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Factors Undermining The Use Of Multimedia Computer Laboratories In Kenya

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Abstract: ***Research shows that availability of computer equipment in an institution does not necessarily translate into uptake of the technology in curriculum delivery among educators. This paper explores challenges that educators encounter as they seek to use computer technology (CT) in the lessons they conduct. In particular, the paper, based on a PhD thesis, looks at challenges that tutors face in the use of multimedia computer laboratories (MCLs) in public teacher training colleges (PPTTCs) in Kenya. The study adopted a descriptive survey design. The target population consisted of 845 tutors from PPTTCs selected from diverse geographical regions. Purposive sampling was used to select a total of 108 tutors of Education, Science and Mathematics subjects. Research instruments included a questionnaire for tutors and an interview guide for deans of curriculum. A pilot study was done to determine and enhance the validity and reliability of the instruments. Test-retest technique determined consistency by calculating Spearman's correlation coefficient which was 0.74. Validation was done by the supervisors and lecturers in CT. The study found positive perceptions of the MCLS among tutors but they barely used the labs to conduct their lessons. The researcher attributed that finding to underlying factors as outlined in this paper. The paper recommends concerted effort by all stakeholders to support the teachers in actual classroom implementation of emerging teaching approaches.***

Keywords: ***Multimedia computer laboratories, challenges, tutors and computer technology***

I. INTRODUCTION

Introduction of MCLs in PTTCs was an effort by the Kenya Government towards application of CT in classroom instruction. The impetus was provided by the realization of the important place of CT in the modern society that saw the government put in place a policy framework to guide implementation of CT in education (Republic of Kenya, 2005).Consequently, the National ICT Strategy for Education and Training (NISET) was developed to guide implementation of ICT interventions. As a result, Televic NV, a Belgian company equipped PTTCs along with some secondary schools with multimedia computer laboratories. The aim was that all target learning institutions would integrate CT in their delivery so as to enhance access to learning opportunities and improvement of the quality of curriculum instruction (Republic of Kenya, 2006).

A multimedia computer laboratory is a curriculum delivery room containing computers and computer fittings which facilitate multimedia instruction. The significance of multimedia learning is supported by the opinion advanced by Mayer (2005) in his cognitive theory of multimedia learning. He claims that people learn better when they see and hear than when they hear alone. In the MCL, instruction involves use of text, sounds, graphics, animations and videos which according to UNESCO (2013) promotes attentiveness, participation, understanding and retention among learners.

However, availability of the computers and their accessories does not yield the desired outcome by itself. In his theory of diffusion of innovation, Rogers (2003) explains that an innovation diffuses through stages the last of which is the confirmation stage. This is the stage where the individual looks for support for his or her decision to adopt the innovation. This decision can be reversed if the individual does not receive support for adoption of the innovation. This study looks at support as technical, moral and professional assistance given to tutors in accepting to use and actual use of CT in the teaching and learning.

Research confirms Rogers's theory by indicating that despite the enthusiasm about CT integration in teaching and

learning among policy makers, low adoption by the implementers is a major concern. Ajayi and Ekundayo (2009) did a survey of application of CT in Nigerian Secondary schools using a sample of 320 teachers and attributed the low application to the low capacity of teachers for using CT.

II. STATEMENT OF THE PROBLEM

Research has shown that availability of CT infrastructure is not an end in itself as the perceptions and capacity of the tutor to use it play a critical role (Erickson, 2005). Monitoring and evaluation of interventions such as CT application in instruction is essential in providing information to stakeholders with the aim of improving implementation of such interventions (UNESCO, 2013). On its part, the Government of Kenya has emphasized its commitment to promote CT as a tool for training but has pointed at inadequate assessment of educators' perceptions and utilization of ICT in learning institutions as a challenge (Republic of Kenya, 2012). It is in this context that this study was done in a bid to among other objectives to find out the challenges that tutors faced tutors in use of MCLs.

III. LITERATURE REVIEW

An exposition of challenges that might hinder effective application of CT in the teaching and learning process is considered to be necessary in informing mitigation towards better teaching practice. Zamfir (2008) found that when computer applications do not work properly, or not work at all in some cases, they might lead to the wrong results. Zamfir reports that both students and teacher could feel frustrated because they all had certain expectations at the beginning of the lesson. Below are some reviewed challenges to effective application of CT in the teaching and learning process.

Literature shows that the computer could distract students from the real learning content when they see it as a playing tool. Zamfir (2008) from his study reported that the Romanian students who were under investigation were focused on learning how to play with the computer applications instead of how to interpret the results of these applications. It is therefore necessary that teachers teach the students how to fully benefit from using computers because computer technological interventions do not by themselves change the process of learning – they are only tools the teacher has to manipulate to facilitate teaching and learning (Kozma, McGhee, Quellmalz, and Zalles, 2004).

Studies show that computers are mechanical devices that can break down and interfere with the flow of a lesson. Becta (2004) survey, reports that mechanical breakdown of computer equipment can lower levels of CT use by teachers. Cuban et al. (2001) explain that if technical hitches occur frequently, user confidence in the value of the technology is eroded translating into apathy among teachers with regard to up take of CT. Compounding the issue, according to the said study, is inadequate technical support which is likely to make teachers avoid using CT fearing occurrence of a fault that cannot be remedied rendering the affected lesson unsuccessful.

Research indicates that in many developing economies including Africa, there are many limitations encountered in attempting to bring CT into the education process. Hennessy, Harrison & Wamakote (2010) identified a range of physical dynamics that influence computer use by teachers, including unreliable electrical power supply, inadequate computer resources (internet access, hardware and software provision). In this study, the researcher sought to find out if despite the installation of the multimedia laboratories, there are other infrastructural issues that might undermine effective integration of CT in the teaching and learning process.

One of the biggest obstacles in the use of computers for teaching as identified by teacher participants in the 1998-1999 survey evaluating the 'World Links schools program' was inadequate time (Kozma, et al, 2004).The study pointed out that quite often the curriculum in developing countries was not flexible besides being overloaded, hardly making time for inventive curriculum delivery practices. Similarly, Lankshear and Snyder (2000) claimed that despite computers having high possibilities of enhancing education, teachers are unable to actualize it to the full because time does not allow sufficient preparation and researching of materials required for the lesson. From another perspective, adequate time is necessary for teachers to be better accustomed with computer hardware and software (Becta, 2004).This study sought to find out how tutors planned their lessons to use the MCLs within the time available.

Research indicates that another challenge facing CT integration in classroom instruction is lack of computer literacy and know how on integration in teaching among teachers. Hennessy et al (2010) explain that the effective incorporation of CT into the teaching and learning hinges on the capability of the teachers to organize their learning environments to suit computer pedagogical approaches. With regard to tutors' preparedness to impart computer skills, Wilhelmsen, Ørnes, Kristiansen, and Breivik (2009) found that four in every ten pre service teachers thought that they were not being adequately trained on how to utilize CT in classroom instruction. Similarly, in a survey of both Oslo University College and Sør-Trøndelag University College, student teachers felt that they did not get enough courses on pedagogical use of computer (Enochsson and Rizza, 2009). Those findings agreed with previous ones, such as Hetland and Solum (2008) who stated that the digital proficiency of the tutor was inadequate and apparently there was need for more courses to enhance training.

An emerging barrier to use of CT could be the negative effect it has on the sight of the user. Wambugu (2013) lamented that with the world gone digital, long hours of using of computers has led to short sightedness. This is, the author says, an eye defect where near objects are seen clearly but far away objects are blurred. The researcher saw the eye defect as of great concern particularly bearing in mind that the current jubilee Government planned to ensure that laptops were introduced in government schools to enhance learning.

Cultural mindset is a factor that could affect perception towards an innovation as review of literature reveals. (Becta, 2004) reports existence of cultural mind set among teachers

whereby they have a tendency to resist change from the teaching methods they are used to and adopt new ones. With reference to the current study, this would refer to resisting change from mere use of chalk and talk method to use of emerging 'complex' computer approaches. According to the Becta report, the resistance goes beyond individuals to institutions whereby some set ups are not easy to rearrange in order to accommodate emergent infrastructural resources and new approaches. That finding had been found earlier by Cuban, L., Kirkpatrick, H. & Peck, (2001) and later by Zamfir (2008) who concurred, that even though use of CT in classroom instruction had shown remarkable academic outcomes, transforming from one approach to another is a perplexing procedure. The Becta survey (Becta, 2004) further indicates that often, teachers are wary of different ways of doing things with a tendency to embrace only if there is tangible evidence of its value. An example of this is found in a study where a teacher explained in an interview that she "wished to remain comfortable with her teaching, and although this may have kept her from adopting the best teaching methods, being comfortable was important to her." (Snoeyink et al 2001, pg. 40),

Similarly, Grossman (2008) in his study that concluded one of the major barriers in the use of CT applications in classroom instruction is opposition, (often sub consciously) by many teachers about invasion by computer based teaching approaches that are yet ambiguous and portend to change considerably traditionally recognized and reputable approaches. In connection to past research the current study investigated possible barriers in the use of multimedia computer laboratories in PTTCs in Kenya.

IV. RESULTS

In order to identify challenges in the use of the MCLs in PTTCs and to suggest recommendations for improvement the researcher gave an open ended question that was directed to the tutors who used the MCLs and so multiple responses were given. The responses according to the percentage frequencies are shown in Figure 1. In addition the researcher triangulated the responses with responses of the deans of curriculum following the interviews.

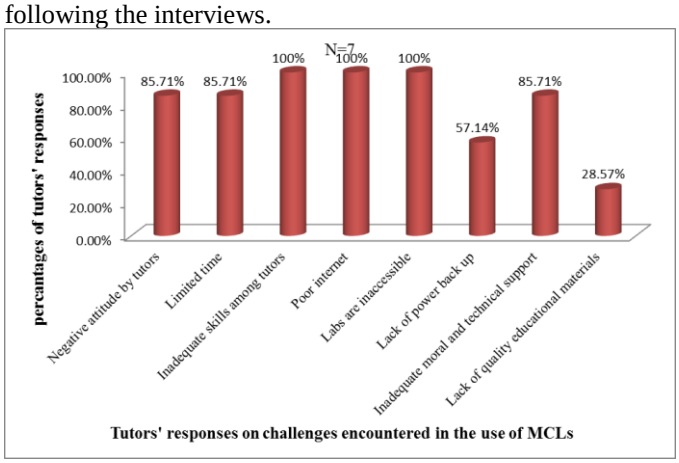

Figure 1: Tutors' responses on challenges in the use of MCLs

Figure 1 shows tutors' responses on challenges encountered in the use of MCLs. The following is a list of those challenges.

- ✓ Inadequate computer skills among tutors
- ✓ Poor internet
- ✓ MCLs are inaccessible
- ✓ Negative attitude by tutors
- ✓ Limited time
- ✓ Inadequate moral and technical support
- ✓ Lack of power back up
- ✓ Lack of quality educational materials

Following is a presentation, discussion and interpretation of challenges encountered by tutors while using the MCLs.

V. INADEQUATE COMPUTERS/ ACCESSORIES

Figure 1 shows that all the seven tutors who used the MCLs identified inadequate computers and accessories such as software and projectors among others as a challenge in the use of MCLs. This was also mentioned by the deans of curriculum in the interviews. One of them said, "Computer facilities are not enough. Half of the computers are grounded…Desktops are only 40 and the students are close to 1000."

Literature review shows that across Africa and most developing countries, inadequate facilities are a challenge in the use of CT in the education process. A synthesis of literature review of factors influencing classroom use of CT in Sub-Saharan Africa identified limited technology infrastructure as a leading cause (Hennessy et al, 2010). Maruti (2010) in a survey of e-learning readiness in PTTCs in Kenya reported poor and inadequate ICT infrastructure in colleges as one of the factors that hindered E-learning in colleges. Maruti reported a student –computer ratio of 13 students per computer. The challenge has persisted as reported by Mwaniki (2013) in an exploratory study of responsiveness of Primary Teacher Education in Kenya to challenges of the 21ST century. By the time of this study, infrastructural inadequacy was a major challenge despite CT being identified as an investment area by NESSP 2013-2018 (Republic of Kenya, 2013) and the Jubilee Government Manifesto (2013).

VI. LIMITED TIME

Limited time was identified by nearly all of the respondents 6 (85.71%) as a challenge to effective use of MCLs. On being asked by the researcher if tutors in specific subject areas used the MCLs, one dean of curriculum asked,

Where is the time to go to the lab? The labs are few and almost exclusively used for ICT subject lessons. Time is a big challenge…an hour after school hours when the technician opens the lab is hardly enough for all the other subjects!?

Research studies agree that lack of adequate time hinders effective implementation of CT. Kozma, et al, and (2004) point out that too often the curriculum in developing countries is rigid and overloaded, leaving little time for innovative classroom practices. Similar reports have been done by researchers in various parts of the world (Bingimlas 2009,

Maruti 2010 and Mwaniki 2013).The implication of inadequate time is that the objective of addressing quality of education through new innovative practices becomes elusive as educators require time and effort to implement them.

VII. INADEQUATE COMPUTER SKILLS AMONG TUTORS

Inadequacy of computer skills among tutors was mentioned by all the tutors who used the MCLs. The challenge was also mentioned by the deans of studies in the interviews. One of them had this to say;

Training of tutors is a big setback to implementation of CT in the college. I can only remember one afternoon training, hardly enough to internalize and there has been no practice because access to the lab is another issue coupled by time.

This challenge was found by Khan (2012) who reported that lack of knowledge regarding the use of ICT and lack of skill on ICT tools and software had limited the use of ICT tools in the teaching learning situation in Bangladesh. The current study found that inadequate CT skills undermined effective application of modern CT in the MCLS.

VIII. POOR INTERNET CONNECTION

All the seven respondents who used MCLs cited poor internet connection as a challenge to implementation of CT in PTTCs. Wi-Fi was reported by the deans of curriculum as being too expensive and so in one college it had even been disconnected. One dean on internet connectivity said;

Wi-Fi is available but very slow and so searching information online is very frustrating. In fact students use their mobile phones to search for information. Besides, due to financial constraints, the computer lab technician has been advised by the administration to control internet and this of course limits usage.

This finding is confirmed by literature review which shows that poor internet connection is a challenge in many Sub-Saharan African countries (Hennessy et al, 2010) and Bangladesh (Khan, 2012). Maruti (2010) reported 53% of the tutor population mentioned lack of connectivity to the internet as one of the hindrances to E-learning in PTTCs in Kenya. Even bigger economies than Kenya like Saudi (Al-Alwani 2005) and European schools (Korte & Husing 2007) have an issue with internet connectivity. The preamble of the MCL training manual (2010), highlights the fact that countries world over are working very hard to escape the eminent 'Global Digital Divide' (GDD). If PTTCs in Kenya do not access the World Wide Web (WWW), then the society will be unable to escape the GDD which implies that it will be on the receiving end in various areas of global competitiveness.

IX. INACCESSIBLE LABS

All the seven tutors who used MCLs cited lack of accessibility to the MCLs as a challenge. The interviews with the deans of curriculum were consistent with that finding. One of the deans, on the issue of accessibility to the MCLs said, 'One poorly equipped lab for 1000 students is like a drop in the sea. In any case computer labs are only used for ICT….it is booked throughout the week.' Studies of access to CT in even the developing countries show inadequate access as overriding in inhibiting its adequate application in education and training (Kessy, Kaemba & Gachoka, 2006; Becta 2004 & Ford 2007).

Hennessy et al (2010) concluded in their study that if technology could not be accessed by the teacher, as in so many educational settings in Sub Saharan Africa, then it would not be used. Agreeing with this view is (Maruti, 2010) who reported that computers in PTTCs in Kenya were not enough to meet the tutor and student population and most were of low speed. Sadly, five years later, the situation had not changed.

X. LACK OF POWER BACK-UP

Half of the seven tutors who used the MCLs cited lack of power back up as a problem in the use of labs. That finding was consistent with literature particularly studies from the developing world. Khan (2012) reported that most of the rural areas in Bangladesh do not have electricity and therefore one cannot even run a computer in the first place. Khan added that most of the cities of Bangladesh do not get electricity more than eight hours in a day due to inadequate electricity supply. Hennessey at al (2010) argues that some countries in Sub Saharan Africa are developing digital content for use across the curriculum but electricity supply remains rather sporadic and therefore a hindrance. The interviews with the deans of curriculum revealed that it was frustrating to tutors when power went off in the middle of the lesson and there was no back up and so data would be lost, besides, the lesson would not proceed. The implication of unreliable power supply is that tutors lack confidence and therefore apprehensive about conducting lessons in the MCLs.

XI. INADEQUATE ADMINISTRATIVE SUPPORT

Three quarters of the tutors who used the MCLs 6 (85.61%) felt that inadequate administrative support was a hindrance to effective use of the MCLs. Concerning the issue, one dean of curriculum had the following to say,

I think tutors are positive about using computers in teaching and learning because I see some using their personal laptops to do staff related to their work here in college. It means that if administration provided the necessary computer hardware and software to be used in classrooms besides the lab, tutors can easily use CT for instruction.

Although more and more teachers and student teachers are becoming personal users of computers, and the availability of technology is increasing, this knowledge does not simply transfer to teaching practices (PlayerKoro, 2007). PlayerKoro suggests that school administration should give direction and support to the teachers for effective use of CT. Similarly, although the MCLs have been put in place and tutors are becoming more and more computer compliant, there is the

feeling among tutors that college leadership is not doing enough. This finding was revealed by the deans of curriculum during the interviews. One of them said;

The support that tutors get is mere verbal encouragement because the facilities and the resource materials are inadequate. The excuse given is that there are financial constraints. Some tutors use their personal computers for college work but the lab technician is slippery when the tutors seek his technical help…but he maintains the lab equipment.

There is evidence in reviewed literature that administrative support is a key to successful use of CT in teaching and learning. Hennessy et al (2010) point out that the negative attitude among school leaders towards computers is a challenge to application of CT to teaching and learning. Similar findings were made by Anderson & Dexter (2005). Ang'ondi (2013) reported how school administrators would keep the computer room under lock and key and sometimes even accuse teachers of vandalism! The implication is that tutors become apprehensive about using the computers and so the college administration needs to create an enabling environment for tutors to use MCLs for instruction. The administration should for example guide the ICT department on how to collaborate with other subjects.

XII. NEGATIVE ATTITUDE BY TUTORS

Nearly all the respondents who used the MCLs saw negative attitude among tutors as a challenge to effective use of the MCLs. One dean of curriculum in the interview pointed out that barrier in the excerpt below:

The danger area is that generally our education system is too much examination oriented. A lot of emphasis is on syllabus coverage and not the learning process itself. Therefore some tutors see going to the lab as a waste of time...

This finding of tutors with negative attitude has been reported under the first objective of this study where 27 (26.21%) of the sampled tutors had negative perceptions of MCLs. Some research studies have attributed negative attitude among tutors to cultural mindset especially among the older ones. Becta, (2004) survey reports that teachers are often suspicious of new ideas and they only tend to adopt after seeing proof that it can help them do what they are currently doing better. Similarly, Grossman (2008) reported resistance, (often unconscious) of many educators to the intrusion of the still obscure technological newcomers that threaten to alter drastically long established and time honoured practices and customs. The implication is that tutor preparedness should go beyond acquisition of CT skills to a change of mind set.

XIII. INACCESSIBLE QUALITY EDUCATIONAL MATERIALS

A few tutors mentioned lack of access to quality educational material and the interviews revealed the same. One dean of curriculum upon being asked about challenges encountered in use of CT said,

Computers have opened avenues to lots and lots of information but most of the credible information is not for free…it has to be subscribed and the PTTCs have not come to that level. The digitized content from KICD is not available in all subjects and for those that have been digitized, the facilities and hardware is too inadequate to allow effective use.

Literature review shows that adequate and good quality resources in developing countries are elusive. Effective implementation of technology into education systems involves substantial funding, that is very hard to manage in developing countries (Hennessy et al 2010). Khan (2012) in a study of ICT barriers in Bangladesh, found acquisition of computer resources in a country where many people are living below the international poverty line a big challenge. In the same light, Afshari, Bakar and Su-Luan (2009) state that efficient and effective use of technology depends among other things, access to online educational resources by teachers and students. This study found that more and updated content from the internet that would boost the quality of learning matter was not accessible. The researcher found such boost to have been long overdue as Bunyi, Wangia, Magoma, Limboro and Akyeampong (2011) observe:

Although the history of primary education and teacher education is imbued with discourse on teacher quality, the rhetoric on improving the quality of teachers has not been matched with action with the result that primary teacher education programs have remained virtually unchanged since attainment of independence in 1963.

XIV. CONCLUSIONS

The study concluded that tutors' perceptions towards MCLs were largely positive. However, majority of the tutors did not use the labs despite having positive perception. The study therefore revealed that there was inconsistency between teachers' beliefs and their actual use of MCLs. The researcher found the inconsistency between teachers' perceptions and actual use of MCLs to be due to underlying factors such as inadequate and inconsistent training on use of MCLs, lack of access to the lab and its accessories, insufficient administrative and technical support and lack of appropriate action to support educational policies.

XV. RECOMMENDATIONS

- ✓ Since this study has shown that most tutors have positive perception of MCLs, it recommends that the Ministry of Education, Science and Technology (MOEST) should focus on creating an enabling environment. One such way is decentralizing computers and their accessories from the MCLs. This study recommends every classroom to have at least one computer with internet access and an LCD projector.
- ✓ The MoEST in conjunction with KICD should adequately train subject tutors on how to use the MCLs and generally how to integrate CT in their subjects. Besides, Computer Studies' tutor should be guided on how to assist other tutors to integrate CT in their specific subject areas. Mechanisms of inducting new tutors should be put in place.

- ✓ The study found one of the benefits of using MCLs as ability to use online literature but has not been effectively done. The study thus recommends that PTTCs be more proactive in improving the quality of subject matter by tapping from the global arena. Students can benefit more if they were given topics to research on or projects to do and share with the others via blogs or even social media. Colleges should have web pages where tutors can post and share important academic information. Colleges should also subscribe good quality online scholarly books and journal articles instead of just relying on course books that they have used over the years as reported.
- ✓ The study recommends that all the stakeholders involved in PTE in Kenya should closely monitor and evaluate progress made towards addressing challenges affecting effective use of MCLs in the colleges including: ensuring power backup, providing high speed internet and improving access and computer skills among other constraints.
- ✓ Finally, this study found inadequate moral and technical support by various stakeholders and curriculum support documents as a challenge to effective use of the MCLs. It thus recommends that MoEST together with KICD should support and encourage learning institutions to develop suitable policies that are relevant to their institutions. Such policies should provide suitable guidelines for action. The PTE syllabus for example, should be reviewed in a way that incorporates CT in all subject areas.

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