

# A Proposed Guideline for ICT Acceptance and Usage for Universities in Developing Countries

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**Abstract:** Universities in developing countries require adequate ICT facilities to augment face-to-face teaching. Acceptance has its models, the most current and notable being UTAUT. This paper is proposing guidelines for ICT acceptance and usage for universities in developing countries. ICT policies on education in some developing countries were reviewed. The major focus was on challenges and barriers encountered during ICT integration. The proposed ICT guidelines were considered in four phases: the present, the future, challenges and action, and implementation plans. The approach placed emphasis on teacher training on how to use ICT in the classroom. The knowledge acquired from this paper is useful to university administrators, academicians and ICT policy makers in developing countries.

**Keywords:** *Guideline; ICT; Integration; Policy; Implementation Plan.*

## I. INTRODUCTION

ICT proficiency is the ability to use digital technology, communication tools, and networks appropriately to solve information problems in order to function in an information society. The global shift towards knowledge-base economies will require a change in the traditional view of learning process. Universities in developing countries require adequate ICT facilities to augment face-to-face teaching. Students are expected to have academic networking with their student counterpart across the globe. Excellent and current learning materials are required from academic staff to promote the quality of education and their product. The university academic staff in developing countries should be able to compete globally with their colleagues. However the concern is whether they are prepared to integrate the technology that is feasible to them into effective lessons for their students (Brown & Warschauer, 2006; Ma & Streith, 2005). The challenges facing Nigerian Public Universities pertaining ICT acceptance and usage for teaching and learning is primarily lack of commitment by the government in terms of funding, staff training and stable power supply (Ijeoma, Joseph, & Franca, 2010; Oye, Salleh, & Iahad, 2011). The higher education institutions around the globe have increasingly adopted ICT as tools for teaching, curriculum development, staff development, and student learning (Kumpulainen, 2007; Usluel, As\_kar, & Bas\_, 2008).

(Keegwe, Onchwari, & Wachira, 2008), argue that, "the integration of ICT into our classrooms is determined by key factors, such as the contexts in which teachers interact, their

beliefs, and their attitudes towards teaching and learning" (p80). (Dermot, Oliver, & John, 2011), opined that numerous hurdles must be jumped over to bring about successful ICT integration into classroom. One type of hurdle is insufficient resources such as equipment, training and support. The other type is embedded in teachers' core beliefs and unyielding to change. The stage of enlightenment on which ICT could be use in education is still low. Many lecturers hardly comprehend the benefit of ICT in education. Most of the lecturers acknowledged the fact that internet could be browsed as a point of supply of teaching materials. (Braak, 2001; Oyelaran-Oyeyinka & Adeya, 2004), investigated the level and depth of use of computers by university staff. From the survey, in Nigeria, 58.5% use computers for word processing, 32.2% use it for spreadsheet and data processing and 20.5% use it for programming. 66.9% use it for e- mail/Internet while 9.4% use the computer for other purposes apart from the aforementioned. (Iloanusi & Osuagwu, 2009) stated that 90% of Nigerian educational institutions are in the emerging phase of ICT, 7% in the applying phase, and 3% in the infusing and transforming phases. ICT is therefore in its' infancy in Nigeria. Nigeria though, has a great advantage because there are many Nigerian ICT experts in the Diaspora. However, no concerted and win-win effort have been made to harness this potential to accelerate and sustain ICT development in Nigerian educational settings. (Oye, Salleh, & Iahad, 2010), in a case study of Federal University of Technology Yola (FUTY), Adamawa state, Nigeria, shows that the application of ICTs is already changing many higher learning institutions in most developing counties due to many socio-economic and technological circumstances. However in the case of FUTY, the ICT infrastructure is more tilted to the management of schools (faculties) than to the departments, lecture halls and the student hostels. This is the partial e-learning that exist in most Nigerian HE institutions. Hence the paper is proposing a move from partial e-learning to holistic e-learning research focus.

(Gubahar, 2008) in his study found that pre-service teachers are willing to use technology but the problem is that no lessons to facilitate them with skills that will transform them into technology competent teachers. In a study by (Archibong & Effiom, 2009), lack of interest, limited access to ICT facilities and lack of training opportunities were some of the

problems associated to ICT usage among the Nigerian University academic staff. (Ijeoma et al., 2010) opined that inadequate ICT facilities, excess workload and funding were identified as major challenges to ICT usage among academic staff in Nigerian universities. According to the (Carol, 2007) most of our curricula and education systems are still products from a mechanistic past, in which predetermined knowledge was delivered in a linear format to a mass audience. The focus was on transferring information in a controlled sequence without accounting for the contextual settings of the different learners. The Universities in the developing countries need to align its teaching and learning methods with best practices found both nationally and globally. Adopting the use of ICT and IS within higher education seems inevitable as digital communication and information models become the preferred means of storing, accessing and disseminating information. The question of why university academicians decide to accept or reject a particular technology continues to be an important issue.

## 2. Technology Acceptance Model

Many researchers have proposed theories and models of technology acceptance in order to explain and predict user acceptance with technology in order to account for rapid change in both technologies and their environment. Given that the academicians are the key to effective use of information technologies in the university educational system, it is important to understand academicians' behavioral intention towards IT and the factors that influence these intentions. The *Technology Acceptance Model* or TAM (Davis, Bagozzi, & Warshaw, 1989) is one of the most profound frameworks frequently used in studies to predict and explain the use of computer based applications and solutions. The model asserts that the adoption of a technology is determined by the user's intention to use, which in turn is influenced by his or her attitudes towards the technology. It is very likely that the variability in these attitudinal and behavioral constructs depends on the user's perceptions — *perceived usefulness* (PU) and *perceived ease of use* (PEOU). While PU indicates the extent to which the use of the technology is promising to advance one's work, PEOU represents the degree to which the technology seems to be free of effort (Davis et al., 1989). This model posits that attitudes and behavioral intention mediate the effects of PU and PEOU, the two constructs of extrinsic motivation. With the ongoing development of ICT and the diversification of the fields it affects, various theoretical studies have been carried out in order to ensure better understanding concerning its diffusion, adoption, acceptance, and usage (Davis et al., 1989; Rogers, 2003; Taylor & Todd, 1995; Venkatesh & Davis, 2000; Venkatesh, Davis, Morris, & Davis, 2003; Yi 2006). The Technology Acceptance Model (TAM) is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it. Many researchers have investigated the issue of ICT adoption and acceptance and use (Abdul-Gader,

1996; Adams, Nelson, & Todd, 1992; Igbaria, Guimaraes, & Davis, 1995; Ngai & Chan, 2005).

The Unified Theory of Acceptance and Use of Technology (UTAUT) were used for this study because of its advantages. TAM is only capable of predicting technology adoption success of 30% and TAM2 (TAM extension) can predict 40%. UTAUT has condensed the 32 variables found in the existing eight models (TRA, TPB, TAM, MM, C-TPB-TAM, MPCU, IDT and SCT) into four main effect and four moderating factors. The combinations of the constructs and moderating factors have increased the predictive efficiency to 70%, a major improvement over previous TAM model rates. Self efficacy has been shown to influence choices of whether to engage in a task, the effort expended in performing it, and the persistence shown in accomplishing it. The greater people perceived their self efficacy to be, the more active and longer they persist in their efforts (Bandura, 1986; Bouffard-Bouchard, 1990; Brosnan, 1998; Compeau & Higgins, 1995; Miura, 1987). Computer anxiety has been defined as a fear of computers (ICT) when using one, or fearing the possibility of using ICT (Chua, Chen, & Wong, 1999; Kanfer & Heggstad, 1997). (Woodrow, 1991) opined that attitudes towards computer is very critical issues. Monitoring the users' attitudes towards computers (ICT) should be a continuous process if ICT is to be used for effective training and learning (Ford & Noe, 1987; Paxton & Turner, 1984).

- UTAUT- *Unified Theory of Acceptance and Use of Technology*
- TRA—*Theory of Reason Action*
- TPB—*Theory of Planned Behavior*
- TAM—*Technology Acceptance Model*
- MM—*Motivational Model*
- C-TPB-TAM—*Combine Theory of Planned Behavior and Technology Acceptance Model*
- MPCU—*Model of PC Utilization*
- IDT—*Innovation Diffusion Theory*
- SCT—*Social Cognitive Theory*.

## I. Research Objective

To propose a guideline for ICT Acceptance and usage for universities in developing countries.

## 3. ICT Policy on Education in Developing Countries

ICT is crucial to educational development of any nation, as it improves the quality of teaching, learning and research in the university. Teaching is becoming one of the most challenging professions in our society where knowledge is expanding rapidly because we are in the information age. Recent advancement of innovative technologies have provided new possibilities to teaching professions, and it has consequently placed more demands on teachers to learn how to use these new technologies in their teaching (Robinson & Latchem, 2003). The challenges on teachers now is to continuously

retrain themselves and acquire new knowledge and skills while maintaining their jobs. The developing use of ICT motivated the need for ICT policy.

ICT policy in education cannot be formulated without addressing the degree of development of a country's ICT infrastructure and its overall ICT policy. Tertiary institutions such as university find it difficult to acquire funds and computers to have access to the Internet if the country's telecommunication infrastructure and costs are too expensive or inadequate to wire up the whole department, institution or establishment. Certainly implementation policy are vital to the success of an innovation, however teacher education on ICT usage is critical to the successful introduction of the use of ICT in tertiary institutions. When teachers are familiar with the technologies and how it can assist their students, they will incorporate them into their teaching and learning. In the developing countries, although governments have stated their ICT educational policies, still the content is at disadvantage within the global information and technological revolution. The information infrastructure of higher education institutions in the developing countries are poorly developed and inadequately distributed. African universities are poorly disposed compared with their counterparts in Europe, North America, and non-African developing regions, to benefit from the global information economy and knowledge systems. The development and application of ICT for tertiary institutions in developing countries becomes crucial and urgent to be able to reduce the knowledge, technological and economic gap. The primary aim of integrating ICT into higher education institutions should be the transformation of the university into a knowledge and information influence, with the ability, capacity and necessary skills. The assignment is how to readjust the policy initiatives and preferences of the key players to model out a realistic and feasible development agenda for the introduction and application of ICT in these institutions.

#### 4. ICT Education Policy in some Developing Countries

(Adeyeye & Iwela, 2005) p.202, define policy as "the vision, goals, principles and plans that guide the activities" of government, organization and institutions. Policy makers in education (Universities) are therefore responsible for developing a vision and strategy for educational development. ICT policy is concerned with the provision of appropriate law, rule and regulation or guidelines by the university to direct, control and regulate its staff on the adoption and integration of ICT in information management, processing and dissemination (Uhegbu, 2007). ICT policy at both national and institutional levels as applicable to universities in Nigeria; aim to streamline the integration of technology into teaching and learning, through the intervention of national university commission (NUC).

In Nigeria the necessity for a national ICT policy became more obvious after the participation of the Nigerian delegation in the first African Development Forum on the challenge to Africa of Globalization in the information Age Held in Addis Abba in October 1999; this gave birth to vision 2020.

ICT policy and plans for Nigerian education states that: The Federal Ministry of Education (FME) will develop an ICT policy to ensure that by 2020, the education sector benefit from a comprehensive ICT ecosystem that has the following components:

- Fully automated and ICT driven processes of back office tasks including examinations management and learning delivery.
- 100% computer literacy for secondary and tertiary sectors.
- 100% computer literacy for teachers across the three tiers of the education system.

Source :( The World Fact book, 2007).

There is a strong focus on ICT and education in Tanzania. The National ICT policy of 2003 recognizes the role ICT can play to enhance education, including curriculum development, teaching methodologies, lifelong learning and distance education. In Tanzania the framework for linking ICT and basic education has been developed in the form of ICT policy for basic education in 2007. A multi-stakeholder consultation advice on technology integration resulted in an ICT guideline. Source: (National ICT Policy, 2003).

In Malaysia, ICT is believed to have the potential to transform education and facilitate learning. Already IT has transformed Hospitals, Banks, Industries and the society at large.

- The first ICT policy in Malaysia is that all schools should use ICT.
- The second policy is that ICT is considered as a tool to enhance teaching and learning process and to be taught as a subject in the curriculum.
- The third policy is that ICT should be given priority in all human endeavors, by so doing there will be increase productivity, innovations and economic freedom.

Source: (Educational Technology Division, Ministry of Education, Malaysia, 2001).

The scope of Uganda's National ICT policy framework covers information as a resource for development, mechanisms for accessing information, and ICT as an industry, including e-business, software development and manufacturing. The policy looks at various categories of information from different sectors, essentially aimed at empowering people to improve their living conditions. The sectors include: Health, education, agriculture, energy, environment, business, and science and technology.

Source: (National Information and Communication Technology Policy, 2003).

**Table 1. Rationale for Educational ICT Integration into Teaching and Learning**

s/n	Rationale	Source
1	In order to learn IT skills	(Harris, 1999; Twining, 2001a, 2002b, 2002c)
2	As a tool to achieve	(Harris, 1999; Pelgrum &

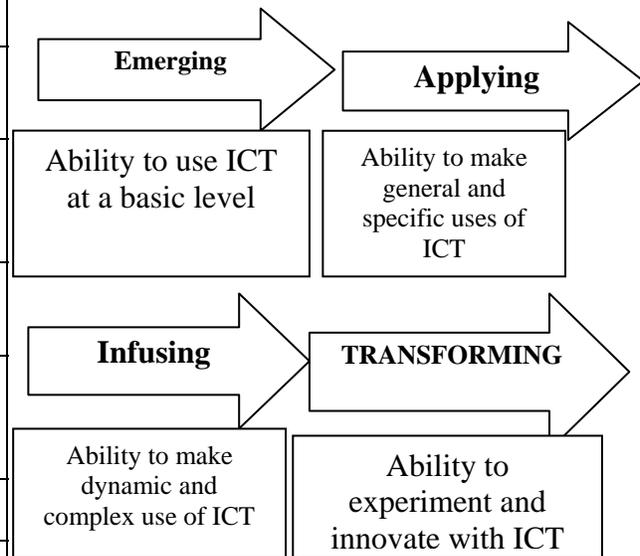
	traditional teaching and learning goals across the curriculum	Plomp, 1991; Twining, 2001a, 2002b, 2002c)
3	In order to extend and enrich learning across the curriculum	(Cuban, 1993; Harris, 1999; Hexel, De Marcellus, & Bernoulli, 1998; Twining, 2001a, 2002b, 2002c)
4	In order to motivate learners	(Hexel et al., 1998; Twining, 2001a, 2002b, 2002c)
5	As a catalyst for educational change	(Moseley et al., 1999; Pelgrum & Plomp, 1991; Twining, 2001a, 2002b, 2002c).
6	Because of the impact of ICT on the nature of knowledge	(Cloeke, 2000); Twining (2001b)
7	In order to fundamentally change teaching and learning.	(Cuban, 2001; Dwyer, Ringstaff, & Sanholtz, 1990); Twining (2001a, 2002b, 2002c).
8	As a tool to support learners in thinking about their own learning.	Twining (2001a, 2002b, 2002c).
9	In order to provide access to the curriculum for those who might otherwise be excluded from it.	Twining (2001a, 2002b, 2002c)
10	In order to increase productivity in education	Cuban (1993)
11	In order to reduce the cost of education	Pelgrum and Polmp (1991)
12	In order to make education more efficient	Moseley et al (1999); Cuban (2001); Twining (2002b, 2002c)
13	As a substitute for teachers	Harris (1999)
14	In order to reward teachers	Harris (1999); Twining (2002b, 2002c)
15	As preparation for living in a society that is permeated with technology	Pelgrum and Polmp (1991); Cuban (2001)
16	As preparation for employment (work)	Pelgrum and Polmp (1991); Cuban (2001)
17	In order to support and stimulate the country's economic development	Pelgrum and Polmp (1991)
18	In order to impress stakeholders ( e.g. inspectors, funders, prospective parents and students)	Pelgrum and Polmp (1991); Twining (2002b, 2002c)
19	In order to reduce inequalities between students with differential access to ICT outside	Twining (2002b, 2002c).

formal education
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### 5. ICT Integration Approach

In the process of revolutionizing education throughout the world, the foundation of the revolution is built on ICT integration in the education system. (Ng, Miao, & Lee, 2008) identify four broad approaches for developing a model for ICT integration in teacher development. The model states that skills of teachers flow from emerging to applying to infusing to transforming stages of ICT integration.

Figure 1. A Continuum of ICT Integration Approaches in Teacher Development



Source: Ng, Miao & Lee (2008).

Emerging Stage: Here the target is on ICT usage and priority is on ICT literacy and skills.

Applying Stage: This embraces ICT usage in general with its applications.

Infusing Stage: Here students are being instructed on how to use ICT tools to solve problems.

Transforming Stage: Here the teacher embarks on the latest method of teaching and learning with ICT tools.

### 6. Guideline

A guideline is a statement by which to determine a course of action. It aims to streamline particular process according to a set routine or practice. Guideline distinguish a series of steps within the strategic planning process, that leads to a structured gathering of facts, information, analysis and production of critical inputs for the next steps (or phases). The proposed ICT guideline for university academicians will be considered in four phases.

Phase 1: The present, where are we, analysis of the current state.

Phase 2: The future, where do we want to go, envisioned state and choices.

Phase 3: The challenges, what do we need, the gap analysis.

Phase 4: The strategies, how do we get there, the action plan and implementation.

#### **Phase 1:**

Here we focus on information gathering in order to understand the current context and describe the university issues.

- We have the ICT policy and plan on education
- Emphasis has been laid on ICT in administration and financial transactions, wireless and mobile communication with promising results.
- Ineffective Internet, only available for administrators and higher officers.
- Teaching methods, predominantly lecture method.
- Teaching aids, Whiteboards non-automatic, Blackboard and chalk.
- Available Technologies, Desktop, Laptops (for departments), PowerPoint (for special occasions).
- Available Software: Office suite, Adobe, Apache, Linux, windows.
- All academic staff are mandatory to use available technologies
- University Café to browse and pay ( both staff/ students)
- The Nigerian University Network (Nunet) is available but not functioning.

#### **Phase 2:**

This phase captures the long term view of key stakeholders on the future direction and vision for the institutions. One of the goals of the National Universities Commission (NUC) is: To initiate and promote proficiency in the use of ICT for service delivery within the commission and Nigerian University system. To upgrade and maintain physical facilities in the Nigerian university system for delivery of quality university education. In the current knowledge-driven global economy, many universities are incorporating information and communication technology (ICT) into their management, administration and educational programmes in order to serve their students and prepare them for the global world. Therefore the vision statements are to:

- Ensure ICT access for university academic staff for effective teaching and learning
- Ensure that academic staff has ubiquitous access to the necessary ICT infrastructure, software and connectivity to access the internet and develop or adapt educational materials of different kinds.
- Ensure the availability of software application, web content editing tools, content management system etc
- Ensure that the university academic staff s' ICT skills are updated regularly.

#### **Phase 3:**

In this phase, we identify all challenges, opportunities and constraints. The area where there is least development in ICT integration is in all aspects of teaching and learning in the universities. These challenges are grouped into four categories:

##### **(i) Outside Challenges:**

A major outside challenge that seems to have plagued ICT implementation in Nigerian universities is the problem of bandwidth. The problem of insincerity on the part of internet service provider (ISPs). Many universities are being made to pay for an amount of bandwidth not supplied to them. The problem of political instability, such instability frustrates policies and plans.

##### **(ii) Inside Challenges**

Decision makers and academicians are sometimes reluctant to change curriculum and pedagogical approaches. Lack of incentives and reward for teaching staff. Challenges related to infrastructure, staff retention and computer illiteracy among academic staff. Problem of acquisition of ICT facilities such as computers & printers. Unavailability of networking within the university campus (LAN & WAN). Low salaries and poor condition of service of academic staff. Most universities are grossly underfunded. Integrating ICT into teaching and learning in university is a complex process faced with a number of difficulties known as barriers.

##### **(iii) Teacher- Level Barriers:**

Lack of teacher confidence: one barrier that prevents teachers from using ICT in their teaching is lack of confidence. Lack of teacher's competence: in developing countries (Nigeria) teachers' lack of technological competence is a main barrier to their acceptance and adoption of ICT. Resistance to change and negative attitudes: (not wanting to use new technology)

##### **(iv) University-Level Barriers**

Lack of time: teacher had no time to plan technology lesson, high workload on academic staff

Lack of effective training: Academic staffs are not given enough training opportunities. We have pedagogical training, ICT- skill training and ICT use.

Lack of accessibility: accessibility to resources, computers and ICT materials. Lack of technical support: failing to connect to internet, waiting for websites to open, malfunctioning of computer, printer not printing etc. Unsteady and inadequate electrical

power supply: it is worse to embark on intensive ICT project within an education institution, without solving power problem first. Even the premier universities cannot foot the bill of maintaining several standby generators. Private ISPs cannot maintain their boosters for 24hrs due to high cost of Gas. Many subscribers cannot effectively use the internet.

#### Phase 4:

The strategy: how do we get there, using the action plans and implementation? These will basically address the challenges to develop a roadmap of specific activities with expected outcome. In any educational reforms the teacher is a crucial element. Therefore when considering ICT-related innovations in education, we cannot isolate the teachers. Here three questions are addressed:

- (a) What type of ICT skills do teachers need?
- (b) Which policies and programs are effective to prepare and motivate teachers for their role in education for the information society?
- (c) What is the impact of ICT on teachers' working conditions?

The UNESCO ICT competency Standards for teachers (UNESCO, 2008), describes three approaches: technology literacy, Knowledge deepening and knowledge creation. ICT plays a different, but complementary role in each of these approaches, with new technologies requiring new teacher's roles, new pedagogies and new approaches to teacher education. The successful integration of ICT into the classroom depend on the ability of teacher to structure their learning environment in some non-traditional way, merging technology with new pedagogies, to develop active classrooms that encourage cooperative interaction, collaborative learning and group work.

#### 7. How ICT is Used in the Classroom

ICT applications depend on the teachers' successfully adapting them to specific teaching and learning context (N. Davis, Preston, & Sahin, 2009). According to (UNESCO, 2004), the three main approaches taken by teachers are:

- (i) An integrated approach: planning the use of ICT within the subject to enhance particular concept and skills and improve students' attainment.
- (ii) An enhancement approach: planning the use of an ICT resource which will enhance the existing topic through some aspect of the lessons and tasks.
- (iii) A complementation approach: using an ICT resource to empower the students' learning. All the three approaches can enhance attainment, but the effects may be different.

### 7.1 Action and Implementation Plans

The proposed ICT acceptance and usage guideline for university academic staff is comprised of two parts namely action and implementation plans.

#### Action Plan

- The university should identify true cost of components necessary to support investments in ICT for education and the true cost of running effective ICT in educational systems. It is necessary for all institutions to declare ICT as priority in budget allocation because of its importance as a major utility after water and electricity.
- Policy makers and planners should calculate the total cost of ownership (TCO) of the vision for ICT integration. The TCO includes:
  - (i) Investment costs (e.g. hardware, Classroom refurbishment, rewiring, and furniture provision).
  - (ii) Replacement cost (e.g. hardware).
  - (iii) Recurrent costs (e.g. consumables, power, internet connection, maintenance services)and
  - (iv) Associate costs (e.g. teacher training, possible additional human resources, software development and provision).

### 7.2 Implementation Plan

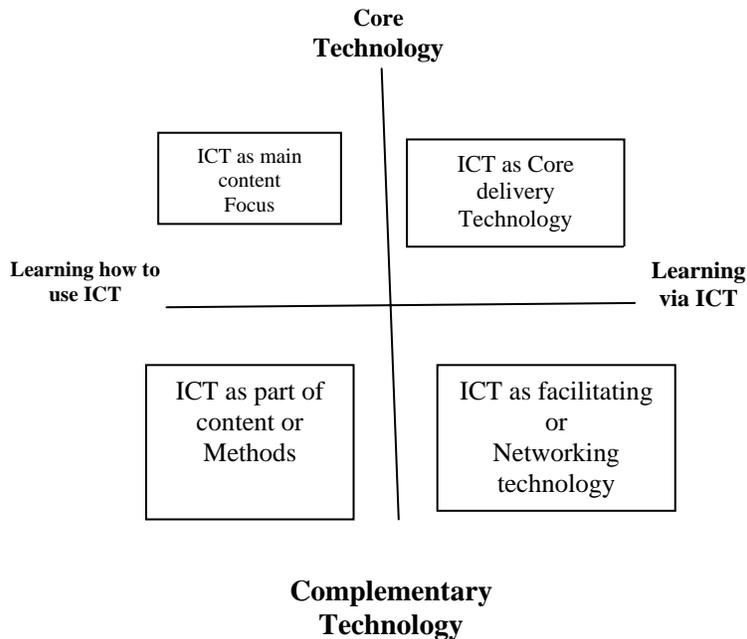
While many institutions remain at various stages of planning and infrastructural development, some have achieved regular internet connectivity. Given that the academicians are the key to effective use of information technologies in the university educational system, it is important to understand academicians' behavioral intention toward IT and the factors that influence these intentions. The successful integration of ICT into the classroom warrants careful planning and depends largely on how well policy makers understand and appreciate the dynamics of such integration. Preparation of technology integration implementation plans involves major stakeholders, such as teachers and school administrators. The following activities are outline:

- Organize in-house training program for all academic staff for the use of ICT for teaching and learning. ICT teacher training can take many forms. Teachers can be trained to learn how to use ICT or teachers can be trained via ICT. (Collis & Jung, 2003) opined that ICT can be used as a core or complementary technology in teacher training process.
- Staff must be motivated to attend the training sessions, by using attendance as an index for promotion point. Therefore, opportunities and incentives to innovate must be widely distributed in

the university, and rewards for success should be provided through recognition and promotion.

- All lectures to be delivered in the coming semester should be submitted in PPT slides at least 2wks before resumption to the HOD.
- Students evaluation of lecturers' teaching methods should be done a week after the examination online.
- Limit the amount of on the job forms being filled by academic staff to remove data phobia. E.g. APER form should not exceed 5-10 lines of required information.
- To awaken staff ICT interest saddle them with Laptops (free , but belonging to the department).
- There should be standby technicians to be maintaining the Laptops through the infrastructure Lab, and projectors and other ICT equipments.
- Limit lecturer and student interaction and encourage online interaction through university web mail system.
- Assessment should be gradual and online.
- Tertiary Institution Management System (TIMS) to be developed, to handle (students record, staff assessment, academic and administration recorded. See sample template.

## 8. Categories of ICT Teacher Training:



Adapted from Collis and Jung, 2003

### 8.1 ICT Use as main Content

Majority of university academic staff in the developing countries will fall under this category of ICT use as main

content. According to (Ng et al., 2008), this is the emerging stage. Here teachers' focus is on the use of ICT and emphasis is on basic ICT literacy and skills. This approach has an emphasis on teacher training in how to use ICT in the classroom. Using ICT to promote learning activities. Developing new methods of facilitating learning and evaluating students' performance.

Basic ICT-Skill Workshop (covers):

- Word processing
- Power point
- Internet literacy
- Other technical skills

Instructional Technology: (covers):

- Learning, thinking and the effective use of instructional technologies in the classroom
- Instructional planning models
- Integrating instructional technologies and resource materials
- Organizing and managing instructional activities with appropriate ICT resources in the classroom.

This approach of using ICT as the main content emphasis the development of teacher's basic ICT skills.

### 8.2 ICT as Part of Teaching Methods

This approach integrates ICT into teacher training to facilitate some aspects of training. It uses videotapes and CD-ROM to help teachers to see how technology can be integrated in their work. CD-ROM made up of stories about teachers who are making meaningful and creative uses of technology in their instruction. Teachers learn how to use ICT in their classrooms by actually being engaged in the process of ICT-integrated training.

### 8.3 ICT as Core Technology for Delivering Teacher Training

The content of this approach covers a variety of ICT applications. The digital technology is frequently becoming the core technology of ICT teacher training. Packages that train teacher to teach existing online courses. The use of ICT as core technology for delivering training can be found in limited context.

### 8.4 ICT Used to Facilitate Professional Development and Networking

The use of the internet would enhance continuous professional development activities of teachers, connecting teachers to larger teaching communities and allowing for interaction with expert groups.

Teachers can find a range of resources for professional development, such as the ICT support Network Directory which provides easy access to ICT provision and training. At the international level, the World Banks' World Links for Development (WorLD) program provides Internet connectivity and training for teachers, teacher trainer and students in developing countries in the use of ICT and other technologies in education. One of the best ways to develop

teachers' ICT skill and promote ICT-pedagogy integration in their teaching is the provision of ICT-based training environment where the experts can be engage in active discussion in relation to the technologies.

### 8.5 ICT Guideline Summary for Acceptance and Usage in Tertiary Institutions

- Establishment of a priority list. National policies in ICT education and a priority list need to be formulated.
- Preparation of technology integration implementation plans.
- Involvement of all major stakeholders, such as teachers, schools administrators, parents etc.
- Exploration of funding sources.
- Setting up of adequate school technological infrastructure.
- Identification of a priority list of staff training needs.
- Synchronization of training with infrastructure.
- Gradual integration of technology into classroom instruction.
- Provision of easy access to technology to all teachers and students.
- Provision of technical support to schools.
- Appraisal and motivation of teachers.
- Recycling and redeployment of older machines.
- Creation and subsequent computerization of the school library.
- Establish links with other institutions within the country or outside the country.
- Support teachers and students in purchasing computers.

### 9. Conclusion

ICT proficiency is the ability to use digital technology, communication tools, and networks appropriately to solve information problems in order to function in an information society. The global shift towards knowledge-base economies will require a change in the traditional view of learning process. Universities in developing countries require adequate ICT facilities to augment face-to-face teaching. The question of why university academicians in the developing countries decide to accept or reject a particular technology continues to be an important issue. Acceptance has its models, the most current and notable being UTAUT. ICT policy on education in some developing countries was reviewed. The major focus was on challenges and barriers encountered during ICT integration. The proposed ICT guidelines were considered in four phases: the present, the future, the challenges and the action and implementation plans.

Majority of university academic staff in the developing countries will fall under this category of ICT use as main content. This approach has an emphasis on teacher training in

how to use ICT in the classroom. The proposed ICT guideline summary will benefit university administrators, academicians and ICT policy makers in developing countries.

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