

**Adoption and Effective Integration of ICT in Teaching and Learning in Higher institutions in Ghana****Nelly Abaidoo and Valentina Arkorful****University of Cape Coast**

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**ABSTRACT**

*This concept paper focuses on how the adoption and effective integration of ICT in higher education in Ghana is having an impact on teaching and learning. Several models that can be used to improve understanding concerning the diffusion, adoption and usage of new technologies in teaching higher institutions are discussed. Some of the models include Technology Acceptance Model (TAM), Diffusion Innovation Model (DIM) and Unified Theory of Acceptance and Use of Technology (UTAUT) Model. Impacts, as well as barriers to the use of ICT in teaching and learning in the universities will also be looked at. This study will help educational authorities and administrators who will seek to enhance teaching and learning in the universities as a means of improving performance and quality education. The study will also make contribution by way of providing insight into the problem of access to and usage of ICT for teaching and learning in Ghanaian universities. It is recommended that different models should be integrated for adoption and integration of ICT in universities.*

*Key words: Adoption, integration, diffusion, models, Technology Acceptance Model, Diffusion Innovation Model, Unified Theory of Acceptance and Use of Technology Model.*

**INTRODUCTION**

The role of education traditionally has always been the preparation of people to live and work within their own society. Globalization of world economies and also the introduction of new and sophisticated technologies are continuously placing much pressure upon institutions of learning as governments, employers and students are obviously expecting them to have solutions to national problems. Such institutions are turning to Information and Communication Technology (ICT) for many of these answers (Pearson & Somekh, 2006). According to Krishnaveni and Meenakumari (2010), in the growth-oriented industry, change has been going on at rapid rate, and the education sector is no exception. This rapid growth in the educational field has made governance in the academic sector a very complex duty. The authors continue to note that, a tremendous improvement in technology which has led to far-reaching developments in the administrative system has been witnessed in the 21st century. Usage of ICT in school has become an inherent part of teaching and learning, both in and out of the classroom. With numerous resources that are being spent on ICT in schools, the integration and impacts of ICT on teaching and learning has been of serious concern

among government policy makers, leaders of schools, teachers, as well as researchers globally. According to Edumadze and Owusu (2013), the introduction of ICT and its incorporation into the educational system, especially the tertiary educational system, targets to improve the teaching and learning processes, and yet there has been much difficulty for lecturers and students in their use of the technology.

Henderson and Venkatraman (1999) have argued that the effective use of ICT in any organization provides supports and also shapes its strategies. Kyobe (2004) on his part noted that, the effective use of ICT refers to the use of ICT resources including hardware and software to offer an institution or organization with a competitive advantage. According to Sosin (2004), it has been observed that there has been a large-scale development and use of technology in every area of human activities, including the educational field and this has led to a dramatic change in the methods of instruction for education at all levels, especially the higher education level. In view of this, almost every university all over the world is struggling to develop a general strategy for ICT as well as produce ICT teaching and learning strategies. It has been advocated by Hyvönen et al. (2003) that using ICT can be seen as one of the major areas modern institutions and organizations develop so as to achieve strategic gains. It is revealed in Grade and Grade (2007) that there are two different approaches in the adoption and use of technology in education: those that have an institution wide strategy on the ICT and those who consider it as something that everyone is expected to do without agreeing for a general push from the top. Universities that have consequently embraced the student-centered learning find that there is a rising demand for ICT-based materials. The consequences of the extensive demand and use of ICT resources in teaching and learning for all parts of the universities bring to mind the key resources.

The adoption and use of ICT in tertiary educational setting are done in different areas including administrative, admission, finance, as well as classroom teaching and learning (Barnnet and Coate, 2005, Pearson and Somekh, 2006). However, the major problem of this study is on the adoption and use of ICT in classroom teaching and learning.

Many lecturers particularly the old ones in Ghanaian universities have had little exposure to ICT resources such as computers until lately (Edumadze & Owusu, 2013). There are therefore calls for training of the staff and lecturers, as well as teaching and research assistants of the universities in order to adequately prepare them their task of teaching. In many universities in Ghana, the ICT equipment that are needed to enhance effective delivery of lecture as well as effective learning pose a very serious limitation (Edumadze & Owusu, 2013). ICT tools and resources such as laptops, speakers, projectors, reliable internet connectivity, among other are still not in abundant supply in the public universities in Ghana. When it comes to the availability of such tools and resources, the students are the worst hit victims. Despite the numerous policies and strategies that are put in place by the authorities of the universities, there is a need for a severe consideration to how the ICTs are employed in teaching and learning in the universities in Ghana, assess the impacts of ICTs on teaching and learning, and also how to examine the possible barriers to the integration and use of ICTs in teaching and learning in the universities.

It has also been observed that, in most Ghanaian universities, the scarce ICT resources that are provided for teaching and learning such as the internet are not put into appropriate use (Edumadze & Owusu, 2013), especially by the students. If the ICT facilities in the universities are properly used and well regulated, then the enormous opportunities that ICT provides could help to improve the ways that the students acquire relevant knowledge, develop appropriate skills, and also improve their performance academically. The state of affairs where student, particularly use the facilities for

non-academic purposes including visiting chat rooms, social media, fun sites, listening to music among other pose problems and therefore must be looked at. Many students in the Ghanaian universities spend most of their time in ICT laboratories for non-academic purposes (Boakye & Banini, 2008).

However the Ghanaian universities lack infrastructure, affordable and sufficient bandwidth, and the human resource capacity to exploit the technology. This makes Ghanaian universities lagging behind in the global ICT context.

Despite the increasing number of research on the adoption and use of ICT in education, it has been suggested in several literatures (Olatokun and Kebonye, 2010; Harindranath et al., 2008; Levy, 2006; Hussain and Safdar, 2008; Boakye and Banini, 2008) that there is the need for further investigation on the level of ICT adoption and use as well as the impacts of its use in different context worldwide, especially in developing countries. Studies in the area of ICT use in higher education are still under-researched in many sub-Saharan African countries and Ghana is no exception. For example Aleke et al. (2009) has noted that the impacts of the use of ICT applications have not been explored fully in in the developing countries.

Also some studies have been done on ICT use in education in Ghana (Boakye and Banini, 2008; Mereku et al, 2009; Agyemang, 2012; Sarfo and Anson-Gyimah, 2010; Asare, 2010; Omollo, 2011). However, none of the studies in Ghana have investigated on the level of adoption and use of ICT particularly in teaching and learning in universities in Ghana. Also no study has concentrated on the impacts and challenges of using ICT in teaching and learning in Ghanaian universities. It is therefore important to investigate the level of adoption and use, impacts, as well as challenges of using ICT in teaching and learning in Ghanaian universities, both public and private ones.

## **Literature Review**

### **Theoretical Framework**

A lot of theoretical models have been offered for improved understanding concerning the diffusion, adoption, acceptance, and usage of new technologies (Aduke, 2008; Davis et al, 1989; Roger, 2003; Taylor and Tood, 1995; Venkatesh et al, 2003; Yi et al, 2006). However, according to Oye et al (2012), three theories among the several proposed theories have been influential. These are the technology Acceptance Model (TAM) (Davis et al, 1989; Roger, 1995; 2003), the Diffusing of Innovation Theory, and also the Five-Step Hierarchical Model of Technology Diffusion (Davis et al, 1989; Hooper and Rieber, 1995; Rieber and Welliver, 1989). Other models for technology acceptance include: Theory of Reasoned Action, Theory of Planned Behavior, Motivational Model, Combine Theory of Planned Behavior and Technology Acceptance Model, Model of PC Utilization, and the Social Cognitive Theory (Oye et al (2012).

The Theory of Reasoned Action was established by Fishbein and Ajzen (1975; 1980). It is a model for predicting the behavioral intention, across attitude prediction and behaviour prediction. According to this model, the subsequent separation of behavioral intention from behavior permits explanation of limiting factors on attitudinal influence. The theory of Reasoned Action, (TRA) has three major constructs as components including: behavioral intention, attitude, and also subjective norm. According to the proponents of TRA, the behavioural intention of a person depends on the person's attitude about the behaviour and also the subjective norm. To them, if a person intends to

do a behavior then it is possible that he/she will do it. Behavioural Intention in the model was defined as the relative strength of intention of a person to perform behaviour. Attitude was also defined as consisting of beliefs about the effects of carrying out the behaviour as well as the person's evaluation of the effects. Subjective norm is also defined as the combination of perceived expectation from individuals or groups along with intentions to conform to these expectations ((Fishbein&Ajzen, 1975). However, according to the proponents of the TRA, in predicting behaviour, attitudes and norms are not equally weighted. To the proponents, these factors might have different effects on behavioral intention, depending on the individual and also on the situation.

The TRA, however, has some limitations. For instance Shepherd et al (1988) noted three (3) limiting conditions on the use of subjective norms to predict intentions and also the prediction of performance behaviour using intention. The following are the limiting conditions noted in Shepherd et al (1988);

1. The distinction between goal intention and behaviour intention.
2. The existence of choice among alternatives, since the presence of choice might change the nature of the process of intention formation and also the role of intentions in the performance of behavior.
3. Intentions as opposed to estimates, since there are times when what people intend to do differs from what they actually do.

The TRA has also be criticized by Hale et al. (2002) that its explanatory scope excludes a wide range of behaviors such as those that are spontaneous, habitual, impulsive, and scripted or mindless.

Another theory of acceptance and integration of IT into education is the Theory of Planned Behaviour(TPB) proposed by Ajzen in 1985 in his article named "From intentions to actions: A theory of planned behavior". Ajzen developed the TPB from the Theory of Reasoned Action (TRA) proposed by Fishbein and Ajzen (1975) by adding a new component of "perceived behavioral control". The TPB holds that only particular attitudes toward the behaviour in question can be anticipated to predict that behaviour. The TPB can be seen as a theory which predicts deliberate behaviour, since behaviour can be deliberative and planned (Ajzen, 1985). The major constructs of the Theory of Planned Behaviour (TPB) are described below:

The central element in the TPB according to Ajzen (1985) is the intention of the individual to perform behaviour. Intentions, according the Ajzen (1985) are presumed to capture the motivational factors that affect a behavior. Intentions are also of how hard people are willing to try, and also of how much of an effort people are planning to exert, to be able to perform the behaviour. According to Ajzen (1985), the stronger the intentions one has to engage in behaviour, the more expected should be its performance. According to Ajzen (1991), though the relationship between behavioural intention and actual behaviour is not perfect, intention can be used as a proxy measure of behaviour, and this observation according to Ajzen (1991) constitutes one of the most vital contributions of the TPB when compared to the previous models such as the TRA.

Another construct in the TPB is the attitude toward the behaviour, which comprises of the individual's negative or positive assessment of self-performance of the particular behavior. It refers to the extent to which individuals have a favourable or unfavourable appraisal of behaviour. According to Ajzen (1991), attitude is the overall evaluation of the behaviour by persons.

Perceived behavioural control is the degree to which one feels able to enact the behaviour. According to Ajzen (2002), it is presumed to be an immediate originator of behaviour, and according to Bandura (1997) has two aspects including how much an individual has control over behaviour, and how confident a person feels about being able to perform or not the behaviour. Perceived behavioral control, according to Ajzen (1991) is an important part in the TPB model, and that its addition makes the TPB different from the TRA.

Another component of the TPB model is the “behaviour”, which according to Ajzen (1991) is the observable response of the individual in a given situation with regards to a given target. The behavior is a function of perception of behavioural control and compatible intentions, in that perceived behavioral control is anticipated to moderate the influence of intention on behavior, such that a favorable intention generates the behavior only when perceived behavioral control is strong (Ajzen, 1991; 2002).

A major critique leveled against the Theory of Planned Behaviour developed by Ajzen (1991) is that it overlooks other emotional variables including, threat, and fear, according to Sniehotta (2009).

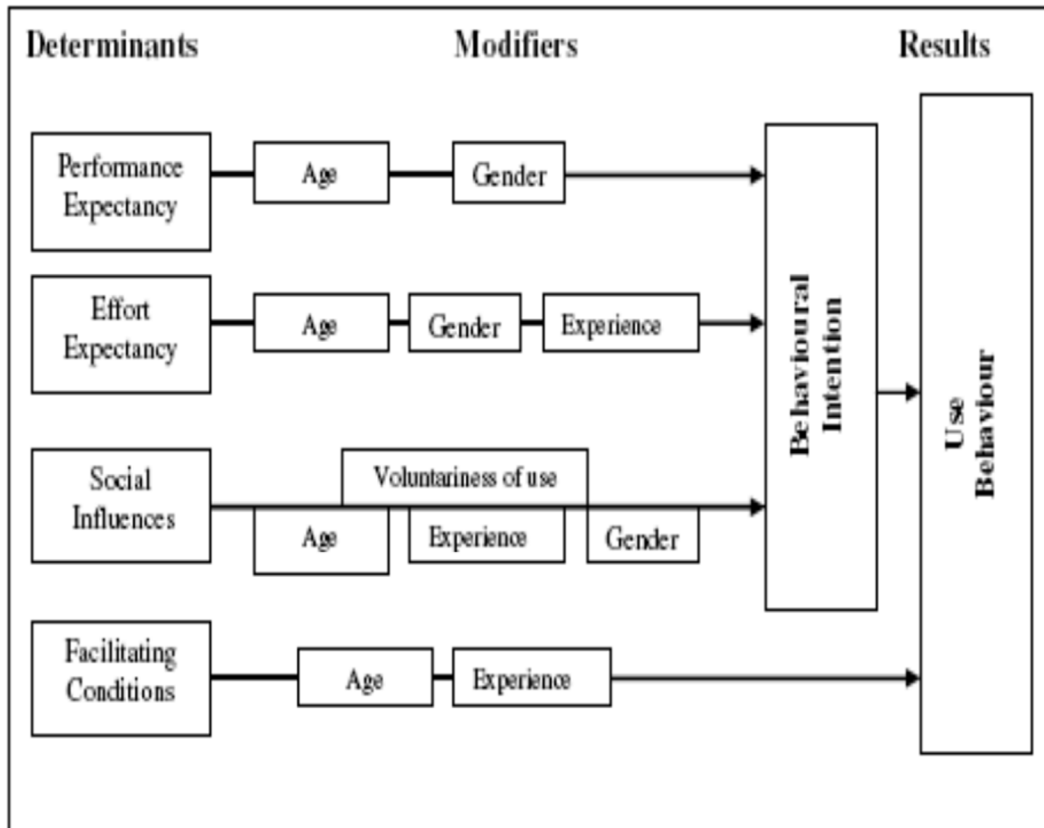
This study however adopts the Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al (2003). This model (UTAUT) has been adopted for the current due to the advantages it has had over the other models. For instance Oye et al (2012) indicates that the Technology Acceptance Model (TAM) is only able to predict the success of technology adoption by 30% and its extension (TAM 2) can only predict 40%. However, according to Oye et al (2012) and Jan et al (2012) the Unified Theory of Acceptance and Use of Technology (UTAUT), which is adopted for this study summarized the variables in the other models into four main effect factors and also four moderating factors. The amalgamations of the effect and moderating factors have increased the efficiency of prediction to 70% (Oye et al, 2012) which is a significant progress over previous model rates. The model is selected because it is an empirically validated model that combines eight major models of technology acceptance and their extensions.

This theory has the aim of explaining the intention of users to use information systems and subsequent behaviour to use the technologies. The Unified Theory of Acceptance and Use of Technology recognize the fundamental factors in acceptance of Information Technologies (IT) as measured by behavioral intention to use the technology and also actual usage of the technology. These factors or determinants of the acceptance and use of new technologies according to the model are four (4), and they include (a) performance expectancy, (b) effort expectancy, (c) social influence and also (d) facilitating conditions (Venkatesh et al, 2003). According to Jan et al (2012), the first three constructs or factors are direct determinants of intention and behaviour to use the technologies and also the fourth one is a direct determinant of use behaviour. Factors including age, gender, voluntariness and experience are hypothesized to moderate the influences of the four vital factors on the intention and behaviour to use the technologies. The four key constructs in the model are defined as follows:

Performances Expectancy was defined as the degree to which individuals have believe that using new technologies will help him or her to achieve improvements in their performance. Effort expectancy is also defined as the degree of ease accompanying the use of the technologies. Social influence was also defined as the degree to which individuals perceived that important others believe they should make use of the new technologies. Facilitating conditions was also defined as the degree to which individuals believe that technical and organizational infrastructure are available

to support the use of the new technologies (Venkatesh et al, 2003). The figure below depicts the Unified Theory of Acceptance and Use of technology.

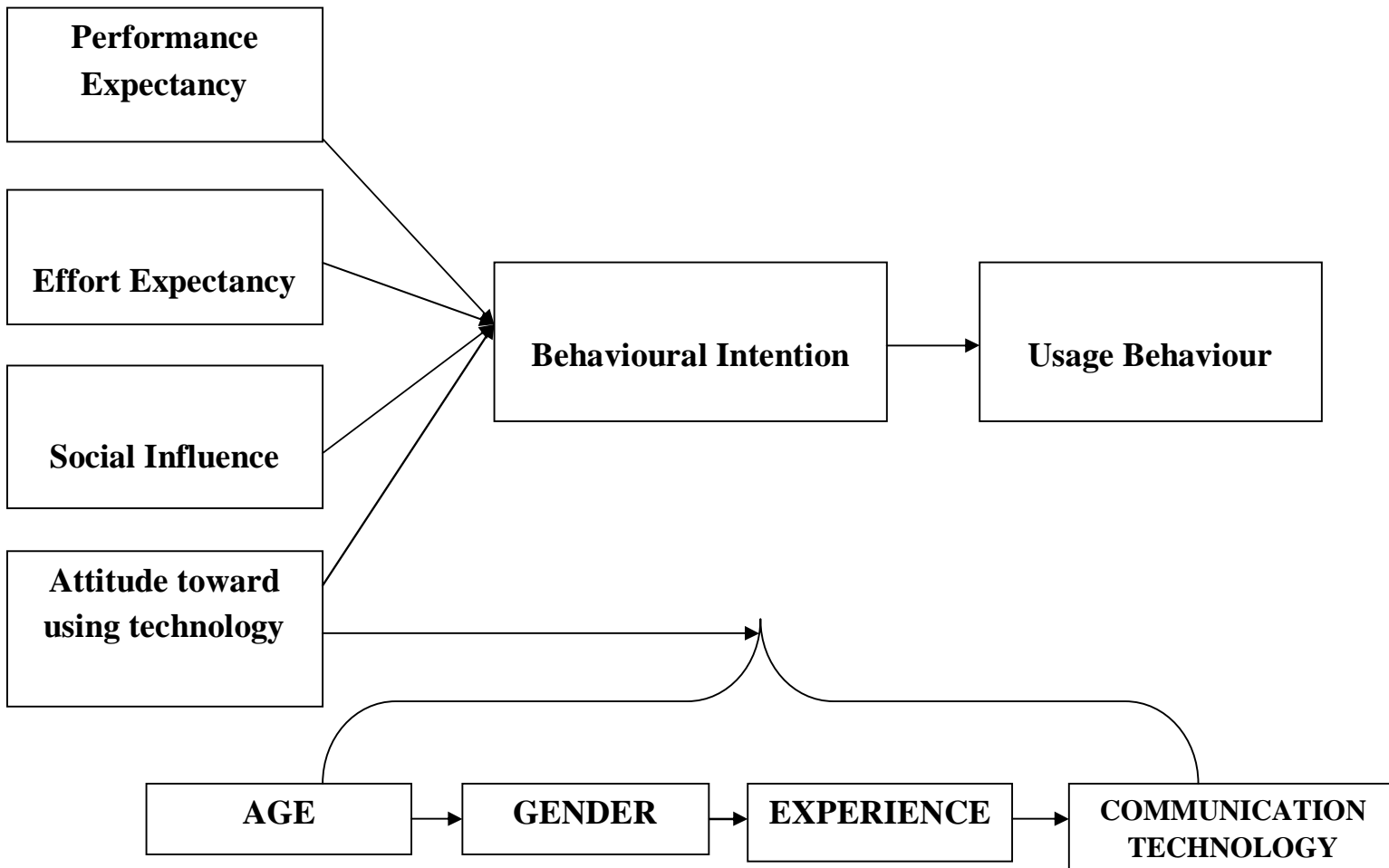
Figure 1: The Unified Theory of Acceptance and Use of Technology (UTAUT)



The UTAUT model however failed to include the potentially significant impact of Communication Technology on the behaviour to adopt technology. The researcher believes that this moderating factor will significantly influence the effects of the core determinants including performance expectancy, social influence, and effort expectancy, on intention and usage. The conceptual model for the study therefore aims to fill the gap in knowledge by adding this missing moderating factor. Communication technology according to Cameron (2006) is defined as the exchanging of information for an IT system to improve the acceptance and use of IT. The figure below illustrates the new theoretical framework with the addition of communication technology as a moderating variable.

Fig 2: The New framework for the Study

## DEPENDENT VARIABLES

**Model**

This study also adopts the Adedokun-Shittu's (2012) Impact Assessment Model as the framework for assessing the impacts of ICT in teaching and learning. This model is made up of four themes consisting of incentives, integration, positive effects, and challenges. To the authors, the model has a cyclic form, which implies that the process of impacts assessment of IT integration in teaching and learning can start from any stage.

The first element of the model, according to Adedokun-Shittu (2012) is the positive effects which include the benefits of ICT, the response of students to ICT, and ICT comfort and compatibility with teaching and learning. This element of the model is derived from the deployment of ICT facilities into teaching and learning. It can also be derived from the usage level and integration of ICT in the curriculum, as well as assessment and pedagogy (Madden et al, 2007). Positive effects include benefits, ICT compatibility or comfort on teaching and learning, and students' response. Benefits, according to Lao and Gonzales (2005) and Madden et al (2007) include ease in teaching

and learning, online interaction between students and staff, access to information and updated resources, and also starting contact with the outside world by way of exchange of academic works. Challenges in the Impact Assessment Model consist of technical issues, constraints, and problems (McGill and Bax, 2007). According to Adedokun-Shittu (2012), problems consist of absenteeism, plagiarism, and over reliance on ICT. Also constraints that were identified in the model are large student populations, insufficient technical staff, inadequate and limited access to facilities, and also poor power supply (McGill and Bax, 2007). Also the technical issues consist of issues of hardware, software and internet services.

Incentives as a component of this model comprise of four issues including accessibility, training, motivation, and adequacy. These incentives according to Adedokun-Shittu (2012) need to produce some effects to be felt in the area of integration of information and communication technology into teaching and learning before the distribution of ICT facilities in higher education institutes could be seen as useful.

Integration is the last component of the Technology Assessment Model. According to the model, integration of IT in education can be done in some areas such as teaching and learning, assessment, curriculum, and also a blend of the technology based teaching and learning methods with the traditional methods (Adedokun-Shittu, 2012). This study however only concentrated on the integration of ICT into teaching and learning.

### **Empirical Review**

Studies have focused on the adoption and use of new technologies in teaching and learning. In Australia, Loong (2003) conducted a research with the goal of investigating the use of internet by teachers. He surveyed a total of 63 teachers, and the findings showed that the teachers make use of the internet for the purpose of finding information including articles about research, and also for data for students to analyze. His study, however observed no significant relationship between use of new technologies and factors such as competency, and years of teaching experience. The study also failed to investigate the impact of using internet on the teaching process. Forgasz (2004) similarly conducted a study on the use of computers in mathematics classrooms in Victoria by teacher with 7 to 10 years of experience, and factors that influence the use of computers. It was therefore found that most teachers had the confidence to use computers for teaching. The study found that most of the teachers had used computers in their teaching process, though not frequent. Another significant finding was that many of the teachers had taken part in professional development in computer education, but then most of them wanted additional training (Forgasz, 2002). The study however failed to analyze the possible challenges or factors that hinder the use of computers in teaching. Keong et al (2005) conducted an investigation of the use of technology, and also focused on the barriers to the integration of ICT into the teaching. The findings of the study indicate a low level of technology used by teachers in their teaching practice. It was found that majority (71.1%) of the teachers used technology for only word processing, followed by spreadsheets (51.2%), internet activity (44.1%), search engines (44.1%), and presentation software (36.9%) (Keong et al, 2005). It was found that 39.6% of the 111 teachers surveyed as respondents indicated that they had not used technologies in their teaching before, with ( 32.1%) indicating that they had used new technologies infrequently. Only (5.7%) indicated that they had fully integrated technologies into their teaching programs (Keong et al, 2005). On the barriers to the integration of ICT into teaching, Keong et al (2005) found that factors such as lack of competence, low confidence, lack of training and technical support were the barriers the use of ICT in mathematics teaching by the teachers. The impacts of ICT on teaching were however not studied.



On how ICT are being used for educational purpose, Becker (2001) found that, generally, teachers used ICT only to support their existing practices and also communication rather than to involve the students in learning that encompasses higher order thinking.

On factors that affect the use of ICT in education, Chigona and Chigona (2010) conducted interview with 14 educators to establish the factors influencing the use of technology for teaching. It was revealed in their findings that there was low integration of technology in the curriculum delivery. It was revealed in the analysis that factors such as low level of ICT literacy on the part of the educators, and inadequate technical support with regard to the use of technologies led to the inadequate integration of information technologies in education in South Africa. The study however did not find the influence of factors such as professional training, accessibility, and attitude of the teachers on the integration of ICT in teaching.

In summary, on the adoption of ICT in higher education, it has been observed that not much studies or investigations has been one in Africa on the factors that influence the adoption of ICT in teaching and learning, impacts of the integration, as well as barriers to the integration of ICT in higher education in Africa, which Ghana is not different. The study therefore aims to fill the gap by studying on the adoption and use of ICT in teaching and learning in Ghanaian Universities.

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