ICT IN TEACHER EDUCATION: AN ANLYSIS OF *EDUCATIONAL MEDIA AND TECHNOLOGY* INSTRUCTIONAL MATERIAL OF THE OPEN UNIVERSITY OF TANZANIA

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Abstract: *The quest to integrate ICT in Tanzania's teacher education programs is reflected in the National ICT Policy for Basic Education (URT, 2007). This study analysed the content of the Educational Media and Technology (OED 202) instructional material of the Open University of Tanzania (OUT) to understand whether or not it promotes knowledge and competences of technology, pedagogy and content (TPCK) among student-teachers. The study involved reading of the instructional material repeatedly and carefully and some notes taken against each sub-questions. Findings show that the material has four major strengths which are related to its objectives, coverage of different kinds of ICTs, being an attempt towards effective ICT integration in teacher education and its alignment to the OUT's in-house style. The material has the following weaknesses which need to be fixed accordingly; some of its objectives are broader and vague, lacks promotion of knowledge on how and when to use ICT, lacks content on the pedagogical approaches and content of particular discipline and some lectures are disconnect from each other. It is suggested that the improvement of the material should consider review of its (i) content and objectives, (ii) develop knowledge of how and when to use ICTs in education and (iii) promotion of knowledge on technology and pedagogies. In conclusion the Educational Media and Technology instructional material is generally skewed towards promoting knowledge of technologies more than knowledge of pedagogies. However, despite the fact that the material seems deficient in contributing significantly to the realization of the objectives of the National ICT Policy for Basic Education, it is acknowledged that the material is useful and provides initial knowledge on the use of ICT in education.*

Keywords: ICT, Technology, Educational Media, Teacher Education, Instructional Material, Tanzania

INTRODUCTION

The quest to integrate Information and Communication Technology (ICT) in teacher education programs in Tanzania is well reflected in the ICT Policy for Basic Education (URT, 2007: ICT Policy). According to the policy document ICT integration in teacher education aims to enable teachers to realize the following objectives among other things: (i) integrate the use of ICT to achieve educational objectives, (ii) facilitate the use of ICT resources in schools and (iii) facilitate development and use of ICT as a pedagogical tool for teaching and learning. Several efforts have been made to enable these great ambitions become true in Tanzania's teacher education programs. In teacher education colleges for example, the government of Tanzania in collaboration with SIDA have been implementing a project (in about 32 teacher education colleges in Tanzania (refer to http://www.teachers.or.tz) which focuses to introduce ICT in the colleges. Among other things, the project's aims include to train tutors and student-teachers on ICT to be able to use ICT as a tool for teaching and learning. The syllabi for Diploma in Secondary Education are

already developed to guide the implementation of ICT in teacher education, academic and pedagogical (MoEVT, 2007).

Higher education institutions also have a great role towards realization of ICT implementation in Tanzania's education. Most efforts in higher education have been on training ICT-related graduates in areas of computer sciences, computer engineering, Information and telecommunication, electronics e.t.c. it is expected that some of these graduates will contribute to ICT integration and application in education in the country. Only a few ICT-related courses/program do exist in higher learning institution that really attempt to orient student-teachers about ICT, which include the Educational Media and Technology (refer to the prospectus of OUT[1], DUCE[2], UDSM[3] & SJUT[4]), Educational Media and General Methods (refer to the OUT prospectus) and BSc ICT with Education (refer to the prospectus of UDOM[5]). Ideally, the later courses aim to orient / train student-teachers on the different technologies that can be used as media in education delivery.

Despite these efforts and perhaps more others, still the integration of ICT in education has always remained a nightmare. Of course many reasons can account for this but certainly one of them may be insufficiency of the ICT-related courses / programs in teacher education that adequately orient teachers on the use of ICT. The situation is not unique to Tanzania. Experiences from elsewhere (see for example Hazzan, 2000; Manoucheri, 1999) reveal that instructional technology is not reaching its potential in classrooms because student-teachers are reluctant to use technology for a variety of reasons which include: some do not believe that ICT is useful for teaching and learning, some lack familiarity with the technological tools, some lack knowledge related to the use of technology as part of instruction and others may not be aware of the vast amount of resources available to assist them in this effort. Therefore, it is important for teacher education programs or courses to consider means of helping student-teachers learn fully about how to incorporate technology as a regular part of their course or program.

This study discusses results of an analysis of the *Educational Media and Technology* (OED 202) instructional material (commonly known as study material) of the Open University of Tanzania in order to understand its coverage and whether or not the material does adequately contribute to the realization of the Tanzania's ambitions of ICT integration in teacher education as stipulated in its ICT Policy for Basic Education. It also sought to understand whether or not the course promotes the application of ICTs among student-teachers and develops knowledge about *what* technologies to use, *how* and *when* to use.

THE EDUCATIONAL MEDIA AND TECHNOLOGY COURSE

Teacher education programs at the Open University are offered by the Faculty of Education. Among the many compulsory courses that constitute teacher education programs is the *Educational Media and Technology* (OED 202, written by Makyikyeli, 2003) course. The *Educational Media and Technology* is a one unit core course studied by all second year student–teachers. Like other courses at the Open University of Tanzania, the course is offered through distance education mode where print-based instructional materials are

[1] Open University of Tanzania

[2] Dar es salaam University College of Education

[3] University of Dar es salaam

[4] St. John's University of Tanzania

[5] University of Dodoma

disseminated to students at the beginning of every academic year. The *Educational Media and Technology* instructional material which has a yellow hard cover with 117 pages is organised into eleven lecturers. It has three appendices, thirty figures and two photos. Table 1 provides a list of different topics covered by each lecture in the instructional material.

Table 1. List of Topics Covered in the Lectures

Lecture No.	Topics
1	Technology
2	Educational technology
3	Communication
4	Theory conceptualization
5	Communication theory
6	Educational media
7	Media in teaching and learning
8	Systems approach
9	Educational objectives-media involvement
10	Resources and resource centres
11	Future developments trends of educational media and technology

There is a general introduction that is meant to introduce the whole instructional material to the student-teacher. It is argued in the general introduction that developments in science and technology have influenced many things including the methods, techniques and media used to disseminate information and education. As revealed in the general introduction, the overall intention of the *Educational Media and Technology* course (instructional material) is to *educate student-teachers on the issues of media and technology and its impact on our lives. It is intended to demonstrate to student-teachers how these technologies have influenced educational activities especially in teaching and learning.* (Makyikyeli, 2003, p.vi).

The rest of other lecturers are organised into introduction, specific objectives of the lecture, text (with some sub-headings and illustrations where necessary), summary of the lecture, activity for student-teachers and list of references for further reading. Each lecture covers a different topic as briefly described in the following paragraph and as shown in Table 1. In Lecture one, student-teachers are introduced to what technology is and how it enhances development and vise-versa. Lecture two analyses the concept of educational technology and enlightens student-teachers on how educational technology improves efficiency and effectiveness in teaching and learning. Communication as an important aspect in teaching and learning, its process and models are dealt with in lecture three. Lecture four discusses theory and its different perspectives while lecture five presents communication theory as an insight to principles of communication in teaching and learning. Educational media is presented in lecture six while media in teaching and learning is dealt with in lecture seven. Lecture eight presents systems approach and lecture nine looks into educational objectives and their functions in realization of the objectives. In lecture ten focuses on resources and resource centres and the last lecture discusses the development trends of educational media and technology. In this article, an analysis of the content of the *Educational Media and Technology* instructional material is reported. The analysis sought to illuminate whether or not the content provides student-teachers with appropriate knowledge and competences required to integrate appropriate technologies in the teaching and learning processes in classrooms.

ICT IN TEACHER EDUCATION

Literature demonstrates that when used pedagogically, Information and Communication Technology (ICT) have the potential to address most of the educational challenges (Dunn & Lingerfelt, 2004; Dunn, 2004; Malikowski & Theis, 2006; Malikowski, Thompson & Theis, 2006; Papastergious, 2006). It is therefore crucial that student-teachers acquire appropriate knowledge, skills and competences on how to integrate technology in education. In recognisance of this, the knowledge and competences on how to use ICT in teaching and learning has gained enormous importance in today's teacher education programs/ courses. This is because student-teachers' adoption of ICT use in the classroom has strong positive correlation with the pedagogical training rather than technical skills (Law, Pelgrum, & Plomp, 2008c).

According to Richardson (2009) merely knowing how to use technology, nor merely knowing how to teach a particular subject is not enough. First, according to Zhao (2003) a particular ICT-related teacher education program or course must seek to promote the following aspects of knowledge so as to help students-teachers know how to use technology in the teaching and learning processes: (i) knowledge of problems or situations that can be solved by technology, (ii) knowledge of the kind of technology that can solve this kind of problem and (iii) knowledge of how the technology can solve a specified problem. This round parked kind of knowledge is known as Technological Pedagogical Content Knowledge (TPCK) (Koehler, Mishra, Hershey, & Peruski, 2004; Mishra &, Koehler 2006; Koehler & Mishra, 2008). Richardson (2009) argues that for effective ICT use in teaching and learning, teacher education courses must consider the relationship between all three components. It is important that student-teachers are trained on how to use ICT in delivering of education to make learning more meaningful for using education technologies to support instruction.

Studies show that programs that orient student-teachers on ICT use in the TPCK fashion have been effective to adequately train such students to apply appropriate ICT in their teaching and learning processes (Schnittka & Bell, 2009; Richardson, 2009). However experiences from elsewhere inform that developing TPCK may be difficult for new student-teachers or new users of technology because of the extra demand it places on them. In this case student-teachers should be supported in making the transition from using technology to illustrate concepts (TCK) to utilizing these tools as means for exploration and discovery leading to student-teachers' deep conceptual understanding (TPCK) (Richardson, 2009). In the context of Tanzania and in fact in most other developing countries, the idea of TPCK is still virgin and unless deliberate efforts are made to expose student-teachers to the concept, the effective application of ICT in education may seem to be behind the curtain.

Student-teachers should be introduced to TPCK concept and should work in an environment that fosters / promotes this understanding for effective integration of technology in their future teaching (Zao, 2003). Additionally, Hughes (2004) argues that for student-teachers to become "technology integrationist" the courses should be able to orient them to understand, consider, and choose to use technologies when they require in enhancing curriculum, instruction, and/or students' learning in a subject matter area.

In addition to the knowledge of TPCK, ICT courses in teacher education must also strive to develop a sound understanding of the learning theories and ways how ICT can be used to enhance teaching and learning (Baruque & Melo, 2004; Goldberg & Michlin, 2003; Tan, Aris & Abu, 2006: Huffman, Goldberg & Michlin). It is expected that ICT courses in teacher education should make student-teachers appreciate that the choice of any particular technology should be grounded not only on specific learning theory (ies) but also on pedagogical needs and the context. Moreover, the course must foster among student-teachers the knowledge and competences related to the application of ICT to promote learning using specific learning theory.

Third, the course / program should be organised to address specific rationale and objectives. In terms of rationale for using ICT in education, Hawkridge (1990) identifies several rationales for ICT in education. The social rationale is related to the preparation of students for their place in society. The vocational rational emphasizes the importance of giving students appropriate skills for their future jobs. The pedagogical rational is focused on the enhancement of teaching and learning with the help of computers. The catalytic rational assumes an important role for ICT in realizing educational change. The information technology industry rational is related to the promotion of the ICT industry in education. And finally the cost effective rational supposes that ICT will reduce the costs for education. Most of these rationales can be noted in ICT policies and in some ways are also reflected in ICT-related programs or courses.

Based on what rationale(s) an institution strives to promote among its student-teachers, the teaching of programs or courses about ICT-use in classroom must be formulated to foster one or the other of the following stipulated objectives. According to Drent & Meelissen (2007) and Plomp, Brummelhuis & Rapmund (1996) the objectives for using ICT in education includes: (i) the use of ICT as object of study: which refers to learning about ICT which enables student-teachers to use ICT in their daily life, (ii) the use of ICT as aspect of a discipline or profession: meaning that ICT is used for development of ICT skills for professional or vocational purposes and (iii) ICT as medium for teaching and learning which focuses on the use of ICT for the enhancement of the teaching and learning process. Studies reveal that most efforts to promote ICT use among student-teachers focus on learning how to use technology rather than using technology to learning. This study uses the insights from literature and own experiences to analyse the *Educational Media and Technology* instructional material of the Open University of Tanzania.

THE STUDY

Objective of the Study

The main objective of this study is to analyse the content of the *Educational Media and Technology* (OED 202) instructional material of the Open University of Tanzania so as to understand its coverage and adequacy. The following main question was formulated to guide the study: *Does the content of the Educational Media and Technology material provide student-teachers with appropriate knowledge and competences inline with the TPCK model for them to integrate appropriate technologies in the teaching and learning processes in education*. The following sub-questions were used in order to answer the main question of the study:

1. Are the course objectives clearly stated in the instructional material?
2. What specific ICTs does the instructional material cover and discuss? Does it orient student-teachers about what technologies to use, how and when to use them?
3. Does the instructional material discuss any pedagogy and the ways that they can be enhanced by particular ICTs?
4. Does the instructional material seek to develop any specific subject-matter related content?

Approach and Procedures

The study involved reading of the instructional material repeatedly and carefully with the sub-questions at the back of the mind. All pages of the study material were read and some notes taken against each sub-question. Since the sub-questions reflected the TPCK model of ICT integration in education, it was easy to organise the notes in a way that answered the

questions. Further cross-checking of the notes with the instructional material was also done so as to ensure that the jotted down information represented the reality of the instructional material under study. The notes were then used as data for the study and are thus presented in the findings section. All these happened between January–October, 2009.

FINDINGS

Clarity of the Course Objectives

Analysis of the course objectives in the instructional material revealed that there are basically two major kinds of objectives in the material, namely (i) Unit objectives and (ii) Specific objectives for individual lecturers. Table 2 provides a list of the Unit objectives as captured in the study material.

Table 2. Unit Objectives

Objective No.	Objective Statement
	After studying the unit, you should be able to:
1	*demonstrate that you understand what technology is and how it enhances development and vice-versa*
2	*explain how technology can be used to improve efficiency and effectiveness in educational activities and program*
*3**	*demonstrate that you understand the concept of communication in educational settings*
*4**	*explain in your own words what communication theory is and its impact in learning*
5	*identify different forms and types of educational media*
6	*demonstrate the use of the identified media in different teaching and learning situations*
*7**	*develop a theoretical learning centre equipping it with the basic resources*
*8**	*demonstrate you understand what community resources are and how you can best utilize them*
*9**	*differentiate educational aims from objectives*
*10**	*identify some learning domains and their levels*

Note: * = unit objectives that need to be considered dropped from the course

It is clear from Table 2 that all objectives are clearly stated because they are in line with the way educational objectives should be stated. However only unit objectives 1, 2, 5 & 6 (equivalent to 40%) provide an indication that they foster knowledge and competences among student-teachers on how to apply ICT in education. Specifically the four unit objectives reveal to have contained the kind of knowledge and competences that the course seek to promote among student-teachers. Such knowledge and competences related to the understanding of technology and also how to use such technologies in education. A closer look at the four unit objectives reveals that they too seem to require some refinement to make them sharper and to the point. For example the unit objective number 1 can be restated as:

demonstrate that you understand what technology is and how it enhances teaching and learning processes.

Furthermore, the analysis established that the rest of the unit objectives (which forms 60% of all unit objectives) are too broader and vague. They have nothing to do with fostering the use of ICT among student-teachers.

Specific objectives across all lectures in the instructional material were also analyzed during the study and the findings summarized in Table 3.

Table 3. Specific objectives for each lecture

Lecture No.	Specific Objective Statements	Comments
1	At the end of the lecture you should be able to: *i. define the concept of technology* *ii. explain (a) how technology influences development (b) what technology misuse is* *iii. identify technologies used in other countries that influence development but are lacking in Tanzania*	• *need to be more refined*
2	*i. explain in your own words what educational technology is* *ii. identify different categories of educational technologies* *iii. demonstrate that you know the role of educational technology in transforming educational systems, supporting teaching and learning processes*	• *need to be more refined* • *add some more specific objectives to make it complete*
*3**		• *consider to drop lecture 3*
4	*i. explain in your own words what a theory is* *ii. identify various types of theories* *iii. describe with examples the major functions of theories* *iv. identify at least two learning theories and explain how teachers / educators can make use of them to improve teaching-learning process*	• *need to be more refined* • *need to be linked to ICT discussion*
*5**		• *consider to drop lecture 5*
6	*i. name and analyse different functions of different forms of media* *ii. identify various types and forms of educational media* *iii. explain the significance of media in social, economic and cultural development*	• *need to be more refined* • *add some more specific objectives* • *could focus more on new ICTs*
7	*i. define the role of media in teaching and learning* *ii. demonstrate the ability to develop or match different forms of media with the specific subject or topic that would be relevant for them* *iii. explain how you can access useful teaching-learning media which your institution can not afford to buy*	• *could be merged with lecture 5 above* • *add some more specific objectives* • *could focus on new ICTs*
*8**		• *consider to drop lecture 8*

*9**	• *consider to drop lecture 9*
*10**	• *consider to drop lecture 10*
*11**	• *consider to drop lecture 11*

Note: * = lectures that need to be considered dropped from the course. Specific objectives of such lectures are not included in the table.

Findings in Table 3 reveal that generally all specific objectives are clearly stated across all 11 lectures. But a closer look at each specific objective in all 11 lectures reveals that only 5 lectures (equivalent to 45% of all lectures) are in accordance to fostering ICT application among student-teachers. Despite that, most of the specific objectives in the 5 lectures do need be reframed and more sharply stated. For example referring to lecture 4 in Table 3, the discussion of the learning theories need to be linked to ICT and also be more refined to make it more focused. Therefore one of the specific objectives in lecture 4 could require student-teachers to design a lesson plan that uses ICT to foster social constructivism way of teaching and learning.

Another interesting finding in Table 3 relates to the inclusion of some lectures which are labelled in the table as *consider to drop.* Such lectures include lectures 5, 8, 9, 10 & 11 (which forms 55% of all lectures in the study material). The analysis revealed that the specific objectives in such lectures (and in fact the contents as well) are not linked to fostering of ICT application among student-teachers.

ICTs Covered in the Study Material

The analysis also sought to understand specific kinds of ICTs that are discussed in the instructional material. Moreover, the material was scrutinized to ascertain whether or not they orient student-teachers about how and when to use any particular ICT in the teaching and learning process. Table 4 provides a summary of the various ICTs that are covered in the instructional material.

Table 4. ICTs for Use in Education

List of ICTs	Comments about the content covered
CD-ROMs & CDs	• *what:* defined, described, advantages & disadvantages, • *why, how & when?*
Computer	• *what:* defined, described, advantages & disadvantages, • *why, how & when?*
Internet	• *what:* defined, described, advantages & disadvantages, • *why, how & when?*
Videotape	• *what:* defined, described, advantages & disadvantages, • *why, how & when?*
Email	• what: defined, described, advantages & disadvantages, • *why, how & when?*

Fax	• what: defined, described, advantages & disadvantages, • *why, how & when?*
Telephone	• *what:* defined, described, advantages & disadvantages, • *why, how & when?*
Satellite Network	• *what:* defined, described, advantages & disadvantages, • *why, how & when?*
TV	• *what:* defined, described, advantages & disadvantages, • *why, how & when?*
Radio	• *What:* defined, described, advantages & disadvantages, its uses in distance education • *Why, how & when?*
Print	• *What*: defined, described, advantages & disadvantages, functions & some history • *Why, how & when?*
Film	• *What:* defined, described, advantages & disadvantages, • *Why, how & when?*
Video conferencing	• *What:* defined, described, advantages & disadvantages, • *Why, how & when?*
Audio cassette	• *What:* defined, described, advantages & disadvantages, its used in distance education, • *Why, how & when?*
Visual media	• *What:* defined, described, classified, advantages & disadvantages, illustrations • *Why, how & when?*

Note from Table 4 that the instructional material covers several ICTs which include (among others) computer, internet, e-mails, video conferencing, TV, CDs and CD-ROMs. Furthermore the table reveals that the instructional material have dwelt much on the *what* aspects of the technologies by providing definition or description for most of the technologies. Along the same line, the material also discusses about the classification of some of the technologies, their advantages & disadvantages and functions (see for example computer, internet, visual media, CDs & CD-ROMs). Unexpectedly, the findings in Table 4 demonstrate that the instructional material is silent on the discussions regarding the *why* is it important to use particular technologies in education, *how* to use them and perhaps more importantly about *when* to use the selected technology (see for example video tapes, audio

cassettes, print, TV, internet, computer). It is also to be noted from Table 4 that most time the instructional material provides examples on how ICT can be used in distance education with almost no any example provided for ICT application in primary and secondary education.

Pedagogies to be Enhanced by ICT

An analysis of the different kinds of pedagogical approaches that were expected to be discussed in the instructional material was done. An attempt was also made so as to understand whether or not the material discusses how the various learning theories can be used to enhance the pedagogical approaches. The study has established that the instructional material does not contain any discussion or topic on pedagogical approaches. As a result of that, the instructional material is silent on the discussions about how the various ICTs can be used to enhance pedagogical approaches in education. Interestingly, the material has adequately covered a discussion on the learning theories. However it was clearly noted during the study that the discussions on the learning theories are not linked to ICT choices.

Content Covered in the Instructional Material

The nature of content covered in the material was also analysed. It is evident from the material that it entirely covers the "ICT" content. Specifically, the material covers the following aspects of ICT content: technology, educational technology, educational media, media in teaching and learning, educational objectives-media involvement, resources and resource centres, future developments trends of educational media and technology. It was therefore established that the instructional material does not cover any academic discipline-related content throughout the lectures.

CONCLUSION, DISCUSSION AND SUGGESTIONS FOR IMPROVEMENT

This study analysed an instructional material titled: *Educational Media and Technology*, OED 202 (written by Makyikyeli, 2003) of the Open University of Tanzania to understand its suitability for fostering ICT application in education. The analysis has carefully established that the material is characterised by strengths and some weaknesses which need to be fixed accordingly in the light of the suggestions made in this study. Four major areas of strengths are identified in the material; these are related to the *objectives, different kinds of ICTs, being an attempt towards effective ICT integration in teacher education* and *its alignment to university's in-house style.* In terms of its objectives, the material contains clearly stated unit objectives and lecture-specific objectives. 40% of the objectives are well focused towards fostering ICT application in education among student-teachers. In a way the objectives are in line to the idea of using ICT as an aspect of a profession where ICT is used to for development of ICT competences for professional purpose (Drent *et al*, 2007 & Plomp *et al*, 1996).

The material identifies different kinds of ICTs such as computer, CDs, CD-ROMs, internet, TV, audio cassettes, print and others. It also defines / describes the technologies and discusses about their advantages and disadvantages. Most of such technologies are quite useful in education in Tanzania's context. Also the material is an initial attempt towards effective ICT integration in teacher education not only at the Open University of Tanzania but in Tanzania in general. Moreover the material reflects the Open University of Tanzania's in-house style and organization. It contains (among other things) activities for students, summary of the lectures, questions for further reflection and a list of references for further reading for each lecture.

Despite the strengths, four major weaknesses of the material which need to be addressed are identified: these are; *broader and vague objectives, lack of knowledge on how and when to use ICT, lack of pedagogical approaches and content of particular discipline* and

disconnected of some topics. Despite of the fact that the objectives are clearly stated in the study material, most of such objectives (which form 60%) are too broader and vague. As a matter of fact they do not seek to promote ICT application in education, but they develop competences related communication, communication theories, systems approach, educational objectives-media involvement and the future trends of educational media and technology. Only 40% of the objectives promote the application of ICT in education and thus are likely to contribute to the realization of the objectives of the National ICT for Basic Education (URT, 2007: ICT Policy) in Tanzania.

Another weakness is that the material does not discuss issues relates to promoting the knowledge of *how* and *when* student-teachers can use particular ICT in education. Teacher education course on ICT must seek to systematically guide novice users of technologies on how and when to use any specific technology otherwise they will always avoid using them (Hughes, 2004). Student-teachers need the knowledge of the problem, what technology is suitable to address such a problem and at times they need knowledge on how to use the technology in a given situation (Zhao, 2003). Also the instructional material does not discuss the basic pedagogical approaches that can be enhanced by ICTs, nor does it focus any particular academic discipline content. Koehler et al (2004) suggest that for teacher education course to promote ICT application in education among student-teachers, it must develop the knowledge of technology, pedagogy and content of a specific subject matter. The instructional material promotes knowledge of technology more than the rest of the components. This is tolerable because the rationale and objectives of the course relate to the promotion of knowledge of technologies for use in the profession (Drent *et at*, 2007 & Plomp *et al*, 1996).

Last but not least is that some of the lectures in the material are disconnected to each other. For example it has been learned that the discussion on the learning theory (which was expected to be linked to that of educational media or/and media in teaching and learning) is left unlinked. Student-teachers must be groomed to understand that the choice of technologies should be influenced by pedagogical needs and the learning theories and not by merely availability of technology.

As pointed earlier most of the weaknesses discussed in this study need to be fixed accordingly. It is therefore suggested that the attempt to review and rewrite the *Educational Media and Technology* instructional material must consider the following three major suggestions: *review of content & objectives,* promote knowledge related to *how* and *when* to use ICT and promotion of knowledge of *technologies and pedagogies.* It is suggested that the content and some of the objectives must be reviewed to incorporate most recent developments of knowledge in the area of ICT use in education. Contents such as communication, communication theory and systems approach may be considered for removal from the material. Such contents may be dealt with in some other courses. In addition, topics on pedagogical approaches must be included and where necessary the discussions in some lectures (e.g. learning theory, pedagogies and educational media) should be carefully linked to each other.

Another suggestion is that the individual lectures and respective content should be organised such that they foster ICT application in education. The ideas previously suggested by Zhao (2003) should be considered when rewriting the material. In a sense the instructional material must go beyond promoting knowledge and competence related to *what,* it should promote knowledge of *why, how* and *when* to apply a particular technology. However, it is suggested that the instructional material should maintain its focus on the 'ICT' content as opposed to developing academic-specific content. This is based on the rationale of the course as pointed earlier. Instead efforts should be made to develop the technology, pedagogy and content knowledge (TPCK) through academic-specific Method courses (such as the Method course

for Biology, Geography, Chemistry, Kiswahili, English e.t.c.). This is because such method courses are well placed to promote the development of TPCK than the *Educational Media and Technology* course.

Based on the findings of this analysis, it is argued that the *Educational Media and Technology* instructional material is skewed towards promoting knowledge of technologies more than knowledge of pedagogies. Thus the material is deficient in contributing significantly to the realization of the objectives of the National ICT Policy for Basic Education (URT, 2007: ICT Policy). However, as pointed earlier the material is useful, consistent in itself and provides the initial knowledge on the use of ICT in education.

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