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The Impact of ICT on Teaching and Learning in Colleges of Education: The Dambai College of Education Issue

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Abstract

The frightening effect of the increasing spate of poor teaching and learning in recent times underscores management of tertiary institutions, tutors and students concern for the integration of ICT into Colleges of Education. The study specifically aimed at evaluating the benefit of various ICT tools used by Colleges of Education and examines the challenges Colleges of Education face in terms of implementing ICT in teaching and learning. Another objective is to determine the role of tutors, administrators and students in integrating ICT into Colleges of Education now tertiary institutions. The research was conducted on tutors, administrators and students of Dambai College of Education, Dambai and information was gathered through administration of structured questionnaires. Three null hypotheses were postulated and tested at 0.05 level of significance. Results from the study indicated that there is a positively high impact of ICT on teaching and learning in tertiary institutions in the sense that, broadband is a major factor in increasing collaboration between teachers; Interactive whiteboards make a difference to aspects of classroom interaction. The findings also presented challenges, where students need to access computers in an easy way; recurrent technical problems; and the use of software applications require skills that have to be gotten. It was then recommended based on the findings of the study that, policy makers should include new competencies in the curricula and in assessment schemes, implement new forms of continuous professional development in a workplace environment and also motivate both tutors and students to use ICT.

Keywords: information system in education, teaching and learning, importance of ICT

1.0 Introduction

In the beginning of the implementation of ICT, there were optimistic beliefs about profound changes in teaching and learning practices, among both educational researchers and policy-makers. Although there have been several development projects, experiment and pilot studies on using ICT in Colleges of Education, the studies about long-term and unending effect of ICT is still few (Kozma, 2003; Venetzky & Davies, 2001). Although 15-20 year experience in classroom and tertiary institution practices, as well as research evidence show that something changes in education when ICT is used (Bayraktar, 2000-2001; Korte Husing, 2007; Kozma, 2003) but the content, the direction and the depth of the change still under discussion and remain issues for investigation. The effects of ICT have often regarded as a positive change, and as if change always brings improvement. However, 'change' and 'improvement' are not synonyms, and the changes, when using ICT, are not merely beneficial or expected; similarly as Rogers (1995) depicts unexpected consequences of innovations. In this study, the theme was investigated by using different points of view of the main actors in Colleges of Education now tertiary institutions, i.e. tutors and students. In addition, various research methods were applied based on how well they met the research topic and objectives. This study refers to the ecological approach, which compares tertiary institution to an ecological system "to holistically capture the dynamic nature of technology use in tertiary institution settings" (Zhao, Lei & Frank, 2006). The concept 'affordance' (Gibson, 1979) which has an ecological background; Basalla (1987) the investigated the history of technology by using ecology as a metaphor. Later on Nardi and O'Day (1999) investigated the new forms of technology with an ecological framework. The need and importance of investigating 'tertiary institution', ICT holistically, and the approach is a fruitful tool for understanding the dissemination of technology. The significance of education in the growth of every country cannot be underestimated. Tertiary education especially Colleges of Education have over the years become the core of every economy's growth. However, people have become disturbed about the falling standards of teacher education in the country. One of the contributing factors is poor teaching. Teaching is core the success of education and the role of information and communications technology in adding teaching in the tertiary education is very significant. There has always been debate among educators on how the technology should be used and what improvements in teaching could be expected. Initially microchip or integrated circuit (IC) computers were used to teach programming but the development of the microprocessor in the early 70's saw the introduction of affordable microcomputers into tertiary institutions at a rapid rate. Computers and applications of technology become more pervasive in society which led to a concern about the need for computing skills in everyday life.

2.0 Dambai College of Education, Dambai, Oti Region – Ghana

In the year 1973, it became apparent that there was the need to establish a Teacher Training College (TTC) in the northern-most part of the Volta Region to train teachers for the area and the nation at large. The first meeting on that issue was held at Banka Local Authority Primary School, Banka- Dambai. In attendance were the then Minister of Education, Col.E.O. Nyanteh, the Volta Regional Director of Education- Mr. Akoto Ampaw, Mr. Okyere Henaku, Chiefs and Elders from Dormabin and Tokurano and members of the Dambai Town Development Committee. The aim was to absorb the qualified students from the Krachi Secondary and Nkwanta Secondary Schools to train as teachers for that part of the region so as to minimize the setback in education created by the lack of qualified teachers. In the year 1974, a final decision was reached in line with the exact location of the College. The Chairman of the Town Development Committee (TDC), the late Opanyin Kwame Awuranyi empowered his Vice Chairman Mr. Godfried Kwaku Ayesu to spearhead affairs regarding the establishment process. In earlier deliberations, Banka, a suburb of Dambai, was proposed to be the site for the college to be named 'Banka Teacher Training College'.This decision was later cancelled and present site chosen. The Minister of Education, Col. E.O. Nyanteh and the late Akoto Ampaw visited the second time to take the final decision on the site of the College. Before they departed, they promised the TDC of a training college for the people of Dambai to be known and called Dambai Training College (DATCO).

The College was officially opened on 4th October 1974 as 'Dambai Teacher Training College' with thirty-five (35) men as first students. The initial staff included Messrs G.N.Busumprah from Ada, Principal; E.K. Dogbey from Nkonya - Vice Principal; Nana Kanya from Bejamse- Agriculture Science Master, and Mr. E.K.Agbo,a tutor and Senior House Master. In the second year, the college changed to a co-educational institution admitting for the first time, twenty- four (24) women. With the passage of the Colleges of Education Act, Act 847 in 2012, the College is now a tertiary educational institution with initial affiliation to University of Cape Coast. In the current dispensation of transitional arrangement in the affiliation of Colleges to the five government teaching universities in the country, the College has been affiliated to the University for Development Studies. The College offers Diploma in Basic Education (Regular with last batch graduating in 2020), 4-Bachelor of Education in Basic Education, and Post – Diploma for Sandwich students. Currently, the College has the following teaching departments which includes; Department of Mathematics/ICT, Department of Social Sciences, Languages Department, Department of Pre-vocational Skills, Department of Education Studies, Department of Science. The College has been led by 14 Principals since its inception with the current being Mrs. Benedicta Awusi Atiku.

3.0 Defining Tertiary Education

Tertiary education broadly refers to all post-secondary education, including but not limited to Colleges of Education. Colleges of Education are clearly a key part of all tertiary systems, but the diverse and growing set of public and private tertiary institutions in every country colleges, technical training institutes, community colleges, nursing schools, research laboratories, centers of excellence, distance learning centers, and many more forms a network of institutions that support the production of the higher-order capacity necessary for development. Among the various definitions given to tertiary education and information and communication technology by various researchers including the following.

4.0 General use of ICT

The greatest impact is found in relation to tutors who are experienced users and who from the start had already come far with the integration of ICT in their teaching. Tutors who perceive a highly positive impact of ICT use ICT in the most project-oriented, collaborative and experimental way (Ramboll Management, 2006). With ICT, the tutor tends to become more of an advisor, critical dialogue partner and leader for specific subject domains (ITU, 2004). The impact of ICT is highly dependent on how it is used. The impact of a specific ICT application or device depends on the capacity of the tutor to exploit it efficiently for pedagogical purposes. Factors beyond the tutor's control influence ICT uptake, e.g. institutional cultures, leadership, the curriculum and assessment (Ramboll Management, 2005 and 2006). Tutors do not yet exploit the creative potential of ICT and engage students more actively in the production of knowledge. Tutors' use of ICT for communication with and between students is still in its infancy. ICT is not fully utilized to create learning environments where students are more actively engaged in the creation of knowledge rather than just being passive consumers. The researcher also found more transformative use of ICT where it was used within a curriculum context, more "built in" than "bolt on". Here again simple distinction between "built in" or "bolt on" does not tell the whole story: Three aspects need to be separated according to the experience of the Dutch Inspectorate gained within the ERNIST ICT tertiary institution portraits:

> *The affordances of technology: Does it possess characteristics that enable transformation?*
> *The relationship of the technology use with the curriculum.*
> *The pedagogy that tutors use. There have been many examples where the use of the technology was innovative, interesting and transformative, but completely 'bolt*

on'. In other cases the use of simple technology was really 'built in' but in a traditional pedagogy.

The ICT Test Bed evaluation by Underwood (2006) provides further evidence that tutors use ICT to support existing pedagogies thus, new technologies that provide a good fit with existing practices, such as interactive whiteboards are first to be embedded. However, others like video conferencing, digital video and virtual learning environments are now being incorporated providing evidence of ongoing learning by the workforce. Training needs to continue to support innovative pedagogy.

5.0 Tutors' ICT Usage

The integration of ICT can help revitalize tutors and students by reducing the amount of effort they used to put in either teaching or learning. This can help to improve and develop the quality of education by providing curricular support in difficult subject areas. To achieve these objectives, tutors need to be involved in collaborative projects and development of intervention change strategies, which would include teaching partnerships with ICT as a tool. Tutors' attitudes are major predictors of the use of new technologies in instructional settings. Tutors' attitudes toward ICT shape not only their own ICT experiences, but also the experiences of the students they teach. According to Zhao and Cziko (2001), three conditions are necessary for tutors to introduce ICT into their classrooms: tutors should believe in the effectiveness of technology, tutors should believe that the use of technology will not cause any disturbances, and finally tutors should believe that they have control over technology. Demetriadis et al (2003) reached similar conclusions in their research study that, training efforts are generally welcomed by tutors nevertheless, consistent support and extensive training is necessary in order for them to consider themselves able to integrate ICT in their teaching methodologies. According to Rogers (1995), one of the major factors affecting people's attitudes toward a new technology is related to the features of the technology itself. Rogers points out five basic features of technology that affect its acceptance and subsequent adoption: relative advantage, compatibility, complexity, observability, and trialibility. Thus, a new technology will be increasingly diffused if potential adopters perceive that the innovation.

5.1 Tutor Characteristics and the use of ICT

The individual tutor is usually the one who makes the decisions on practical concerning technology. It is obvious that tutors use such tools, and one of the cases investigated is briefly presented. The computer-supported collaboration in Lansimaki Tertiary institution practices that support their beliefs about “good learning” and tools that fit

easily into the existing conceptual and social organization of classroom. As Marx, Bluemenfeld, Krajcik and Soloway (1998) noticed, the use of technology tools mainly maintains the existing Culture, and they have little potential for transforming tutors' work, or the nature of teaching and learning in classrooms. In the studies of Hakkarainen et al. (2001) and Moseley et al. (1999), it was found that there was a relationship between tutors' pedagogical conceptions and the type of instructional use of ICT. Tutors who intensively used ICT emphasized the importance of using ICT for facilitating students' participation in progressive inquiry, collaborative learning and the learners' active engagement in the knowledge formation process, but as Lin (2001) says the relationship between tutors 'conceptions and practice, are complex, not clear or simple.

5.2 Significance of the project

The study is significant because it provides administrator with the necessary facts to recognize the important of using information communication technology to teaching and learning and also how to invest in it. The students would also understand the various ICT tools available and the anticipated challenges as well as how they can be improved. This research work is meant to give a comprehensive insight into the impact of ICT in teacher education in Ghana, with respect to Dambai College of Education. It will also serve as a reference material for student of various institutions, especially those undertaking computer related programs thereby allowing students to produce high quality multimedia products and also help in the spreading of technology education at various levels and different disciplines in Ghana's tertiary institutions. It will again help students to appreciate web resources which they use to arrive at answers to their problems and help tutors to update and improve of their skills. Finding of this research work will be of benefit to the academia, educational policy makers, tutors, administrators and students. Again as a source of references for future work and direct attention toward the ICT aspect of education.

6.0 Methodology

6.1 Research Design

Research design as defined by Parahoo (1997) is a plan that describes how, when and where data are to be collected and analyzed. Grounded Theory (GT) is the research methodology employed for this study. GT, introduced by Glaser & Strauss (1967) in their book "To Generate or Discover a Theory", is one of the ever-improving qualitative research strategies. Grounded Theory talks about the discovery of theory from data systematically obtained from social research. Grounded theory is a methodology intended for developing inductive theories that are grounded in steadily gathered and

analyzed data. Data collection, analysis, interpretation, and theory development are done iteratively and interdependently.

6.2 Population and Sample

According to McDaniel & Gates (2006) population is the entire group of people about whom the researcher needs to obtain information. Zikmund (2007) asserts that a population or universe is any complete group that shares common characteristic. The same source also put a sample as a subset or some part of the population. Population in this study refers to all the tutors, administrators and students that formed part of the respondents to the research at Dambai College of Education.

6.3 Population

The study was limited to a single case (institution) in other to develop detailed and intensive knowledge about the institution. The researcher's target population was Dambai College of Education. Response from tutors, administrators, and students of Dambai College of Education, in respect of the study was required. However time constraints and prohibitive cost necessitated the use of selected sample. Specifically, one hundred fifty (150) students where select from the total population of seven hundred students in the college, thirty (30) tutors and ten (10) from the administration. However, random sampling was used in selecting the participants.

6.4 Research Instrument for Data Collection.

Structured questionnaire was the instrument used for data collection. The instrument was designed to gather both quantitative and qualitative data. It also used open and closed-ended questions to illicit the appropriate responses to meet the objective of the study. Questionnaire is define by Oppenheim (2001) as important instrument of research, a tool for data collection and as such may include a variety of research methods. The main decisions to make in questionnaire design relate to the type of questions to be included and the overall format of the questionnaire Hussey and Hussey (1997).

6.5 Method of Data Analysis

To analyze data, researcher coded them so that they could be broken down, conceptualized, put together and presented in an understandable manner. Qualitative and Quantitative data are analyzed non-statistically and statistically respectively. Quantitative data are statistically analyzed and expressed. Presented or measured in numbers. On the other hand, data that cannot be statistically analyzed and difficult to measure are often called qualitative. The researcher applied Chi-Square test to examine

the relationship between ICT and teaching and learning. A table figure less than the chi-square figure indicates a positive relationship, and a visa versa indicates a no relationship.

7. Results

7.1 The Impact of ICT tools used in Colleges of Education

From the quantitative analysis, it was proven that there was a relationship between the use of ICT and teaching and learning. From the literature review, there is a consensus that use of Information and Communication Technology will enhance the quality of teaching and learning process (Paul, 2002; Papert, 1987; Voogt & Pelgrum, 2005; Watson, 2001; Well-Strand, 1991). Tutors who perceive a highly positive impact of ICT use ICT in the most project-oriented, collaborative and experimental way (Ramboll Management, 2006). With ICT, the tutor tends to become more of an advisor, critical dialogue partner and leader for specific subject domains (ITU, 2004). Tutors do not yet exploit the creative potential of ICT and engage students more actively in the production of knowledge. Tutors' use of ICT for communication with and between students is still in its infancy.

7.2 How challenges of ICT usage affect Teaching and learning

In analyzing the challenging factors, it can be seen that all the respondents were in agreement of the challenges faced in integrating ICT into tertiary institutions. This implies that majority of the respondents believe that the cost of ICT tool is a great challenge. In other words, the Colleges of Education management does not provide all the ICT tools because they think they are expensive even though students are charged to pay for them. Again, most of the respondents believe that the reason why ICT tools are not fully used is because the faculty members do not have the technical know-how to use the tools just as how Lamer and Timberlake (1995) found that tutors were worried about showing their students that they did not know how to use the equipment, and that it was the tutors who experienced this kind of anxiety who were less willing and /or able to make use of computers in their teaching. In addition, students' attitude and expectation of their tutors’ competence in ICT are likely to contribute to this tutor anxiety. This notion of tutors experiencing a fear of ICT is also supported by Russell and Bradley (1997), who refer to a 'cyber phobia' that exists in some tutors which can be a genuine concern for them, and that these concerns deserve serious attention.

Table 5.1 Demographic Factor

		Tutors		Admin		Student	
Variable Response		Freq	Per	Freq	Per	Freq	Per
Gender	**(Male)**	26	86.67	8	80.00	100	62.86
	(Female)	4	13.33	2	20.00	50	37.14
Age	**18-25**	3	10.00	0	0.00	36	51.43
years		12	40.00	2	20.00	20	28.57
	26-35 years	10	33.33	3	30.00	10	14.29
	36-45 years	5	16.67	5	50.00	4	5.71
	46-55 years						
Years Served	**1-10**	21	70.00	6	60.00	0	0.00
	11-20	9	30.00	4	40.00	0	0.00
	21-30	0	0.00	0	0.00	0	0.00
	31-40	0	0.00	0	0.00	0	0.00
Highest	**(SHC)**	0	0.00	7	0.00	0	0.00
Academic		0	0.00	3	25.00	0	0.00
(Diploma)		0	0.00	3	35.00	0	0.00
Qualification	**(HND)**	4	13.33	0	15.00	0	0.00
	Degree	26	86.67	3	15.00	0	0.00
	Master	0	0.00	2	10.00	0	0.00
	Doctorate	0	0.00	0	0.00	0	0.00
	Professor						
Programme study							
Business							42.86
Administrator		0	0.00	0	30		11.43
Development Studies		0	0.00	0	8		17.14
Computer science		0	0.00	0	12		8.57
Communication		0	0.00	0	6		

Source: Field data, 2018

Table 5. 1: Tutors respond to ICT usage in Dambai College of Education

Radio cassette recorder	0	0	0	39
Video camera	0	0	0	30
Learning management system	25	5	0	30
Website interactive tools	27	3	0	30
intranet	20	5	5	30
Grade records software	27	3	0	30
Television /video conferencing	0	0	30	30
Internet / web environment	25	5	0	30
Multimedia computers	25	5	0	30
Projectors	22	5	3	30
V1	Frequently	Sometime	Never	30
	1	2	3	Total number

8.0 Conclusion

Technology has the potential to draw out teachers from the isolation of classrooms as well as students and administrators. Some tutors have through indifference or intellectual incompetence or through circumstances, such as lack of time and lack of opportunities because of remote locations, lack of resources, etc. They have accepted a role confining their professional practice to lecture rooms. Their isolation them from participating in activities that could have improved their own practice. They also had no impact on or contribution to the larger educational community. To these tutors, technology offers both the tools and opportunities to draw a personal road map that would bring them a better practice and to becoming an active contributor to growth of new knowledge. The research endeavor might have made a considerable stride in the understanding of the impact of ICT on teacher preparation towards producing a new caliber teachers whose professional ability are very essential in a developing economy. Finally, teacher training institutions, professional development tertiary institutions, professional societies and public educational agencies must continue to identify study and disseminate examples of effective technology integration that answer professional development needs.

9.0 Recommendation

The purpose of this paper was to find out the impact of information communication technology on teaching and learning in tertiary institutions. Based on the findings of the study, the following are recommended to policy makers and tertiary institutions.

9.1 Policy Makers

a) Plan for transformation and for ICT: support the transformation process and management of change, of which ICT is an enabler and amplifier. The key word is transformation. If the organizational and institutional context does not support new working methods, educational practices will not change. Taking into account that most teachers embrace new technologies in a step by step process, systematically but slowly any change should be supplemented by process management and connected to realistic vision.

b) Include new competencies in the curricula and in assessment schemes: Most of the reviewed studies show that ICT impact on competency development specially team work, independent learning and higher order thinking skills – that are not yet recognized by any education system. These competencies should be formally included in the curricula and ways of assessing them explored. They are important outcomes of a new and changed educational context.

c) Motivate and reward teachers to use ICT: As the survey has shown, in addition to access the infrastructure and content and having the requisite skills, teachers' motivation is a critical factor in ICT adoption, and this is often neglected. Policies in this area should include measures raising the confidence levels of teachers, sufficient on-site support, appropriate in-service and initial teacher training in ICT, but also means of incentivizing recognizing and rewarding the use of ICT (such as appraisal schemes, making good ICT use part of career paths or time benefits for teachers engaged in ICT related projects.

d) Transform positive attitudes towards ICT into efficient widespread practice: Tertiary institutions should capitalize on positive attitudes. To achieve greater impact it is important that teachers underpin ICT use with a pedagogical approach. There seems to be a mismatch between the potential of ICT for learning and the actual teaching approach of teachers. The majority of teachers think that ICT can improve learning outcomes, but they think that ICT has little or on their impact on their methodology. This could be achieved by hands on practical training, providing easy to use ICT based materials, peer learning and peer sharing of experiences, securing reliable infrastructure, triggering teachers knowledge in their subject, pupil motivation, and easy access to research findings. Teachers join on-line study group within and outside the tertiary institution to

explore new and better ways of teaching and to share lesson plans, web-based resources and experiences with web-based activities.

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