UNIVERSITY OF GHANA
DEPARTMENT OF INFORMATION STUDIES

USE OF INFORMATION AND COMMUNICATION TECHNOLOGY FOR
STUDENTS’ INFORMATION MANAGEMENT IN TECHNICAL
UNIVERSITIES IN GHANA

BY
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IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD
OF MPHIL INFORMATION STUDIES DEGREE

JULY, 2019
DECLARATION

I, Akwasi Duffour Frimpong do hereby declare that with the exception of acknowledged citation, this thesis is my original work produced under the supervision of Dr. Philip Nukpe and Dr. Ebenezer Ankrah and that this work has not been presented either in whole or in part to any institution for any purpose.

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DEDICATION

This work is dedicated to the glory of the Almighty God. Secondly, to my lovely daughters, Stephanie, Nana, Ohemaa and Nana Afia.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>±SD</td>
<td>Standard Deviation Rank</td>
</tr>
<tr>
<td>ATU</td>
<td>Accra Technical University</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>KsTU</td>
<td>Kumasi Technical University</td>
</tr>
<tr>
<td>M</td>
<td>Mean Rank</td>
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<tr>
<td>Max</td>
<td>Maximum value</td>
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<tr>
<td>Min</td>
<td>Minimum value</td>
</tr>
<tr>
<td>N</td>
<td>Number</td>
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<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<tr>
<td>STU</td>
<td>Sunyani Technical University</td>
</tr>
<tr>
<td>SQL</td>
<td>Structured Query Language</td>
</tr>
<tr>
<td>TAM</td>
<td>Technology Acceptance Model</td>
</tr>
<tr>
<td>TPB</td>
<td>Theory of Planned Behaviour</td>
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<tr>
<td>TRA</td>
<td>Theory of Reasoned Action</td>
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<tr>
<td>TU</td>
<td>Technical University</td>
</tr>
<tr>
<td>TUs</td>
<td>Technical Universities</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational Scientific and Cultural Organization</td>
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ABSTRACT

Students’ information management holds a strategic position in the effective and efficient administration of the higher education system. The growing student populace in institutions of higher learning has hastened the requirement for ICTs in order to effectively process, store and retrieve reliable information in a swift and precise manner.

The study aimed at examining the use of ICTs for students’ information management in Technical Universities (TUs) in Ghana in ways that address information security challenges and enhances the accuracy and sustainability of students’ information. The study adopted mixed-method design and used a questionnaire to collect data from 136 respondents from three selected Technical Universities staff in Ghana. Interviews were also conducted for two educational ICT providers who were purposively sampled. Analyses of data were descriptive statistics (means and standard deviation) of the quantitative data and thematic analysis of the qualitative data.

The study revealed that the three selected TUs have ICT related internal policies governing the conduct of admissions, awards of grades and records management. Also, the study revealed that the TUs use ICTs for application and admissions processes, which ensure reliable data of students’ information, registrations, fees payments, as well as the processing and reduced time spent on retrieving information.

Poor ICT maintenance culture and limited financial resources were key challenges in using ICT for managing students’ information in the three TUs.

The study recommends that the TUs in Ghana must establish a state of the art, appropriate, cost-effective and adequate ICT infrastructure. Again, the management of the TUs must reinforce the automation of all institutional administration programs and
build capacities for effective and sustainable implementation of optimum ICT based on their needs. Also, the automation of students and lecturers attendance to lectures and lecturers assessment by students must be deployed in the three selected TUs.
CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Students’ information management or otherwise referred to as students’ records management holds a strategic position in the effective and efficient administration of the higher education system (Gala, 2016). In effect, it is fundamental in the management of educational institutions as it documents the preparation, as well as the execution of relevant progression of services permitting appropriate monitoring of the entire educational system (Adade et al., 2018). Thus, the efficient and effective management of students’ information in higher education institutions has become one of the several challenging concerns confronting higher learning globally. As inferred by Asogwa (2013), Chinyemba, (2011) and Ngumbi (2010), the existing students’ information management traditions in some higher education institutions are not receptive to the contemporary higher education system that is symbolised by extensive technological advancement and development and thus, may not be able to launch the organisations to the full fulfilment of their intentions.

Failure to adequately address the evolving students’ information management problems impacts adversely on the development of these organizations (Bigirimana et al., 2015). Consequently, many higher education institutions have suffered in terms of monetary losses, poor academic performance, workforce discontentment, loss of students and erosion of public confidence (Chidobi, 2015).

Poor students’ information management has manifested in several ways including the failure in communiqué amongst the administrators of institutions, academic personnel, learners and other interested parties (Ngumbi, 2010). This breakdown often
results in predicaments that frequently leads to student unrests and leading to damages of to humans as well as properties that could otherwise be circumvented by the availability of accurate and timely students’ records, a product of effective integration of Information and Communications Technologies (ICT) into students’ information management processes (Juma et al., 2016). As pointed out by UNESCO (2011), the expeditious growing student populace in institutions of higher learning has hastened the requirement for ICTs in order to process, store and retrieve information in a swift, logical as well as in a precise manner. The number of individuals entering institutions of higher learning in Ghana has risen dramatically in nine (9) years, just as the figure globally has moved up (UNESCO, 2017).

According to UNESCO (2017), 41,783 students were enrolled in higher education in Ghana in 2005; however, the latest data demonstrates that the number has increased to 157,626 in 2014 which indicates more than twice the figure in less than a decade. Again, as indicated by UNESCO (2017), the worldwide, enrolment in higher education has increased steadily signifying that between the year 2000 and 2014, the aggregate of learners in higher education institutions more than multiplied, rising from one hundred (100) million to two hundred and seven (207) million. The necessity to control this growing learner numbers and control their progress within the educational system demands that higher education institutions administrators turn to ICTs solutions to manage students’ information effectively. Also, the efficacy and potential of ICTs is an indication technology can afford opportunities that hitherto were not in existence a few decades ago.

Consequently, the Information and Communication Technology (ICT) application in education has gained popularity in recent times which has primarily affected the way
higher learning institutions go about their activities (Sherifi, 2015). Not only in the processes of teaching and learning but also, monitoring of students’ progress. Information technology is defined as the aggregation, treating, storing or retrieval of data (Sherifi, 2015). In comprehensive terms, ICT highlights the purpose of communication in contemporary IT, in the diffusion or transmission of data from one place to the other and over a distance. As pointed out by UNESCO (2008), ICT is a term employed to define an array of hardware apparatus, computer software as well as telecommunication infrastructure that allow access, retrieval, storage, organisation, manipulation, presentation, sending of materials and communicating both domestically and internationally through digital media.

To Becta (2008), ICT characteristically denotes computer technologies, as well as other technologies employed in the gathering, storing, managing and communicating information. According to Bayangan-Cosidon (2016), ICT is a distinct array of high-tech apparatuses and resources employed to interconnect and generate, disseminate, store and regulate data. Information and Communications Technology as Chawinga & Zozie (2016) point out is crucial in enhancing efficiency and the advancement of knowledge-intensive services as well as products, which represents the primary ambition of every nation worldwide, as it offers endless success for nations (Popescu et al. 2017).

ICT has been accepted by diverse segments comprising both manufacturers as well as health to improve their day to day operations (Tay & Lim, 2013). The realm of education has been transformed by the assertive consequences of information and communication technology as well. Asogwa et al. (2015) and Iwhiwhu (2005), infer that ICT has the capacity to expedite, ameliorate, and intensify skills, stimulate and
occupy learners in pedagogy, assists in relating educational familiarities to job practices, aids in building monetary sustainability for future employees, contributes to revolutionary developments in institutions, supports instruction, and affords occasions for link between the institution and the real world. Wolfe & Fletcher (2013) infer that ICT has wide-ranging pedagogic prospects and a high likelihood of modifying the pedagogical context when it is applied judiciously.

The embracing of ICT in educational settings commences from preschool (Lupu et al., 2015) up to institutions of higher learning (Pavel, et al., 2014). Explicitly, the usage of ICT in institutions of higher learning has re-demarcated pursuits in the education process, research and data sourcing, administration of learners’ records, correspondence between academics, learners and other stakeholders in the establishments (Sapere-Obi, 2014). As Asogwa et al., (2015), puts it, the application of ICT in institutions makes the management and instruction process more amenable, less time consuming, and less costly, and thus most of the higher educational institutions including Technical Universities (TUs) in Ghana are striving to adopt the values of ICT.

Managers of universities supervise multiple operations such as accounts, personnel, students as well as taking care of the institution in general. The management of students’ activities encompasses multiple undertakings beginning from the entry processes through instructional undertakings to handling and releasing of students’ results. These managerial operations have been acknowledged to have been significantly enriched with the use of ICT. According to Obeng (2004), the amalgamation of information and communication technology into this practice
increases the entire admittance undertakings of universities by making it available to all.

Again, ICT use and use in the management of students’ academic records in TUs could become an antidote in providing practical solutions to student information management problems that otherwise would have been difficult if not impossible. ICT according to Asogwa et al. (2015) facilitates student data management. While Maguire (2005) asserts that academic institutions have adopted the use of ICT in order to cope with the volumes of information generated by organisations.

Commenting on the relevance of student information/statistics to tertiary institutions, Krishnaveni & Meenakumari (2010) infer that for pedagogical advancement, faculty, institutional planners and administrators require sufficient and reliable data of learners’ enrolment as well as students school records through the use of ICT for effective planning and management of the tertiary educational system. There is no doubt thus that the management of TUs has become more complex; consequently, student information management demands more attention (Scheuermann et al., 2009).

The massive upsurge in the number of learners in the TUs, as well as the multiplicity of programmes, has led to the management of large volumes of information that must be accessed speedily to afford information for effective management and decision-making processes (Matovu, 2009). Consequently, the use and usage of ICT for student information management in TUs has become crucial. The necessity for and significance of students’ records cannot be overemphasised (Mondal & Mete, 2012). Additionally, the fact that they ensure continuousness in the university scheme, records encompass statistics, and educational institutions need to efficiently and adequately manage student information.
Students’ information is further needed during institutional review activities in order to make a determination regarding the institution and affording the relevant suggestions for reform. Recommendations, as well as academic transcripts of graduates/learners frequently required by employers and other establishments, can only be made available through accurate information systems. It could be an exaggeration to intimate that student information management challenges are normal at the various echelons of the educational sector. Nevertheless, it is becoming evident that these issues are more prominent in the higher education system as a result of correct, consistent and dependable records that fulfill evidential demands are being generated, however, they are not appropriately handled (Bayangan-Cosidon, 2016).

This, thus, becomes a matter of great worry to governments, guardians, learners, individuals as well as organisations (Olmstead, 2013; Merkley et al., 2006). Desperate attempts in the past to advance the state of affairs in many higher education institutions through the instigation of technology and internet services in addition to the development of a database did not appear to have aided the condition much since the information management systems remains orthodoxly paper-based and labour-intensive (Gürkut & Nat, 2016).

Isah (2007) is of the view that university records can enrich administrative duty routines in terms of scheduling for resource procurement and utilisation of student as well as employee services, fiscal administration, enhancement of instructional programs, and the preservation of an active interactive association with their community and other external agencies. Thus, individuals who constitute an institution tend to exhibit more appropriate behaviour if they are aware that
information about them is kept (Pegu, 2014) and this in no small way, improves advancement and order in the establishment.

Student’s information management has a tactical locus in the effectual and effective administration of any higher educational scheme. It is fundamental to the management of universities since it documents the scheduling and execution of a suitable sequence of services permitting appropriate monitoring of work (Igwoku, 2008). In the conservative paper-based organisations like the institution of higher learning, the paper remains the main platform for information in the organizational documentation. Mostly, as inferred by Gunnlausdottir, (2012), information management should be steered by some level of privacy, proper preservation, safety, conservation of the content as well as setting, etc.

The field of information management (Azad, 2008) has over the past two decades undergone great advancements as a result of the emergence of contemporary ICT. It is widely accepted though not fully appreciated that the integration of ICT in institutional functions is necessary for increased efficiency, cost-effectiveness and competitiveness. Chidobi (2015) noted that the application of ICT is essential for the collection of student data, recording of student results, and for the effective keeping of students’ records. Information management involves the creation, storage, retrieval, maintenance, disposition and the use of compact and other manual or electronic means.

It has also been acknowledged that the monitoring and evaluation of staff, physical planning, curriculum development, financial management, and information dissemination will increase the efficiency of the universities if ICT facilities are adequately and adequately utilised (Nwaomah, 2015; Osakwe, 2012; Olubusuyi,
While various researchers (Popoola 2003; Nakpodia, 2011) have investigated the roles ICT play in making the pedagogic processes effective in higher educational institutions and the problems faced in successful integration, quite a few researches have been carried out to investigate its use and use in the management of students’ information at the Technical University level. As a result, the aim of this study, therefore, is to examine the use and usage of ICT for students’ information management in TUs in Ghana.

1.2 Statement of the Problem

Students’ information management aims to proficiently and methodically regulate the lifecycle of data that are regularly created base on activities and dealings of an institution (Chidobi, 2015). Most higher education institutions are unceasingly deploying integrated students’ information management by way of refining their decision-making process and quality service delivered. Again, it is believed commonly that at the core of the multifaceted higher education institutions’ challenges are their inadequacy in managing students’ information efficiently (Gala, 2016; Atulomah, 2011; Iwhiwhu, 2005).

Consequently, with ICT, the management of students’ information in universities has become easier and smoother (Makhanu, 2010). ICT has brought in its wake change and adeptness in the manner various administrative duties are managed (Sprehe, 2005). It has transformed the ways information is handled, stored and regulated making record preservation, document handling, clerical and those other undertakings less onerous. It has further made data transmission smoother and quicker, and data regarding an establishment may now be efficiently dispersed to the whole world (Waldron, 2004). It has further afforded admittance to schools stress-free, and
students may nowadays process admission, pay their fees, register and perform several other services through the use of ICT.

The positive outcomes of ICT on managerial services in educational institutions are copious. There is nonetheless evidence that TUs are yet to adequately appreciate the benefits of ICT use, particularly with the scarcity of essential amenities witnessed in many of these institutions (Frimpong et al., 2018). Thus, the necessity to evaluate the use of ICT for students’ information management in TUs in Ghana. This study is aimed at empowering record managers to comprehend the value and effectiveness of using ICTs in managing students’ information, relative to candidates, enrolled and past students, to guarantee their security, reliability as well as its accessibility to authorized users for as long as necessary by the TUs.

This will aid the TUs in meeting its duty of care to its stakeholders as well as conform to the lawful responsibilities including Data Protection Act 2012 (Act 843) and other equal law in other dominions in which the TU’s function. Students’ information should be adequately and steadily controlled for all candidates as well as students irrespective of where or how they are learning.

Again, although the area of ICT use in education has attracted quite a number of researchers in the recent past, several of these studies demonstrate that there are varied factors affecting the use of ICT in schools including but not limited to; the lack of strong support from government at national and local levels by relevant institutions and education authorities, technical difficulties, cost and lack of strategies (Makhanu, 2010). Prior to the conversion of Polytechnics to TUs, the majority of these polytechnics made use of the manual system for managing students’ information (Frimpong et al., 2018). This suggests that the use of ICT for students’ information
management in the TUs in Ghana did not receive and might still not receive any attention. This study, therefore, examined the use of ICT for students’ information management in TUs in Ghana.

1.3 Purpose of the study

The purpose of the study was to examine the use of ICTs for students’ information management in TUs in Ghana that address information security challenges and enhance the accuracy and sustainability of students’ information and management.

1.4 Objectives of the study

Specifically, the current research sought to:

i. Examine the internal policies that relate to the use of ICTs for students’ information management in TUs in Ghana

ii. Find out ICTs platforms/use available for students’ information management in TUs in Ghana

iii. Examine the prospects of ICTs use for students’ information management in TUs in Ghana

iv. Investigate the challenges related to ICTs use for students’ information management in TUs in Ghana

v. Recommend strategies for the use of ICTs for students’ information management in TUs in Ghana

1.5 Scope and Limitations of the Study

The study aims to examine the use of ICTs for students’ information management in TUs in Ghana that addresses information security challenges and enhance the
credibility and sustainability of students’ information. In order to keep the investigation within controllable scope, the study is limited to three TUs in Ghana (Kumasi Technical University, Accra Technical University, and Sunyani Technical University).

The justification for selecting these three TUs is based on the fact that they were the leading three TUs in Ghana (MOE, 2014) and are relatively closer to each other. Another reason for selecting these TUs was based on the fact that the three universities run almost similar programmes of study and handle similar students’ information. For these reasons it was believed that they may have certain ICT usage factors in common.

1.6 Significance of the study

The current study is premised on the assumption that students’ information management practices in TUs are not efficient. It is an evaluation of the state of the management of students’ information with the intent of suggesting strategies that will advance students’ information management practices in these universities. It is hence not inapt to assume that the research will be beneficial in the following ways:

1. To all educational stakeholders who can be certain that not only will students’ information be well managed, but they can obtain this data when needed for developmental purposes.

2. The Technical University administration will further profit from this study since the outcome will elucidate the fusty domains of students’ information management systems in the institutions and further generate the consciousness on the manner students’ information is handled effectually and efficiently using ICT.
3. Workers, learners, and graduates will not be left out as they can readily have access to essential information in their proper form.

4. It is anticipated that the study will make a priceless contribution to the literature relative to the use of ICTs for student’s information management.

1.7 Study Setting

According to Bhattacharya (2013), the research setting can be seen as the physical, social, and cultural site in which the researcher conducts the study. In qualitative research, the focus is mainly on meaning-making, and the researcher studies the participants in their natural setting whereas quantitative research the researcher focuses on situated activities that locate her or him in the context. The research setting was the selected three TUs in Ghana (Kumasi Technical University, Accra Technical University, and Sunyani Technical University). It also included two educational ICT provider for tertiary institutions.

1.7.1 Technical Universities in Ghana

The government of Ghana in 2016, converted eight (8) Polytechnics in Ghana to Technical Universities (TUs) with a redefined mandate to deliver advanced learning in engineering, science, and technology-based disciplines, technical and vocational education and training, applied arts and related disciplines with little concentration on Business and Humanities. This is evidently specified in the Technical Universities Act, 2016 (Act 992) passed by the Parliament of the Republic of Ghana and assented to by the President of Ghana on 31st August 2016. Thus, TUs are technological universities with a focus on the application of technology to the various fields of
learning rather than the search for new knowledge. They are mandated to offer a minimum of four (4) year Bachelor of Technology (B Tech) degree programmes in Science and Technology-based disciplines. The new converted TUs are Kumasi Technical University, Accra Technical University, Sunyani Technical University, Koforidua Technical University, Ho Technical University, Tamale Technical University, Takoradi Technical University and Cape Coast Technical University (MOE, 2014).

1.8 Theoretical framework

The theoretical framework explicates the route of a study and places it resolutely in theoretical concepts. The broad purpose is to make study outcomes more reminiscent, satisfactory to the theoretic paradigms in the study arena and guarantees generalizability. Theoretical frameworks also contribute to motivating research while guaranteeing the addition of knowledge by affording the course and stimulus to the study investigation. Theoretical frameworks further enrich the practicality and consistency of an investigation. Consequently, it is no overstatement when Imenda (2014) specify that theoretical frameworks give life to research. Technology has come to stay in all aspects of life especially in education and how TUs are adopting and using ICTs to manage students’ information has been a course for concern. To achieve this, the Technology Acceptance Model Theory would be used.

1.8.1 The Technology Acceptance Model

The Technology Acceptance Model (TAM) describes the determining factor of behaviours exhibited with cognisant intents (Ajzen & Fishbein, 1980). According to Fishbein & Ajzen, (1975), an individual’s behaviour through their intent to execute it, is advocated in turn to be formed by the person’s attitudes as well as the individual’s
subjective norms concerning that behaviour (Fishbein & Ajzen, 1980). Davis in 1986, originated the TAM. The TAM according to Davis et al., (1989), was specifically designed to describe behaviours concerning computer usage. TAM affords convincing hypothetical foundations for defining an individual’s intentions of employing IT or scheme (Kim, 2008).

TAM submits that if an individual is presented to a novel info system or novel technology, their choice concerning its use could be influenced by numerous issues. The TAM hypothesises that two (2) belief variables, perceived ease of use and perceived usefulness are the primary determining factor of the consumer’s behavioural intent to adopt a technology according to Davis, (1989). As pointed out by Davis, (1989), perceived usefulness is described as the degree to which an individual assumes that adopting a specific scheme will improve the performance, while perceived ease of use is explained as the extent to which an individual considers that adopting a specific technology will be independent of effort.

Davis examined the associations of useful-usage, as well as ease of use-usage and usefulness, and is evidenced to be implicitly more firmly correlated with use in contrast to the ease of use. Similarly, Davis (1989) inferred that perceived usefulness was powerfully associated with the consumers’ technology acceptance. Thus, it is essential to acknowledge consumer beliefs in any scheme or technology acceptance, as a result of their impact on user behaviour. According to Davis (1989), the significance of perceived usefulness and perceived ease of use has been widely examined from varying theoretical perspectives including the theory of self-efficacy, expectancy theory, and theory of behavioural decision, diffusion of innovations, advertising, and human-computer interaction.
Davis et al. (1989) asserted that the actual technology usage per the TAM is defined by the behavioural intention which in turn is affected by perceived ease of use and perceived usefulness. Further, perceived usefulness influences directly the behavioural intention whereas perceived ease of use exercises either a direct or indirect impact through perceived usefulness on the behavioural intent. Perceived ease of use further determines perceived usefulness since, all things being equal, the simpler the technology is to use the more valuable it will be (Venkatesh & Davis, 2000). Additionally, TAM suggests that the influence of peripheral elements on the behavioural intent for a system used will be arbitrated by perceived ease of use and perceived usefulness.

Davis et al. (1989) emphasised that external variables afford the connection between the internal beliefs, attitudes, and intentions designated in the Technology Acceptance Model and the different individual differences, contextual limitations and managerially controllable interventions affecting behaviour. In the practise of execution, practitioners may apply influence on consumer judgments regarding technology and eventually user behavioural intents as well as the technology use through the manipulation of these external forces (Hong et al., 2002). TAM according to Davis et al., (1989), specifies the prevailing circumstances determining a consumer use of a system. Consequently, this model has the potential for clarifying and forecasting consumer behaviour over an extensive range of end-user technology and consumers while concurrently being both frugal and hypothetically defensible.

The attitude construct was incorporated in the original Technology Acceptance Model version; however, it was discarded from the ultimate model after Davis et al. (1989) observed that the influence of the two (2) belief variables, perceived ease of use and perceived usefulness, on intent was not entirely arbitrated by attitude. Attitude
according to Ajzen & Fishbein, (1975) is a person’s positive or negative sentiments regarding the display of the intended behaviour. According to Davis et al. (1989), there could be situations when an individual, offered a specific technology seen to be beneficial, could immediately nurture a profound behavioural intent to use that technology devoid of creating any attitudes about it.

Venkatesh, (2000) notes that the elimination of the attitude element increases the appreciation of the effect of perceived ease of use as well as perceived usefulness on the model’s core dependent variable of intent. Several investigations including (Kim 2008; Park et al. 2009; Jeong, 2011; and Williams, et al., 2015), have demonstrated that the Technology Acceptance Model maintained its robustness despite the exclusion of the attitude construct, since a consumer’s behavioural intent is essentially defined by the belief variables such as perceived ease of use as well as perceived usefulness. Nevertheless, Chau & Hu, (2002) and Jackson, et al. (1997) have afforded pragmatic proof to authenticate that attitude exercised a notable influence on a consumer’s behavioural intent and thus a crucial construct in the TAM.

The TAM assumes that the application of a particular system or information scheme is optional (see Davis, 1989). Again, TAM hypothesises that, when sufficient information and time on a specific behavioural action is presented, the consumer’s behavioural intent will display a stifling similarity to that particular behaviour (Kripanont, 2007). The postulation as specified by Ajzen & Fishbein (1980), pertains merely to situations where the behaviour is under the voluntary direction of the individual. Also, according to Kripanont (2007), TAM has reliable behavioural components and presumes that when an individual form an intent to act in a certain manner, he or she will be unrestricted to act devoid of any restriction. Hitherto, as specified by Bagozzi, et al. (1992), in real-life individuals might encounter several
obstacles such as the absence of skills, insufficient time, contextual limitations and insentient behaviours which may limit their autonomy to act.

Generally, the development of the Technology Acceptance Model according to Han, (2003) may be classified into three (3) distinct stages, use, validation and extension.

- The use stage deals with the frugality of the TAM. Davis et al. (1989) endeavoured to develop a hypothetical acceptable model that can forecast as well as interpret a consumer’s behavioural intent in the information systems setting. The advancement of the Technology Acceptance Model has been implemented across an assortment of technologies. The conclusions of these investigations validated the relevance of Technology Acceptance Model above the chosen technologies in various info system settings.

- The validation phase can be categorised into two (2) separate components. One is meant to establish the psychometric features of the Technology Acceptance Model’s major constructs, perceived usefulness and perceived ease of use. In order to determine the two (2) constructs, Davis et al. (1989) designed a range of variables for every construct.

Therefore, the TAM theory was employed to evaluate the use of ICTs for students’ information management at the three selected TUs (Kumasi Technical University, Accra Technical University, and Sunyani Technical University). Additionally, the theory hypothesises that perceived ease of use and perceived usefulness are the primary determining factors of consumer’s behavioural intent to adopt a particular technology. This theory along these lines can control a researcher in building up determinants of TUs to adopt and use ICTs for managing students’ information.
TAM theory operates on the fact that once an individual is presented with innovative technology, their choice concerning its use is influenced by numerous elements (i.e. idiosyncratic norm, image, job applicability, product quality, and result certitude). To conclude, the TAM theory accommodates the objectives set out for the study, and thus serve as a guide to the entire study. It is also important to note that external stimulus builds up the cognitive response of an individual and the institution which results in a behavioural intention to use a particular system within a Technical University setting.

![Figure 1: Final Model of the TAM (Venkatesh & Davis, 1996)](image)

1.9 Organization of Chapters

The study was organised into six (6) chapters. Chapter one comprises of the introduction which captures the study background, problem statement, the study purpose, objectives, significance, scope, and limitations of the study as well as the theoretical framework. Chapter Two reviews relevant literature on the topic under study which comprises the following themes: Worldview of job ICTs in education, African view and Ghanaian view of ICTs usage for managing students’ information and literature on other specific areas of the study topic. Chapter Three focuses on the
methodology of the study. This comprises the research design, population, sample and sampling technique, research instrumentations and tools, pre-testing, data collection procedure and data processing and analysis and ethical issues relevant to the study.

Chapter Four looked at the presentation and analysis of the data in terms of the demographic information of respondents, category of staff in the three TUs, educational qualification of respondents, work experience level of respondents, ICT policy components of the TUs, ICT infrastructure at the TUs, ICT use for students’ information management, ICTs prospects for students’ information management and challenges of ICTs for students’ information management.

Chapter Five discussed the major findings emanating from the analysed data. Finally, Chapter Six presented a summary of the findings, conclusion, and recommendations of the study.
References


CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This section provides literature on the use of ICTs for students’ information management from the World, African and Ghanaian point of view. Building on previous studies, this chapter addresses the purposes for which the literature is used in the current study and demonstrates how the literature review for this study was organised. It focuses on the following:

- Information in Tertiary Institutions
- Students’ information management
- Information and Communication Technology (ICT)
- ICTs in education
- ICT Policies in Tertiary Institutions
- ICTs and management of students’ information,
- Contribution of ICTs towards effective management of students’ information and
- Challenges impeding the usage of ICTs in students’ information management
- Theories of Human Behaviour and Technology Adoption

2.1 Information in Tertiary Institutions

Students’ information or what is usually referred to as records are prized assets that have to be adequately controlled and protected. Records are the benchmark (Misra et al., 2018; Atulomah, 2011) on which present and future decisions and activities of
institutions are projected. Records play essential functions in institutions by providing
evidence of and information about the transactions of students and institutions.
Records afford a mechanism by which institutions can be held liable for their
activities and ultimately serve as a foundation on which institutional memory is
constructed (Shepherd & Yeo, 2003). Records are major instruments in the running of
institutions, thus their non-availability could lead to inadequacies or failure in their
daily practices (Langsdale, 2014; World Bank 2006).

Without information, no assessment can be made as to whether institutions have truly
conducted the duties and undertakings they are supposed to. Neither can it be
guaranteed that these activities and dealings meet the benchmarks of adeptness,
acceptability or the ethics of good governance, or whether or not they have performed
actions that ought not to have been performed (Abdulrahman, 2015; Chinyemba, A.
2011; Egwunyenga, 2009). Records and the proof they hold are the tools by which
institutions could stimulate the environment of faith and establish a general onus to
students (Chinyemba, 2011; Nakpodia, 2011).

Students' records, as essential resources for institutions, must be harnessed through
appropriate records management practices (Atulomah, 2011; Abioye & Habila, 2004).
Correct information management is the foundation for responsibility, limpidity, good
governance, poverty elimination, eradication of dishonesty and the prudent
application of scarce resources (Chinyemba, 2011; Mutula & Wamukoya 2009).
Proper management of information encompasses the establishment of efficient
internal controls at each phase of the record's life cycle, consistent with conventional
codes as well as acknowledged models of records management (Atulomah, 2011;
Chinyemba & Ngulube, 2005).
Furthermore, proper information management in an institution, (Mokhtar & Yusof, 2016; Ifedili, & Agbaire, 2011; Rebore, 2005) will guarantee that records with their collective knowledge, are captured in a recordkeeping system so that the information they contain can be accessed when needed and can be shared in the institution. Accurate conservation of students’ information and the suitable provision of information empower students to exercise their rights, providing them with information and data they can employ to hold the institutions accountable for their education (Major & Omenu, 2016; Eguwunyenga, 2009; Popoola, 2003).

The provision of reliable, accurate, and certifiable information similarly aids in detecting and averting fraudulent dealings that undermine the efficient and effective provision of services by higher education institutions (Sapere-Obi, 2014; Iwhiwhu, 2005). Customer services, the performance of tasks efficiently, as well as quantifiable results, are ever more becoming essential responsibilities, and all these aspirations are contingent on accessible and usable records (ISO, 2017). Thus, students’ information must be prudently managed to afford the verifiable evidence needed to support institutions, fulfill their mandate to their clients (students) and protect fundamental values on which the institution is built (Chinyemba, 2011; Chinyemba, & Ngulube, 2005).

Chinyemba (2011) and Shepherd & Yeo (2003) infer that transparency and accountability in institutions are ultimately achieved by giving students the accurate access to information, and this can only be realised through excellent records management. However, records, viewed as the most essential foundation of student information, have only recently beginning to be managed as a strategic resource, since there still are prevalent challenges storing and in retrieving them (Nakpodia 2011;
Egwunyenga, 2009; IRMT 2008). In most institutions, students’ information management has neither been assimilated nor grasped as a strategic management function with other data managing functions of the institutions (Major & Omenu 2016; Nakpodia 2011). This situation hinders the ability of the institutions to discharge their economic as well as managerial restructuring programmes designed to realise productivity, liability, and improved services to students (Sapere-Obi, 2014).

2.1.1 Records in organisations
As pointed out by Mokhtar, & Yusof, (2016) and Yusof & Chell (2005) there is no commonly acknowledged description of the word record thus, the various descriptions of the term have led to misperception which influences the design of a concept to support it. According to Harris (2009), the description of the term record advanced from an archives’ standpoint through management perspective to an information technology standpoint, and these paradigm shifts led to variations in the status of records. Some descriptions are premised explicitly on the function of the records, while others view records as physical objects for generations to come (IRMT, 2008; World Bank 2006; Myburgh 2005; Mnjama, 2004).

Thus, any original meaning of the term record needs to consider the elements of a record which comprises that the information, the medium as well as the function. Emery, (2005) outlined record as chronicled information formed or received in the commencement, conduct or accomplishment of an official or individual undertaking that encompasses content, setting and scheme satisfactory to afford proof of the undertaking. ISO 23081-1 (2017) describe records as any data generated, received and preserved as proof by an establishment or individual, in fulfillment of legitimate responsibilities or in the transaction of business. Shepherd & Yeo, (2003) define
record as recorded evidence of an action undertaken by an individual or an establishment during their corporate dealings, which results in a definite conclusion.

Records, as specified by Shepherd & Yeo (2003), may be presented in any form and in several mediums. Most establishments have amalgam record structures, with most on paper and others in a digital form. Records are extensions of human memories, decisively designed to document data, record events, express opinions, verify claims, advance information, suggest explanations and afford permanent testimony of activities (Garcia, 2011; Read, & Ginn, 2011; Kanzi 2010). Their formation is as a consequence of a basic human desire to generate and store data, to retrieve and diffuse it, and to institute concrete links with the past (Akor, & Udensi, 2013; Ndenje-Sichalwe, 2011).

Consequently, as inferred by Atulomah, (2011) organisations apply records in conducting their day to day business, to allow judgments to be made and actions to be taken. Records afford admittance to practices and strategies, as well as proof of what was accomplished or resolved once upon a time. Records empower institutions to protect against deception and to preserve human rights as well as assets. Institutions employ records to promote accountability when they are required to verify that they have satisfied their responsibilities to their clients, in this case, students (Shepherd and Yeo 2003).

Moreover, records function as a tool of liability by affording the necessary proof stakeholders require to account for their decisions and activities and to respond to the requirements of laws and policies (Chinyemba, 2011). Records may further be utilised for cultural determinations for investigation, to advance knowledge and comprehension of an enterprises’ past. The broader community as Shepherd & Yeo
(2003) pointed out, further has anticipations of transparency in institutions, the safeguarding of rights as well as the preservation of origins for shared memory. Records are more than mere information (Ngulube, 2011), and what differentiates a record from other sets of data are that it is fashioned as a consequence of an exceptional venture or activity and may, thus, afford proof of that action (Adam, 2017; Mokhtar & Yusof, 2016; Franks, 2013; Mnjama, 2004).

2.1.2 Information/Records Creation and Use
Many institutional undertakings typically lead to the creation of records. Records formulation is one of the stages of the life cycle of records (Garcia, 2011). Record creation denotes the deed of accruing records or integrating the data into a recordkeeping structure (Evans et al., 2014; Sutuliffe, 2003). Essentials of records creation consist of the existence of an appropriate system to document the happenings of the institution; preserving records of every endeavour that is adequately comprehensive and precise to enable an audit of any facet of the activities to guarantee the fortification of the privileges of the institution (Jones, 2003; Cowling, 2003; Palmer, 2000). As inferred by Yusof & Chell (2005), records creation encompasses the development of reliable guidelines to guarantee integrity and availability, determining the systems to log and track records, as well as techniques for recording, categorising and indexing.

Records creation strategy is indispensable to guarantee that records meet the proper standards of quality and it is vital that they are kept in a safe and operative records management system so that they will remain intact over time (Read & Ginn, 2011; Shepherd & Yeo, 2003). According to Eusch, (2017), the fundamental goal of records creation is the provision of evidence of the functioning of an organisation or for accountability. According to Shepherd & Yeo (2003), in evaluating the necessity for
creating records, the goal must be to recognize and assess the requirements of the institution regarding records that provide evidence and information as well as for operational use and can support accountability as well as the costs of creating, and preserving the records that are required. The risk to the institution must also be considered in case they do not have those records.

In higher education institutions, records are created and employed for numerous purposes. Institutions use records in conducting their day to day business, as this permits effective decision making. Furthermore, records afford accessibility to precedents, strategies, and provide proof of happenings in the past. Records allow institutions to guard against deception as well as protect their rights and assets (Eusch, 2017; Chinyemba, 2011; Chinyemba & Ngulube, 2005). Read & Ginn, (2011) underscored that in order to support corporate functions and to afford evidence, records must have two (2) fundamental features which comprise authenticity, described as the perseverance overtime of the primary physiognomies of the record regarding its setting, structure as well as content and reliability which is the capability of a record to serve as dependable evidence

Records that have these features will have adequate content, composition and setting to afford a complete justification of the happenings and activities to which the records relate, and will accordingly mirror decisions, activities, and responsibilities (Jones, 2003; Palmer, 2000). Consequently, if such records are preserved in a reachable, comprehensible and operational method, they may be able to support students’ requirements and be employed for accountability purposes over time (Chinyemba, 2011; Palmer, 2000). Besides, institutions create and manage records to promote
liability, when they require to verify that they have realised their responsibilities and acted in accordance with accepted procedures (Chinyemba, 2011).

### 2.2 Information Management

According to Rao and Nayak (2014) scientists, practitioners, managers, etc. in most establishments make vital decisions regarding their strategies, day to day activities in order to beat competitors, to pursue research at cutting-edge levels, to deliver satisfactory services, etc. all through the use of information. Information in whatever form, whether formal or informal, must be well managed. Information is presently perceived as a priceless resource in several establishments. It is viewed as an organizational resource. Information may be retrieved by everyone from anywhere, as often as desirable, nonetheless remain unreduced and unaffected; however, this necessitates a comprehensive application of information technologies.

A number of private-sector agencies give alternate information services, and government funding is dwindling annually; consumers approach information suppliers directly for their desires. In commercial, academic, public and other sectors, info (both external and internal) is treated and handled devoid of professional assistance. ISO 15489-1 (2001) outlines records management as a domain of management in charge for the proficient and efficient regulator of the creation, receiving, preservation, usage, and disposal of records, as well as procedures for obtaining and preserving proof of as well as information regarding corporate undertakings and dealings in the form of records. This description implies the administration of records as valued sources of proof and to their function as the basis of accountability and transparency for institutions are indispensable (Peterson & Ndlovu, 2013; Finnell, 2011; Bantin, 2008).
Others have defined records and its management as the managing of any data obtained in a reproducible format which is necessary for carrying out transactions. This description emphasises the management aspect of information (Katuu, 2015; Read & Ginn, 2011; Bailey, 2008). Consequently, the grasp of management philosophies assists in affording a better comprehension of the records management function (Ndenje-Sichalwe, 2011; Katuu, 2009). Records management is thus, a management activity that guarantees that comprehensive, precise and reliable records of institutional happenings and procedures are created, preserved such that it allows for their eventual retrieval for both external and internal users and to attest to the fact that the business an institution is conducting is in agreement with what is expected of them (Chinyemba, 2011; Shepherd, 2006).

As inferred by Stephens (2007), practising sound and effective records management is especially crucial to institutions. Superior records (Atulomah, 2011) are desirable to guarantee institutions take correct decisions and activities. Reliable and accessible records (Dewah, & Ndlovu, 2013; Palmer, 2000) are convincing sources of evidence and information that support as well as sustain the integrity and accountability of any establishment. The primary aims of records management according to Mokhtar, & Yusof, 2016; Jones, 2003; Agere et al., 1999) comprise the need to;

- Afford enhanced filing measures so that associated information can be filed together and consequently retrieved effortlessly when needed.
- Regulate the ways in which information is created and the manner in which inbound and outbound information is received, handled, disseminated, utilised and consequently stored.
 affirmed cost-effective storing of information by recognising, scheduling and disposing of obsolete information, thus diminishing capital and recurring investment and expenses in filing apparatus as well as space.

- Categorise and make suitable provisions for the safekeeping and conservation of records that are crucial to the institution or have past, research and other long-term worth.

- Effect cost savings to the institution through the regulation of the creation, distribution and retaining of duplicates of reports, forms, and other diverse documents.

2.2.1 Access to information and records

According to Ngulube (2011), nothing is more rudimentary to the relationship between government and the governed than the freedom of access to information. The freedom of access information is not only a prerequisite for good governance but also a fundamental human right, and the foundation for all other human rights (Ngulube, 2011; Chibambo, 2006). Philosophies of good governance including transparency, accountability, and the rule of law are all contingent in no small degree on the free flow of information (Read, & Ginn, 2011; Mutula & Wamukoya 2009; Bailey, 2008).

Sincerity and transparency in the decision-making process (Chinyemba, 2011) can contribute to the development of trust in an institution's activity and upholding a civil and autonomous civilisation. Individuals can be part of an institution and express their rights only if the institution affords access to information. Thus, it is vital that information in the care of an institution is not merely accessible, but must be handy to its populace. The obtainability and availability of pertinent and opportune information empower individuals, allowing them to effectually contribute to the governance
process and hold institutions and its managers accountable (Chinyemba, 2011; Mutula & Wamukoya, 2009).

The channel of access to information legislation in a nation is a sign of transformation shifting away from a culture of concealment and secrecy toward a culture of sincerity and transparency. Administrators need to be determined in changing their mindset to appreciate that the populace owns the information they handle and that their constituents possess a power to acquire that information (Chinyemba, 2011; Banisar, 2004). Access regulations are intended to encourage transparency and accountability in governance by affording constituents with a legitimately enforceable power to receive complete and valid information ((Adam, 2017).

A primary source of information in records and a fundamental right is access to this information (Mokhtar & Yusof, 2016; Özdemirci, 2008). Access to information signifies access to records, access to the documented decisions of government and the evidence that supports and sustains public sector work (Adam, 2017; Mnjama, 2004). The relationship between effective records management and adequate freedom of information is vital. Thus, institutions need to effect a practical institutional framework as well as a satisfactory ability to control, promote and improve information acquisition, preservation, and utilisation (Mutula & Wamukoya, 2009).

The right of access to information is of little value if reliable records are not created in the first place. Furthermore, if information cannot be obtained when required or if the arrangements for their ultimate elimination or shift to an archives service are inadequate (Shepherd, 2010). Akor, & Udensi, (2013) pointed out that conventionally, archivists and records administrators have been inactive guardians of information, restricting their role to the selection, storage, preservation and controlling of access to
information. Nonetheless, the circumstances have altered, and proposals have been made for a review of legislation governing access to information.

### 2.2.2 Records Management Practices

The last few decades have transformed the manner in which info is created and kept (Atulomah, 2011; Abioye & Habila, 2004; Penn et al., 1994). The facility offered by records management is crucial to any establishment, as well as to all information-using stakeholders in it. The prime role is to enable the smooth and easy movement of information in the organisation, to guarantee that information is swiftly accessible when and where it is required (Yusof, 2009). In order to fulfill this function, there is a need for an efficient and effective records management programme (Rebore, 2005). Granting an organisation’s records are exclusive to it, they have to be controlled overtly, same as other resources of the organisation will be managed such as employees, funds and other assets (Mokhtar, & Yusof, 2016).

Information/records management systems and processes must facilitate compliance with the institutions’ strategies. Precise corporate functions and happenings in colleges could be dependent on precise regulation or to expert practice or applicable moral strategies (Rothbard, 2015; Harris, 2009). Further, school managers, universities, other business units within the school hold the inclusive liability for the administration of information created by their actions, therefore, certifying that information managed in their sections are engineered to meet the objectives of the school's records administration guidelines (Finnell, 2011; Yeo, 2008; Sutuliffe, 2003). According to Ngoepe, & Keakopa, (2011) and Kanzi (2010), for excellent records management practices to be effective, institutions managers must designate or assign an employee at senior management who can be delegated with the duty of certifying that thorough records management practices are executed and preserved. It is also
essential the records managers advance and implements records management strategies, sanctioned by the institution’s managers (Ngoepe, & Makhubela, 2015; Dewah, & Ndlovu, 2013). Compliance with the above must be incessantly observed and be revised periodically (Eusch, 2017).

Moreover, there must be records management processes (Major, & Omenu 2016; Chinyemba, 2011) to serve as a monitor to personnel, records cataloging scheme to simplify the proficient recovery as well as discarding of records, and preparation of record administrators as well as records agency personnel to arm them with the required expertise to perform their roles appropriately. Records Management and Archives personnel (Sapere-Obi, 2014; Myburgh 2005) must be accountable for the provision of proper record management training programs to the employees.

2.3 Students Information/Records

Record keeping in a higher education institution set up is essential and cannot be overemphasised. This is so since continuity is contingent on the accessibility of valuable records of foregone happenings. However, in a multifaceted organisation such as an academic institution, it is impracticable to retain all relevant information in the head since the quantity of information is massive; hence records must be maintained (Langsdale, 2014; Atulomah, 2011). In Ghana, it is obligatory that every educational institution have certain records like logbooks, admission registers, visitors’ book, inventory books, account books, and so on (Ifedili, & Agbaire, 2011; Ibara, 2010). The preservation of information is frequently designed around a life cycle that all records must comply. This includes Creation, Storage, Retrieval, Retention as well as Disposal which comprises the protection of crucial document (Abdulkareem, 2015; Rebore, 2005).
As asserted by ISO (2017 and 2001), records may be described as information generated, received and preserved as proof and information by an institution or individual in fulfillment of a legitimate responsibility or in the fulfillment of contracts. Student’s records are crucial in realising institutions’ aims and objectives (Eusch, 2017). In higher educational institutions, academic records denote the data or information that relates to learners both on paper and digital formats that provide proof of admission, matriculation, examination, and convocation amongst others (Major & Omenu, 2016; Ololube, 2013). Moreover, higher education institutions might similarly receive information regarding their students from other institutions or bodies.

Consequently, records may either be created externally or internally, and records are proof of the processors of exchanges that transpire every day in any human civilisation. Higher education institutions as mentioned earlier principally preserve records regarding learners to fulfil as well as live up to their contractual commitments to all learners (Nakpodia, 2011) and to afford evidence on the educational, profession and accomplishments relative to the learner to organisations, accrediting/monitoring groups, other groupings, and to the learner as part of their lifetime educational record (Chidobi, 2015).

Furthermore, higher education institutions retain records regarding the pursuits of learners as individuals as well as users of learner support and other institutional assistance as a way of handling those services as well as devising and perfecting the records in the future (Achu, 2017). Student’s records or information are linked to managing the association between a university and its customers (students). Thus, student records may be categorised into three (3) comprehensive classes; (Eusch, 2017; Bigirimana et al., 2015; Nakpodia 2011; Fabunmi, & Isah, 2008):
i. Records documenting the votive association among learners and the school which includes admission, payment of fees, etc.

ii. Records documenting the learner as a student comprising study programmes, academic performance, and development, honours, etc.

iii. Records documenting the learner as a person as well as the user of the services offered by the school including hostel and counseling facilities, library and technological support careers as well as engagement services.

The records in groups one and three possess precise preservation times prompted by the official completion of the learner’s direct association with the institution, even though the information they hold may be accumulated and examined to afford information demanded by third parties or to assist the institutions development as well as advancement undertakings (Major & Omenu, 2016). An institution may have to hold some of the records in group two to afford assenting information to possible employers (Fabunmi, & Isah, 2008).

Higher education institutions must, therefore, securely regulate access to students' information to avoid illegal use, modification, elimination or obliteration of the records as well as unlawful divulgence of the information they hold. Exclusively, only personnel who require them to carry out their obligation must be allowed access to student information, and that accessibility must be confined to information of the immediate association and not to the content of the entire record. Learner’s records hold individual information thus are consequently conditional on the provisions of Ghana’s Data Protection Act (2012), together with the provision that the learner as the information subject must be granted admission to private information kept, either in digital or paper form.
2.3.1 Management of Students’ Information/Records

Student information holds a crucial place in the effective and efficient management of the higher educational system (Chidobi, 2015). Students’ information is core in the management of organisations of learning as it details the development and execution of a proper sequence of facilities permitting appropriate monitoring of performance (Achu, 2017). As indicated by Igwoku, (2008), in traditional paper-based establishments like higher education institutions, paper remains the substance for records in management and documentation. Records thus remain the object, document or the means, that bears the information. Most records are paper-based; nonetheless, the medium for information carriage may be in other formats such as graphics, images, flash drives, diskettes, machine-readable disks, and pictographic media (McKemmish & Gilliland, 2013; Yeo, 2007; Tough & Moss, 2006; Upward, 2005).

The kinds of decisions institutions make ultimately determines its information requirements. Nevertheless, most issues in higher education institutions could have been prevented if ICT facilities are in place in these institutions (Adam, 2017). Accordingly, Ali et al. (2013) specify that university administrators require practical management of activities regarding the application of computers and other ICT equipment. According to Evans et al. (2014), management has to do with the organisation and planning of varieties of resources for explicit goals. Acceptable management regarding students’ information thus encompasses five (5) basic philosophies; planning, organisation, staffing supervision, and control.

- **Planning** – This comprises strategy formulation, asserting the goals and objectives of the institution, budgeting, designing of a program of services as well as techniques and approaches.
Organisation – This infers organising both the human as well as physical resources towards the actualisation of the estimated goals and purposes. This will assist in affording a sense of direction regarding students’ information, assigning the appropriate resource in the proper place in the appropriate sequence at the appropriate time for the achievement of the institutions’ intent.

Staffing - This connotes matters regarding employees, their competence, training as well as ethical behaviour in terms of student information management.

Supervision - This includes examining the job performance of employees, teaching and superintending, correcting and directing to achieve the goal of the institution.

Control - This involves guaranteeing excellence services afforded by the records staffs in the institution. It further encompasses compliance with rules in students’ information management.

Dewah, & Ndlovu (2013) assert that in order to ensure efficacy, efficiency and to permit higher education institutions to be accountable, students’ information must be dynamically managed throughout their lifecycle. This must be carried out through a records management program which is the primary channel for implementation of a records control system whose goals should be allied with that of the institution (Kenosi, 2011; Fabunmi & Isah, 2008). Students’ information in higher education institutions endures inconsistent and arbitrary damage, unguarded from harm, loads of folders without suitable organisation. There is further a lack of management policies that protect students’ information from their creation through their application to their ultimate disposal. According to Nakpodia (2011), the value of students’ information management is the enablement of permanency in the management of a university
requirement of information required by learners for advanced and other associated institution, employment placement, for devising and determination by the university, Ministry of education as well as other associated education stakeholders. Achu, (2017) Andoh, (2012) Carrillo, et al. (2010) and Mbaeze, et al. (2010) specify the value of students’ information to include the ensuing:

- Guaranteeing that accurate and appropriate students’ information is realised and preserved, and the same is reported parents/guardians, employers, as well as other organisations for learners’ admittance or employment
- Provision of information for development and determination by institution administrators, the ministry of education as well as other relevant stakeholders.
- Expedition of steadiness in the management of an institution and research pursuits that may advance effectiveness and adeptness.
- Affording information required by teachers, other staff and counselors who deal with students.

Furthermore, Langsdale, (2014), Mbaeze et al. (2010) and Fabunmi & Isah (2008) infer that education governing bodies depend on students’ information to assess the status of governance of an institution as well as the academic excellence of institutions. Furthermore, institution managers depend on students’ information in evaluating their performance and reward them. Researchers also apply students’ information for research thus contributing to knowledge. Sound students’ information management can guarantee an advantage of an institution (Achu, 2017; Agrahari & Singh, 2013; Carrillo et al. 2010) over another, permit continuous and controlled access to student’s information concurrently by various arms of the institution and further protects an institution from scams.
Notwithstanding the critical role students’ information management plays as illustrated above, there is agreement among scholars (Egwunyenga, 2009; Ngulube, 2005) that several institutions give insufficient consideration to the management of records and thus control students’ information haphazardly devoid of recognising that records make up a significant resource as opposed to financing and equipment. Furthermore, Popoola, (2003) asserts that school managers are frequently concerned with the alarming frequency of misplaced or loss of essential students’ information as well as the slow pace at which required students' information is recovered from their storage by record administration staff. In several instances, displaced records prevent crucial actions on pressing subjects or lead to illogical judgments, which can lead to social catastrophe or discomfiture to the institution as a whole (Nakpodia, 2011).

The core business of higher education institution includes pedagogy, research, and community improvement. Most of these institutions in enunciating their purpose, suggest that they are dedicated to academic excellence and a novelty in research and commitment to society. In pursuits of these, they create records, which afford proof that the institution is administering its legal obligations. If these records are not suitably controlled or are displaced, then the relevant testimony could be gone perpetually.

Appropriate management denotes the establishment of logical controls at each phase of the information life cycle, in agreement with conventional philosophies and acknowledged models of information/record management (Achu, 2017; Akor & Udensi 2014; Asogwa, 2013; Ifedili & Agbaire, 2011). Consequently, the loss of an institutions’ records, can erase the proof of learners’ accomplishments, and endanger the school’s human rights and interests. Principally, students’ information management must be guided by some degree of discretion, maintained adequately,
secured, and the content must be well preserved (Egwunyenga, 2009; Iwhiwhu 2007). Higher education institutions are centres for information generation (Abdulrahman, 2015) and by extension records keeping. It has become a recurring problem for records to be irreparable when needed.

2.4 Information Communication Technology (ICT)

Information and Communication Technology (ICT) has become, within a short period, one of the primary structures of contemporary civilisation (Dendev, 2013). ICT is frequently utilised as an extended substitute for information technology (IT), however, ICT (Bladergroen et al., 2012; World Bank, 2005) is a more explicit term which emphasises the function of amalgamated communications as well as the incorporation of telecommunications, computers and the essential software, middleware, storage, and audio-visual systems, that permit consumers to access, store, transfer, and manage information (O’Brien & Marakas, 2010).

To Chitla (2012), ICT commonly refers those technologies employed for accessing, collecting, handling and presenting or communicating information. These technologies may consist of hardware, software applications; and connectivity. Thus, ICT is an amalgamation of hardware, software, telecommunication, and the internet that permits individuals to create, collect, consolidate and communicate the information in multimedia formats to be applied to varied purposes (Chidobi, 2015). In other words, ICT is a fundamental term connoting the processing, storage, and transference of information with the use of computers and telecommunication technology in the business of information handling and information to proceed from creating to the application (Asafe & Olawale, 2012; Islam & Islam, 2006).
ICT can contribute to universal access to learning, equality in the institution, the delivery of quality pedagogy, educators’ professional advancement and more effective education administration, governance and management (Chidobi, 2015). UNESCO (2017) takes a holistic and wide-ranging approach to the promotion of ICT in Education. ICT in education is fundamentally the society’s efforts in teaching valued knowledge and skills regarding computing and communication devices; software’s that runs them, applications that operate on them and structures built in them. ICT is multifaceted changes rapidly, thus, confusing many individuals (Choudhary & Choudhary, 2013; Agrahari, & Singh, 2013). It is so prevalent in the contemporary environment that most people have an idea of what it is, however, some of these conceptions are frequently deviating.

2.5 ICTs in Education

The determinants that influenced the use and dissemination of ICTs in education have been recognised in numerous research as well as project reports including the UNESCO Meta-survey on the application of Technologies in Asia and the Pacific (Lei, 2010). In both homes and institutions, ICT is generally viewed as improving education, and this is feeding their speedy dispersion and use throughout advanced cultures.

Zlamanski & Ciccarrelli (2012) stated that the display to ICT is a significant component of institutions of higher learning, and the development of ICT for pedagogy in these institutions requires that both learners and teachers are capable and competent in applying every variety of ICT devices. In furtherance of that UNESCO is guaranteeing that all nations must be equipped to guide their learners in ICT with the available resource.
Livingstone (2007) indicated that studies in contemporary times have witnessed constant embedding of digital and networked technologies in lecture theatres, with the extensive application of collaborative whiteboard, virtual learning contexts. Instructional games including a growing dependence on internet applications such as email and e-learning for both lecture-halls and autonomous studies are the order in most tertiary institutions. In traditional Universities, there has, and continue to be a substantial institutional expenditure toward ICT infrastructure to promote increased flexible and blended forms of pedagogy (Kirkup, and Kirkwood, 2005).

ICT is currently used to assist in the learning of students. Nguyen et al. (2012) stated that adopting ICT and e-learning has become the standard across universities where learners have been recognised as stakeholders in the advancement and implementation of e-online education. Institutions of higher learning have explored different ways of increasing ICT abilities and knowledge in their students with a determination to equip them for future employment (Gay et al., 2006).

In Africa, studies conducted in Botswana, Kenya, and Rwanda by the World Bank Report (2010) indicated that ICT application in education is at an expressly active phase in Africa; novel advancements and pronouncements occurring daily everywhere on the continent. Furthermore, in practice, Botswana debatably brags about the highest ICT diffusion in academic institutions in Africa. Additionally, all senior and junior second cycle schools and public higher education institutions have ICT laboratories. The various African governments have devoted fiscal resources to advance connectivity and to encourage the educational usage of ICTs (World Bank Report, 2010). According to the World Bank Report (2010), the higher education
sector in Ghana is the most progressive in ICT use, followed by the second cycle before basic education sectors in that order.

2.6 ICT Policies in Tertiary Institutions

To companion the potentials of ICT, most countries of the world have developed public information plus communication technology systems, to serve as frameworks for ICT integration in all aspects of the society (Yusuf, 2009). ICT policy, as pointed out by Rowland (1996) and cited by Yusuf (2009), may be classified into vertical, infrastructural, and horizontal approaches. Vertical ICT system discusses sectoral requirements, like health, education, and tourism. The infrastructural aspect has to do with the improvement of public infrastructure, and this is firmly related to telecommunication. The horizontal component deals with the influence on extensive concerns of society like the right to information, tariff, pricing, privacy, and security.

The higher education sector in Ghana is the most superior in the deployment and application of ICTs in the nation (World Bank Report, 2010). Almost all the country’s leading institutions of higher learning have their individual separate ICT system, which comprises ICT fees for learners. This allows learners to have access to 24-hour computer laboratories with broadband connections. Notwithstanding, not all of these schools in the nation are similarly endowed, and there are occurrences where the ICT equipment is managed solely by the private sector as cyber cafés on the campuses of these universities.

To enhance education access through the placement and utilisation of ICTs in the educational scheme, the Ghanaian Government is dedicated to executing some policy actions as well as standards such as those directed at:
Transmuting Ghana into an ICT cultured country and encouraging basic literateness as well as ICT literacy of all the populace through the execution of distinct initiatives targeting the informal as well as the formal educational sectors from the primary to the advanced level.

Reforming the educational structure by means of ICTs to enhance and increase access to education, research resources, and services;

Stimulating and inspiring distance education (DE), such as online DE and virtual learning concentrating on advanced level learning in all domains and fields to expand access to educational resource and facilities to a greater segment of the populace.

2.7 ICTs and Management of Students’ Information

ICT performs a crucial function in promoting the effective and efficient administration and management in the education arena. Chidobi, (2015) asserts technology may be applied directly from student administration to the different resource management in higher education institutions. In this era of globalisation there is a swing in the universal advancement agenda, and thus, most institutions are introducing major transformations in their educational systems with the view of repositioning the institutions to be relative to ICT usage (Achu, 2017; UNESCO, 2011). The need for technological modernisation has led to an insurgency in the advancement of technological amenities applicable to keeping and managing university records (Bigirimana et al., 2015; Ali et al., 2013).

Higher education institutions are fast appreciating the need for using computers in keeping and managing students’ information. This is expedient to managers, as well as academic and non-academic staff in higher education institutions (Gürkut, & Nat, 2016; Mosweu et al., 2014). Records and record keeping constitute the life wire of
these institutions hence it is not surprising that these are rapidly catching up with the educational sector (Bladergroen et al., 2012; Krishnaveni & Meenakumari, 2010). The management of students’ information must be regarded as a critical responsibility by university authorities since they play a vital role in the everyday administration of the university. It would be challenging to strategise and manage an organisation like a university efficiently if records are not kept and managed appropriately (Nwaomah, 2015; Mondal & Mete, 2012; Matovu, 2009).

ICT, according to (Bigirimana et al., 2015; Olubusuyi, 2008) affords numerous facilities and opportunities for educational managers to carry out their responsibilities adequately. It is noteworthy that ICT systems have transformed the very nature of university education, permitting data to be transferred, stored, retrieved and processed by those that manage, learn and/or interact with a specific educational organisation (Misra et al., 2018; Parker, 2012). As a complex organization, the higher education institutions (Krishnaveni & Meenakumari, 2010) are expected to handle huge volumes of information which ought to be processed rapidly so that information can be provided to the administration for adequate decision-making as well as satisfying the data demands of diverse stakeholders including learners, guardians, alumni, directory, information community, as well as the general populace (Rothbard, 2015; Sarkar, 2012; Egwunyenga, 2009).

Consequently, the increasing intricacies of higher education institutions and the difficulties it poses to its managers make the utilisation of ICTs necessary for quality assurance in the institutions (Misra et al., 2018; Büyükbaykal, 2015; Lemieux et al., 2014). In order to make decisions on short-term as well as long-term policies, university authorities depend on information. Nevertheless, most university authorities do not have an excellent culture of record keeping. The few records that
are kept are frequently not suitably stored, therefore creating problems of retrieval to users when required (Pegu, 2014; Toro, & Joshi, 2012).

Contemporary information storage amenities (Idowu, & Esere, 2013; Egwunyenga, 2009) such as computers, microfilm, CD-ROMs, Cassettes, E-mail, collaborative software, and hardware, have all contributed to the actual storage and management of university students’ information. The usage of ICT for students’ information management offers an indication of the number of students that registered, precise information on their fees payment status, and an all-inclusive database of employees, students and teachers with just a click of a button (Bigirimana et al., 2015). Accordingly, it is essential to wholly apply ICT to students’ information management in higher education institutions. This will improve individual, institutional and nationwide development.

Furthermore, as pointed out by Franks, (2013) energy and time employed on manual record management will be preserved, communal assurance between academic staff as well as students will be improved. ICT will further enable the groundwork for and subject of transcripts to graduates who wish to further their education along a specified specialised line Achu, 2017; Bigirimana et al. 2015; Fabunmi, & Isah, 2008). The use of ICT, therefore, has the prospect of satisfying the gap created by manual information management. The usage of ICT can similarly facilitate the management of accurate records in the areas such as examination, employee recruitment, and promotion, publishing, students’ enrolment as well as admissions (Misra et al., 2018; Bigirimana et al., 2015).
2.8 Contribution of ICT towards Effective Management of Students’ information

ICT's have the potential to expedite, enhance, as well as develop skills; stimulate and involve learners in learning experiences; serves in relating school experiences to work applications; assists in creating financial viability for future workers; contributes to drastic shifts in institutions; encourages instruction, and affords possibilities for link between the institution and the real world (Davis & Tearle, 1999; Lemke & Coughlin, 1998). The practice of students’ information management has experienced noteworthy reformations in contemporary times (Misra et al. 2018; Chidobi, 2015; Nakapodia, 2011; Matovu, 2009; Isah, 2007). Students’ records have transited from a paper-based task concerned with the storage of organisations varied document, to a profession engaged with the administration of detailed internal information in varied medium (media) (Achu, 2017; Bigirimana et al., 2015). The introduction of ICT into records management has afforded swiftness, accuracy, variety, flexibility and rich and inclusive documentation of procedures (Büyükbaykal, 2015; Pegu, 2014; Toro & Joshi, 2012).

Additionally, the use of ICT systems in students’ information/records management has brought in its wake space savings as most information can be filed by electronic means (Mosweu et al., 2014; Asogwa, 2013) which has also diminished the risk in the event of a loss. A study conducted by Bakari, (2017) and Sichalwe et al. (2011) on the management of records in Tanzania revealed that staff who apply ICT in generating and storing experienced improved storage, retrieval, access, usage, improved security, improved preservation, improved communication as well as enhanced record generation.

It is widely acknowledged (Nwaomah, 2015; Mondal, & Mete, 2012; Parker, 2012; Krishnaveni, & Meenakumari, 2010; O’Brien, & Marakas, 2010; Olubusuyi, 2008;
Visscher et al., 2001) that ICT infrastructure such as word processors, electronic databases, e-mails, and management information systems can result in more efficient communications and management of students as well as academic records. The application of ICT to the management of students’ information consequently, will go a long way in making these records convenient, handy and practical. The importance of ICT for students’ information management has been identified by researchers (Misra et al., 2018; Achu, 2017; Chidobi 2015; Langsdale, 2014) as helping in the promotion and maintenance of the quality of output at a higher level over time than manual activity. It further saves cost, time as well as labour and improves fecundity and performance. These guarantees the efficiency of university management.

2.9 Challenges impeding the usage of ICTs in students’ information management

The use of ICT in information management is vital to any meaningful advancement in the education sector. Consequently, employing ICT systems in record management may be ostensibly problematic if the fundamental challenges of ICT are not addressed. Pegu, (2014) Lemieux et al. (2014) categorised poor installation of ICT associated facilities, irregular electricity supply, and poor maintenance culture, as glitches affecting ICT usage. Other issues affecting the usage of ICT in information management include the lack of basic and adequate infrastructures and/or resources such as the non-existence of elementary and satisfactory physical amenities including space for computers with internet connectivity, generators and satisfactory equipment pose challenges in the application of ICT for students’ information management (Katuu, 2015; Abdulkareem et al., 2013; Nakpodia, 2011).

A study conducted by Adeya & Oyelaran-Oyeyinka (2002) observed that the sluggish evolution of some features of ICTs, for instance, the Internet, in several African nations have essentially been a result of inadequate scientific as well as financial
administration and other incompetence on the part of the telecommunications arena. It is an undeniable reality that the Internet infrastructure in most African higher educational institutions remains poor. The study further noted that even in instances where the infrastructure exists, the application levels are notably below those in advanced nations. Nonetheless, the number of patrons, outside the principal municipalities, in Africa is evolving. For instance, Botswana, Ghana, Kenya, Tanzania, Zambia and Zimbabwe all have Points of Presence in approximately seventy (70) locations in every nation.

Institutions in most nations, nevertheless, are in the initial stages of ICT use, characterised by sketchy uncoordinated provision and application, some improvement of the educational process, others the growth of e-learning, however no deep-felt advances in pedagogy and learning (Balanskat et al., 2006). Again, the scarcity of expertise that can handle the installation, operation, and maintenance of ICT facilities are also some challenges hampering the usage of ICT in students’ information management (Asogwa et al., 2015; Azameti, & Adjei, 2013). These fields are indispensable to the usage of ICT in record management. Furthermore, ICT facilities are not within reach of many as a result of the high cost of acquiring them. This poses a barrier to accessing these facilities for record management purposes. Thus, monetary support is critical to the successful execution as well as the integration of ICT for students’ information management (Pegu, 2014; Azameti, & Adjei, 2013; Mondal, & Mete, 2012).

Additionally, the lack of primary education and ICT skills could be a challenge to record management (Azameti, & Adjei, 2013; Nakpodia, 2011) as many academic and non-academic staff who should be applying ICT facilities are not computer literate and, thus, fail to appreciate the advantages offered by ICT in record
management. More so, several of these staffs have conservative attitudes and still practice the old habits of doing things thus resisting change (Nakpodia, 2011; Ngumbi, 2010).

Consequently, the effective management of student’s information in TUs in Ghana’s educational system with specific importance on controlling information produced from learners in the form of admissions, matriculation, registration, examination, graduation, amongst others seem to be challenging (Katuu, 2015; Abdulkareem et al., 2013). Occurrences of misplaced documents, and incomplete students’ records, as well as delayed publication and access to crucial information and documents, are common incidences in most higher education institutions (Asogwa, et al., 2011; Nakpodia, 2011). These hindrances may have been occasioned by the absence of and/or inadequate ICT infrastructure on the one hand and worker's competence in managing students’ records, (Nwaomah, 2015).

The IRMT (2008), infer that inadequate competencies and skills among records and archives administration staffs in the domain of electronic records management suggest the failure to perform an essential function in devising and executing electronic records management practices. An empirical study on the use, usage and challenges of electronic records management, (Bigirimana, et al. 2015; Mosweu et al., 2014; Asogwa, 2013) it was found that despite the extensive education, most employees never got used to the system because they did not find the system user friendly, issues arising from the way portions of the system were set up and complex rules governing the usage were too complex.

Assar and Al El-Amrani (2010) indicated that for ICT programs to be workable in Ghana’s higher education institutions, they must be tailored to the specific
requirements as well as with the application of relevant technology for the program development could be realized. By inference, ICT achievement in these institutions will be contingent on the proper design of software as well as hardware relevant to the specifications of the Technical Universities. Moens et al. (2010) as cited by Addy & Ofori-Boateng (2015) indicated that ICT programs are not fashioned to the local condition in these institutions and therefore there is the difference between design and reality which is suggested to as the margin where the technology was formed and applied. Also, the difficulties associated with workforce dimensions defined by poor professional, technical as well as managerial workforce base of Ghana has contributed to its low usage ICTs in addressing service delivery in the public sector as well private (World Bank Report, 2010).

2.10 Theories of Human Behaviour and Technology Adoption

Three principal models are examined. These comprise the Theory of Planned Behaviour (TPB), Theory of Reasoned Action (TRA), as well as the Technology Acceptance Model (TAM). These models were formed and advanced through meticulous authentications and expansions. The basis for including the TAM although it is the primary focus of this investigation is because of its interconnectivity with the rest. It also to affords a fair idea regarding the evolution of TAM.

2.10.1 Theory of Reasoned Action

The Theory of Reasoned Action by Ajzen & Fishbein, (1980) is viewed as one of the pioneering models formulated to describe technology assent in the area of Psychology. This concept was advanced to forecast and interpret a persons’ voluntary behaviour and to explain their psychological determining factors. The concept postulates that people are sane by nature (Ajzen & Fishbein, 1980) hence will act on the basis of the information accessible to them with their behavioural intents denoting
the central determining factor of their activities. The theory views intentions as the main predictor of a person’s behaviour and any external influence towards behaviour will be through their intentions.

Eagly et al., (2001) describe intention as an individual’s urge in the sense of their understanding to stimulate an attempt to perform a certain behaviour. The Theory of Reasoned Action as specified by Fishbein & Ajzen, (1975), have two determining factors for people’s intents regarding their personal influence as well as social influence. Personal influence according to Ajzen (1985), signifies posture which suggests the positive or negative assessments of the behaviour exhibited by a person whereas social influence is a subjective norm that may be described as the extent to which an individual assumes that individuals who are relevant to them believe that they must or must not exhibit the behaviour. The influence of these two (2) determinates vary depending on the individual exhibiting the behaviour as well as on the intent as depicted in figure 2.1.

Figure 2.1: Theory of Reasoned Action; source: Ajzen & Fishbein (1980)
According to the TRA, attitude is developed through an individual’s striking beliefs regarding particular conduct. These striking beliefs will link the individual’s conduct with performance outcomes. Besides, the distinct assessment of the outcome will define the impact of attitude relative to the behaviour. Thus, a person’s position may be assessed by the striking beliefs as well as the evaluation of the outcome of the circumstance. Further, the subjective norm is a function of belief where an individual will observe the social influence of his/her group to display the behaviour in question.

There are basically two principal weaknesses of the Theory of Reasoned Action. For one, the theory according to Ajzen, (1985) suffers from what is termed factors correspondence. This implies that in order to predict a person’s behaviour, attitude and intent must be connected in action, context as well as time (see Sheppard et al. 1988). Again, as specified by Yousafzai et al., (2010) the theory solely pertains to behaviour that is voluntary, a behaviour that has previously been conceived in an individual’s conscious previously. Consequently, any behaviour encompasses illogical judgments, multifaceted abilities or social support this according to Wright (1998), cannot be justified by the Theory of Reasoned Action.

2.10.2 Theory of Planned Behaviour
The Concept of Planned Behaviour is an extension of the TRA, formulated by Ajzen (1985) to correct the model’s initial shortcomings. The Theory of Planned Behaviour presented perceived behavioural control which accounts for a persons’ behaviour under non-voluntary control. Perceived behavioural control according to Hamilton & White, (2010) is the measure of control individuals assume they hold over displaying a specific behaviour. As indicated in figure 2.2, (Ajzen, 1991) the broken line symbolises that in some situations perceived behavioural control has a greater influence on behaviour. Notwithstanding, both intention and perceived behavioural
control are critical in predicting individuals’ behaviour. The Theory of Planned Behaviour, suggests that displaying positive conduct is contingent on how much energy the individual is prepared to devote to the level of control (Carr & Sequeira, 2007).

Figure 2.2: Theory of Planned Behaviour (Aizen, 1991)

The Theory of Reasoned Action suffered countless censures over the years although it was formed to address the TRA’s volitional control restriction. Firstly, both the TRA and TPB postulate that people must be inspired to demonstrate specific behaviour. This premise according to Taylor & Todd, (1995) may create difficulties for the consumer use behaviour since there are external restrictions that may hinder them from displaying the behaviour such as price.

Secondly, as Ajzen (1991) asserted, the determinants of intention are not confined to attitude, subjective norms, and perceived behavioural control. Besides, empirical inquiries explicated that the TRA and that of TPB solely described 40% of the variation in a persons’ behaviour. Moreover, Taylor & Todd, (1995) noted that the Theory of Planned Behavior is censured for combining all the uncontrollable variables influencing people’s behaviour into a single variable.
2.10.3 Technology Acceptance Model

The Technology Acceptance Model (TAM) is a conceptual extension of the TRA which describes the determining factors of behaviours exhibited with conscious intents (see Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Technology Acceptance Model explains a person’s behaviour through their intent to execute that behaviour, which sequentially is advocated to be formed by the person’s attitudes as well as their subjective norms concerning that behaviour (Fishbein & Ajzen, 1980). Davis in 1986, originated the TAM as use of TRA (Davis, 1989). The TAM according to Davis et al., (1989), was specifically designed to describe behaviours concerning computer usage.

TAM submits that if an individual is presented to a novel info system or novel technology, their choice concerning its use could be influenced by numerous issues. The TAM hypothesises that two (2) belief variables, perceived ease of use and perceived usefulness are the primary determining factor of the consumer’s behavioural intent to adopt a technology according to Davis, (1989). As pointed out by Davis, (1989), perceived usefulness is described as the degree to which an individual assumes that adopting a specific scheme will improve the performance, while perceived ease of use is explained as the extent to which an individual considers that adopting a specific technology will be independent of effort.

Davis examined the associations of useful-usage, as well as ease of use-usage and usefulness, and is evidenced to be implicitly more firmly correlated with use in contrast to the ease of use. Similarly, Davis (1989) inferred that perceived usefulness was powerfully associated with the consumers’ technology acceptance. Thus, it is essential to acknowledge consumer beliefs in any scheme or technology acceptance, as a result of their impact on user behaviour. According to Davis (1989), the
significance of perceived usefulness and perceived ease of use has been widely examined from varying theoretical perspectives including the theory of self-efficacy, expectancy theory, the theory of behavioural decision, diffusion of innovations, advertising, and human-computer interaction.

Davis et al. (1989) asserted that the actual technology usage per the TAM is defined by the behavioural intention which in turn is affected by perceived ease of use and perceived usefulness. Further, perceived usefulness influences directly the behavioural intention whereas perceived ease of use exercises either a direct or indirect impact through perceived usefulness on the behavioural intent. Perceived ease of use further determines perceived usefulness since, all things being equal, the simpler the technology is to use the more valuable it will be (see Venkatesh & Davis, 2000). Additionally, TAM suggests that the influence of peripheral elements on the behavioural intent for a system used will be arbitrated by perceived ease of use and perceived usefulness.

Davis et al. (1989) emphasised that external variables afford the connection between the internal beliefs, attitudes, and intentions designated in the Technology Acceptance Model and the different individual differences, contextual limitations and managerially controllable interventions affecting behaviour. In the practice of execution, practitioners may apply influence on consumer judgments regarding technology and eventually user behavioural intents as well as the technology use through the manipulation of these external forces (Hong et al., 2002). TAM according to Davis et al., (1989), specifies the prevailing circumstances determining a consumer's use of a system. Consequently, this model has the potential for clarifying and forecasting consumer behaviour over an extensive range of end-user technology and consumers while concurrently being both frugal and hypothetically defensible.
The attitude construct was incorporated in the original Technology Acceptance Model version; however, it was discarded from the ultimate model after Davis et al. (1989) observed that the influence of the two (2) belief variables, perceived ease of use and perceived usefulness, on intent was not entirely arbitrated by attitude. Attitude according to Ajzen & Fishbein, (1975) is a person’s positive or negative sentiments regarding the display of the intended behaviour. According to Davis et al. (1989), there could be situations when an individual, offered a specific technology seen to be beneficial, could immediately nurture a profound behavioural intent to use that technology devoid of creating any attitudes about it.

Venkatesh, (2000) notes that the elimination of the attitude element increases the appreciation of the effect of perceived ease of use as well as perceived usefulness on the model’s core dependent variable of intent. Several investigations including (Kim 2006; Park et al. 2009; Jeong, 2011; and Williams, et al., 2014), have demonstrated that the Technology Acceptance Model maintained its robustness despite the exclusion of the attitude construct, since a consumer’s behavioural intent is essentially defined by the belief variables such as perceived ease of use as well as perceived usefulness. Nevertheless, Chau & Hu, (2002) and Jackson, et al. (1997) have afforded pragmatic proof to authenticate that attitude exercised a notable influence on a consumer’s behavioural intent and thus a crucial construct in the TAM.

The TAM assumes that the application of a particular system or information scheme is optional (Davis, 1989). Again, TAM hypothesises that, when sufficient information and time on a specific behavioural action is presented, the consumer’s behavioural intent will display a stifling similarity to that particular behaviour (Kripanont, 2007). The postulation as specified by Ajzen & Fishbein (1980), pertains merely to situations where the behaviour is under the voluntary direction of the individual. Also,
according to Kripanont (2007), TAM has reliable behavioural components and presumes that when an individual forms an intent to act in a certain manner, he or she will be unrestricted to act devoid of any restriction. Hitherto, as specified by Bagozzi, et al. (1992), in real-life individuals might encounter several obstacles such as the absence of skills, insufficient time, contextual limitations and insentient behaviours which may limit their autonomy to act.

*Figure 2.3: Final Model of the TAM (Venkatesh & Davis, 1996)*

Generally, the development of Technology Acceptance Model according to Han, (2003) may be classified into three (3) distinct stages, use, validation and extension.

- The use stage deals with the frugality of the TAM. Davis et al. (1989) endeavoured to develop a hypothetical acceptable model that can forecast as well as interpret a consumer’s behavioural intent in the information systems setting. The advancement of Technology Acceptance Model has been implemented across an assortment of technologies. The conclusions of these investigations validated the relevance of Technology Acceptance Model above the chosen technologies in various information system settings.
The validation phase can be categorised into two (2) separate components. One is meant to establish the psychometric features of the Technology Acceptance Model’s major constructs, perceived usefulness and perceived ease of use. In order to determine the two (2) constructs, Davis (1989) designed a range of variables for every construct. Table 1 illustrates some instances of the procedures adopted to determine perceived usefulness and perceived ease of use.

**Table 2.1: Perceived usefulness and perceived ease of use measures**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness</td>
<td>The system will improve a person’s work performance</td>
</tr>
<tr>
<td></td>
<td>The system will improve a person’s efficiency</td>
</tr>
<tr>
<td></td>
<td>The system will enrich a person’s job effectiveness</td>
</tr>
<tr>
<td></td>
<td>The system will improve task accomplishment more swiftly</td>
</tr>
<tr>
<td></td>
<td>The system will make work much more comfortable</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>learning to manage a specific technology will be simple</td>
</tr>
<tr>
<td></td>
<td>Finding it easier to make the technology to accomplish what the individual requires</td>
</tr>
<tr>
<td></td>
<td>It will be easier to become an expert at applying the technology</td>
</tr>
<tr>
<td></td>
<td>Finding technology usage easier</td>
</tr>
</tbody>
</table>

**Source: Adapted from Han (2003)**

The quantity of items utilised in estimating perceived usefulness and perceived ease of use differs with different studies. Most of Technology Acceptance Model’s constructs measures have been practically experimented and authenticated in various investigations. For instance, Davis et al. (1989) measured the Technology Acceptance
Model applying Write One, a word processing package. The research employed four (4) measures for each construct (perceived usefulness and perceived ease of use) and the outcomes suggest a high level of converging and discriminate validity for the preferred measures. Similarly, Adam et al. (1992) concentrated on the psychometric characteristics of the Technology Acceptance Model’s scales. They duplicated Davis’s (1989) effort to assess the efficacy of perceived usefulness and perceived ease of use for various technologies in two studies. Both studies validated the reliability and efficacy of perceived usefulness and perceived ease of use scales with excellent convergent and discriminate properties.

Furthermore, Chin & Todd (1995) demonstrated that the Technology Acceptance Model’s usefulness construct had a satisfactory psychometric property. The other part of the authentication stage is to substantiate the causal associations amongst Technology Acceptance Model’s constructs and any external variables influencing perceived usefulness and perceived ease of use. The four (4) causal links between TAM’s constructs are:

Perceived Usefulness  Behavioural Intention
Perceived Ease of Use  Behavioural Intention
Perceived Ease of Use  Perceived Usefulness
Behavioural Intention  Actual Use

- Most of those causal links have been experimented and displayed a consentient effect with the initial model of TAM, besides the causal nexus between perceived ease of use towards behavioural intent. The association has been irregular which demands additional research (Venkatesh & Morris, 2000).
- The extension phase deals with extension. Research has been extending the Technology Acceptance Model over the decades by appending either external
variables or moderating variables. Primarily, there are two (2) popular extensions of the TAM suggested by Venkatesh & Davis (2000) as well as Venkatesh & Bala (2008). The initial extension of the TAM’s primary focus was to distinguish the determinants of perceived usefulness - TAM2. Venkatesh & Davis (2000) included five (5) other variables which are the subjective norm, image, relevance, output quality, and result demonstrability. They examined the extended model over four (4) commercial entities. The outcomes uncovered that perceived usefulness was the strongest determining factor of behavioural intent. The second extension’s primary effort was to suggest determining factors of perceived ease of use - TAM3. The suggested variables by Venkatesh & Bala (2008) were computer self-efficacy, perception of external control, computer anxiety, computer playfulness, perceived enjoyment, and objective usability.

Consolidating the determining factors of the 2nd and 3rd models afforded extra lushness and comprehension to the extended model according to Venkatesh & Bala (2008). Nevertheless, as specified by Tang & Chen, (2011), the TAM model performed considerably better than TAM2 and TAM3 with respect to the described variance in behavioural intention. Besides, the moderating variables function as pointed out by Sun & Zhang, (2006) is to describe the model’s incongruities by distinguishing the situational variations. Venkatesh et al. (2003) studied eight (8) models, and the outcomes indicate that six (6) out of the eight (8) models had their predictive validity improved considerably after the addition of moderating variables. Again, Chin et al. (2003) established the significant influence of moderating variables on TAM. Venkatesh et al. (2003) acknowledged four (4) moderators including age, gender, computer experience and voluntariness as the frequently employed in the technology use studies.
References


Carrillo, P., Onofa, M., & Ponce, J. (2010). Information technology and student’s achievement: Evidence from a randomized experiment in Ecuador. Inter-American Development Bank:


General Conference on Access to Information: Archives and Records in Support of Public Sector Reform in Context, Maputo, Mozambique, 6-10 June 2011.


CHAPTER THREE
METHODOLOGY

3.0 Introduction

This chapter describes the methods and procedures used to conduct the research. Research methodology represents the systemic investigation aimed at solving research problems (Leavy, 2017). It seeks to provide an outline of the parameters used in the research methodology of the study. It describes and justifies the methods and processes employed in the collection and analysis of data. This chapter thus, comprises the research design, the population, the sample size, the research instrument, pre-testing, mode of data collection and the method of data analysis.

3.1 Research Design

A research design is a conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement, and analysis of data (Leavy, 2017). Saunders et al. (2012) emphasised that the selection of any research design is based on numerous constituents with the ultimate being the attributes of the variables or population being used or investigated. To Cohen et al. (2011), a research design is an overall plan for obtaining answers to the questions being studied and for handling some of the difficulties encountered during the research process.

Cresswell & Plano Clark (2017) infers that appropriate research design is critical in determining the type of data, the data collection technique, the sampling procedure, the schedule, and the budget. Similarly, Schwartz-Shea & Yanow (2012) indicates that an appropriate research design helps to align the planned methodology for the research problems. Since different research
designs attempt to answer different types of research problems, Williams (2011) asserts that the choice of research design must be grounded on the nature of the research, its setting, the possible limitations and its underlying paradigm that informs the study.

This study focused on the use of ICTs for students’ information management in TUs in Ghana; hence the research approach was mixed-method design. Leavy (2017) infers that mixed-methods research represents more of an approach to examining a research problem than a methodology. Accordingly, mixed-method is characterised by a focus on research problems that require the following:

- an examination of real-life contextual understandings, multi-level perspectives and cultural influences
- an intentional application of rigorous quantitative and qualitative research
- an objective drawing on the strengths of quantitative and qualitative data-gathering technique to formulate a holistic interpretative framework

Doyle et al. (2009) argue that the mixed-method encompasses more than simply combining quantitative and qualitative methods but rather, reflects a new third-way epistemological paradigm that occupies the conceptual space between positivism and interpretivism. By adopting the mixed-method research design, the researcher could provide a stronger, more robust evidence to support a conclusion or set recommendations on the state of ICTs use in TUs in Ghana.

### 3.2 Population

A population can be described as the complete set of subjects that can be studied (Oppong, 2013). Lohr (2010) notes that specifying the population that is targeted for a study is crucial as it helps the researcher to make decisions on sampling and resources to use. The target population
for this study was One Hundred and Thirty-Six (136) which included all administrative staff that were directly concerned with students’ information management and two Educational ICT service providers. The administrative staff comprised Academic Affairs staff, Admission staff, Planning and Quality Assurance staff, as well as Examinations Officers and ICT Directorate staff at the three, selected TUs.

The three TUs (Kumasi Technical University, Sunyani Technical University, and Accra Technical University) were selected because they were among the leading eight polytechnics converted to Technical Universities in terms of staff strength, infrastructure, governance, etc. (MOE, 2016). They also offer similar programmes of study and student population.

Table 1: Total Population of the study

<table>
<thead>
<tr>
<th>No.</th>
<th>Respondents/Administrators</th>
<th>KsTU</th>
<th>STU</th>
<th>ATU</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Academic Affairs</td>
<td>5</td>
<td>3</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>Admissions</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>ICT Directorate</td>
<td>13</td>
<td>8</td>
<td>8</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>Examinations Officers</td>
<td>26</td>
<td>15</td>
<td>18</td>
<td>59</td>
</tr>
<tr>
<td>5</td>
<td>Planning and Quality Assurance Unit</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>54</td>
<td>33</td>
<td>49</td>
<td>136</td>
</tr>
</tbody>
</table>


3.3 Sample Size and Sampling Technique

As Lohr, (2010) points out, sampling cannot be avoided in research as it is impracticable to survey the entire population due to budget and time constraints; thus, samples are drawn to represent a population adequately. Bryman (2012) defines a sample as a relatively small number of units used to make generalisations about the whole. Its primary objective is to provide
accurate estimates of an unknown parameter. It is made up of single members or units. The actual procedures involved, according to Saunders et al. (2012) are a selection of a sample from a complete list of sampling units. In practice, a real list rarely exists, and, thus, an equivalent list is substituted. For some study questions, it is feasible to solicit information from an entire population as it is of a controllable size (Zhi, 2014).

According to Gentles et al. (2015), if a simple process has been correctly followed then the sample size of 150-200 study participants can be considered acceptable and reflect the whole population. Where the population is small, there is no need for sampling. The entire target population was used for the study which is known as the census sampling technique.

According to Harding (2018) census is the process of collecting data from every unit of a population under study rather than choosing a sample. Census study has to do with the use of the total enumeration of the target population for a study. The main purpose of selecting the entire population for the research is due to the small size of the total population and with this technique, a true measure of the population is provided.

Two ICT educational service providers were also purposively sampled and included in the population of the study. The reason for its inclusion was to provide the standards for the use of ICTs for students’ information management with regards to the objectives of the study.

3.4 Data Collection

Data is collected through secondary and primary sources. The study used both questionnaire and interview guides as research instruments to collect primary data. A self-administered questionnaire was distributed to respondents. To compensate for some amount of qualitative data; two ICT Educational service providers were engaged for in-depth interviews to know the
international standards that will address information security challenges and enhance the credibility and sustainability of students’ information respectively. In-depth interviews according to (Hammon & Wellington, 2013) are personal and unstructured interviews, whose aim is to identify participant’s emotions, feelings, and opinions regarding a particular research subject; as this study was in part to capture the perceptions regarding the use of ICTs for students’ information management in TUs in Ghana.

3.5 Instrumentation

There are two primary sources of data collection in educational research: primary and secondary sources (Sekaran, 2010). The data collected for this research were from both sources. A primary source (Sreejesh et al., 2014) is an original document or account that is not about another document but stands on its own. For example, interviews that come straight from participants’ replies (Boddy, 2016; Punch, 2013). Primary sources enable a researcher to get as close as possible to what actually happened during a historical event or period. A secondary source is those that do not have a direct physical relationship with the event being studied, which are made up of information that cannot be described as being an original source data (Saunders et al., 2012). A secondary source would thus be one in which the person describing the event was not actually present but who obtained a description from another person or source such as textbooks, quoted materials, and so on.

Saunders et al. (2012) pointed out that secondary sources of data are usually of limited worth because of the errors that result when information is passed on from one person to another. Nevertheless, secondary sources of data are still very relevant to educational research. Bryman, (2012) noted that the value of secondary sources should not be minimised. There are numerous occasions where a secondary source can contribute significantly to more valid and reliable
sources than would otherwise be the case because education is primarily concerned with the individual’s physical, social, intellectual. An eclectic approach (Flick, 2011) using different tools was employed to obtain the necessary data to address the research objectives. This included the use of questionnaires and interviews. Together, they provided rich sources of detailed information and ensured validation of the findings through triangulation.

3.5.1 Interviews

An interview is a purposeful discussion between two or more people (Rowley, 2012). Thus, an interview is a one-to-one conversation between the researcher and a participant (Lewis & McNaughton-Nicholls, 2013; Sreejesh, 2014). An interview aims to gain a deeper understanding of the feelings, motivations, and beliefs of the interviewee. In general, there are three types of interviews: standardised, semi-structured and unstructured (Sreejesh, 2014).

Standardised interviews are ordered, standardised, open-ended questions, while semi-structured interviews (Leavy, 2017), are more flexible regarding the order of the questions and standardisation; thus, the researcher can rephrase inquiries or interrogate in more depth. The third type the unstructured interview is not standardised or ordered in any form, allowing the interviewee to guide the conversation in any direction and narrate everything that is considered relevant (Boddy, 2016). In all three types, the researcher is in direct contact with the object of research thus, stimulates interviewer bias (Hesse-Biber, & Leavy, 2010). However, the interview allowed the researcher to gather valid and reliable data that are relevant to the research questions and objectives.

The interview was made up of two sections. Section “A” measured the bio-data of the interviewees. It had five items. These items were measured on an open-ended structure. Section “B” analysed the standards in ICT adoption for the management of students’ information at the University of Ghana http://ugspace.ug.edu.gh
tertiary level. The variables were twelve based on the objectives of the study in order to find out the standards of ICT adoption and use at the tertiary level of education (ie. internal ICT policies, impression about data management, software management, database infrastructure, the database for tertiary institutions, ICT impact on management of students’ information, challenges of ICT's for management of students information, strategies to address the use of ICTs for management of students’ information)

3.5.2 Questionnaire

The questionnaire is used as a general term to include all techniques of data gathering in which each person is required to respond to the same set of questions in a predetermined order (Saris, & Gallhofer, 2014). Questionnaires usually are one of the particular forms of primary data collection on which it relies for precision in the data. It is a standard technique used for gathering primary data in more than half of the comprehensive research studies in education. A valid questionnaire will enable accurate data to be collected, and one that is reliable will mean that these data are collected consistently (Sreejesh, 2014). Again, the use of the questionnaire will ensure consistency, uniformity, and stability in response. Its usage will make the respondents complete answering the questionnaire at their own convenience and will also ensure the respondents greater anonymity. Both closed-ended and open-ended questions were asked. The open-ended questions allowed participants to express their views freely on issues raised (Punch, 2013).

The questionnaire was made up of six sections. Section “A” measured the bio-data of the respondents surveyed. It had six items. These items were measured on a close-ended structure. Section “B” measured the extent to which respondents have internal policies regarding the use of ICTs for students’ information management at the Technical University. The state of availability
of the internal policies was measured on a scale of \(1=Yes\) and \(2=No\). The variables were twelve in the internal policies scale (privacy policy, data collection policy, health information collection policy, admission policy, awards of grade policy, records management policy, ICT infrastructure policy, ICT software management policy, ICT security policy, ICT usage policy, ICT training and development policy. This section also sought to assess the type of students’ information kept at the TU. The types of students’ information had fifteen variables. The opinions of the respondents were measured on a 2-point Likert Scale where \(1=Yes\) and \(2=No\).

Section “C” also measured the ICT platforms available for managing students’ information in the TU. The ICT platforms scale was made up of nine variables. The participants’ opinions were rated on a 2-point Likert Scale rated from \(1=Yes\) to \(2=No\). This section also sought to assess the extent to which the respondents agree with the use of ICT in education processes at the TU. The opinions of the respondents were measured on a 5-point Likert scale rated from \(5=to\ a\ very\ large\ extent\ to\ 1=not\ at\ all\ with\ 3.0\ as\ the\ mid-point\ threshold\). Use of ICT in education processes construct had nine items – creation of records, processing of records, storage of records, use/distribution of records, retrieval of records, migration of records, preservation of records and continued access to records.

Section “D” however assessed the prospects of ICTs in managing students’ information at the TU. The prospects of ICT scale was made up of thirteen variables. Respondents were asked to state the extent of agreement or disagreement regarding the statements representing the variable. For instance, the respondents were asked “the use of ICTs reduces the loss of students’ information” to which they rated based on a 5-point Likert Scale ranging from \(1=Strongly\ disagree\) to \(5=Strongly\ agree\). This section also sought to assess the extent to which ICT has
been applied in monitoring educational activities at the TU. The extent of monitoring educational activities using ICT had nine variables. The opinions of the respondents were measured on a 5-point Likert Scale ranging from $1=\text{Not at all}$ to $5=\text{To a very large extent}$

Section “E” also measured the challenges in relation to the use of ICT for managing students’ information in the TU. The challenges ICT platforms scale was made up of fourteen variables. The participants’ opinions were rated on a 5-point Likert Scale rated from $5=\text{to a very large extent}$ to $1=\text{not at all}$ with 3.0 as the mid-point threshold. Further, respondents were asked to suggest strategies that could be adopted for the use of ICTs for managing students’ information in section “F”.

The questioning strategy used was mostly the close-ended approach. The closed-ended items were made up of alternative options that the respondents were to choose from while only one opened-ended question had space for the respondents to provide their own answers with regards to new technologies to adopt to manage the TUs information better.

3.6 Pre-Test

The pre-testing was carried out at the Kwame Nkrumah University of Science and Technology (KNUST) main administration and College of Arts and Built Environment. This was chosen because members of staff had characteristics similar to the staff of three (3) TUs selected. Thirty (30) members of staff were selected for the pretest and out of this number, 20 were from the Academic Affairs, Admissions and ICT Directorates of the main Administration whilst the rest of the ten (10) were the Examinations Officers at the College of Art and Built Environment. This helped the researcher to review the questionnaires in order to ensure consistency across to focus on the clarity and relevance of the questions for the categories of staff included in the study.
3.7 Mode of Data Collection

To gather data from the sampled individuals, permission was sought from the management of the three TUs selected. Approval was sought from the three Registrars through an introductory letter collected from the Department of Information Studies, University of Ghana to introduce the researcher to the staff of the Administration in order to collect the data.

After the permission was granted, the Registrars of the three TUs were contacted in person and were briefed on the importance of the study. Afterward, their consent was sought for the participation of their staff in the study. The questionnaire was administered personally by the researcher with the help of another administrative staff member at each of the three (3) TUs to help improve the collection and response rates of the data collection exercise. Again, an in-depth personal interview was conducted for the two ICT Educational service providers.

3.8 Presentation and Analysis of Data

In methodology literature, there is not one single right way or the most appropriate way to analyse qualitative or quantitative data. Analysis implies and indeed requires an ultimate choice (Sekaran, 2010). For instance, in analysing and interpreting both qualitative and qualitative data, it is the process of systematically organising the materials collected, bringing meaning to them so that they tell a coherent story and writing it all up so that others can read what one has learned. Based on this premise, the data collected was analysed using both the qualitative and quantitative methods to enable the researcher to provide a reasoned meaning to the study. However, the responses were edited, coded and scored using the Statistical Package for Social Sciences (SPSS) version 21 and thematic analysis for the quantitative and qualitative data respectively. The scores for each respondent were summed across the items to obtain their final raw score. Simple percentages, bar graphs, pie charts, and frequency tables were adopted to examine the issues. In a
few cases, the mean of means was used to analyse specific variables. The analysis was done based on each research objective.

### 3.9 Ethical Considerations

Ethics in research is involved with what is right and what is not right to do when conducting research (Dich et al. 2013) and forms an integral part of any research study. The issue of ethics in research is particularly important when human beings are the research subjects (Hammond, & Wellington, 2013), as is the case in this study. Ethics in research according to Dich, et al. (2013), spans the entire research process, from the nature of the problem being investigated, the reporting of the theoretical framework thereof, the context within which the research is conducted, the data collection instruments employed, the data collection methods used, the research subjects, the procedures employed to analyse the data and the way in which the data is reported.

Participants were given full information on the objectives and purposes of the study to enable them to make decisions as to whether to participate in the exercise. The study ensured that all ethical issues bordering on confidentiality and anonymity of participants were adhered to. Finally, the study was conducted using the University of Ghana Research Ethics Policy (2013) and all documentary sources such as books, articles, data, and documents used or consulted were appropriately acknowledged.
References


CHAPTER FOUR
DATA ANALYSIS AND FINDINGS

4.0 Introduction

The purpose of the study is to examine the use of Information and Communication Technology for students’ information management in selected TUs in Ghana that addresses information security challenges and the enhance accuracy and sustainability of students’ information and management. This chapter presents data analysis and findings obtained using Statistical Package for Social Sciences (SPSS) version 21. The findings are arranged according to the themes of the main objectives of the study.

4.1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

![Figure 4.1 Gender distribution of respondents](image)

From a total of 115 questionnaires distributed, 103 were considered valid and acceptable for analysis. Some of the questionnaires were partially completed, whereas others were soiled and
were barely readable. This represents approximately 89.6% response rate and hence regarded as adequate to draw conclusions.

Figure 4.1 presents information regarding the gender distribution of the respondents used for the study. The responses give the impression that there were more males (67%) than females (33%). The trend implies that the institutions are populated with more males than their female counterparts.

Table 4.1 Demographics of the study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 30</td>
<td>17</td>
<td>16.7%</td>
</tr>
<tr>
<td>30-35</td>
<td>28</td>
<td>27.5%</td>
</tr>
<tr>
<td>36-40</td>
<td>34</td>
<td>33.3%</td>
</tr>
<tr>
<td>41-45</td>
<td>16</td>
<td>15.7%</td>
</tr>
<tr>
<td>46+</td>
<td>7</td>
<td>6.90%</td>
</tr>
<tr>
<td><strong>Department</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Affairs</td>
<td>27</td>
<td>26.2%</td>
</tr>
<tr>
<td>ICT</td>
<td>30</td>
<td>29.1%</td>
</tr>
<tr>
<td>Exams Officer</td>
<td>23</td>
<td>22.3%</td>
</tr>
<tr>
<td>Planning &amp; Quality Assurance</td>
<td>23</td>
<td>22.3%</td>
</tr>
<tr>
<td><strong>Institution</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KsTU</td>
<td>33</td>
<td>32.0%</td>
</tr>
<tr>
<td>ATU</td>
<td>41</td>
<td>39.8%</td>
</tr>
<tr>
<td>STU</td>
<td>29</td>
<td>28.2%</td>
</tr>
<tr>
<td><strong>Highest Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certificate/Diploma</td>
<td>15</td>
<td>15%</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>35</td>
<td>35%</td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>46</td>
<td>46%</td>
</tr>
<tr>
<td>Post Graduate Cert/Diploma</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Position</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrator</td>
<td>69</td>
<td>69%</td>
</tr>
<tr>
<td>Lecturer/Exams Officer</td>
<td>18</td>
<td>18%</td>
</tr>
<tr>
<td>Senior Lecturer/Exams Officer</td>
<td>4</td>
<td>4%</td>
</tr>
</tbody>
</table>
Table 4.1 provides information regarding respondents’ demographic characteristics. The characteristics considered here are age, department, institution, highest educational qualification and position of respondents. From the table, regarding the age distribution of the respondents; thirty-four (n=34) respondents representing 33.3% were between the ages of 36 – 40 years, 28 respondents representing 27.5% were between 30 – 35 years, 17 representing 16.7% were less than 30 years, 16 comprising 15.7% of the respondents were within the 41 – 45 years age range with seven respondents representing 6.9% being 46 years and above. The responses imply that the respondents are matured enough to make credible contributions to the study.

Moreover, 30 respondents representing 29.1% were in the ICT department, 23 respondents each representing 22.3% were Examination Officers and Planning and Quality Assurance respectively with 27 respondents (26.2%) being at the Academic Affairs department.

The results further show that more than one-third, 41 of the respondents (39.8%) were from ATU, 33, representing 32% were from KsTU, whereas 29 representing 28.2% came from STU. With respect to the educational level of respondents, 46 respondents representing 46% possessed Master’s Degree, 35 representing 35% had Bachelor’s Degree, 15 representing 15% had Certificate/Diploma, 3 representing 3% had Post Graduate Cert/Diploma whiles only one respondent representing 1% possessed other certificates. From the educational qualification, it can be concluded that the respondents have had sufficient education making them worthy contributors to the study.

Finally, more than half of the respondents, 69 representing 69% were Administrators, 18 representing 18% were Lecturers/Examination officers, four representing 4% were Senior

<table>
<thead>
<tr>
<th>Professor</th>
<th>1</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>8</td>
<td>8%</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)
Lecturers/Examination Officers whiles only one representing 1% was a Professor and 8% representing other positions.

4.2 RESULTS FROM KUMASI TECHNICAL UNIVERSITY (KsTU)

4.2.1 Internal Policies on ICT for student information management (KsTU)

Table 4.2 Descriptive Statistics on internal policies for student’s information management

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privacy Policy</td>
<td>33</td>
<td>1.76</td>
<td>.435</td>
</tr>
<tr>
<td>Data Collection Policy</td>
<td>33</td>
<td>1.82</td>
<td>.392</td>
</tr>
<tr>
<td>Health Information Collection Policy</td>
<td>33</td>
<td>1.88</td>
<td>.331</td>
</tr>
<tr>
<td>Admission Policy</td>
<td>33</td>
<td>1.15</td>
<td>.364</td>
</tr>
<tr>
<td>Awards of Grades Policy</td>
<td>33</td>
<td>1.39</td>
<td>.496</td>
</tr>
<tr>
<td>Records Management Policy</td>
<td>33</td>
<td>1.30</td>
<td>.467</td>
</tr>
<tr>
<td>ICT Infrastructure Policy</td>
<td>33</td>
<td>1.36</td>
<td>.489</td>
</tr>
<tr>
<td>ICT Software Management Policy</td>
<td>33</td>
<td>1.18</td>
<td>.392</td>
</tr>
<tr>
<td>ICT Security Policy</td>
<td>33</td>
<td>1.21</td>
<td>.415</td>
</tr>
<tr>
<td>ICT Usage Policy</td>
<td>33</td>
<td>1.33</td>
<td>.479</td>
</tr>
<tr>
<td>ICT Training and Development Policy</td>
<td>33</td>
<td>1.39</td>
<td>.496</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

Table 4.2 presents a summary of the responses from the respondents at the Kumasi Technical University (KsTU) regarding internal policies for student’s information management. Analysis of the responses using the scale of 1=Yes, 2=No. From the responses it is apparent that KsTU has internal policies on Admissions (Mean (M) =1.15, (Standard Deviation (±SD)=.364), ICT...
Software Management (Mean (M)=1.18, Standard Deviation(±SD)=.392), ICT Security (Mean (M)=1.21, Standard Deviation (±SD)=.415), Records Management (Mean (M)=1.30, (±SD)=.467), ICT Usage (Mean (M)=1.33, Standard Deviation (±SD)=.479), ICT infrastructure (Mean (M)=1.36, Standard Deviation (±SD)=.489), Awarding of Grades (Mean (M)=1.39 with the highest Standard Deviation of (±SD)=.496) and ICT Training and Development (Mean (M)=1.39, Standard Deviation (±SD)=.496).

However, the results show that the majority of the respondents indicated that KsTU does not have Policies on Privacy (Mean (M)=1.76, (±SD)=.435), Data Collection Policy (Mean (M)=1.82, Standard Deviation (±SD)=.392) and Health Information Collection (Mean (M)=1.88 with the lowest Standard Deviation (±SD)=.331).

From the responses, it could be resolved that KsTU has policies on Admissions, ICT Software, Security, Records, ICT Usage, Infrastructure, Award of Grades and Training and Development. On the contrary, KsTU does not have explicit policies on Privacy, Data Collection and Health Information.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students Admission/Enrolment Records</td>
<td>33</td>
<td>1.06</td>
<td>.242</td>
</tr>
<tr>
<td>Admission Letters</td>
<td>33</td>
<td>1.09</td>
<td>.292</td>
</tr>
<tr>
<td>Acceptance Letters</td>
<td>33</td>
<td>1.18</td>
<td>.392</td>
</tr>
<tr>
<td>Academic Registration</td>
<td>33</td>
<td>1.06</td>
<td>.242</td>
</tr>
<tr>
<td>Residential Registration</td>
<td>33</td>
<td>1.48</td>
<td>.508</td>
</tr>
<tr>
<td>Matriculation Oath</td>
<td>33</td>
<td>1.39</td>
<td>.496</td>
</tr>
<tr>
<td>Students Personal Bio-data</td>
<td>33</td>
<td>1.24</td>
<td>.435</td>
</tr>
<tr>
<td>Students’ performance in examinations</td>
<td>33</td>
<td>1.18</td>
<td>.392</td>
</tr>
<tr>
<td>Examination results and transcripts</td>
<td>33</td>
<td>1.09</td>
<td>.292</td>
</tr>
<tr>
<td>Students Results (Summary Sheets)</td>
<td>33</td>
<td>1.21</td>
<td>.415</td>
</tr>
<tr>
<td>Payment of Academic and Residential Fees</td>
<td>33</td>
<td>1.30</td>
<td>.467</td>
</tr>
</tbody>
</table>
In Table 4.3, respondents from KsTU were asked to indicate the type of student’s information they keep. The responses showing in Table 4.3 was summarized along a two-point scale where 1=Yes and 2=No with 1.5 as the mid-point threshold. From the responses it could be observed that the institution keeps records of students admission/enrolment, academic registration, admission letters, examination results and transcripts, acceptance letters, students’ performance in examinations, students results (summary sheets), students personal bio-data, payment of academic and residential fees, payment history of students, matriculation oath and residential registration all had mean scores less than 1.5 threshold implying that the University maintains records in all these areas of students activities on campus.

However, the institution does not keep records of medical examination registrations as well as examination schedules, which obtained mean scores greater than the 1.5 thresholds. Medical examinations are normally conducted by third-party service providers.

### 4.2.2 ICT Platforms/Use Available for Students’ Information Management (KsTU)

**Table 4.4** Descriptive statistics on ICT platforms/use available for students’ information management

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input and Output devices</td>
<td>33</td>
<td>1.33</td>
<td>.479</td>
</tr>
<tr>
<td>Storage devices</td>
<td>33</td>
<td>1.24</td>
<td>.435</td>
</tr>
<tr>
<td>Processor components</td>
<td>33</td>
<td>1.33</td>
<td>.479</td>
</tr>
<tr>
<td>Networks</td>
<td>33</td>
<td>1.30</td>
<td>.467</td>
</tr>
<tr>
<td>Software</td>
<td>33</td>
<td>1.30</td>
<td>.467</td>
</tr>
<tr>
<td>Data</td>
<td>33</td>
<td>1.48</td>
<td>.508</td>
</tr>
</tbody>
</table>
Table 4.4 presents the descriptive statistics on the ICT platforms used for students’ information management. The results are interpreted along a two-point scale where 1=Yes, 2=No. The results show that the majority of the respondents agreed that the institution resort to the use of Input and Output devices (M=1.33, ±SD=.479), Storage devices (M=1.24, lowest ±SD=.435), Processor components (M=1.33, ±SD=.479), Networks (M=1.33, ±SD=.479), Software (M=1.30, ±SD=.467), Data (M=1.48, highest ±SD=.508), User interfaces (M=1.45, ±SD=.506), and Database and File Concepts (M=1.42, ±SD=.502) in the management of students’ information in the institution. From the results, it can be concluded that in managing students’ information KSITU use platforms such as Input and Output devices, Storage devices, Processor components, Networks, Software, Data, User interfaces, Database, and File concepts.

### Table 4.5 Descriptive statistics on Application of ICT in processes

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation of records</td>
<td>33</td>
<td>4.52</td>
<td>.939</td>
</tr>
<tr>
<td>Processing of records</td>
<td>32</td>
<td>4.41</td>
<td>.837</td>
</tr>
<tr>
<td>Storage of records</td>
<td>32</td>
<td>4.38</td>
<td>1.040</td>
</tr>
<tr>
<td>Use/distribution records</td>
<td>31</td>
<td>3.84</td>
<td>1.214</td>
</tr>
<tr>
<td>Retrieval of records</td>
<td>31</td>
<td>4.19</td>
<td>1.223</td>
</tr>
<tr>
<td>Migration of records</td>
<td>30</td>
<td>4.00</td>
<td>1.017</td>
</tr>
<tr>
<td>Records Security</td>
<td>31</td>
<td>3.81</td>
<td>1.195</td>
</tr>
<tr>
<td>Preservation of records</td>
<td>31</td>
<td>4.13</td>
<td>.922</td>
</tr>
<tr>
<td>Continued access to records</td>
<td>32</td>
<td>4.00</td>
<td>1.164</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

The respondents were further asked to indicate how ICT is utilized in processing students’ information. The results have been presented along a 5-point Likert Scale where 1=strongly
disagree to 5=strongly agreed with 3.0 as the mid-point threshold. General overview of the summary of the responses show that the majority of the respondents agreed that ICT tools at KsTU are applied to the creation of records (M=4.52, ±SD=.939), processing or records (M=4.41, lowest ±SD=.837), storage of records (M=4.38, ±SD=1.040), use/distribution (M=3.84, ±SD=1.214), retrieval (M=4.19, ±SD=1.223), migration (M=4.00, ±SD=1.017), records security (M=3.81, highest ±SD=1.195)preservation (M=4.13 ±SD=.922), access and security (M=4.00, ±SD=1.164) of students’ records or information in the institution.

The results imply that KsTU apply ICT tools in the management of virtually every records management activity in the institution. It can be concluded that the tools are used for the creation of records, storage of records, processing of records, storage of records, distribution and retrieval of records, migration, preservation and the control of access to records.

4.2.3 Prospects of ICT on the management of students’ information at (KsTU)

Table 4.6 Descriptive statistics the prospects of ICT in the management of student’s information

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicants purchase and/or return admission forms online through the use of ICT</td>
<td>33</td>
<td>4.76</td>
<td>.830</td>
</tr>
<tr>
<td>Applications and admissions are conducted online, and applicants can check admission status anywhere through the use of ICT</td>
<td>33</td>
<td>4.82</td>
<td>.465</td>
</tr>
<tr>
<td>Registrations are also online, eliminating the previous process of long queues at the university registration desk due to the use of ICT</td>
<td>33</td>
<td>4.58</td>
<td>.792</td>
</tr>
<tr>
<td>Due to the use of ICT, payments of fees are processed online averting the fraudulent loss of revenue, to students who would want to evade payment</td>
<td>33</td>
<td>4.36</td>
<td>1.025</td>
</tr>
<tr>
<td>ICT is used to display information about students and are accessed online</td>
<td>31</td>
<td>4.23</td>
<td>.920</td>
</tr>
</tbody>
</table>
There is online access to information including course details, course content, time-table, etc. through the use of ICT

<table>
<thead>
<tr>
<th>Description</th>
<th>Mean (M)</th>
<th>SD (±)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination and assessments results of students’ are released online, eliminating cheating and manipulations</td>
<td>33</td>
<td>4.42</td>
</tr>
<tr>
<td>Through the use of ICT, students’ accommodation/hostels are allocated online</td>
<td>33</td>
<td>3.21</td>
</tr>
<tr>
<td>The use of ICTs prevents the loss of students’ information</td>
<td>32</td>
<td>4.13</td>
</tr>
<tr>
<td>It is now easy to access students’ transcript and other documents online</td>
<td>33</td>
<td>3.88</td>
</tr>
<tr>
<td>The Use of ICTs reduces the time spent on retrieving students’ information</td>
<td>32</td>
<td>4.53</td>
</tr>
<tr>
<td>The use of ICTs in keeping students’ records aids faster service delivery</td>
<td>33</td>
<td>4.39</td>
</tr>
<tr>
<td>The use of ICT saves space previously used for keeping hard copy files</td>
<td>33</td>
<td>4.30</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

Table 4.6 presents the summary of responses concerning the prospects of ICT in the management of students’ information. The results have been interpreted along a 5-point Likert Scale where 1=strongly disagree to 5=strongly agree with 3.0 as the mid-point threshold. From the Table, it could be observed that there was strong agreement on the fact that applications and admissions are conducted online, and applicants being able to check admission status anywhere through the use of ICT (M=4.82, lowest ±SD=.465). Another has to do with a strong agreement with the assertion that there is the prospect that applicants purchase and/or return admission forms online through the use of ICT (M=4.76, ±SD=.830).

Furthermore, the majority of the respondents strongly agreed that there is the prospect that registrations can also be done online, thereby eliminating the previous process of long queues at the university registration desk due to the use of ICT (M=4.58, ±SD=.792). Also, the respondents agreed that the use of ICT reduces the time spent on retrieving students’ information (M=4.53,
Meanwhile examination and assessment results of students’ are released online, eliminating cheating and manipulations (M=4.42, ±SD=.902), the use of ICTs in keeping students’ records aids faster service delivery (M=4.39, ±SD=.933), due to the use of ICT, payments of fees are processed online averting the fraudulent loss of revenue, to students who would want to evade payment (M=4.36, ±SD=1.025), the use of ICT saves space previously used for keeping hard copy files (M=4.30, ±SD=.951), ICT is used to display information about students and are accessed online (M=4.23, ±SD=.920), and the use of ICTs prevents the loss of students’ information (M=4.13, ±SD=1.008).

Again, the majority of the respondents agreed that with the introduction of ICT it is now easy to access students’ transcript and other documents online (M=3.88, ±SD=1.244), and then the respondents agreed that there is an online access to information including course details, course content, time-table through the use of ICT (M=3.66, ±SD=1.405). Furthermore, the majority of the respondents agreed that through the use of ICT students’ accommodation/hostels can be allocated online (M=3.21, highest ±SD=1.453).

From the responses it can be concluded that relative to the prospects of ICT in the management of student’s information; ICT can be adopted for the effective management of students’ information relative to students’ admissions, purchase and return of admissions forms, online registrations, speeding the processing and retrieval of information, examinations, and assessment processes, generation of transcripts, processing of students fees, access to course details as well as the allocation of student accommodation.
Table 4.7 Descriptive statistics on the extent of the application of ICT in Monitoring educational activities

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Attendance of students</td>
<td>33</td>
<td>1.58</td>
<td>1.062</td>
</tr>
<tr>
<td>Academic performance records of students</td>
<td>33</td>
<td>4.03</td>
<td>1.212</td>
</tr>
<tr>
<td>Managing absenteeism of students</td>
<td>33</td>
<td>1.73</td>
<td>1.329</td>
</tr>
<tr>
<td>Personal record of students</td>
<td>33</td>
<td>4.03</td>
<td>1.357</td>
</tr>
<tr>
<td>Class Attendance of Lecturers</td>
<td>33</td>
<td>1.48</td>
<td>.870</td>
</tr>
<tr>
<td>Assessment records of Lecturers</td>
<td>33</td>
<td>3.06</td>
<td>1.749</td>
</tr>
<tr>
<td>Managing absenteeism of Lecturers</td>
<td>33</td>
<td>1.70</td>
<td>1.075</td>
</tr>
<tr>
<td>Personnel records of Lecturers</td>
<td>33</td>
<td>3.12</td>
<td>1.709</td>
</tr>
<tr>
<td>Other students’ and Lecturers information</td>
<td>29</td>
<td>2.62</td>
<td>1.545</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

In Table 4.7, respondents were asked to indicate the extent to which ICT is applied to the monitoring of educational activities at KsTU. From the responses, it could be observed that the majority of the respondents maintained that to a large extent ICT is applied in monitoring the academic performance of students (M=4.03, ±SD=1.212), personal records of students (M=4.03, ±SD=1.357). Furthermore, the results show that the majority of the respondents also stated that ICT to a moderate extent is used in the assessment of the personal records of lecturers (M=3.12, ±SD=1.709) and assessment records of lecturers (M=3.06, ±SD=1.749).

The respondents maintained that to a small extent ICT is applied to other student’s and lecturers information (M=3.88, ±SD=1.244), However, it was revealed that ICT is never applied to monitor the absenteeism of students (M=1.73, ±SD=1.329), lecturers (M=1.70, ±SD=1.075),
class attendance of students (M=1.58, ±SD=1.062) as well as class attendance of lecturers (M=1.48, ±SD=.870).

From the results it could be resolved that to a large extent ICT is used to monitor the academic performances of students, personal records of students and lecturers, assessment records of lectures and other students’ information. However, KsTU does not use ICT to monitor the class attendance of students and lecturers.

**Contribution of ICT to the Management of Students’ Information KsTU**

![Descriptive statistics on areas ICT contributed to the management of students’ information management](image)

**Source:** Fieldwork (2019)

*Figure 4.2 Descriptive statistics on areas ICT contributed to the management of students’ information management*

Respondents from KsTU were asked to indicate the extent to which ICT contributes to the management of student’s information management. The responses analysed on a 5-point Likert
scale where 1=not at all to 5=to a very large extent. From the Figure 4.2, it could be observed that the majority of the respondents noted that to a very large extent ICT has contributed to the management of students’ information by making it possible for the registration of students (academic and residential) (Mean=4.63), verification of students’ payments of fees (Mean=4.62), management of students’ academic information (Mean=4.53), ensuring the authenticity of students’ information (Mean=4.45), preservation of students’ information (Mean=4.45) and constant access to students’ information (Mean=4.13).

From the trend of the responses it can be concluded that at KsTU ICT has contributed to a very large extent to the registration of students, verification of students’ payments of fees, management of students’ academic information, ensuring the authenticity of students’ information, preservation of students’ information as well as constant access to students’ information.

4.2.4 Challenges regarding ICT use in the management of students’ information at (KsTU) Table 4.8 Descriptive statistics on challenges related to the use of ICT in management of Students’ information

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of ICT Policies and strategies</td>
<td>32</td>
<td>3.66</td>
<td>.971</td>
</tr>
<tr>
<td>Lack of commitment by University Management</td>
<td>32</td>
<td>4.03</td>
<td>.999</td>
</tr>
<tr>
<td>Inadequate ICT facilities (e.g. computers, infrastructure, etc.)</td>
<td>32</td>
<td>4.19</td>
<td>.965</td>
</tr>
<tr>
<td>Inadequate trained ICT personnel</td>
<td>31</td>
<td>3.97</td>
<td>1.224</td>
</tr>
<tr>
<td>The absence of ICT operational guidelines and regulations, as there is a lack of record manuals and filling guidelines, and this may lead to a loss of students’ information.</td>
<td>32</td>
<td>3.47</td>
<td>1.077</td>
</tr>
<tr>
<td>Inadequate computer terminals as this have made the retrieval and maintenance of students’ information difficult</td>
<td>32</td>
<td>3.75</td>
<td>.984</td>
</tr>
<tr>
<td>Outdated systems e.g. software, database, infrastructure etc.</td>
<td>32</td>
<td>3.97</td>
<td>1.092</td>
</tr>
</tbody>
</table>
In Table 4.8, the respondents from KsTU were asked to assess the challenges related to the use of ICT in the management of students’ information. The results show that the majority of the respondents strongly agreed that inadequate ICT facilities (M=4.19, ±SD=.965), poor ICT maintenance culture (irregular updates and upgrades) (M=4.19, ±SD=.896), lack of commitment by university management (M=4.03, ±SD=.999), poor management of ICT tools and facilities (M=4.03, ±SD=.933) and Limited financial resource (M=4.03, ±SD=.999).

Additionally, the study found that the majority of the respondents agreed that inadequate trained ICT personnel (M=3.97, ±SD=1.224), outdated systems, limited data management capacity, inadequate computer terminals, lack of ICT policies and strategies, inadequate horizontal and vertical communication, inadequate communication and power infrastructure, the absence of ICT operational guidelines and regulations, irregular power supply all obtained mean scores between 3.2 to 4.0.

From the responses, it is apparent that the KsTU use of ICT in the management of students’ information is challenged by the effects of inadequate ICT facilities, Poor ICT maintenance culture, lack of commitment by university management, poor management of ICT tools and facilities.
facilities and limited financial resources. However, the least of challenges encountered by the institution in the use of ICT has to do with the absence of ICT operational guidelines and regulations as well as irregular power supply.

4.2.5 Strategies for the Use of ICT in Students’ Information Management at (KsTU)

Table 4.9 Descriptive statistics on strategies for effective application of ICT in students’ information management

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The University must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation</td>
<td>33</td>
<td>4.70</td>
<td>.467</td>
</tr>
<tr>
<td>A University Wide-Area-Network which enables automation of a variety of processes must be installed.</td>
<td>33</td>
<td>4.58</td>
<td>.708</td>
</tr>
<tr>
<td>The University must establish a state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure</td>
<td>33</td>
<td>4.55</td>
<td>.794</td>
</tr>
<tr>
<td>Based on the needs of ICT and time-sharing possibilities, the University must define an optimum ICT infrastructure</td>
<td>33</td>
<td>4.30</td>
<td>.585</td>
</tr>
<tr>
<td>Appropriate hardware for satellite terminals must be provided in a progressive manner</td>
<td>33</td>
<td>4.27</td>
<td>.876</td>
</tr>
<tr>
<td>Computer access points with internet connectivity must be provided at the Academic Affairs department to facilitate effective and efficient management of student’s information activities.</td>
<td>33</td>
<td>4.79</td>
<td>.415</td>
</tr>
<tr>
<td>A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities, e.g. dedicated s</td>
<td>33</td>
<td>4.48</td>
<td>.619</td>
</tr>
<tr>
<td>An enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained.</td>
<td>33</td>
<td>4.55</td>
<td>.617</td>
</tr>
<tr>
<td>Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must be ensured.</td>
<td>33</td>
<td>4.64</td>
<td>.549</td>
</tr>
<tr>
<td>All the equipment and resources must be secured from theft and damage.</td>
<td>33</td>
<td>4.73</td>
<td>.452</td>
</tr>
</tbody>
</table>
The equipment must also be covered under an appropriate insurance policy against any disaster.  

<table>
<thead>
<tr>
<th>Activity</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>The equipment must also be covered under an appropriate insurance policy against any disaster.</td>
<td>33</td>
<td>4.33</td>
<td>.957</td>
</tr>
<tr>
<td>All administrative and ICT personnel must be given adequate training and support to use the technology effectively.</td>
<td>33</td>
<td>4.64</td>
<td>.489</td>
</tr>
<tr>
<td>Formulation and codification of monitoring, evaluation and feedback system to ensure that the ICT system achieves it to set goals.</td>
<td>32</td>
<td>4.56</td>
<td>.619</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

In Table 4.9, the respondents at KsTU were asked to give suggestions relative to the strategies necessary for the effective application of ICT in students’ information management. The responses were analyzed along a continuum where 1=not at all to 5=to a very large extent. From the responses, it could be observed that all the variables obtained mean scores above 4.0 which indicates strong agreement to a large extent with the assertions relative to the strategies necessary for effective application of ICT in students’ information management.

From the trend of the responses it could be observed that the majority of the respondents agreed the university must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation (e.g. development of appropriate ICT policies, strategic plans, and manuals for managing ICTs), a University Wide-Area-Network which enables automation of a variety of processes must be installed, The University must establish a state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure, Based on the needs of ICT and time-sharing possibilities, the University must define an optimum ICT infrastructure, Appropriate hardware for satellite terminals must be provided in a progressive manner, Computer access points with internet connectivity must be provided at the Academic Affairs department to facilitate effective and efficient management of student’s information activities and a wide variety of software applications and tools, going well beyond
an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities.

An enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained. Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must be ensured. All the equipment and resources must be secured from theft and damage, the equipment must also be covered under an appropriate insurance policy against any disaster. All administrative and ICT personnel must be given adequate training and support to use the technology effectively, formulation and codification of monitoring, evaluation and feedback system to ensure that the ICT system achieves it set goals.

4.3 RESPONSES FROM SUNYANI TECHNICAL UNIVERSITY (STU)

4.3.1 Internal Policies on ICT for students’ information management (STU)

Table 4.10 Descriptive Statistics on internal policies for students’ information management

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privacy Policy</td>
<td>29</td>
<td>1.38</td>
<td>.494</td>
</tr>
<tr>
<td>Data Collection Policy</td>
<td>29</td>
<td>1.69</td>
<td>.471</td>
</tr>
<tr>
<td>Health Information Collection Policy</td>
<td>29</td>
<td>1.76</td>
<td>.435</td>
</tr>
<tr>
<td>Admission Policy</td>
<td>29</td>
<td>1.14</td>
<td>.351</td>
</tr>
<tr>
<td>Awards of Grades Policy</td>
<td>29</td>
<td>1.24</td>
<td>.435</td>
</tr>
<tr>
<td>Records Management Policy</td>
<td>29</td>
<td>1.62</td>
<td>.494</td>
</tr>
<tr>
<td>ICT Infrastructure Policy</td>
<td>29</td>
<td>1.69</td>
<td>.471</td>
</tr>
<tr>
<td>ICT Software Management Policy</td>
<td>29</td>
<td>1.69</td>
<td>.471</td>
</tr>
<tr>
<td>ICT Security Policy</td>
<td>29</td>
<td>1.76</td>
<td>.435</td>
</tr>
<tr>
<td>ICT Usage Policy</td>
<td>29</td>
<td>1.52</td>
<td>.509</td>
</tr>
<tr>
<td>ICT Training and Development</td>
<td>29</td>
<td>1.72</td>
<td>.455</td>
</tr>
<tr>
<td>Others</td>
<td>29</td>
<td>1.83</td>
<td>.384</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)
Table 4.10 presents a summary of the responses from the respondents at the Sunyani Technical University (STU) regarding internal policies for student’s information management. The responses were analyzed along the scale of 1=Yes, 2=No. From the responses it could be observed that similar to the situation at KsTU the majority of the respondents at the STU indicated that there are internal policies on Admissions (M=1.14, ±SD=.351), Award of Grades (M=1.24, ±SD=.435), Privacy Policy (M=1.38, ±SD=.494), and ICT usage (M=1.52, ±SD=.509). On the other hand, the results show that the majority of the respondents indicated that STU does not have internal policies on Health Information Collection (M=1.76, ±SD=.435), ICT Security (M=1.76, ±SD=.435) and ICT Training and Development (M=1.72, ±SD=.455).

From the responses, it could be resolved that-like the situation at KsTU; STU has internal policies on Admission, Award of Grades and Privacy. Further, it is worth noting that both institutions do not have internal policies on Health Information Collections, ICT Security, as well as ICT Training and Development. This is somewhat surprising finding as in relative to the fact that there is no ICT security policy likewise anything on Training and Development for ICT staff and personnel in the institution.

Table 4.11 Descriptive statistics on types of students’ information kept

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students Admission/Enrolment Records</td>
<td>29</td>
<td>1.00</td>
<td>.000</td>
</tr>
<tr>
<td>Admission Letters</td>
<td>29</td>
<td>1.03</td>
<td>.186</td>
</tr>
<tr>
<td>Acceptance Letters</td>
<td>29</td>
<td>1.14</td>
<td>.351</td>
</tr>
<tr>
<td>Academic Registration</td>
<td>29</td>
<td>1.07</td>
<td>.258</td>
</tr>
<tr>
<td>Residential Registration</td>
<td>28</td>
<td>1.29</td>
<td>.460</td>
</tr>
<tr>
<td>Matriculation Oath</td>
<td>29</td>
<td>1.66</td>
<td>.484</td>
</tr>
<tr>
<td>Students Personal Bio-data</td>
<td>29</td>
<td>1.24</td>
<td>.435</td>
</tr>
<tr>
<td>Students performance in examinations</td>
<td>29</td>
<td>1.07</td>
<td>.258</td>
</tr>
<tr>
<td>Examination results and transcripts</td>
<td>29</td>
<td>1.07</td>
<td>.258</td>
</tr>
<tr>
<td>Students Results (Summary Sheets)</td>
<td>29</td>
<td>1.03</td>
<td>.186</td>
</tr>
</tbody>
</table>
In Table 4.11, respondents from STU were asked to indicate the type of students’ information they maintain in the institution. The responses as being shown in the Table was summarized along a two-point scale where 1=Yes and 2=No with 1.5 as the mid-point threshold. From the responses it could be observed that the institution keeps records of students admission/enrolment, academic registration, admission letters, examination results and transcripts, acceptance letters, students’ performance in examinations, students results (summary sheets), students personal biodata, payment of academic and residential fees, payment history of students, matriculation oath and residential registration all had mean scores less than 1.5 threshold implying that the University maintains records in all these areas of students activities on campus.

However, the institution does not keep records of medical examination registrations as well as examination schedules, which obtained mean scores greater than the 1.5 thresholds. Medical examinations are normally conducted by third-party service providers.

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payment of Academic and Residential Fees</td>
<td>29</td>
<td>1.10</td>
<td>.310</td>
</tr>
<tr>
<td>Payment History of Students</td>
<td>29</td>
<td>1.17</td>
<td>.384</td>
</tr>
<tr>
<td>Medical Examination Registration</td>
<td>29</td>
<td>1.48</td>
<td>.509</td>
</tr>
<tr>
<td>Examination Schedules</td>
<td>29</td>
<td>1.52</td>
<td>.509</td>
</tr>
<tr>
<td>Others</td>
<td>29</td>
<td>1.76</td>
<td>.435</td>
</tr>
</tbody>
</table>

**Source: Fieldwork (2019)**
4.3.2 ICT Platforms/Use Available for Students’ Information Management (STU)
Descriptive statistics on ICT platforms/use available for students’ information management

Figure 4.3 presents the descriptive statistics on the ICT platforms used for students’ information management. The results are interpreted along a two-point scale where 1=Yes, 2=No. From the results it could be observed that students STU uses ICT tools in managing students admissions/enrolment records (M=1.00), admission letters (M=1.03), student results (summary sheets) (M=1.03), academic registration (M=1.07), student performance in examinations (M=1.07), examination results and transcripts (M=1.078), payment of academic and residential fees (M=1.10), acceptance letters (M=1.14), payment history of students (M=1.17), student personal bio-data (M=1.24), residential registration (M=1.48).

Source: Fieldwork (2019)
Figure 4.3 Descriptive statistics on ICT platforms/use available for students’ information management
However, STU does not use ICTs in managing students’ information relative to examination schedules (M=1.52), matriculation oath (M=1.66).

From the results, it could be concluded that STU adopted ICT in the management of students’ admissions/enrolment records, admission letters, students’ results (summary sheets), academic registration, students’ performance in examinations, examination results and transcripts, and payment of academic and residential fees.

Table 4.12 Descriptive statistics on Application of ICT in processes

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation of records</td>
<td>29</td>
<td>4.14</td>
<td>.693</td>
</tr>
<tr>
<td>Processing of records</td>
<td>29</td>
<td>4.00</td>
<td>.845</td>
</tr>
<tr>
<td>Storage of records</td>
<td>28</td>
<td>3.93</td>
<td>.940</td>
</tr>
<tr>
<td>Use/distribution records</td>
<td>28</td>
<td>3.46</td>
<td>1.036</td>
</tr>
<tr>
<td>Retrieval of records</td>
<td>29</td>
<td>3.52</td>
<td>.986</td>
</tr>
<tr>
<td>Migration of records</td>
<td>29</td>
<td>3.34</td>
<td>.974</td>
</tr>
<tr>
<td>Records Security</td>
<td>28</td>
<td>3.64</td>
<td>1.062</td>
</tr>
<tr>
<td>Preservation of records</td>
<td>28</td>
<td>3.79</td>
<td>1.031</td>
</tr>
<tr>
<td>Continued access to records</td>
<td>29</td>
<td>3.41</td>
<td>1.086</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

In table 4.12, the respondents were further asked to indicate how ICT is utilized in processing students’ information. The results have been presented along a 5-point Likert Scale where 1=not at all to 5=to a very large extent with 3.0 as the mid-point threshold. The responses show that all the variables obtained mean scores above the 3.0 mid-point thresholds. This gives the indication
that they agreed that to relative extent STU uses ICT relative to the creation of records, processing of records, storage of records, use/distribution of records, retrieval of records, migration, security, preservation as well as facilitating the continued access to records.

4.3.3 Prospects of ICT on the management of students’ information (STU)

Table 4.13 Descriptive statistics the prospects of ICT in the management of students’ information

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicants purchase and/or return admission forms online through the use of ICT</td>
<td>29</td>
<td>4.21</td>
<td>.620</td>
</tr>
<tr>
<td>Applications and admissions are conducted online, and applicants can check admission status anywhere through the use of ICT</td>
<td>29</td>
<td>4.48</td>
<td>.871</td>
</tr>
<tr>
<td>Registrations are also online, eliminating the previous process of long queues at the university registration desk due to the use of ICT</td>
<td>29</td>
<td>4.45</td>
<td>1.021</td>
</tr>
<tr>
<td>Due to the use of ICT, payments of fees are processed online averting the fraudulent loss of revenue, to students who would want to evade payment</td>
<td>28</td>
<td>3.64</td>
<td>1.129</td>
</tr>
<tr>
<td>ICT is used to display information about students and are accessed online</td>
<td>28</td>
<td>4.21</td>
<td>.957</td>
</tr>
<tr>
<td>There is online access to information including course details, course content, time-table, etc. through the use of ICT</td>
<td>27</td>
<td>4.15</td>
<td>1.064</td>
</tr>
<tr>
<td>Examination and assessments results of students are released online, eliminating cheating and manipulations</td>
<td>29</td>
<td>4.48</td>
<td>.785</td>
</tr>
<tr>
<td>Through the use of ICT, students’ accommodation/hostels are allocated online</td>
<td>28</td>
<td>3.54</td>
<td>1.401</td>
</tr>
<tr>
<td>The use of ICTs prevents the loss of students’ information</td>
<td>29</td>
<td>4.31</td>
<td>.891</td>
</tr>
<tr>
<td>It is now easy to access students’ transcript and other documents online</td>
<td>29</td>
<td>3.72</td>
<td>1.334</td>
</tr>
<tr>
<td>The Use of ICTs reduces the time spent on retrieving students’ information</td>
<td>29</td>
<td>4.28</td>
<td>.797</td>
</tr>
<tr>
<td>The use of ICTs in keeping students’ records aids faster service delivery</td>
<td>29</td>
<td>4.17</td>
<td>1.071</td>
</tr>
<tr>
<td>The use of ICT saves space previously used for keeping hard copy files</td>
<td>29</td>
<td>4.38</td>
<td>1.015</td>
</tr>
</tbody>
</table>

**Source: Fieldwork (2019)**

Table 4.13 presents a summary of responses concerning the prospects of ICT in the management of students’ information. The results have been presented along a 5-point Likert Scale where
1=not at all to 5=to a very large extent with 3.0 as the mid-point threshold. The results show that the majority of the respondents agreed to a very large extent that applications and admissions are conducted online, whereas they can check their admission status anywhere through the use of ICT (M=4.48, SD=.871). Additionally, another prospect has to do with the examination as well as the assessment results of students being released online, eliminating cheating and manipulations (M=4.48, SD=.785).

Meanwhile, the respondents agreed to a large extent that the use of ICT will facilitate online registrations, thereby eliminating the previous process of long queues at the university registration desk (M=4.45, SD=1.021). The use of ICT will make it possible to save time previously used for manual bookkeeping (M=4.38, SD=1.015). Furthermore, they agreed that the use of ICT would prevent the loss of students’ information (M=4.31, SD=.891) as well as reduce the time spent on retrieving students’ information (M=4.28, SD=797).

Another has to do with agreement to a large extent that Applicants purchase and/or return admission forms online through the use of ICT (M=4.21, lowest SD=.620), ICT is used to display information about students and are accessed online (M=4.21, SD=.957), the use of ICTs in keeping students’ records aids faster service delivery (M=4.17, SD=1.071), there is online access to information including course details, course content, time-table, etc. through the use of ICT (M=4.15, SD=1.064).

However, the results show that the majority of the respondents agreed to a moderate extent that through ICT it is now easy to access students’ transcripts and other documents online (M=3.72, SD=1.334), payments of fees are processed online thereby averting the fraudulent loss of revenue to students who would want to evade payments (M=3.64, SD=1.129) and students accommodation/hotels being allocated online (M=3.54, highest SD=1.401).
From the responses it can be concluded that relative to the prospects of ICT in the management of student’s information; ICT can be adopted for the effective management of students’ information relative to students’ admissions, purchase and return of admissions forms, online registrations, speeding the processing and retrieval of information, examinations, and assessment processes, generation of transcripts, processing of students fees, access to course details as well as the allocation of student accommodation.

**Descriptive statistics on the extent of application of ICT in monitoring educational activities**

![Descriptive statistics on the extent of application of ICT in monitoring educational activities](image)

**Source:** Fieldwork (2019)

**Figure 4.4 Descriptive statistics on the extent of the application of ICT in Monitoring**

In Figure 4.4, respondents were asked to indicate the extent to which ICT is applied to the monitoring of educational activities at STU. The responses show that the majority of the respondents agreed to a very large extent that ICT is applied in monitoring the academic
performance of students (M=4.07), personal records of students (M=3.93). It is also applied to the monitoring of the personal records of lecturers (M=3.52) and assessment records of lecturers (M=3.10) as well as other students’ and lecturer’s information (M=3.07).

However, the majority of the respondents agreed to a rather small extent that STU applies ICT in monitoring the absenteeism of lecturers (M=1.93, SD=1.163), Class attendance of lecturers (M=1.89, ±SD=1.197), Managing absenteeism of students (M=1.76, ±SD=1.154) and class attendance of students (M=1.62, ±SD=1.147).

From the results it could be resolved that to a large extent like it is used at KsTU, ICT is used to monitor the academic performances of students, personal records of students and lecturers, assessment records of lectures and other students’ information. However, STU uses ICT to minimal in the monitoring of the class attendances of students and lecturers.

Table 4.14 Descriptive statistics on the contributions of ICT to the management of students’ information at STU

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration of students (Academic and residential)</td>
<td>28</td>
<td>4.54</td>
<td>.881</td>
</tr>
<tr>
<td>Verification of students’ payments of fees</td>
<td>28</td>
<td>3.93</td>
<td>1.120</td>
</tr>
<tr>
<td>Management of students’ academic information</td>
<td>28</td>
<td>4.25</td>
<td>.844</td>
</tr>
<tr>
<td>Ensuring the authenticity of students’ information</td>
<td>28</td>
<td>3.79</td>
<td>1.134</td>
</tr>
<tr>
<td>Preservation of students’ information</td>
<td>28</td>
<td>4.36</td>
<td>.989</td>
</tr>
<tr>
<td>Constant access to students’ information</td>
<td>28</td>
<td>4.32</td>
<td>.945</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)
Respondents from STU were asked to indicate the areas to which ICT has contributed to management students’ information. The responses analysed on a 5-point Likert scale where 1=not at all to 5=to a very large extent. From the Table 4.14, it could be observed that the majority of the respondents agreed to a very large extent that ICT has contributed to the management of students’ information in the areas of registration of students (academic and residential) (Mean=4.54, ±SD=.881), preservation of students’ information (Mean=4.36, ±SD=.989), constant access to students’ information (Mean=4.32, ±SD=.945), management of students’ academic information (Mean=4.25, ±SD=.844), verification of students’ payments of fees (Mean=3.93, ±SD=1.120) and ensuring the authenticity of students’ information (Mean=3.79, ±SD=1.134),

From the trend of the responses it can be concluded that at STU ICT has contributed to a very large extent to the registration of students, verification of students’ payments of fees, management of students’ academic information, ensuring the authenticity of students’ information, preservation of students’ information as well as constant access to students’ information.

4.3.4 Challenges related to the use of ICT in the management of students’ information at (STU)

Table 4.15 Descriptive statistics on challenges related to the use of ICT in management of Students’ information

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of ICT Policies and strategies</td>
<td>28</td>
<td>3.21</td>
<td>1.067</td>
</tr>
<tr>
<td>Lack of commitment by University Management</td>
<td>29</td>
<td>3.45</td>
<td>1.055</td>
</tr>
<tr>
<td>Inadequate ICT facilities (e.g. computers, infrastructure, etc.)</td>
<td>28</td>
<td>3.75</td>
<td>.844</td>
</tr>
</tbody>
</table>
Inadequate trained ICT personnel. & 28 & 3.39 & .994 \\
The absence of ICT operational guidelines and regulations, as there is a lack of record manuals and filling guidelines, and this may lead to the loss of students’ information. & 29 & 3.41 & .983 \\
Inadequate computer terminals as this have made the retrieval and maintenance of students’ information difficult & 29 & 3.34 & 1.111 \\
Outdated systems e.g. software, database, infrastructure etc. & 28 & 3.18 & 1.156 \\
Poor ICT maintenance culture (irregular updates and upgrades) & 29 & 3.59 & 1.086 \\
Poor management of ICT tools and facilities & 28 & 3.21 & .917 \\
Limited data management capacity & 29 & 3.21 & 1.146 \\
Inadequate horizontal and vertical communication & 29 & 3.45 & 1.121 \\
Inadequate communications and power infrastructure & 29 & 3.59 & 1.296 \\
Limited financial resources & 29 & 3.93 & 1.193 \\
Irregular power supply & 29 & 3.97 & 1.180 \\

**Source: Fieldwork (2019)**

In Table 4.15, the respondents from STU were asked to assess the challenges related to the use of ICT in the management of students’ information. The results were analysed along a continuum of a 5-point Likert scale where 1=not at all to 5=to a very large extent where 3 represents the mid-point threshold. From the responses, it could be observed that the majority of the respondents agreed that the use and implementation of ICT in the management of students’ information are challenged by series of constraints considering the indication that all variables obtained mean scores greater than the 3.0 mean threshold.

From the responses it is apparent that the STU use of ICT in the management of students’ information is challenged by the effects of irregular power supply, limited financial resources, inadequate ICT facilities, poor ICT maintenance culture, inadequate communications, and power infrastructure, lack of commitment from university authorities, inadequate horizontal and vertical communication, the absence of ICT operational guidelines and regulations, as there is a lack of record manuals and filling guidelines, and this may lead to loss of students’ information, inadequately trained ICT personnel, inadequate computer terminals as this have made the
retrieval and maintenance of students’ information difficult, lack of ICT Policies and strategies, poor management of ICT tools and facilities, limited data management capacity and outdated systems.

4.3.5 Strategies for the Use of ICT in Students’ Information Management at (STU)

Table 4.16 Descriptive statistics on strategies necessary for effective application of ICT in students’ information management

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The University must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation.</td>
<td>29</td>
<td>4.17</td>
<td>.966</td>
</tr>
<tr>
<td>A University Wide-Area-Network which enables automation of a variety of processes must be installed.</td>
<td>29</td>
<td>4.31</td>
<td>.712</td>
</tr>
<tr>
<td>The University must establish a state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure.</td>
<td>29</td>
<td>4.34</td>
<td>.721</td>
</tr>
<tr>
<td>Based on the needs of ICT and time-sharing possibilities, the University must define an optimum ICT infrastructure.</td>
<td>29</td>
<td>3.90</td>
<td>1.113</td>
</tr>
<tr>
<td>Appropriate hardware for satellite terminals must be provided in a progressive manner.</td>
<td>28</td>
<td>4.21</td>
<td>.833</td>
</tr>
<tr>
<td>Computer access points with internet connectivity must be provided at the Academic Affairs department to facilitate effective and efficient management of student’s information activities.</td>
<td>29</td>
<td>4.24</td>
<td>.988</td>
</tr>
<tr>
<td>A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities.</td>
<td>29</td>
<td>4.41</td>
<td>.682</td>
</tr>
<tr>
<td>An enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained.</td>
<td>29</td>
<td>4.34</td>
<td>.974</td>
</tr>
<tr>
<td>Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must be ensured.</td>
<td>29</td>
<td>4.41</td>
<td>.733</td>
</tr>
<tr>
<td>All the equipment and resources must be secured from theft and damage.</td>
<td>28</td>
<td>4.18</td>
<td>1.307</td>
</tr>
<tr>
<td>The equipment must also be covered under an appropriate insurance policy against any disaster.</td>
<td>29</td>
<td>4.31</td>
<td>.806</td>
</tr>
<tr>
<td>All administrative and ICT personnel must be given adequate training and support to use the technology effectively.</td>
<td>29</td>
<td>4.31</td>
<td>1.004</td>
</tr>
</tbody>
</table>
Formulation and codification of monitoring, evaluation and feedback system to ensure that the ICT system achieves it to set goals.

| 29 | 4.10 | 1.175 |

Source: Fieldwork (2019)

In Table 4.16, the respondents at STU were asked to indicate the extent of their agreement relative to suggestions relative to the strategies necessary for the effective application of ICT in student’s information management. The responses were analyzed along a continuum where 1=not at all to 5=to a very large extent. From the responses, it could be observed that all the variables obtained mean scores above 3.0 which indicates strong agreement to a large extent with the assertions relative to the strategies necessary for effective application of ICT in students’ information management.

From the trend of the responses it could be observed that the majority of the respondents agreed the university must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation (e.g. development of appropriate ICT policies, strategic plans, and manuals for managing ICTs), a University Wide-Area-Network which enables automation of a variety of processes must be installed, The University must establish a state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure, Based on the needs of ICT and time-sharing possibilities, the University must define an optimum ICT infrastructure, Appropriate hardware for satellite terminals must be provided in a progressive manner, Computer access points with internet connectivity must be provided at the Academic Affairs department to facilitate effective and efficient management of student’s information activities and a wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities.
4.4 RESPONSES FROM ACCRA TECHNICAL UNIVERSITY (ATU)

The following seeks to analyse the responses collected from the respondents at the Accra Technical University (ATU).

4.4.1 Internal Policies on ICT for students’ information management (ATU)

Table 4.17 Descriptive Statistics on internal policies for students’ information management

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privacy Policy</td>
<td>41</td>
<td>1.49</td>
<td>.506</td>
</tr>
<tr>
<td>Data Collection Policy</td>
<td>41</td>
<td>1.39</td>
<td>.494</td>
</tr>
<tr>
<td>Health Information Collection Policy</td>
<td>41</td>
<td>1.68</td>
<td>.471</td>
</tr>
<tr>
<td>Admission Policy</td>
<td>41</td>
<td>1.17</td>
<td>.381</td>
</tr>
<tr>
<td>Awards of Grades Policy</td>
<td>41</td>
<td>1.32</td>
<td>.471</td>
</tr>
<tr>
<td>Records Management Policy</td>
<td>41</td>
<td>1.37</td>
<td>.488</td>
</tr>
<tr>
<td>ICT Infrastructure Policy</td>
<td>41</td>
<td>1.41</td>
<td>.499</td>
</tr>
<tr>
<td>ICT Software Management Policy</td>
<td>41</td>
<td>1.49</td>
<td>.506</td>
</tr>
<tr>
<td>ICT Security Policy</td>
<td>41</td>
<td>1.49</td>
<td>.506</td>
</tr>
<tr>
<td>ICT Usage Policy</td>
<td>41</td>
<td>1.44</td>
<td>.502</td>
</tr>
<tr>
<td>ICT Training and Development</td>
<td>41</td>
<td>1.49</td>
<td>.506</td>
</tr>
<tr>
<td>Others</td>
<td>41</td>
<td>1.88</td>
<td>.331</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

Table 4.17 presents a summary of the responses regarding the internal policies on ICT for students’ information management. Descriptive statistics were employed and the data analysed along a 2-point Likert Scale where 1=Yes and 2=No. Assessment of the results was based on the
assertion that means scores close to 1 were deemed as in agreement, whereas close to 2 were judged towards disagreement with the assertion. Factors relative to the internal policies of the Technical University; the results show that the majority of the respondents agreed that the ATU has an internal policy on Admissions (M=1.17, ±SD=.381), Awarding of Grades (M=1.32, ±SD=.471), records management (M=1.37, ±SD=.488), data collection (M=1.39, ±SD=.494), ICT infrastructure (M=1.41, ±SD=.499) and ICT usage (M=1.44, ±SD=.502). On the other hand, the results show that the institution does not have an internal policy regarding health information collection (M=1.68, ±SD=.471).

From the responses, it can be concluded that ATU has drafted internal policies to regulate admissions, awarding of grades, records management, data collection, ICT infrastructure as well as ICT usage in the institution.

Table 4.18 Descriptive statistics on types of students’ information kept

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students Admission/Enrolment Records</td>
<td>41</td>
<td>1.00</td>
<td>.000</td>
</tr>
<tr>
<td>Admission Letters</td>
<td>41</td>
<td>1.12</td>
<td>.331</td>
</tr>
<tr>
<td>Acceptance Letters</td>
<td>41</td>
<td>1.41</td>
<td>.499</td>
</tr>
<tr>
<td>Academic Registration</td>
<td>41</td>
<td>1.07</td>
<td>.264</td>
</tr>
<tr>
<td>Residential Registration</td>
<td>41</td>
<td>1.32</td>
<td>.471</td>
</tr>
<tr>
<td>Matriculation Oath</td>
<td>41</td>
<td>1.37</td>
<td>.488</td>
</tr>
<tr>
<td>Students Personal Bio-data</td>
<td>41</td>
<td>1.20</td>
<td>.401</td>
</tr>
<tr>
<td>Students’ performance in examinations</td>
<td>41</td>
<td>1.12</td>
<td>.331</td>
</tr>
<tr>
<td>Examination results and transcripts</td>
<td>41</td>
<td>1.10</td>
<td>.300</td>
</tr>
<tr>
<td>Students Results (Summary Sheets)</td>
<td>41</td>
<td>1.15</td>
<td>.358</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Payment of Academic and Residential Fees</td>
<td>41</td>
<td>1.22</td>
<td>.475</td>
</tr>
<tr>
<td>Payment History of Students</td>
<td>41</td>
<td>1.20</td>
<td>.558</td>
</tr>
<tr>
<td>Medical Examination Registration</td>
<td>41</td>
<td>1.41</td>
<td>.741</td>
</tr>
<tr>
<td>Examination Schedules</td>
<td>41</td>
<td>1.29</td>
<td>.461</td>
</tr>
<tr>
<td>Others</td>
<td>41</td>
<td>1.73</td>
<td>.449</td>
</tr>
</tbody>
</table>

**Source: Fieldwork (2019)**

The respondents were asked to indicate the types of students’ information kept by the institution. Descriptive statistics were employed and the data analysed along a 2-point Likert Scale where 1=Yes and 2=No. Assessment of the results was based on the assertion that mean scores close to 1 were deemed as in agreement, whereas close to 2 were judged towards disagreement with the assertion.

The responses in Table 18 show that ATU keeps information on virtually every aspect of students’ details that are from students’ admissions/enrolment records to medical examination registration. From the table, it could be seen that all the variables of information/data points all obtained mean scores lower than 1.5 thresholds.

From the result it can be concluded that ATU keeps information on students admissions/enrolment records, academic Registration, examination results and transcripts, admission letters, students’ performance in examinations, students result (summary sheets), students personal bio-data, payment history of students, payment of academic and residential fees, examination schedules residential registration, matriculation oath, acceptance letters and medical examination registration.
4.4.2 ICT Platforms/Use Available for Students’ Information Management (ATU)

Table 4.19 Descriptive statistics on ICT platforms/use available for students’ information management

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input and Output devices</td>
<td>39</td>
<td>1.18</td>
<td>.683</td>
</tr>
<tr>
<td>Storage devices</td>
<td>39</td>
<td>1.28</td>
<td>.724</td>
</tr>
<tr>
<td>Processor components</td>
<td>39</td>
<td>1.41</td>
<td>.751</td>
</tr>
<tr>
<td>Networks</td>
<td>39</td>
<td>1.23</td>
<td>.427</td>
</tr>
<tr>
<td>Software</td>
<td>39</td>
<td>1.26</td>
<td>.715</td>
</tr>
<tr>
<td>Data</td>
<td>39</td>
<td>1.31</td>
<td>.521</td>
</tr>
<tr>
<td>User interfaces</td>
<td>39</td>
<td>1.33</td>
<td>.478</td>
</tr>
<tr>
<td>Database and File concepts</td>
<td>39</td>
<td>1.38</td>
<td>.747</td>
</tr>
<tr>
<td>Others</td>
<td>39</td>
<td>1.49</td>
<td>.506</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

Table 4.19 presents the descriptive statistics on ICT platforms/use available for student’s information management. The respondents were asked to indicate the types of students’ information kept by the institution. Descriptive statistics were employed and the data analysed along a 2-point Likert Scale where 1=Yes and 2=No. Assessment of the results was based on the assertion that mean scores close to 1 were deemed as in agreement, whereas close to 2 were judged towards disagreement with the assertion.

From the responses, it could be observed that Input and Output devices (M=1.18, ±SD=.683) obtained the lowest mean score indicating that it is the most obvious platform available for students’ information management. Further, it could be realised from the results that all the variables obtained mean scores lower than the 1.5 mean thresholds.
The results then suggest that Networks, software, storage devices, data, user interfaces, database and file concepts, processor components remain the platforms available to the ATU for the management of students’ information.

Descriptive statistics on Application of ICT in processes

![Descriptive statistics on Application of ICT in processes](image-url)

**Source:** Fieldwork (2019)

**Figure 4.5 Descriptive statistics on Application of ICT in processes**

Presented in figure 4.5 relates to the ATUs application of ICT in processes with regards to the institution’s management of student information. The result was analysed along a 5-point Likert scale where 5=to a very large extent to 1=not at all with 3.0 as the mid-point threshold. It could be observed that the variables obtained mean scores above the 3.0 mid-point thresholds.

This gives the indication that ATU uses ICT in the processes relative to the creation of records, processing of records, storage of records, use/distribution of records, retrieval of records,
migration of records, ensure records security, preservation of records and continued access to records.

4.4.3 Prospects of ICT on the management of students’ information (ATU)

Table 4.20 Descriptive statistics the prospects of ICT in the management of students’ information

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicants purchase and/or return admission forms online through the use of ICT</td>
<td>40</td>
<td>4.05</td>
<td>1.176</td>
</tr>
<tr>
<td>Applications and admissions are conducted online, and applicants can check admission status anywhere through the use of ICT</td>
<td>41</td>
<td>4.27</td>
<td>1.025</td>
</tr>
<tr>
<td>Registrations are also online, eliminating the previous process of long queues at the university registration desk due to the use of ICT</td>
<td>41</td>
<td>4.49</td>
<td>.840</td>
</tr>
<tr>
<td>Due to the use of ICT, payments of fees are processed online averting the fraudulent loss of revenue, to students who would want to evade payment</td>
<td>40</td>
<td>4.15</td>
<td>1.001</td>
</tr>
<tr>
<td>ICT is used to display information about students and are accessed online</td>
<td>41</td>
<td>4.34</td>
<td>.728</td>
</tr>
<tr>
<td>There is online access to information including course details, course content, time-table, etc. through the use of ICT</td>
<td>41</td>
<td>4.12</td>
<td>1.100</td>
</tr>
<tr>
<td>Examination and assessments results of students are released online, eliminating cheating and manipulations</td>
<td>41</td>
<td>3.98</td>
<td>1.193</td>
</tr>
<tr>
<td>Through the use of ICT, students’ accommodation/hostels are allocated online</td>
<td>41</td>
<td>4.17</td>
<td>1.046</td>
</tr>
<tr>
<td>The use of ICTs prevents the loss of students’ information</td>
<td>40</td>
<td>4.23</td>
<td>1.000</td>
</tr>
<tr>
<td>It is now easy to access students’ transcript and other documents online</td>
<td>40</td>
<td>3.93</td>
<td>1.347</td>
</tr>
<tr>
<td>The Use of ICTs reduces the time spent on retrieving students’ information</td>
<td>41</td>
<td>4.37</td>
<td>.994</td>
</tr>
<tr>
<td>The use of ICTs in keeping students’ records aids faster service delivery</td>
<td>41</td>
<td>4.32</td>
<td>1.011</td>
</tr>
<tr>
<td>The use of ICT saves space previously used for keeping hard copy files</td>
<td>41</td>
<td>4.39</td>
<td>.997</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td></td>
<td></td>
<td>38</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)
In Table 4.20, the respondents were asked to indicate the extent to which they agreed with the prospects of ICT on the management of students’ information. The responses were analyzed along a continuum where 1=strongly disagree to 5=strongly agree. Again, the results further shows that all the majority of the respondents agreed to a very large extent that registrations are online, thereby eliminating the previous process of long queues at the university registration (M=4.49, ±SD=.840), that the use of ICT saves space previously used for keeping hard copies (M=4.39, ±SD=997), the use of ICTs reduces the time spent on retrieving students’ information (M=4.37, SD=.728).

On the other end, the respondents agreed to a large extent that through ICT examinations and assessment results of students are released online, eliminating cheating and manipulations (M=3.98, SD=1.193), and also, ATU now finds it easy to access students’ transcript and other documents online (M=3.93, SD=1.347).

From the responses it could be concluded that through ICT ATU can register students online thereby eliminating the queues, ATU can use ICT to save space, reduce time spent retrieving information, display information about students, keeping students’ records aids faster service delivery, applications and admissions are conducted online, and applicants can check admission status anywhere through the use of ICT,

It further indicates that the use of ICTs prevents the loss of students’ information, students’ accommodation/hostels are allocated online, payments of fees are processed online averting the fraudulent loss of revenue, to students who would want to evade payment.

Moreover, there is online access to information including course details of students, course content, time-table, etc. through the use of ICT, applicants purchase and/or return admission forms online through the use of ICT, online release of students examination and assessments
results, eliminating cheating and manipulations as well as easy to access students’ transcript and other documents online.

Table 4.21 Descriptive statistics on the extent of the application of ICT in Monitoring educational activities

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Attendance of students</td>
<td>41</td>
<td>2.29</td>
<td>1.436</td>
</tr>
<tr>
<td>Academic performance records of students</td>
<td>41</td>
<td>4.10</td>
<td>1.136</td>
</tr>
<tr>
<td>Managing absenteeism of students</td>
<td>41</td>
<td>2.34</td>
<td>1.493</td>
</tr>
<tr>
<td>Personal record of students</td>
<td>41</td>
<td>3.88</td>
<td>1.308</td>
</tr>
<tr>
<td>Class Attendance of Lecturers</td>
<td>41</td>
<td>2.41</td>
<td>1.533</td>
</tr>
<tr>
<td>Assessment records of Lecturers</td>
<td>41</td>
<td>3.02</td>
<td>1.525</td>
</tr>
<tr>
<td>Managing absenteeism of Lecturers</td>
<td>41</td>
<td>2.46</td>
<td>1.535</td>
</tr>
<tr>
<td>Personnel records of Lecturers</td>
<td>41</td>
<td>3.44</td>
<td>1.566</td>
</tr>
<tr>
<td>Other students’ and Lecturers information</td>
<td>39</td>
<td>3.21</td>
<td>1.490</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

Table 4.21 presents the descriptive statistics on the extent to which ATU applies ICT in the monitoring of educational activities. The results are analysed along a continuum of a 5-point Likert Scale where 1=not at all to 5=a very large extent with 3.0 as the threshold. The responses show that the majority of the respondents agreed strongly to a very large extent that ATU uses ICT to monitor the academic performance records of students (M=4.10, ±SD=1.136). Also, the respondents agreed to a large extent that ICT is used to monitor the personal records of students (M=3.88, ±SD=1.308) as well as monitoring the personal records of lecturers (M=3.44,
Furthermore, the respondents also agreed moderately that the institution applies ICT in the monitoring of other students’ and lecturers information (M=3.21, ±SD=1.490).

On the contrary, the results showed that the majority of the respondents agreed to a small extent that ICT is used to monitor absenteeism of lecturers (M=2.46, ±SD=1.535), Class Attendance of lecturers (M=2.41, ±SD=1.533), Managing absenteeism of students (M=2.34, ±SD=1.493).

From the responses, it can be concluded that ATU uses ICT to monitor the academic performances of students, personal records of students, personal records of lecturers and other students’ and lecturer’s information. However, the institution does not use ICT to monitor absenteeism of lecturers, class attendance of lecturers, absenteeism of students as well as the attendance of students.

**Descriptive statistics on the contributions of ICT to the management of students’ information at ATU**

![Diagram showing contributions of ICT to the management of students' information at ATU](source: Fieldwork (2019))
In Figure 4.6, the respondents were asked to indicate the areas ICT has contributed the most to the management of students’ information. The result was analyzed using a 5-point Likert Scale where 1=not at all to 5=to a very large extent. The results show that the majority of the respondents agreed to a very large extent that ICT has contributed to the registration of students (M=4.58), Verification of students’ payment of fees (M=4.55), management of students’ academic information (M=4.45), preservation of students’ information (M=4.13), ensuring the authenticity of students’ information (M=4.00) and constant access to students’ information (M=4.00).

From the results it can be resolved that at ATU ICT has had significant contributions in the area of student registrations (academic and residential), verification of students’ payments of fees, management of students’ academic information, preservation of students’ information, ensuring the authenticity of students’ information and constant access to students’ information.

4.4.4 Challenges related to the use of ICT in the management of students’ information at (ATU)

Table 4.22 Descriptive statistics on challenges related to the use of ICT in management of Students’ information

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of ICT Policies and strategies</td>
<td>40</td>
<td>3.80</td>
<td>1.285</td>
</tr>
<tr>
<td>Lack of commitment by University Management</td>
<td>39</td>
<td>3.82</td>
<td>1.189</td>
</tr>
<tr>
<td>Inadequate ICT facilities (e.g. computers, infrastructure, etc.)</td>
<td>41</td>
<td>3.54</td>
<td>1.398</td>
</tr>
<tr>
<td>Inadequate trained ICT personnel</td>
<td>41</td>
<td>3.37</td>
<td>1.496</td>
</tr>
</tbody>
</table>
The absence of ICT operational guidelines and regulations, as there is a lack of record manuals and filling guidelines, and this may lead to the loss of students’ information.  

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Rating</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate computer terminals as this have made the retrieval and maintenance of students’ information difficult</td>
<td>41</td>
<td>3.49</td>
<td>1.227</td>
</tr>
<tr>
<td>Outdated systems e.g. software, database, infrastructure etc.</td>
<td>41</td>
<td>3.66</td>
<td>1.442</td>
</tr>
<tr>
<td>Poor ICT maintenance culture (irregular updates and upgrades)</td>
<td>40</td>
<td>3.67</td>
<td>1.309</td>
</tr>
<tr>
<td>Poor management of ICT tools and facilities</td>
<td>41</td>
<td>3.76</td>
<td>1.374</td>
</tr>
<tr>
<td>Limited data management capacity, e.g. increased numbers of students require more data</td>
<td>41</td>
<td>3.78</td>
<td>1.333</td>
</tr>
<tr>
<td>Inadequate horizontal and vertical communication</td>
<td>41</td>
<td>3.51</td>
<td>1.287</td>
</tr>
<tr>
<td>Inadequate communications and power infrastructure</td>
<td>41</td>
<td>3.66</td>
<td>1.175</td>
</tr>
<tr>
<td>Limited financial resources</td>
<td>41</td>
<td>3.73</td>
<td>1.450</td>
</tr>
<tr>
<td>Irregular power supply</td>
<td>41</td>
<td>3.37</td>
<td>1.428</td>
</tr>
</tbody>
</table>

Source: Fieldwork (2019)

Table 4.26 sought to inquire from respondents of ATU, the challenges related to the use of ICT in the management of students’ information. Again, the responses were analysed along a 5-point Likert scale of 1=not at all to 5=very large extent with 3.0 as the mid-point threshold. That notwithstanding, it could be observed from the table that the majority of the respondents agreed to a large extent that they lack commitment by the University management (M=3.82, ±SD=1.189), lack of ICT policies and strategies (M=3.80, ±SD=1.285), limited data management capacity (M=3.78, ±SD=1.333), Poor management of ICT tools and facilities (M=3.76, ±SD=1.374), Limited financial resources (M=3.73, ±SD=1.450), poor ICT maintenance culture (irregular updates and upgrades (M=3.67, ±SD=1.309), Inadequate communications and power infrastructure (M=3.66, ±SD=1.175), outdated systems e.g. software, database, infrastructure etc. (M=3.66, ±SD=1.442), lack of ICT operational guidelines and regulations (M=361, ±SD=1.282), Inadequate ICT facilities (e.g. computers, infrastructure, etc.)
(M=3.54, ±SD=1.398), inadequate horizontal and vertical communication (M=3.51, ±SD=1.287), inadequate computer terminals as this have made the retrieval and maintenance of students’ information difficult (M=3.49, ±SD=1.227), inadequate trained ICT personnel (M=3.37, ±SD=1.496) and irregular power supply (M=3.37, ±SD=1.428).

From the responses it could be concluded that ICT use in the management of students information is constrained by the lack of commitment by university management, lack of ICT Policies and strategies, limited data management capacity, poor management of ICT tools and facilities, limited financial resources, poor ICT maintenance culture, inadequate communications as well as power infrastructure, outdated systems, lack of ICT operational guidelines and regulations, inadequate ICT facilities, inadequate horizontal and vertical communication, inadequate computer terminals, inadequate trained ICT personnel and irregular power supply.

4.4.5 Strategies for the Use of ICT in Students’ Information Management at (ATU)

Table 4.23 Descriptive statistics on strategies necessary for effective application of ICT in students’ information management

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The University must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation</td>
<td>40</td>
<td>4.70</td>
<td>.823</td>
</tr>
<tr>
<td>A University Wide-Area-Network which enables automation of a variety of processes must be installed.</td>
<td>41</td>
<td>4.78</td>
<td>.690</td>
</tr>
<tr>
<td>The University must establish a state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure</td>
<td>41</td>
<td>4.76</td>
<td>.624</td>
</tr>
<tr>
<td>Based on the needs of ICT and time-sharing possibilities, the University must define an optimum ICT infrastructure</td>
<td>41</td>
<td>4.61</td>
<td>.586</td>
</tr>
<tr>
<td>Appropriate hardware for satellite terminals must be provided in a progressive manner</td>
<td>40</td>
<td>4.35</td>
<td>.949</td>
</tr>
<tr>
<td>Computer access points with internet connectivity must be provided at the Academic Affairs department to facilitate effective and efficient management of student’s information activities.</td>
<td>41</td>
<td>4.54</td>
<td>.869</td>
</tr>
</tbody>
</table>
A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities

| A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities | 41 | 4.44 | .923 |
| An enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained. | 41 | 4.37 | .888 |
| Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must be ensured. | 41 | 4.71 | .642 |
| All the equipment and resources must be secured from theft and damage. | 41 | 4.71 | .782 |
| The equipment must also be covered under an appropriate insurance policy against any disaster. | 41 | 4.71 | .716 |
| All administrative and ICT personnel must be given adequate training and support to use the technology effectively. | 41 | 4.73 | .807 |
| Formulation and codification of monitoring, evaluation and feedback system to ensure that the ICT system achieves its set goals. | 41 | 4.68 | .879 |

**Source: Fieldwork (2019)**

Table 4.23 presents the suggested strategies for the use of ICT in students’ information management at the ATU. The respondents were asked to agree with the extent to which the strategies can work out in the institution with regards to the management of students’ information. The results have been analysed along a 5-point Likert scale where 1=not at all to 5=to a very large extent and 3.0 being the mid-point threshold. The majority of the respondents agreed to a very large extent that there should be a university Wide-Area-Network (WAN) which enables automation of a variety of processes (M=4.78, ±SD=.690), the university must establish state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure (M=4.76, ±SD=.624), all administrative and ICT personnel must be given adequate training and support to use the technology effectively (M=4.73, ±SD=.807).

Also regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must be ensured (M=4.71,
±SD=.642), all the equipment and resources must be secured from theft and damage (M=4.71, ±SD=.782), equipment must also be covered under an appropriate insurance policy against any disaster (M=4.71, ±SD=.716).

Furthermore, the University must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation (M=4.70, ±SD=.823), formulation and codification of monitoring, evaluation and feedback system to ensure that the ICT system achieves it set goals (M=4.68, ±SD=.879), based on the needs of ICT and time-sharing possibilities, the University must define an optimum ICT infrastructure (M=4.54, ±SD=.869), computer access points with internet connectivity must be provided at the Academic Affairs department to facilitate effective and efficient management of student’s information activities (M=4.54, ±SD=.869).

Additionally, the introduction of a wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities (M=4.44, ±SD=.923), an enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained (M=4.37, ±SD=.888) and appropriate hardware for satellite terminals must be provided in a progressive manner (M=4.35, ±SD=.949).

From the results, it can be concluded that considering strategies for effective use of ICTs in students’ information management at (ATU) that a university wide-area-network which enables automation of a variety of processes must be installed. The university must establish state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure; and that all administrative and ICT personnel must be given adequate training and support to use the technology effectively. Regular and regulated supply of electricity, appropriate electrical
fixtures, adequate power backup and support, including alternative sources of energy, must be ensured.

All the equipment and resources must be secured from theft and damage. The equipment must also be covered under an appropriate insurance policy against any disaster. The University must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation.

4.5 OVERALL SUMMARY RESULTS

4.5.1 Internal Policies Regarding ICT for Students’ Information Management

Table 4.24 Descriptive Statistics on Internal Policies regarding ICT

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privacy Policy</td>
<td>103</td>
<td>1.54</td>
<td>.501</td>
</tr>
<tr>
<td>Data Collection Policy</td>
<td>103</td>
<td>1.61</td>
<td>.490</td>
</tr>
<tr>
<td>Health Information Collection Policy</td>
<td>103</td>
<td>1.77</td>
<td>.425</td>
</tr>
<tr>
<td>Admission Policy</td>
<td>103</td>
<td>1.16</td>
<td>.364</td>
</tr>
<tr>
<td>Awards of Grades Policy</td>
<td>103</td>
<td>1.32</td>
<td>.469</td>
</tr>
<tr>
<td>Records Management Policy</td>
<td>103</td>
<td>1.42</td>
<td>.496</td>
</tr>
<tr>
<td>ICT Infrastructure Policy</td>
<td>103</td>
<td>1.48</td>
<td>.502</td>
</tr>
<tr>
<td>ICT Software Management Policy</td>
<td>103</td>
<td>1.45</td>
<td>.500</td>
</tr>
<tr>
<td>ICT Security Policy</td>
<td>103</td>
<td>1.48</td>
<td>.502</td>
</tr>
<tr>
<td>ICT Usage Policy</td>
<td>103</td>
<td>1.43</td>
<td>.497</td>
</tr>
<tr>
<td>ICT Training and Development Policy</td>
<td>103</td>
<td>1.52</td>
<td>.502</td>
</tr>
<tr>
<td>Others</td>
<td>103</td>
<td>1.88</td>
<td>.322</td>
</tr>
</tbody>
</table>

Fieldwork (2019)

Table 4.24 depicts respondents’ views on the internal policies regarding ICTs for students’ information management. The measurements considered here are minimum, maximum, mean and standard deviation. The responses were coded with scales 1 = “Yes”, 2 = “No”. Thus, a
mean value of less than 1.5 indicates a high level of agreement to the availability of and identified internal policy and vice versa. From Table 4.24, majority of the respondents agreed to the availability of admission policy (Mean (M) =1.16), awards of grades policy (Mean (M) =1.32), records management policy (Mean (M) =1.42), ICT infrastructure policy (Mean (M) =1.48 and Standard Deviation (SD) =.502 amongst the highest, ICT software management policy (Mean (M) =1.45), ICT security policy (Mean (M) =1.48) and Standard Deviation (SD) =.502 amongst the highest, and ICT usage policy (Mean (M) =1.43). Most of the respondents, however, disagreed with the availability of privacy policy (Mean (M) =1.54), data collection policy (Mean (M) =1.61) and health information collection policy (Mean (M) =1.77). Other policies were however deemed available (Mean (M) =1.88 and lowest Standard Deviation of (SD)=.322). From the responses, it can be concluded that the three selected TUs in Ghana are having policies governing the conduct of admissions, the awards of grades, and records management.

4.5.2 Type of Students’ Information Kept at the Institution

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students Admission/Enrolment Records</td>
<td>103</td>
<td>1.02</td>
<td>.139</td>
</tr>
<tr>
<td>Admission Letters</td>
<td>103</td>
<td>1.09</td>
<td>.284</td>
</tr>
<tr>
<td>Acceptance Letters</td>
<td>103</td>
<td>1.26</td>
<td>.442</td>
</tr>
<tr>
<td>Academic Registration</td>
<td>103</td>
<td>1.07</td>
<td>.253</td>
</tr>
<tr>
<td>Residential Registration</td>
<td>102</td>
<td>1.36</td>
<td>.483</td>
</tr>
<tr>
<td>Matriculation Oath</td>
<td>103</td>
<td>1.46</td>
<td>.501</td>
</tr>
<tr>
<td>Students Personal Bio-data</td>
<td>103</td>
<td>1.22</td>
<td>.418</td>
</tr>
<tr>
<td>Students performance in examinations</td>
<td>103</td>
<td>1.13</td>
<td>.334</td>
</tr>
<tr>
<td>Examination results and transcripts</td>
<td>103</td>
<td>1.09</td>
<td>.284</td>
</tr>
<tr>
<td>Students Results (Summary Sheets)</td>
<td>103</td>
<td>1.14</td>
<td>.344</td>
</tr>
<tr>
<td>Payment of Academic and Residential Fees</td>
<td>103</td>
<td>1.21</td>
<td>.435</td>
</tr>
<tr>
<td>Payment History of Students</td>
<td>103</td>
<td>1.23</td>
<td>.489</td>
</tr>
</tbody>
</table>
In Table 4.25, respondents’ views were sought about the student’s information that was kept at the institution. Such information were related to students admission/enrolment records, admission letters, acceptance letters, academic registration, residential registration, matriculation oath, students personal bio-data, students’ performance in examinations, examination results and transcripts, students results (summary sheets), payment of academic and residential fees, payment history of students, medical examination registration and examination schedules among others.

From the results, it could be noted that relative to the type of students’ information maintained, the Technical Universities surveyed keep information on students’ admissions and enrolment with the lowest Standard Deviation, academic registrations, admission letters, examination results, and transcripts. Additionally, student examination performances, summary sheets, payments of academic and residential fees, students’ personal bio-data, payment history of students, acceptance letters, residential registration, examination schedules, matriculation oaths as well as medical examination registration with the highest Standard Deviation were all kept in the selected TUs.

### 4.5.3 ICT Platforms/Use Available for Students’ Information Management

**Table 4.26 Platforms Available for Students’ Information Management**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input and Output devices</td>
<td>101</td>
<td>1.20</td>
<td>.530</td>
</tr>
<tr>
<td>Storage devices</td>
<td>101</td>
<td>1.22</td>
<td>.540</td>
</tr>
</tbody>
</table>
Table 4.26 gives a representation of respondents’ reactions to the platforms available for students’ information management. The platforms were categorized as follows: input and output devices, storage devices, processor components, networks, software, data, user interfaces, database, and file concepts among others.

From the Table 4.26, respondents indicated “Yes” to the fact that input and output devices (keyboards, pointing devices; document readers; cards; speech input, video input; sensors and data logging; printers, plotters, display units; speech output and output to other electronic devices), storage devices (internal memory including RAM & ROM; external memory using both optical and magnetic technologies), processor components (CPU components including control unit, arithmetic and logic unit and memory) were available.

Also, networks (LAN and WAN); ISDN adapter, modem, router, fibre optic cable, gateway, firewall, CD server, proxy server, hub, switch, bridge etc.), software (Generic software packages: word processing, desktop publishing, spreadsheet, database management, presentation, graphics, web authoring and communication packages), data (Data validation and verification techniques: range checks, check digits, presence and format checks, batch (hash and control) totals and data representation were available to manage the students’ information. Furthermore, numeric
(currency, date, real, integer), text (character, string) and Logical/Boolean), user interfaces (Prompted dialogue (wizards and forms), command-line, menu, graphical user interface and combinations of these) and database and file concepts were available.

From the analysis, it can be seen that the selected TUs have input and output devices with the Mean value of 1.20 which serves as the highest in terms of ICT platforms in managing students’ information.

4.5.4 The Extent to which ICT is used in operations/processes

<table>
<thead>
<tr>
<th>Table 4.27 ICT usage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>Creation of records</td>
</tr>
<tr>
<td>Processing of records</td>
</tr>
<tr>
<td>Storage of records</td>
</tr>
<tr>
<td>Use/distribution records</td>
</tr>
<tr>
<td>Retrieval of records</td>
</tr>
<tr>
<td>Migration of records</td>
</tr>
<tr>
<td>Records Security</td>
</tr>
<tr>
<td>Preservation of records</td>
</tr>
<tr>
<td>Continued access to records</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
</tr>
</tbody>
</table>

Fieldwork (2019)

Table 4.27 presents respondents’ views on the extent to which ICT is used in various operations or processes related to the management of students’ records. Responses were measured on a scale of 1-5; 1- not at all, 2- small extent, 3- moderate extent 4-large extent, 5-a very large extent.

Majority of the respondents indicated to a large extent the usage of ICTs in the creation of records (M=4.25), processing of records (M=4.23), storage of records (M=4.15), use/distribution
of records (M=3.76), retrieval of records (M=3.86), Also, migration of records (M=3.69), records security (M=3.83), preservation of records (M=4.00), and continued access to records (M=3.85) were done through ICT.

It can be seen that the selected TUs make use of ICT for the creation of students’ records which is the basic in terms of ensuring security, confidentiality, and authenticity of data management. It is also used in the processing of records, its storage, preservation, retrieval, distribution and the migration of records.

4.5.5 Prospects of ICT in the Management of Students’ Information

Table 4.28 ICT Prospects

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicants purchase and/or return admission forms online through the use of ICT</td>
<td>102</td>
<td>4.32</td>
<td>.977</td>
</tr>
<tr>
<td>Applications and admissions are conducted online, and applicants can check admission status anywhere through the use of ICT</td>
<td>103</td>
<td>4.50</td>
<td>.862</td>
</tr>
<tr>
<td>Registrations are also online, eliminating the previous process of long queues at the university registration desk due to the use of ICT</td>
<td>103</td>
<td>4.50</td>
<td>.873</td>
</tr>
<tr>
<td>Due to the use of ICT, payments of fees are processed online averting the fraudulent loss of revenue, to students who would want to evade payment</td>
<td>101</td>
<td>4.08</td>
<td>1.074</td>
</tr>
<tr>
<td>ICT is used to capture students information and make such information available online</td>
<td>100</td>
<td>4.27</td>
<td>.851</td>
</tr>
<tr>
<td>There is online access to information including course details, course content, time-table through the use of ICT</td>
<td>100</td>
<td>3.98</td>
<td>1.206</td>
</tr>
<tr>
<td>Examination and assessments results of students’ are released online, eliminating cheating and manipulations</td>
<td>103</td>
<td>4.26</td>
<td>1.019</td>
</tr>
<tr>
<td>Through the use of ICT, students’ accommodation/hostels are allocated online</td>
<td>102</td>
<td>3.69</td>
<td>1.342</td>
</tr>
<tr>
<td>The use of ICTs prevents the loss of students’ information</td>
<td>101</td>
<td>4.22</td>
<td>.965</td>
</tr>
<tr>
<td>It is now easy to access students’ transcript and other documents online</td>
<td>102</td>
<td>3.85</td>
<td>1.300</td>
</tr>
</tbody>
</table>
Information and Communication Technology (ICT) has become a veritable tool being used to solve educational related problems ranging from the sale of application forms through to graduation within academic institutions in many parts of the world. Table 4.28 presents the prospects of ICTs in the management of students’ information. This was on a five-point Likert scale of 1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree.

From the table 4.28 above, majority of the respondents agreed that applications are purchased and/or admission forms are returned online through the use of ICTs (M=4.32), applications and admissions are conducted online (M=4.50), registrations are done online (M=4.50), payments of fees are processed online averting the fraudulent loss of revenue, to students who would want to evade payment (M=4.08).

Also, ICT has enabled information about students to be displayed (M=4.27), information including course details, contents, time-table, etc. are accessed online (M=3.98), examination results are released online (M=4.26), students’ accommodation/hostels are allocated online (M=3.69) with the highest standard deviation of (±SD=1.342), students information is prevented (M=4.22), transcripts and other documents can be accessed (M=3.85). Furthermore, the respondents indicated that ICT has prospects that students’ information will be retrieved on time.
(M=4.39) with the lowest standard deviation (±SD=.846), service delivery is improved (M=4.30) and saves space previously used for keeping hard-copy files (M=4.36).

The results indicate that the selected TUs use ICTs for the application and admissions conducted online which has ensured fairness in the admission processes and reliable data of all-year-round students’ information management, unlike the manual system which is prone to unreliable and unfair admission practices.

4.5.6 The Extent to which ICT has been applied in Monitoring educational activities

Table 4.29 ICT and monitoring

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Attendance of students</td>
<td>103</td>
<td>1.87</td>
<td>1.281</td>
</tr>
<tr>
<td>Academic performance records of students</td>
<td>103</td>
<td>4.07</td>
<td>1.199</td>
</tr>
<tr>
<td>Managing absenteeism of students</td>
<td>103</td>
<td>1.98</td>
<td>1.372</td>
</tr>
<tr>
<td>A personal record of students</td>
<td>103</td>
<td>4.39</td>
<td>4.819</td>
</tr>
<tr>
<td>Class Attendance of Lecturers</td>
<td>102</td>
<td>1.97</td>
<td>1.308</td>
</tr>
<tr>
<td>Assessment records of Lecturers</td>
<td>103</td>
<td>3.06</td>
<td>1.595</td>
</tr>
<tr>
<td>Managing absenteeism of Lecturers</td>
<td>103</td>
<td>2.07</td>
<td>1.330</td>
</tr>
<tr>
<td>Personnel records of Lecturers</td>
<td>103</td>
<td>3.36</td>
<td>1.552</td>
</tr>
<tr>
<td>Other students’ and Lecturers information</td>
<td>95</td>
<td>2.99</td>
<td>1.505</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fieldwork (2019)

Table 4.29 presents respondents’ views on the extent to which ICT is used in monitoring educational activities in the three selected TUs. Responses were measured on a scale of 1-5; 1-not at all, 2- small extent, 3- moderate extent 4-large extent, 5-a very large extent. The majority of the respondents agreed that ICT was used in monitoring academic performance records of students (M=4.07) and personal records of students (M=4.39) to a large extent. ICTs was used in
monitoring assessment records of lecturers (M=3.06) personnel records of lecturers (M=3.36) and other students’ and lecturer's information (M=2.99) to a moderate extent.

However, respondents agreed to a small extent that ICT was used to monitor class attendance of lecturers (M=1.97), manage absenteeism of lecturers (M=2.07), manage absenteeism of students (M=1.98) and manage class attendance of students (M=1.87).

From the responses, it can be concluded that in the three Technical Universities surveyed, ICT is used to monitor the personal records of students, academic performances of students as well as personal and assessment records of lecturers. However, it is worth noting that the institutions do not use ICT to monitor the class attendance and absenteeism of students which is critical in reliable students’ information management.

4.5.7 Areas ICT has contributed to the management of Students’ Information

Table 4.30 ICTs and Management of students’ information

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration of students (Academic and residential)</td>
<td>100</td>
<td>4.58</td>
<td>.806</td>
</tr>
<tr>
<td>Verification of students’ payments of fees</td>
<td>100</td>
<td>4.40</td>
<td>.888</td>
</tr>
<tr>
<td>Management of students’ academic information</td>
<td>100</td>
<td>4.42</td>
<td>.867</td>
</tr>
<tr>
<td>Ensuring the authenticity of students’ information</td>
<td>99</td>
<td>4.08</td>
<td>1.056</td>
</tr>
<tr>
<td>Preservation of students’ information</td>
<td>99</td>
<td>4.29</td>
<td>.961</td>
</tr>
<tr>
<td>Constant access to students’ information</td>
<td>99</td>
<td>4.13</td>
<td>.955</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fieldwork (2019)

Table 4.30 gives a representation of the areas ICT has contributed to the management of students’ information. Responses were measured on a scale of 1-5; 1- not at all, 2- small extent, 3- moderate extent 4-large extent, 5-a very large extent.
From the table, respondents affirmed that ICT has to a large extent contributed in the registration of students (academic and residential) (M=4.58), verification of students payment of fees (M=4.40), management of students’ academic information (M=4.42), ensuring authenticity of students’ information (M=4.08), preservation of students’ information (M=4.29) and ensuring constant access to students’ information (M=4.13).

From the results it can be concluded that in the selected Technical Universities surveyed, the use of ICT has contributed largely in the areas of students’ registrations both academic and residential, verification of students’ fees payments, the management of students’ academic information, students’ information authentication, preservation of students’ information as well as constant access to students’ information. Therefore, authenticity, reliability, and accessibility of students’ information can be achieved attested by the results of the selected TUs.

4.5.8 Challenges Related to ICT use for Students’ Information Management

Table 4.31 Challenges related to the usage of ICTs

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of ICT Policies and strategies</td>
<td>100</td>
<td>3.59</td>
<td>1.147</td>
</tr>
<tr>
<td>Lack of commitment by University Management</td>
<td>100</td>
<td>3.78</td>
<td>1.106</td>
</tr>
<tr>
<td>Inadequate ICT facilities (e.g. computers, infrastructure, etc.)</td>
<td>101</td>
<td>3.80</td>
<td>1.158</td>
</tr>
<tr>
<td>Inadequate trained ICT personnel</td>
<td>100</td>
<td>3.56</td>
<td>1.305</td>
</tr>
<tr>
<td>The absence of ICT operational guidelines and regulations, as there is a lack of</td>
<td>102</td>
<td>3.51</td>
<td>1.132</td>
</tr>
<tr>
<td>record manuals and filling guidelines and this may lead to loss of students’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>information.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate computer terminals as this have made the retrieval and maintenance of</td>
<td>102</td>
<td>3.53</td>
<td>1.123</td>
</tr>
<tr>
<td>students’ information difficult</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdated systems e.g. software, database, infrastructure, etc.</td>
<td>101</td>
<td>3.62</td>
<td>1.287</td>
</tr>
<tr>
<td>Poor ICT maintenance culture (irregular updates and upgrades)</td>
<td>101</td>
<td>3.81</td>
<td>1.146</td>
</tr>
<tr>
<td>Poor management of ICT tools and facilities</td>
<td>101</td>
<td>3.69</td>
<td>1.164</td>
</tr>
<tr>
<td>Limited data management capacity e.g. increased numbers of students require more</td>
<td>102</td>
<td>3.65</td>
<td>1.224</td>
</tr>
<tr>
<td>data</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.31 provides an overview of the extent to which respondents agree to the challenges that hinder the usage of ICTs for the management of students’ information. Responses were measured on a scale of 1-5; 1- not at all, 2- small extent, 3- moderate extent 4-large extent, 5-a very large extent.

It was agreed to a large extent that lack of ICT policies and strategies (M=3.59), lack of commitment by University Management (M=3.78), inadequate ICT facilities (M=3.80), inadequate trained ICT personnel (M=3.56), absence of ICT operational guidelines and regulations (M=3.51), and inadequate computer terminals (M=3.53) hinder the integration of ICT into students information management.

Moreover, factors such as outdated systems (M=3.62), poor ICT maintenance culture (M=3.81), poor management of ICT tools and facilities (M=3.69), limited data management capacity (M=3.65), inadequate horizontal and vertical communication (M=3.54), inadequate communications and power infrastructure (M=3.61), limited financial resources (M=3.88) and irregular power supply (M=3.57) posed challenges to the successful integration of ICT into students’ information management. Limited financial resources for ICT related activities and poor ICT infrastructure maintenance has been the bane of the three selected TUs which needs maximum attention to ensure proper and reliable management of students’ information.
Also, the institutions are constrained with the absence of ICT operational guidelines and regulations, as most of the schools lack records of manuals and filing guidelines which can lead to loss of students’ information. There are inadequate computer terminals; most of the systems are outdated, which is both software and hardware. The TUs also contend with poor maintenance culture when it comes ICT tools and equipment as well as poor management of ICT tools and facilities, poor ICT maintenance culture (irregular updates and upgrades), poor management of ICT tools and facilities, limited data management capacity e.g. increased numbers of students require more data, Inadequate communications, and power infrastructure, limited financial resources and irregular power supply.

4.5.9 Strategies for the Use of ICT to Manage Students’ Information

### Table 4.32 Strategies

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>N</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The University must adopt and adapt ICT and automated institutional administration programs that build capacities for its implementation (e.g. development of appropriate ICT policies, strategic plans, and manuals for managing ICTs).</td>
<td>102</td>
<td>4.55</td>
<td>.804</td>
</tr>
<tr>
<td>A University Wide-Area-Network which enables automation of a variety of processes must be installed.</td>
<td>103</td>
<td>4.58</td>
<td>.721</td>
</tr>
<tr>
<td>The University must establish a state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure</td>
<td>103</td>
<td>4.57</td>
<td>.722</td>
</tr>
<tr>
<td>Based on the needs of ICT and time-sharing possibilities, the University must define an optimum ICT infrastructure</td>
<td>103</td>
<td>4.31</td>
<td>.817</td>
</tr>
<tr>
<td>Appropriate hardware for satellite terminals must be provided in a progressive manner</td>
<td>101</td>
<td>4.29</td>
<td>.887</td>
</tr>
<tr>
<td>Computer access points with internet connectivity must be provided at the Academic Affairs department to facilitate effective and efficient management of student’s information activities.</td>
<td>103</td>
<td>4.53</td>
<td>.814</td>
</tr>
<tr>
<td>A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities e.g. dedicated</td>
<td>103</td>
<td>4.45</td>
<td>.763</td>
</tr>
</tbody>
</table>
An enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained. | 103 | 4.42 | .835

Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must be ensured. | 103 | 4.60 | .647

All the equipment and resources must be secured from theft and damage. | 102 | 4.57 | .907
The equipment must also be covered under an appropriate insurance policy against any disaster. | 103 | 4.48 | .838

All administrative and ICT personnel must be given adequate training and support to use the technology effectively. | 103 | 4.58 | .799

Formulation and codification of monitoring, evaluation and feedback system to ensure that the ICT system achieves its set goals. | 102 | 4.48 | .931

Valid N (listwise) | 98 |

**Fieldwork (2019)**

From table 4.32, most of the respondents agree to a large extent that the following strategies must be incorporated to effectively use ICT to manage Students’ Information; the University must adopt and adapt an ICT and automated institutional administration programs that build capacity for its implementation (M=4.55), a Wide-Area-Network which supports automation must be installed (M=4.58), a state of the art, appropriate, cost-effective ICT infrastructure must be installed (M=4.57), an optimum ICT infrastructure must be defined (M=4.31), appropriate hardware for satellite terminals must be provided (M=4.29), computer access points with internet connectivity must be provided for the Academic Affairs Department (M=4.53) and a wide variety of software applications and tools is required (M=4.45).

Furthermore, respondents affirmed to a large extent that an enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained (M=4.442), regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup, and support must be provided (M=4.60) with the lowest standard Deviation (SD)=947), equipment must be secured from theft and damage (M=4.60), equipment must be insured with an
appropriate insurance plan (M=4.48), adequate training must be given to administrative and ICT personnel (M=4.58) and a monitoring, evaluation and feedback system must be put in place to ensure ICT systems achieves set goals (M=4.48) with the highest standard Deviation (SD)=931.

From the responses it can be concluded that the Technical Universities in Ghana must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation, also, there has to be a Wide-Area-Network which would enable automation of a variety of processes must be installed, the University must establish a state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure, the universities must define an optimum ICT infrastructure based on the needs of ICT and time-sharing possibilities.

Furthermore, appropriate hardware for satellite terminals must be provided in a progressive manner; computer access points with internet connectivity must be provided in all departments to facilitate effective and efficient management of student’s information activities. Again, there must be a wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of student’s information activities, an enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained, regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must also be ensured.

More so, all the equipment and resources must be secured from theft and damage, and the ICT tools and equipment must also be covered under an appropriate insurance policy against any disaster. All administrative and ICT personnel must be given adequate training and support to
use the technology effectively and that there should be a formulation as well as codification of monitoring, evaluation and feedback systems to ensure that the ICT systems achieve its set goals.

4.6 QUALITATIVE DATA ANALYSIS

This aspect of the data analysis sought to assess the responses obtained from representatives of educational service providers regarding the management of students’ information in Technical Universities in Ghana.

4.6.1 Internal policies regarding the use of ICT for managing students’ information

From the responses when the professionals were asked about their views on internal policies regarding students’ information management in the educational institutions. From the responses it could be observed that the majority of the professionals interviewed spoke about data security. Summary of the responses showed that the experts were rather particular about the security of the information once it has been collected. The protection of data collected was paramount to the professionals than the process of data collection itself. Snippets of the responses have been presented below:

“When we talk about policies realistically in this day of cybercrime my concern has to do with the protection of students’ information. I mean you can think all you want about making policies on strategies, the award of grades and whatnot like what you have on that paper but trust you me if there is no security for your systems it's useless”.

The other respondent also noted;

“I believe that securing the data both by virtue of hardware security and software security against cyber attacks is important. So, I think that management should concentrate on making policies to prevent unwarranted access to the information collected”

From the results, it could be observed that rather the ICT educational service providers are much interested in data protection and security. Thus it can be concluded that contrary to the beliefs
shared by the staff of the TUs, the professionals want management to formulate internal policies that will ensure that the integrity, credibility, and security of students’ information.

4.6.2 Impressions about data management and use within the educational sector

Again, the respondents were asked to give their impressions about data management and use in the educational sector. Analysis of the responses suggests that ICT professionals have a negative perception of the management of student information in the education sector. They have the firm belief that information is poorly managed all because the institutions being public institutions are inadequately resourced. They do not have the required structures to fully integrate ICT into their systems hence they are unable to do away with the manual processes. Excerpts from selected responses have been presented below;

“You see I’ve been talking to you about the inability of the schools to properly integrate the ICT into their processes. This is all because you see this is a state-owned and controlled agency but you know government work, they are always under-resourced so they always have to do a mix and when it’s like that it becomes difficult. Things get dualised and lack circumspect.”

Another notable statement is given below;

“You know what in the school’s students’ information management is poorly handled. And it’s all because they are stingy instead of hiring professionals to handle their processes, they want to do all by themselves hence they have problems. Let me tell you they are not doing things right and someone must tell them. They always have their questions leaking before exams what do you think is the cause of that?”

The position of the respondents implies that the professionals have a negative perception about how the tertiary institutions manage information suggesting that it is poorly managed.
4.6.3 Database support infrastructure that should be employed to manage students’ information at the tertiary level of education

Furthermore, the respondents were asked to indicate the kind of database infrastructure that should be employed to manage students’ information at the tertiary level of education. The trend of responses suggests that most of the respondents want the institutions to procure database infrastructure that offers high-speed internet, servers, and high data storage capacity units and among others. Selected comments have been given below;

“There should be high internet support bandwidth; if not, there will be issues system lags and errors in data captured. Also, the institutions considering the huge number of students admitted means that the schools should procure high data storage capacities to be able to hold the volume of data on students. Not forgetting cloud computing also offers great opportunities that the schools can take advantage of...”

The professionals implored that if the universities have adopted ICT then they should take pragmatic steps to acquire every required infrastructure for effective management of students’ information.

4.6.3 Type of database suitable for managing students’ information at the tertiary level of education

The respondents were asked to indicate the type of database system most appropriate for managing students’ information. Summary of the responses showed that the professionals recommend a database system with a Structured Query Language (SQL) or Oracle as the programming software. This according to them is the best database management development system on the market and what makes them the best is the robustness and security of data structures. Selected comments have been posted below;
“...by far SQL and Oracle are the best on the market at the moment. They offer you a lot of tools necessary for effective management of the data captured...”

“...in today’s highly technologically enabled society you can’t afford to collect people’s information and just keep it anyhow so you need a system that is robust to deal with the day to day changes in the set up hence I think SQL powered databases are the best...and also, SQL uses a very strong compression technology which is appropriate for the purpose...”

The responses imply that ICT educational service providers recommend the use of Structured Query Language (SQL) and Oracle because of the relative advantages that it offers to users and managers of big data or information.

4.6.4 ICT impact or influence the management of students’ records/information

The respondents were asked to indicate what they think about the impact the use of ICT has had on the management of students’ information. Summary of the responses to that effect shows that the professionals believe that to a large extent it had a positive impact on the management of students’ information. However, they stressed that much needs to be done especially in the areas of full integration into their entire internal processes. Selected comments have been given below;

“Oh, to an extent it had a relatively positive impact on their activities considering where most of these institutions are coming from in terms of how they used to do their things and how they do it not. See hitherto they were not selling online forms, right? You’d have to go there buy the forms fill and post through the post office but now it's not like that anymore so that alone is sufficient stride they’ve made and its all founded on the use of ICT...”

Another observed that;

“Without ICT it's not faster-accessing students’ records, registration of students for the semester, attendance and many other things. It’s now been made easier all through ICT.”

The professionals noted that through ICT most of the educational institutions are even able to organize classes for students through online portals. Lecturer’s record and share lecture materials such as articles, lecture presentations on the internet. They made a notable observation regarding the use of social media in their activities. They stated that lecturers of today manage thesis
supervision groups through WhatsApp (social media platform) where they communicate with their students on a daily basis regarding their thesis.

This goes to support the notion that the use of ICT to the professionals has had a significant impact on the management of students’ information by the educational institutions.

4.6.5 Challenges associated with the use of ICT for students’ information management

The respondents were asked about the challenges they perceive the institutions are facing relative to the use of ICT for students’ information management. Responses to that effect show that the service providers mainly spoke about the effects of erratic power supply. The point was made that in the absence of a standby generator it makes the whole idea useless if the power supply is not stable; to which they believe that it’s been very difficult for complete integration of ICT into the internal processes. They still have to do some form of manual record keeping.

Also, they spoke about the lack of well-skilled IT personnel to take charge of both the hardware and software infrastructure that supports the whole idea of using ICT to manage students’ information. Selected comment;

“in most cases, people with the right skills are not employed to manage systems like these. You see the ICT discipline has so many branches the fact that someone comes around and says I have a qualification in ICT doesn’t mean they are qualified enough to manage things like these. Sometimes you find their specialty is in just one field like say networking or troubleshooting...”

4.6.7 Strategies that can help with the use of ICTs for students’ information management

Regarding the strategies that can be adapted to help with the use of ICT for students’ information management. The recommendations of the professionals were that the right human resource with the requisite qualification and experiences should be employed to manage the students’
information management systems. That notwithstanding, they also maintained that the institutions need to take the issue of security very seriously. They reckoned that this has to do with the personal information of students and hence if management has to spend every dime to protect or ensure the privacy of students’ information it must do that.
CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Introduction

This section of the study presents the discussion of the findings relative to relevant literature. A significant number of findings have been made in this study, and these findings have been discussed in relation to the objectives of the study as follows:

- Socio-Demographic Information of the Respondents
- Internal policies regarding the use of ICT for managing students’ information
- ICT platforms/use available for managing students’ information
- Prospects of ICT use for managing students’ information
- Challenges relating to the use of ICT for managing students’ information
- Strategies for using ICT to manage students information

5.2 Biographic Data of Respondent

The biographic factors were the institution of work, gender, age, department, education, and position held. This was to enable the researcher to examine the views of the respondents with one another. As per the distribution of the questioner, it became obvious that 41 of the respondents representing 39.8% were staff at ATU, 33 representing 32.0% were at KsTU and 29 respondents representing 28.2% were at STU. This could be partly attributed to the fact that the population of these institutions differs. Since KsTU has a larger population than that of ATU and STU, a greater part of respondents was selected from there but the results showed otherwise that ATU had more participants than the other two universities.
With regard to the gender status of the respondents, the study found that the majority (68.4%) of the respondents were males while 30.5% were females. The male dominance among the selected TUs is evident by the fact that most organizations in Ghana are dominated by male workers (Lawson, 2018).

Age being an essential determinant of labour force, respondents among the three TUs have an overwhelming relatively younger workforce between the ages of 36-40 representing 33.3%. With this workforce, management can tap into their potential to respond to technological advancement in the changing working environment.

In terms of departments, it was discovered that respondents from the “ICT” department were 30 representing 29.1% of the TUs which is the key department in terms of the responsibility of managing students’ information electronically. This was followed by the Academic Affairs with 27 respondents representing 26.2%. Most of the respondents ie. 46 representing 46% have a master’s degree and 69 respondents, representing 69% were administrators with the requisite skill to manage students’ information using ICT.

**5.3 Internal policies regarding the use of ICT for managing students’ information**

Following the Technology Acceptance Model (TAM) (Venkatesh & Davis, 1996), several attempts have been made to improve education through technology such as the invention of lantern slides and television, photography, which all dates back to the early 20th Century (Reiser, 2001). In recent times, the exponential increase relative to information has changed the manner in which institutions carry out their activities (Mukred et al., 2016).

Major changes have taken place particularly in the areas of information generation as well as how it is stored, processed and distributed across internal value chains. In spite of the fact that
technology can be used to facilitate the effective processing of information if used without the fullest of understanding of its use, it may generate adverse effects. Policy is a blueprint for a university to design and manage ICT programme for the administrators of students’ information in a systematic and progressive manner. Boudry and Verdegem (2014) as cited by Yeboah (2013) acknowledged the significance of ICT policy to organisation and state that, organisations that have ICT policy/strategy see ICT as tools and services for supporting and improving the organisation as a whole.

Concerning internal policies that relate to ICT for students’ information management, the study found that the selected TUs in Ghana have internal policies regarding the management of students’ information on the processing of admissions, awarding of grades, management of records, software management, security as well as ICT infrastructure (See Table 4.24).

This finding is consistent with the classification of Rowland (1996) as cited by Yusuf (2005) that proposed ICT in education as part of the infrastructure of the educational system.

5.4 ICT platforms/use available for managing students’ information

Considering the type of students information kept by the TUs in Ghana the study found that the institutions primarily keep information on students’ admissions and enrolment, academic registrations, admission letters, examination results and transcripts, student examination performances, summary sheets, payments of both academic and residential fees, students personal bio-data, payment history of students, acceptance letters, residential registration, examination schedules, matriculation oaths as well as medical examination registration as indicated in Table 4.25.
The findings confirm the writings of Achu (2017), and Bigirimana et al., (2015) who asserted that students records have transited from a paper-based task concerned with the storage of organisations carried documents, to a profession engaged with the administration of detailed internal information in varied medium (media). Additionally, the introduction of ICT into records management has afforded swiftness, accuracy, variety, flexibility and rich and inclusive documentation of procedures (Büyükbaykal, 2015; Pegu, 2014; Toro & Joshi, 2012).

Again, it was discovered that consistent with the findings of Idowu & Esere (2013) and Egwunyenga (2009) Technical Universities in Ghana use contemporary ICT amenities such as input and output devices, storage devices, processor components, networks, software, data, user interfaces and database and file concepts in managing students’ information (See Table 4.26). Idowu & Esere (2013) and Egwunyenga (2009) in their respective studies noted that contemporary information management utilities such as computers, microfilm, CD-ROMs, Cassettes, E-mail, collaborative software, and hardware, have all contributed to the actual storage and management of university students’ information.

Moreover, relative to the extent to which ICT is used in the operations or processes of managing students’ information, the study observed that the three selected TUs in Ghana utilises ICT in the creation of records. It is also used in the processing of records, its storage, preservation, retrieval, distribution and the migration of records (See Table 4.27). Consequently, Misra et al., (2018) and Parker, (2012) reached similar outcome when they observed that ICT systems have transformed the manner in which processes are carried particularly with data being transformed, stored, retrieved and processed by those that manage, learn and interact with a specific educational organization. Also, Bigirimana et al., (2015) and Olubusuyi (2008) concluded in their study that
ICT affords numerous facilities and opportunities for educational managers to carry out their responsibilities adequately.

5.5 Prospects of ICT use for managing students’ information

The study discovered that ICT use offers the prospects of the institutions being able to process prospective students’ applications and admissions online whereas applicants can then also check their admission status anywhere through the use of ICT. Also, registrations can be done online, thereby eliminating the previous process of long queues at the university registration desks, ICT enabled processes could reduce time spent on retrieving students’ information as well as save space previously used for keeping hard copy files.

More so, ICT use could aid the keeping of students’ records for faster service delivery, faster processing of examinations and assessment results of students prevent the loss of students’ information and the effective processing of students’ fees. Additionally, students’ transcripts and other documents could be processed online as well as allocate hostel or residential accommodation for students (See Table 4.28).

Misra *et al.*, (2018) and Bigirimana *et al.*, (2015) reached similar conclusions where they asserted that the use of ICT has the prospect of satisfying the gap created by manual information management and thus can be used to facilitate the management of accurate records in the areas such as examinations, employee recruitment, and promotions, publishing of students enrolments as well as admissions. Furthermore, Mosweu *et al.*, (2014) and Asogwa, (2013) who maintained that the use of ICT systems in students’ information management has brought in its wake space savings as the most information could be filed by electronic means which can diminish the risks in the events of a loss.
According to Afonso et al. (2013) as cited by Yeboah (2013) administrators with higher expectancy are likely to use ICT when they know the usefulness of ICT tools and service will improve their work performance and productivity, address their needs and help them accomplish a task more efficiently and effectively.

Concerning the extent to which ICT has been applied in monitoring of educational activities; the study noted that TUs use ICTs to monitor many activities which include personal records of students, academic performances of students as well as personal and assessment records of lecturers (See Table 4.29). The study also observed that the use of ICT has contributed to the management of students’ information particularly in the areas of students’ registrations both academic and residential, verification of students’ fees payments, the management of students’ academic information, students’ information authentication, and preservation of students’ information as well as constant access to students’ information.

The findings epitomise the position of Bakari, (2017) and Sichalwe et al. (2011) on the management of records in Tanzania revealed that staff who apply ICT in generating and storing experienced improved storage, retrieval, access, usage, improved security, improved preservation, improved communication as well as enhanced record generation. The findings are also in agreement with Otaghsara et.al (2012) whose study revealed that the use of ICT in the educational front will reduce material costs and increased efficiency of the education process.

5.6 Challenges relating to the use of ICT for managing students’ information

The use of ICT in the management of students’ information remains a crucial factor in the effective administration of educational institutions. Thereby, ICT help in addressing issues concerning students’ information does not come without its associated challenges. The study
found that the three selected TUs in their attempt to use ICT in the management of students’ information is challenged by the lack of ICT Policies and strategies, lack of commitment by University Management to support the initiative, inadequate ICT facilities, inadequately trained ICT personnel, lack of operational guidelines and regulations, inadequate computer terminals, outdated software and hardware systems, poor ICT maintenance culture (irregular updates and upgrades), poor management of ICT tools and facilities, limited data management capacity, inadequate communications and power infrastructure, limited financial resources and irregular power supply (See Table 4.31).

The finding falls in line with the works of Katuu (2015); Abdulkareem et al., (2013) and Nakpodia (2011) who concluded in their study that institutions adopting ICT as an information management tool are challenged by the lack of basic and adequate infrastructures and/or resources such as the non-existence of elementary and satisfactory physical amenities including space for computers with internet connectivity, generators, and satisfactory equipment pose challenges in the application of ICT for students’ information management.

The result also affirmed the position reached by Pegu (2014) and Lemieux et al., (2014) who found the poor installation of ICT associated facilities, irregular electricity supply, and poor maintenance culture. Moreover, the finding also supports previous research findings by Yeboah (2013) who also see the lack of funding and inadequate ICT infrastructure as a challenge to ICT deployment. According to Yeboah (2013), there is a competing priority between ICT projects and other projects and management normally prioritise projects that the benefit can be seen than those that are intangible.
5.7 Strategies for using ICT to manage students’ information

In mitigating the challenges associated with the use of ICT in the management of students’ information, the study noted that the three selected TUs have adopted the strategy of ensuring that the equipment and resources are secured from theft and damage. Also, ensure that ICT tools and equipment are covered under an appropriate insurance policy against any disaster. All administrative and ICT personnel must be given adequate training and support to use the technology effectively and that there should be a formulation as well as codification of monitoring, evaluation and feedback systems to ensure that the ICT systems achieve its set goals.

5.8 Conclusion

In conclusion, the findings reinforce the Technology Acceptance Model (TAM) framework within which the study was conducted. Notwithstanding the challenges faced by the selected TUs in Ghana in the use of ICT for students’ information management, the perceived usefulness of technology (the system improving on the task accomplishment more swiftly) and the perceived ease of use (finding technology usage easier) has given these institutions the mindset to automate majority its administrative activities.
References


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CHAPTER SIX
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter of the study summarises the findings, concludes as well as presents the recommendations of the study. Provision is also made for further research.

6.2 Summary of findings

The purpose of the study was to examine the use of ICTs for students’ information management in selected Technical Universities (TUs) in Ghana that address information security challenges and enhance the accuracy and sustainability of students’ information and management. The conduct of the study was guided by five (5) objectives which sought to; examine the internal policies that relate to ICT for students’ information management in TUs in Ghana, analyse ICTs platforms/use available for students’ information management in TUs in Ghana, examine the prospects of ICTs use for students’ information management in TUs in Ghana, investigate the challenges related to ICTs use for students' information management in TUs in Ghana and recommend strategies for the use of ICTs for students’ information management in TUs in Ghana.

6.3 Findings of the Study

6.3.1 Internal Policies Regarding ICT for Students’ Information Management

The study found that regarding students’ information management, the Technical Universities have internal policies regarding admissions, award of grades, records management, ICT usage, ICT software management, ICT security and ICT infrastructure and that concerning the type of
students’ information maintained, the selected Technical Universities surveyed keep information on students’ admissions and enrolment, academic registrations, admission letters, examination results and transcripts, student examination performances, summary sheets, payments of both academic and residential fees, students personal bio-data, payment history of students, acceptance letters, residential registration, examination schedules, matriculation oaths as well as medical examination registration.

6.3.2 The Extent to which ICT is used in Operations/processes

The study found that the three selected Technical Universities examined resort to the use of input and output devices, storage devices, processor components, networks, software, data, user interfaces and database and file concepts in managing students’ information. Also, it was discovered that the Technical Universities utilises ICT in the creation of records, processing of records, storage, preservation, retrieval, distribution and the migration of records.

6.3.4 Prospects of ICT on the Management of Students’ Information

Concerning the prospects that ICT use offers the Technical Universities about the management of students’ information, it was found that admissions and applications can be conducted online and applicants can then also check their admission status anywhere through the use of ICT. Students’ registrations can also be done online, thereby eliminating the previous process of long queues at the university registration desks. Also, ICT could be used to enable processes to reduce time spent on retrieving students’ information as well as save space previously used for keeping hard copy files.

Further, ICT could be used to aid the keeping of students’ records for faster service delivery, faster processing of examinations and assessment results of students, prevent the loss of students’
information and the effective processing of students’ fees. Additionally, students’ transcripts and other documents could be processed online as well as allocate hostel or residential accommodation for students.

**6.3.5 The Extent to which ICT has been applied in Monitoring Educational Activities**

Again, the study discovered that the 3 Technical Universities use ICT to monitor the personal records of students, the academic performances of students as well as personal and assessment records of lecturers but do not use ICT to monitor the class attendance and absenteeism of both lecturers and students.

**6.3.6 Areas ICT has Contributed to the management of Students’ Information**

Regarding the areas ICT has contributed the most to the management of students’ information, the study observed that the use of ICT had contributed mainly in the areas of students’ registrations both academic and residential, verification of students’ fees payments, the management of students’ examination results, students’ information authentication, preservation of students’ information as well as constant access to students’ information.

**6.3.7 Challenges Related to ICT use for Students’ Information Management**

On the challenges faced by the three Technical Universities in the management of students’ information, the study discovered that the TUs had limited financial resources, poor maintenance culture when it comes ICT tools and equipment as well as poor management of ICT tools and facilities, lack commitment by Management, inadequate ICT facilities (e.g. computers, infrastructure, etc.), inadequately trained ICT personnel. Also, the TUs are constrained with the absence of ICT operational guidelines and regulations. Most of the TUs lack records of manuals and filing guideline and there are inadequate computer terminals, most of the systems are
outdated that is both software and hardware, limited data management capacity e.g. increased numbers of students require more data, inadequate communications, and power infrastructure as well as irregular power supply.

6.3.8 Strategies for the use of ICT to Manage Students’ Information

The study found that the 3 TUs must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation, also, there has to be a Wide-Area-Network which enable the automation of a variety of processes must be installed. Also, the TUs must establish a state of the art, appropriate, cost-effective and adequate ICT infrastructure and define an optimum ICT infrastructure based on the needs of ICT.

Further, appropriate hardware for satellite terminals must be provided progressively, computer access points with internet connectivity must be provided in all departments to facilitate effective and efficient management of students’ information activities. Again, there must be a wide variety of software applications and tools, going well beyond an office suite are required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of students’ information activities. In addition, there should be an enabling infrastructure to maintain the ICT facility efficiently. Provisions should be made to ensure there is a regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must also be ensured.

More so, all the equipment and resources must be secured from theft and damage, and the ICT tools and equipment must also be covered under an appropriate insurance policy against any disaster. All administrative and ICT personnel must be given adequate training and support to
use the technology effectively and that there should be a formulation as well as codification of monitoring, evaluation and feedback systems to ensure that the ICT systems achieve its set goals.

6.4 CONCLUSION

From the findings of the study, the three (3) Technical Universities in Ghana only has internal policies guiding admissions, the award of grades, records management, ICT usage, ICT software management, ICT security, and ICT infrastructure. They keep information on students’ admissions and enrolment, academic registrations, admission letters, examination results, and transcripts. Also, student examination performances, summary sheets, payments of both academic and residential fees, student’s personal bio-data, payment history of students, acceptance letters, residential registration, examination schedules, matriculation oaths as well as medical examination registration are all kept at the TUs.

Through ICT use, the study area process admissions and applications online, and applicants can then also check their admission status anywhere through the use of ICT. Students’ registrations can also be done online, thereby eliminating the previous process of long queues at the university registration desks and that ICT could be used to enable processes to reduce time spent on retrieving students’ information as well as save space previously used for keeping hard copy files.

However, the three (3) Technical Universities in Ghana is challenged in the lack of adequate ICT policies and strategies, poor ICT maintenance culture and poor management of ICT tools and facilities, limited financial resources, lack of commitment by Management, inadequate ICT facilities (e.g. computers, infrastructure, etc.), inadequate trained ICT personnel and also, the TUs are constrained with the absence of an ICT operational guidelines and regulations, lack of
manuals and filing guidelines, outdated systems, poor management of ICT tools and facilities, limited data management capacity.

On the bases of the findings made out of the study, it can be concluded that ICT use is a complex concept and can help or harm an organization depending on how it is used within an organisation. If the Technical Universities in Ghana Management takes the time to understand the needs of information managers or administrators, then the recognition for ICT use can be extremely useful. The implication is that when information managers or administrators are provided with the right resources and training, it will go a long way to address information security challenges and enhance the accuracy and sustainability of students’ information and management thereby achieving the organisational goals.

6.5 RECOMMENDATIONS

Based on the conclusions the following were recommended;

6.5.1 The three (3) Technical Universities (TUs) in Ghana must reinforce the automation of institutional administrative activities that build capacities for its implementation. Additionally, there has to be a Wide-Area-Network which enables the automation of a variety of processes that should be installed.

6.5.2 The development of ICT related internal policies in areas such as ICT security, ICT Training and Development, Software Management and ICT Infrastructure must be done. Adherence to national policies on Data Collection and Health Information Collection must be encouraged in the institutions under study.
6.5.3 The automation of students and Lecturer's attendance to lectures and Lecturers assessment by students must be deployed in the three (3) selected TUs.

6.5.4 Again, the three (3) TUs in Ghana must establish a state of the art, appropriate, cost-effective and adequate ICT infrastructure; the TUs must define an optimum ICT infrastructure based on the needs of ICT. Appropriate hardware for satellite terminals must be provided in a progressive manner as well as computer access points with internet connectivity must be provided in all departments to facilitate effective and efficient management of students’ information activities.

6.5.5 Also, there must be a wide variety of software applications and tools, going well beyond an office suite are required to meet the demands of a broad-based ICT literacy and ICT to enable the effective and efficient management of students’ information activities.

6.5.6 Moreover, all the equipment and resources must be secured from theft and damage, and the ICT tools and equipment must also be covered under an appropriate insurance policy against any disaster.

6.5.7 All administrative and ICT personnel who deals with students’ information in the three TUs must be given adequate training and support to use the technology effectively and efficiently.

6.5.8 There should be a formulation as well as codification of monitoring, evaluation and feedback system to ensure that the ICT systems achieve its set goals.
6.6 Suggestions for Further Research

1. This study was primarily limited by the number of institutions selected to participate in the study. There is a total of eight (8) Technical Universities in Ghana. However, a sample of only three (3), representing 37.5% of the total number of Technical Universities in Ghana can be considered inadequate to be able to generalise the findings of this study. The remaining five (5) TUs could be undertaken to generalise the findings on the state of ICT use for managing students’ information in TUs in Ghana.

2. More so, it was primarily focused on public tertiary institutions at the Technical University level; it is therefore suggested that a wider scope of the study sample to include mainstream tertiary institutions (public and private) that would be more appropriate to generate findings that can be generalised to cover the state of ICT use in higher education in Ghana.

3. The population used for the study was only the three Technical Universities administrative and ICT staff who directly deals with students’ information management and therefore further studies could be deployed to include the Technical University students.


XXI Bi-Annual East and Southern Africa Regional Branch of the International Council on Archives (ESARBICA) in Maputo, Mozambique, 6-10 June 2011


London, Sage publications.


institutions in Yemen. *International Journal on Advanced Science, Engineering and Information Technology, 6*(6), 804-811.


Zlamanski, R., & Ciccarelli, M. (2012). Do teachers believe they are competent to promote healthy ICT use among their students?. Work, 41(Supplement 1), 869-875.
APPENDIX A

UNIVERSITY OF GHANA
COLLEGE OF EDUCATION
DEPARTMENT OF INFORMATION STUDIES
QUESTIONNAIRE: INSTITUTIONAL OFFICERS

Dear Participant,

I am an M.Phil. Student of the University of Ghana. As part of the requirement for the award of a Master of Philosophy Degree (Information Studies), I am conducting a study on the topic “Use of Information and Communication Technology for students’ information management in Technical Universities in Ghana”. The purpose of the study is to examine the use of ICT for students’ information management in Technical Universities in Ghana that addresses information security challenges and enhance the credibility and sustainability of students’ information. To this effect, I humbly solicit your help in completing this questionnaire. The study is basically for academic purposes, thus, I guarantee that your responses will be kept strictly anonymous and confidential. Thank you for your support and co-operation.

Yours sincerely,

Akwasi Duffour Frimpong

Thank you for your time
SECTION A - DEMOGRAPHICS

1. Name of the institution: KsTU [ ] ATU [ ] STU [ ]
2. Department: Admissions [ ] Academic Affairs [ ] ICT [ ] Examinations Office [ ] Planning & Quality Assurance [ ]
3. Gender: Male [ ] Female [ ]
4. Age: Below 30 [ ] 31-35 [ ] 36-40 [ ] 41-45 [ ] 46 & above [ ]
5. Highest Educational qualification: Certificate and/or Diploma [ ] Bachelor's Degree [ ] Master's degree [ ] Postgraduate Certificate and/or Diploma [ ] Graduate Certificate and/or Diploma [ ] PHD [ ] Others please specify ……………………
6. What is your position: Administrator [ ] Lecturer/Examinations Officer [ ] Senior Lecturer/Examinations Officer [ ] Professor [ ] Others: Please specify ……………………………

SECTION B: INTERNAL POLICIES REGARDING ICT FOR STUDENTS’ INFORMATION MANAGEMENT

<table>
<thead>
<tr>
<th>S/N</th>
<th>7. Which of the following internal policies are in place for students’ information management?</th>
<th>Tick as applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Privacy Policy</td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>Data Collection Policy</td>
<td></td>
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<tr>
<td>iii</td>
<td>Health Information Collection Policy</td>
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<tr>
<td>iv</td>
<td>Admission Policy</td>
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<tr>
<td>v</td>
<td>Awards of Grades Policy</td>
<td></td>
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<tr>
<td>vi</td>
<td>Records Management Policy</td>
<td></td>
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<tr>
<td>vii</td>
<td>ICT Infrastructure Policy</td>
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<tr>
<td>viii</td>
<td>ICT Software Management Policy</td>
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<tr>
<td>ix</td>
<td>ICT Security Policy</td>
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</tr>
<tr>
<td>x</td>
<td>ICT Usage Policy</td>
<td></td>
</tr>
<tr>
<td>xi</td>
<td>ICT Training and Development</td>
<td></td>
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<tr>
<td>xii</td>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S/N</th>
<th>8. Type of Students’ Information Kept at Your Institution</th>
<th>Tick as applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Students Admission/Enrolment Records</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>Admission Letters</td>
<td></td>
</tr>
<tr>
<td>iii</td>
<td>Acceptance Letters</td>
<td></td>
</tr>
<tr>
<td>iv</td>
<td>Academic Registration</td>
<td></td>
</tr>
<tr>
<td>v</td>
<td>Residential Registration</td>
<td></td>
</tr>
<tr>
<td>vi</td>
<td>Matriculation Oath</td>
<td></td>
</tr>
<tr>
<td>vii</td>
<td>Students Personal Bio-data</td>
<td></td>
</tr>
<tr>
<td>viii</td>
<td>Students performance in examinations</td>
<td></td>
</tr>
<tr>
<td>ix</td>
<td>Examination results and transcripts</td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>Students Results (Summary Sheets)</td>
<td></td>
</tr>
<tr>
<td>xi</td>
<td>Payment of Academic and Residential Fees</td>
<td></td>
</tr>
<tr>
<td>xii</td>
<td>Payment History of Students</td>
<td></td>
</tr>
<tr>
<td>xiii</td>
<td>Medical Examination Registration</td>
<td></td>
</tr>
<tr>
<td>xiv</td>
<td>Examination Schedules</td>
<td></td>
</tr>
<tr>
<td>xv</td>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION C: ICT PLATFORMS/USE AVAILABLE FOR STUDENTS’ INFORMATION MANAGEMENT**

<table>
<thead>
<tr>
<th>S/N</th>
<th>9. ICT Platforms/Use</th>
<th>Tick as applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Input and Output devices (keyboards, pointing devices; document readers; cards; speech input, video input; sensors and data logging; printers, plotters, display units; speech output and output to other electronic devices).</td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>Storage devices (internal memory including RAM &amp; ROM; external memory using both optical and magnetic technologies)</td>
<td></td>
</tr>
<tr>
<td>iii</td>
<td>Processor components (CPU components including control unit, arithmetic, and logic unit and memory).</td>
<td></td>
</tr>
<tr>
<td>iv</td>
<td>Networks (LAN and WAN; ISDN adapter, modem, router, fiber optic cable, gateway, firewall, CD server, proxy server, hub, switch, bridge, etc.).</td>
<td></td>
</tr>
<tr>
<td>v</td>
<td>Software (Generic software packages: word processing, desktop publishing, spreadsheet, database management, presentation, graphics, web authoring, and communication packages).</td>
<td></td>
</tr>
<tr>
<td>vi</td>
<td>Data (Data validation and verification techniques: range checks, check digits, presence and format checks, batch (hash and control) totals and data representation: numeric (currency, date, real, integer), text (character, string) and logical/Boolean).</td>
<td></td>
</tr>
<tr>
<td>vii</td>
<td>User interfaces (Prompted dialogue ( wizards and forms), command-line, menu, graphical user interface and combinations of these).</td>
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<tr>
<td>viii</td>
<td>Database and File concepts</td>
<td></td>
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<tr>
<td>ix</td>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

**S/N | 10. To what extent do you agree to the use of ICT in the following processes?**  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Creation of records</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>ii</td>
<td>Processing of records</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Not at all 1
### SECTION D: PROSPECTS OF ICT ON THE MANAGEMENT OF STUDENTS’ INFORMATION

<table>
<thead>
<tr>
<th>S/N</th>
<th></th>
<th>11. To what extent do you agree with the following regarding the prospects of ICT in the management of students’ information</th>
<th>Strongly Agree</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td></td>
<td>Applicants purchase and/or return admission forms online through the use of ICT</td>
<td></td>
<td></td>
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<td>ii</td>
<td></td>
<td>Applications and admissions are conducted online, and applicants can check admission status anywhere through the use of ICT</td>
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<td>iii</td>
<td></td>
<td>Registrations are also online, eliminating the previous process of long queues at the university registration desk due to the use of ICT</td>
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<td>iv</td>
<td></td>
<td>Due to the use of ICT, payments of fees are processed online averting the fraudulent loss of revenue, to students who would want to evade payment</td>
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<td>v</td>
<td></td>
<td>ICT is used to capture students information and make such information available online</td>
<td></td>
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<tr>
<td>vi</td>
<td></td>
<td>There is online access to information including course details, course content, time-table, etc. through the use of ICT</td>
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<td>vii</td>
<td></td>
<td>Examination and assessments results of students’ are released online, eliminating cheating and manipulations</td>
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<tr>
<td>viii</td>
<td></td>
<td>Through the use of ICT, students’ accommodation/hostels are allocated online</td>
<td></td>
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<tr>
<td>ix</td>
<td></td>
<td>The use of ICTs prevents the loss of students’ information</td>
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<td>x</td>
<td></td>
<td>It is now easy to access students’ transcript and other documents online</td>
<td></td>
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<tr>
<td>xi</td>
<td></td>
<td>The Use of ICTs reduces the time spent on retrieving students’ information</td>
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<td></td>
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<tr>
<td>xii</td>
<td></td>
<td>The use of ICTs in keeping students’ records aids faster service delivery</td>
<td></td>
<td></td>
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<tr>
<td>xiii</td>
<td></td>
<td>The use of ICT saves space previously used for keeping hard copy files</td>
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<td></td>
</tr>
</tbody>
</table>
### 12. To what extent has ICT been applied in monitoring the following activities?

<table>
<thead>
<tr>
<th>S/N</th>
<th>Activity</th>
<th>To a very large extent</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Class Attendance of students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>Academic performance records of students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii</td>
<td>Managing absenteeism of students</td>
<td></td>
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<tr>
<td>iv</td>
<td>A personal record of students</td>
<td></td>
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</tr>
<tr>
<td>v</td>
<td>Class Attendance of Lecturers</td>
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</tr>
<tr>
<td>vi</td>
<td>Assessment records of Lecturers</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>vii</td>
<td>Managing absenteeism of Lecturers</td>
<td></td>
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</tr>
<tr>
<td>viii</td>
<td>Personnel records of Lecturers</td>
<td></td>
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</tr>
<tr>
<td>ix</td>
<td>Other students’ and Lecturers information</td>
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</tr>
</tbody>
</table>

### 13. In what areas has ICT contributed to the management of students’ information?

<table>
<thead>
<tr>
<th>S/N</th>
<th>Area</th>
<th>To a very large extent</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Registration of students (Academic and residential)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>Verification of students’ payments of fees</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>iii</td>
<td>Management of students’ academic information</td>
<td></td>
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<tr>
<td>iv</td>
<td>Ensuring the authenticity of students’ information</td>
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<tr>
<td>v</td>
<td>Preservation of students’ information</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>vi</td>
<td>Constant access to students’ information</td>
<td></td>
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</tr>
</tbody>
</table>

### SECTION E: CHALLENGES RELATED TO ICT USE FOR STUDENTS’ INFORMATION MANAGEMENT

### 14. To what extent do you agree to the following challenges faced in the management of students’ information using ICT?

<table>
<thead>
<tr>
<th>S/N</th>
<th>Challenge</th>
<th>To a very large extent</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Lack of ICT Policies and strategies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>Lack of commitment by University Management</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>iii</td>
<td>Inadequate ICT facilities (e.g. computers, infrastructure, etc.)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>iv</td>
<td>Inadequately trained ICT personnel</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>v</td>
<td>The absence of ICT operational guidelines and regulations, as there is a lack of record manuals and filling guidelines and this may lead to loss of students’ information.</td>
<td></td>
<td></td>
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<td>vi</td>
<td>Inadequate computer terminals as this have made the retrieval and maintenance of students’ information difficult</td>
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<td></td>
<td>Outdated systems eg. software, database, infrastructure, etc.</td>
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<td>vii</td>
<td>Poor ICT maintenance culture (irregular updates and upgrades)</td>
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<td>viii</td>
<td>Poor management of ICT tools and facilities</td>
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<td>ix</td>
<td>Limited data management capacity eg. increased numbers of students require more data</td>
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<td>x</td>
<td>Inadequate horizontal and vertical communication</td>
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<td>xi</td>
<td>Inadequate communications and power infrastructure</td>
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<tr>
<td>xii</td>
<td>Limited financial resources</td>
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<tr>
<td>xiii</td>
<td>Irregular power supply</td>
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</table>

15. Identify current challenges encountered in using ICT to manage students’ academic records

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SECTION F: STRATEGIES FOR THE USE OF ICT TO MANAGE STUDENTS’ INFORMATION

<table>
<thead>
<tr>
<th>S/N</th>
<th>16. To what extent do you agree to the following Strategies for the use of ICT to manage students’ information</th>
<th>To a very large extent</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>The University must adopt and adapt an ICT and automated institutional administration programs that build capacities for its implementation (eg. development of appropriate ICT policies, strategic plans, and manuals for managing ICTs).</td>
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<td>ii</td>
<td>A University Wide-Area-Network which enables automation of a variety of processes must be installed.</td>
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<td>iii</td>
<td>The University must establish a state of the art, appropriate, cost-effective and adequate ICT and other enabling infrastructure</td>
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<td>iv</td>
<td>Based on the needs of ICT and time-sharing possibilities, the University must define an optimum ICT infrastructure</td>
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<td>v</td>
<td>Appropriate hardware for satellite terminals must be provided in a progressive manner</td>
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<td>vi</td>
<td>Computer access points with internet connectivity must be provided at the Academic Affairs department to facilitate effective and efficient management of student’s information activities.</td>
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<td>vii</td>
<td>A wide variety of software applications and tools, going well beyond an office suite is required to meet the demands of a broad-based ICT literacy and ICT to enable</td>
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<td>viii</td>
<td>An enabling infrastructure required to maintain the ICT facility efficiently must be defined, established and maintained.</td>
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<td>ix</td>
<td>Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, including alternative sources of energy, must be ensured.</td>
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<td>x</td>
<td>All the equipment and resources must be secured from theft and damage.</td>
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<td>xi</td>
<td>The equipment must also be covered under an appropriate insurance policy against any disaster.</td>
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<td>xii</td>
<td>All administrative and ICT personnel must be given adequate training and support to use the technology effectively.</td>
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<td>xiii</td>
<td>Formulation and codification of monitoring, evaluation and feedback system to ensure that the ICT system achieves its set goals.</td>
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Which new or other information technologies would you recommend to enable your University to manage its information better?

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THANK YOU
I am an M.Phil. Student of the University of Ghana. As part of the requirement for the award of a Master of Philosophy Degree (Information Studies), I am conducting a study on the topic “Use of Information and Communication Technology for students’ information management in Technical Universities in Ghana”. By honoring this interview schedule, your responses will be highly confidential since I am using it for academic purposes. The study is basically for academic purposes, thus, I guarantee that your responses will be kept strictly anonymous and confidential. Thank you for your support and co-operation.

Thank you

Akwasi Duffour Frimpong

SECTION A: DEMOGRAPHY

Interview No.: ______________________________

Date/Time: _________________________________

Interviewee: ______________________________

Company: _________________________________

Female [ ] Male [ ]
SECTION B: STANDARDS IN ICT USAGE FOR MANAGING STUDENTS’ INFORMATION

1. Which of the following policies are used as far as the implementation of a student’s information management system is concerned?
   - Privacy Policy [  ]
   - Data Collection Policy [  ]
   - Health Information Collection Policy [  ]
   - Admission Policy [  ]
   - Awards of Grades Policy [  ]
   - Records Management Policy [  ]
   - ICT Software Management Policy [ ]
   - ICT Security Policy [  ]
   - ICT Usage Policy [  ]
   - ICT Training and Development [  ]
   - Others ________________________________

2. What are your impressions about data management and use within the educational sector?

3. What is your opinion is the kind of database infrastructure that should be employed to manage students’ information at the tertiary level of education?

4. What type of database will you prefer for managing students’ information at the tertiary level of education?

5. What do you think should be the minimum volume that a database should handle at the tertiary level of education?

6. What kind of software development will you recommend for management of students’ information at the tertiary level?
   - In-house
   - Outsourced
7. Which technology do you think will better serve the management of students’ information at the tertiary level?
   - Web. Application
   - Desktop Application
   - Mobile Application

8. Which type of students’ information should ICT be used to manage at the Tertiary level?

9. Do you think the use of ICT has had an impact or influence on the management of students’ information? If YES, then in what way?

10. Which storage system will you prefer using ICT for managing students’ information
    - Cloud base
    - In-house storage
    - Off-site storage

11. What challenges can you associate with the use of ICT for students’ information management?

12. What strategies do you think can help with the use of ICT for students’ information management?

13. Any further comments on the management of students' information using ICT that will address information security challenges and enhance credibility and sustainability...

Thank you very much