INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AND TEACHING IN TERTIARY INSTITUTIONS

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Introduction

Beginning teachers rarely make smooth transition into teaching. Often they are hired at the last moment left isolated in their classrooms and given little help - a clear example of "sink or swim" attitude towards those newly hired. Consequently, attrition rates among new teachers often are five times higher than among experienced teachers (p. 33).

This quotation by Moskowitz and Stephens (1997) cited in the archived information of the United States Department of Education (1998) is an eloquent testimony to the need for beginning teachers/lecturers to be inducted into the teaching/lecturing profession. This is to ensure that the new lecturers get acculturated into the universe of the school system. The document further emphasized that schools and universities should focus on assisting and supporting new teachers in the first three years of their entry into the profession. This is based on the philosophical frame of reference that induction programmes would provide new lecturers with the necessary models and tools for beginning their teaching career, and also the mentors and support groups to guide them through curriculum planning. Furthermore, induction of new lecturers will provide the necessary platform for specific guidance aimed at assisting new lecturers meet the required performance standard.
Empirical studies have established that schools achieve greater success when newly-recruited teachers are inducted into the school system. Brewster and Railsback (2001) in their review concluded that schools that provided high level of support for beginning teachers retained more teachers, recorded higher students' achievement and test scores, higher quality teaching and increased teacher effectiveness. Also, there is stronger connection among teaching staff leading to a more purposeful and positive learning environment. New teachers also benefit as they develop larger and more sophisticated repertoire of teaching strategies and stronger classroom management skills. Furthermore, induction allows the teacher to develop ability to deal with behaviour and discipline problems more effectively and to have increased job satisfaction, lower stress, anxiety and frustration. Induction further gives opportunities for veteran educators to revisit and reflect on teaching practices and philosophy. It should be stressed that proper induction of new lecturers is essential if the organization of the University is to be efficient.

It is widely acknowledged that ICT can be used to improve the quality of teaching and learning in any tertiary institution. The prevalence and rapid development of information and communication technologies (ICTs) has transformed human society from the information technology age to the knowledge age (Galbreath, 2000). In fact, ICTs are becoming natural part of man's daily life; thus their use in education by staff (academic and non-academic) and students is becoming a necessity. Certainly, the present and future academic global community will utilise ICTs to a high degree. This has made it imperative that lecturers not only need to use ICTs, but they need to become comfortable with using ICTs. This is to ensure that they participate fully in the life of the contemporary university and to accomplish their everyday task.

Information and Communication Technology (ICT) is defined as computer based tools used by people to work with the information and communication processing needs of an organisation. It encompasses the computer hardware and software, the network and several other devices (video, audio, photography camera, etc.) that convert information (text), images, sound, motion, and so on into common digital form (Milken Exchange on Education Technology, 1999). It is an eclectic application of
computing, communication, telecommunication and satellite technology (Yusuf, 2000). Lecturers in tertiary institutions, particularly in the university system are involved basically in two things: teaching and research, with auxiliary administrative assignments. ICTs have the potentials of not only ensuring effectiveness and efficiency in these two areas (teaching and learning); they have the potentials of easing the administrative duties. These applications are further elucidated below.

**ICTs in Teaching/Learning Process in a University System**

Information and communication technologies offer several opportunities in education. First, they can be used as a means of preparing the current generation of students for future workplace, that is, providing tools for tomorrow's practices. This is underscored in the foreword written by Lemke (1999) in the Milken Exchange on Education Technology commissioned report. Lemke noted inter alia "Today's students live in a global knowledge based age, and they deserve teachers whose practice embraces the best that technology can bring to learning". Through teachers' use of technology (ICTs) students can be given the opportunities of becoming a part of the knowledge age and skills imparted to the young people in an increasingly complex world. Lecturers will need to use ICTs in order to equip tomorrow's employees and customers with the requisite competence and knowledge to use ICTs within their work (Davis & Tearle, 1999).

Second, ICTs can make the school more efficient or more productive, engendering variety of tools to support and facilitate teacher's professional activities. Finally, ICTs are seen as means to reform and innovate teaching, that is, to stimulate learners to learn actively and independently in a self directed way and/or in collaboration with others (Kirschner & Woperies, 2003). It can be deduced that ICTs can be used to enhance learning and teaching within a university system.

Collis and Moonen (2001) made a distinction in literature between learning about ICT and learning with ICT and through ICT. These distinctions are important if lecturers are to integrate ICTs in their instructional delivery process. The first stage of ICT application in school is teaching about ICT which is called *topicality*, that is, ICT is the topic. A higher level to that development is teaching with ICT or through ICT, that
is, the presentation and distribution of instructional content through web environment (e-teaching) or systems offering an integrated range of tools (stand-alone computer instruction, CD ROM, among others) to support learning and communication.

Further classifications of the outcomes expected of the teacher in using ICTs to enhance teaching were made by Sefinger and Austin (2003), as personal, subject and teaching competencies. Personal competencies entail the skills, knowledge and understanding of when, when not and how to use ICT effectively in teaching a particular subject, that is, skills in functions, operation, use and capability of ICT which supports teaching. Subject competence is defined as knowledge of the functions, operations use and features of ICT and how ICT can be used to support teaching and learning. Additional competence includes knowledge of subject specific courseware and the way in which information can be handled through ICT. Teaching competency deals with the ability to plan, prepare, teach, assess and evaluate lessons in which ICT could be seen to be supporting a range of suitable learning outcomes.

Kirschner and Davis (2003) summarised the competencies required by teacher/lecturer in ICT application in education. These are that teachers become competent to make personal use of ICT; competent masters of a range of educational paradigms that make use of ICT; sufficiently competent to make use of ICT as mind tools; competent to make use of ICT as a tool for teaching; competent in mastering a range of assessment paradigms which make use of ICT; competency in understanding the policy dimensions of the use of ICT for teaching and learning.

It is not enough to get information and communication technology into the University system without its proper integration in the delivery of quality instruction. Even in advanced countries, knowledge of the potentials of ICT and competence in its use do not guarantee their use with students. This is exemplified in Lemke's assertion (Information Technology Underused in Education, 2003) that

There is inconsistency between what teacher-training faculties know about technology and what they are training teachers to do in their courses. We can be confident that there is more
technology awareness and experience out there, but it is not being used in teacher training to the extent nor in the manner we think necessary.  

Milken Exchange on Education Technology (1999) identified three major ways of using ICT for teaching and learning. These are information technology (IT) assisted learning, technology as a tool and computer and information science. Information Technology (IT) assisted learning was divided into (i) computer-assisted learning, which is the interaction between a student and a computer system designed to help the students learn (drill and practice, tutorials, simulations and virtual realities), (ii) Computer assisted research implies where ICT is used as an aid to doing library and empirical research. This is enhanced through the growth of World Wide Web which has created virtual library that can only be accessed by the technologically literate, (iii) Distance learning, which is the use of telecommunications, designed to facilitate students' learning through e-mail, interactive web sites and two-way audio/video teleconferencing.

Technology as a tool involves the use of a large array of hardware and software: word processors, graphic packages; digital camera, presentation applications, databases, and spreadsheet, among others. These hardware and software do not have limited educational purpose, but they are designed to help people extend their abilities to do work. Digital science probes, for instance, are more specialised, Computer and information science deal with speciality in computer as an area of study for students with particular interests in technology. Information and Communication Technology (ICT) should be used as a pedagogically powerful tool for the construction and modelling of knowledge.

In spite of ICT recognised potentials, their integration in teaching learning process will be dependent on teachers' knowledge, competence and willingness to integrate ICT in their teaching. Empirical findings have indicated that even teachers who have competence in the use of ICT do not integrate them in their teaching. For instance, Moursund and Bielefeldt's (1999) report on new teachers' use of information technology indicated that: - (i) the technology skills of teacher education faculty were comparable to the skills of the student they teach; and that (ii) most teacher educators did not model the use of technology in their teaching.
Thus, new lecturers need to be inducted not only to be competent in using ICT but also in integrating them in instruction.

In using ICTs, new lecturers need to be competent in the use of a variety of software, particularly, software that have specific application in various disciplines. For instance, apart from word processing, data processing, spreadsheet, and so on, that are important for all lecturers, lecturers in the social sciences, statistics, education, among others, should be able to use statistical packages (e.g. SPSS) to enhance their output.

Also, lecturers in the Faculty of Engineering need to be competent in the use of design packages (e.g. AutoCAD). In the delivery of instruction, computer LCD display projector becomes relevant because the popularity of computer to generate presentation is growing daily. There is the need for new lecturers to get prepared for professional presentation ahead of time. A new lecturer must consider the following when using the LCD display projector.

1. Check the environment to ensure that all the facilities needed for the use of the projector in the environment are working and they are available for use. Laskowski (1997) added the following:
   2. Read the projector’s manual on its proper operation because projectors differ.
   3. Practice setting up the equipment several times. This is to ensure that the technicalities involved are mastered.
   4. Set up well in advance. Allow yourself adequate time to set up the computer and the LCD projector and check any last minute details.
   5. Check the LCD projector bulb life: LCD projectors bulb or any projector bulb does have limited life. Check and make sure the bulb you will buy is not close to the end of its life.
   6. Bring spare bulb and cable: - Carry spare bulb with you and make sure you know how to properly change the bulb. Use glove or cloth because hot glass looks like cold ones.
   7. Check the presentation for colour combinations. Take some time to check out actual presentation for the colour combination. Some colour combinations do not match.
8. Check the font size you are using: Inappropriate font can be debilitating for a lecture. Ensure that you use the proper text size for the distance or the farthest viewer.

**ICT and Research in the University System**

The cliche "publish or perish" is quite popular in the university setting. This phrase underscores the importance attached to research in any university. In fact, it is the major index of an academic staff quality and the determinant of advancement. Research is a systematic attempt to find solutions to problems or questions. It may be targeted at describing events, predicting events or controlling events (WAIER, 1991). The value of ICTs cannot be over-emphasised in research design and implementation of experimental and descriptive studies, statistical analysis, data production and storage, and dissemination of research information. Colwell (2000) succinctly pointed out the potential of ICTs in research when she noted that:

*No field of research will be left untouched by the current explosion of information and information technologies. Indeed, science used to be composed of two endeavours – theory and experiment – but today it has a third component: computer simulation which links the other two* (p. 6)

ICTs can guide lecturers into new frontiers in basic and fundamental research. Specific areas of relevance of ICT to lecturers in the areas of research are enumerated below. First, information and communication with one another through e-mail, mail lists, newsgroups and chat rooms. These ICT resources enable communication between scholars as they can post research, assignments, book or journal lists, references to on-line materials. Problems and solutions can be discussed between researchers and scholars can react to the work of others in an electronic manuscript. ICTs is further provide greater opportunities for research collaboration and networking among scholars spread throughout the world, thus national and international dimension of research issues can be studied as they can allow for communication with peers and experts around the world. Through collaborative knowledge building, studies can spotlight transnational trend analysis through human and instrumentation collaboration.
Second, ICTs can facilitate Research in any discipline as they provide quicker and easier access to more extensive and current information through digital libraries that provide digitized full-text resources to learners and researchers. Others are the electronic list - a directory of scholarly and professional e-conferences containing relevant topics and articles relevant to researchers, and electronic reference desks or virtual libraries. Others include electronic journal and catalogues and image database. Other Internet resources, gopher and CD-ROM can provide a researcher with current, in depth, firsthand information.

Thirdly, ICT can be used to do complex mathematical and statistical calculations which are important in research. They can be used for data manipulation and analysis. The ICTs will facilitate the completion of data on time, performance of statistical analysis. In fact, complex statistical analyses are not only performed instantaneously but also more accurately than possible manually.

The ICTs also provide researchers with ready avenue for the dissemination of research reports and findings. Publication outlets include e-books, e-journals or through personal web-sites. ICTs provide ready means for production of research reports. Furthermore, digital video, audio, software simulation, synchronous and asynchronous chats and interactive software, among others, bring dynamism in describing a method or reporting result (Middleton, 2000).

Conclusions

Information and communication technologies (ICTs) offer innumerable benefits in enriching the quality and quantity of learning in universities. Despite the prevalent nature of ICT in virtually every aspect of human endeavours, they have not been widely integrated into the teaching and learning process in schools. Their integration will not only revolutionise teaching in tertiary institutions, they will engender the development of students' innate scientific inquiry mind and their critical thinking abilities. New lecturers must be inducted to develop the needed skills in the use of ICTs and to develop positive attitude towards their use for teaching and research.
References


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