by 9 – 12years. Further analysis revealed that an average respondent worked for 6.7 years with the polytechnic. Thus the respondents were very experienced administrators and lecturers of various courses including IT courses.

Table 4.2 Distribution of category A respondents by number of years of service

Years	Frequency	Percentage (%)
0- 2yrs	4	13
3- 6 yrs	14	47
6- 9 yrs	1	3
9- 12 yrs	9	30
12- 15 yrs	0	0
Over 15 yrs	2	7
Total	30	100

Source: Field survey, 2013

Students

Category B respondents were final year HND students in Tamale Polytechnic. From Table 4.3 it can be deduced that

majority of the respondents were Secretaryship and Management studies (26%), followed by Marketing (23%), Accountancy (14%), Engineering (11%), HCIM (10%), Statistics (9%) and lastly Industrial Arts (7%). Obviously the sample represent a cross section of all the three faculties of the polytechnic; Applied Science, Business, and Engineering.

Table 4.3. Distribution of Students' respondents by program

Program (HND)	Frequency	Percentage (%)
Secretaryship& Management Studies	18	26
Marketing	16	23
Accountancy	10	14
HCIM	7	10
Industrial Arts	5	7
Engineering	8	11
Statistics	6	9
Total	70	100

Intensity of use of IT by Staff of Tamale Polytechnic

The second series of questions sought to assess how the category A respondents intensively use IT in performing their duties. Data gathered revealed that 53% of the respondents use the computer or the internet 1- 3hrs a day and 27% use the computer or the internet 3-6 hours a day (see Table 4.4). Further analysis revealed that the average respondent use the computer or the internet 4hrs a day.

Table 4.4. Distribution of respondents by hours of computer or internet use in a day

Hours of IT use per day	Frequency	Percentage (%)
1 hr	1	3
2 hrs	9	30
3 hrs	6	20
4 hrs	2	7
5 hrs	5	17
6 hrs	4	13
7 hrs	0	0
8 hrs	3	10
Total	30	100

Source: Field Survey, 2013

On a more subjective level, respondents were asked to locate themselves on a 5 point scale in terms of how intensively they use IT. The distribution for the entire panel of respondents is shown in the Figure 4.1 below. 77% of respondents rated themselves as very intensive users of IT' and 20% were average users of IT. Only 3% of the respondents are rare users of IT. This implies that computers are rigorously used in Tamale Polytechnic.

Comfort in use of IT by Staff of Tamale Polytechnic

Further questions sought to assess the category a respondent's level of experience and 'comfort' of working with computers. Almost 40% of these respondents had been working with PCs for less than or up to 6 years with a further 60% having been working with PCs for between 6 and 12 years (see Figure 4.2). Further analysis revealed that the average respondent had been employed by the Polytechnic for 6.7 years and had an average of 7.9 years of working experience with PCs. Again on a more subjective level, respondents were asked to locate themselves on a 5 point scale in terms of how comfortable or uncomfortable they felt in using IT. The distribution for the respondents is shown in the Figure 4.3 below.

The Figure 4.3 reveals that 80% of respondents rated themselves as above 'comfort in using IT' and 14% are average 'comfort in using IT'. Only 6% of the respondents are 'uncomfortable in using IT. The result therefore is indicative of the fact that many workers in Tamale Polytechnic are comfortable with IT use.

IT Related Training in Tamale Polytechnic

One area of measurement of effectiveness of IT use in an organization is the nature and quality of user training (Worrall, Remenyi and Money, 1998). Respondents to the survey were asked to indicate the number of days of formal IT-related training they had received in the last year and to indicate on a 5 point scale ranging from excellent to poor, the quality of the training program. The data presented in Table 4.5 revealed that 63% of respondents had not received any IT-related training in

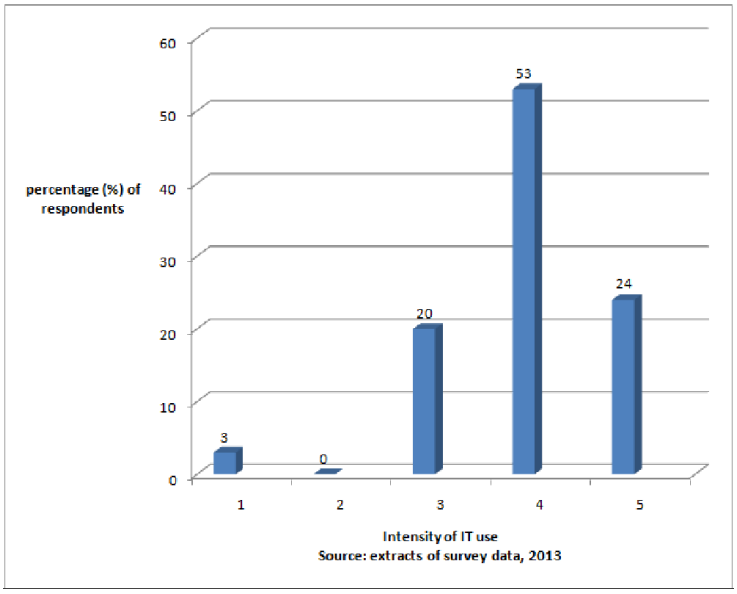

Figure 4. 1 Self assessed intensity of IT use

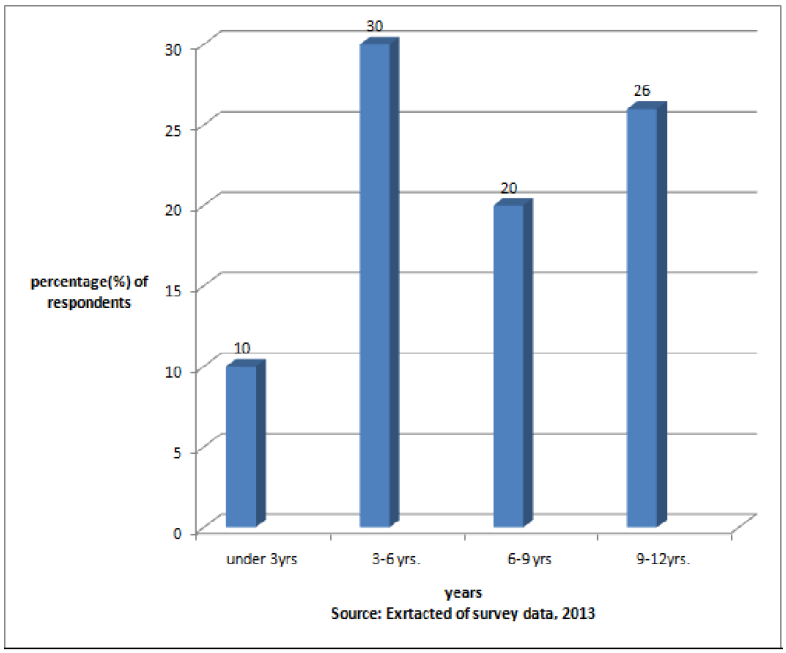

Fig.4.2. Respondents' years of experience with PC

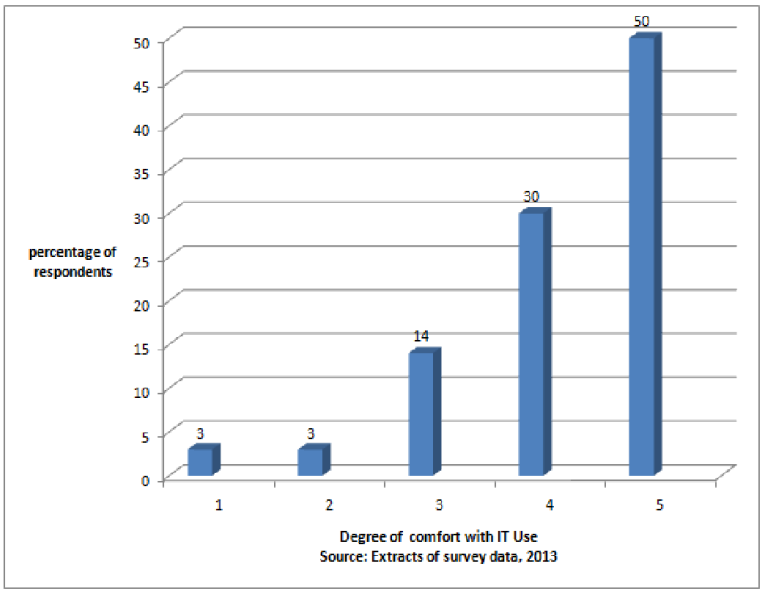

Fig.4.3 User Self- assessed Degree of Comfort with IT Use

the last year with a further 20% of respondents only having had less than 3 weeks formal IT training. Obviously these were very low rates of training. Hence, the implication was that organization of IT related training for staff in Tamale Polytechnic institute was very poor.

Further analysis revealed that, 9% of those who had some training assessed the quality of training as excellent and almost 82% of them assessed it as good.

Table 4.5. Distribution of respondents by duration of IT related training

Weeks	Frequency	Percentage (%)
None	19	63
Less than 1 week	7	23
1 week	0	0
2 weeks	2	7
3 weeks	0	0
4 weeks	0	0
Above 4 weeks	2	7
Total	30	100

Source: field survey, 2013

Factors Influencing IT Effectiveness in Tamale Polytechnic

Another important objective of the study was to assess the factors or attributes that have positive influence on IT effectiveness at Tamale Polytechnic. Respondents were therefore asked to rate these factors on a 5- point scale ranging from strongly disagree to strongly agree. The mean score on each of the 10 factors was calculated and the factors were then ranked to give an impression of the perception of relative influence that respondents assigned to each of the attributes. Table 4.6 below shows that apart from three variables with the mean scores ranging from 3.53 to 2.7 by which respondents barely agreed to have positive influence on effectiveness of IT management in Tamale Polytechnic, the remaining variables, with the mean scores ranging from 2.43 to 1.8, had not influence positively to effectiveness of IT management.

Table 4.6. Perception of respondents towards the determinants of IT effectiveness

Attributes	Influence means score
Availability of high degree of technical competence IT support staff of the Polytechnic	3.53
There is general user confidence in the IT systems of Tamale polytechnic	2.70
Fast response time from computer support staff to remedy problems	2.20
Provision for disaster recovery systems,	1.80
A low percentage of hardware and software breakdowns	2.30
IT responsiveness to changing user needs	
High frequency of user training programmes	2.30
Participation in the planning of the IT requirements	2.33
Prompt processing of requests for changes to the existing systems	2.43
Very elaborate IT policy for implementation	2.63

Source: Extracts survey data, 2013

Effectiveness of IT Education in Tamale Polytechnic

Last but not the least objective of the study was to determine perception of students towards the effectiveness of IT education in Tamale Polytechnic. Respondents were therefore asked to indicate the degree of agreement on a 5-point scale ranging from strongly agree -5points to strongly disagree -1point, whether IT education in Tamale Polytechnic has the potential to improve certain performance outcome from them. The mean score on each of the 8 performance outcomes was calculated and presented in Table 4.7. The scores give impressions of the respondents' perception towards the extent to which IT lessons from Tamale Polytechnic enhance the performance outcomes from them.

Table 4.7 shows that the Polytechnic potential grandaunts generally agreed, with a mean score of 4, that IT lessons in Tamale Polytechnic assist them to produce high quality assignments. They however remained undecided or disagreed, with mean score of 3 or 2 respectively, that IT lessons enhances performance outcomes from them in terms of: awareness of the IT course, being results oriented and tasks focused, ability to use IT resources, time and costs savings and access to materials of international standard. The implication of these is that IT education in Tamale Polytechnic faces some problems. Further investigation revealed a number of problems that both management of IT and IT lessons suffer in Tamale polytechnic.

Table 4.7. Perception distributions of students towards the effectiveness of IT education

Performance Outcomes	IT effectiveness Mean scores
My communication with public has improved after attending some lessons in IT in Tamale polytechnic	2.29
IT lessons in Tamale Polytechnic have improved my general awareness of the course	2.57
IT education in Tamale Polytechnic has made me more results oriented and tasks focused	2.57
IT lessons in Tamale Polytechnic has increased my ability to use IT resources	2.76
Now I can save time and costs by using IT resources in my daily life	3.13
IT education in Tamale Polytechnic make me feel more involved in my studies	3.10
IT education in Tamale Polytechnic helps me to access materials of international standard	2.33
IT education in Tamale Polytechnic helps me to produce high quality assignment	3.67

Source: Extracts of survey data, 2013.

DISCUSSION

The study revealed that IT facilities were rigorously used in Tamale polytechnic. 80% of category A respondents used the computer or the internet 1-9hours a day and the average user spent 4 hours on these facilities every day. Even on a subjective level, 77% of these respondents rated themselves as very intensive users of IT facilities. The study further revealed that the respondents were very experienced users of IT facilities with 60% of them worked with PCs for 6 – 12 years. The average respondent is found to have been employed by the Polytechnic for almost 7 years and had an average of 8years' experience of working with PCs. Thus, the average respondent learnt and worked with the computer before being employed by the Polytechnic. Even on a more subjective level, 80% of the respondents claimed the feeling of comfort when they use IT facilities.

The study found further that there were very low rates of IT related training programs organized in Tamale Polytechnic. 63% of the respondents had not received any IT-related training in the last year and only 20% of the respondents had less than 3 weeks formal IT training. Another findings of the study was that though Tamale Polytechnic has been effective in employing technical competent IT support staff and perhaps in designing elaborate IT policy, the institution failed to ensure that, the computer support staff responded timely in remedying user IT problems and coupled with low frequency of user training programs, there was user perception of high percentage of hardware and software breakdowns in Tamale Polytechnic. Also by failing to provide disaster recovery programs, which was the worst of all the factors in the opinion of respondents, Tamale polytechnic seems not to have learnt from the September 11th crash in America that led to loss of trillions of vital information and affected the survival of many organizations and institutions. This affirms Gupta *et al.* (2007) assertion that the committee system of managing in government organizations lack the urgency required to move

along with fast changing technologies that require fast decision making. The study also found that the Polytechnic potential grandaunts perceived IT lessons in Tamale Polytechnic as effective in training them to produce high quality assignments. They however remained undecided or disagreed that IT lessons in the Polytechnic enhanced performance outcomes from them in areas of; creating awareness of the IT course, being results oriented and tasks focused, ability to use IT resources, time and costs savings through the use of IT and access to materials of international standard.

The study further revealed a number of problems associated with IT lessons in Tamale Polytechnic in the opinion of the students. These were;

- Inadequate IT facilities such as computers and internet facilities.
- Lack of enough IT lecturers.
- Insufficient IT practical lessons.
- Insufficient time allotted for computer lessons.
- Conflicting computer time table with other courses.
- Lack of effective communication between lecturers and students

Conclusion

Even though the staffs of Tamale polytechnic were very comfortable and also intensive users of IT facilities, they may not have be updated in IT related needs of the Polytechnic. This implies that the staffs were comfortable with their existing knowledge in computers and applied them intensively in manners that did not enhance speedy academic and administrative processes. Also there was general lack of supervision of technical IT support staff leading to high hardware and software breakdowns, and poor disaster recovery programs subjecting the polytechnic to high potential loss of data. IT lessons in Tamale Polytechnic faced serious challenges that needed to be addressed in order to build students' confidence in them. There should be collaborative efforts from management of the polytechnic, partner – institutions, Ghana Education Trust Fund (Get Fund), the business community, students/parents and all other stakeholders to designing, financing or implementing IT training programs on regular bases to redirect the needed IT related skills and application to the appropriate processes in the Polytechnic.

All the operational problems that inhibit appropriate IT application and education can be nib in the bud through the design and implementation of effective supervisory procedures both at the tactical and operational level of the institution.

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