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Technology Leadership and ICT Use: Strategies for Capacity Building for ICT integration

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Abstract

Technology leadership is a fairly new concept in school leadership focus. It has become a concern for study in recent times, in tandem with the pedagogical change of integrating ICT in teaching and learning especially in the developed nations. However, few such studies have been done in Africa. A number of studies in the developed countries have advanced descriptive approaches on how educators should go about the using of ICT in education. Teachers, therefore, need to have prerequisite skills to integrate ICT in teaching and learning and school leaders have a role in enabling the effective use of ICTs. This study aimed at investigating how school leaders help build capacities of teachers to be able to effectively integrate ICT in their teaching and learning, at school level, in a public secondary school in Kenya. Using a qualitative case study approach, five school leaders involved in the capacity building, were purposively sampled for interviews, four teachers were engaged in a Focus Group Discussion and two teachers were observed engaged in classroom practice. Further data was obtained by analysing official school documents. The data analysed indicate the school leaders facilitated increased access to ICT facilities to the teachers and supported them, alongside training, to enable them explore various ways of integrating ICT in teaching and learning.

Introduction

School leaders are expected to spearhead all the school improvement changes including those that are technological in nature. They, therefore, execute this duty in their capacities as technological leaders. According to Januszewski and Molenda (2008), cited in Brown (2009), technological leadership is defined as the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources. In their technological capacities, school leaders provide finances and technological infrastructure, social and moral support to all the school stakeholders to realise the full potential of ICTs in education (Harris, 2001). Anderson and Dexter (2005), on their part, contend that technology leadership is a stronger predictor of technology outcomes as compared to expenditure and infrastructure. This means, therefore, that technological leadership is considered very essential to Information Communication Technology (ICT) integration due to the various roles school leaders are expected to perform. This study provided insights into school leadership practice as a key factor that influences effective ICT use.

Background and Literature Review

The term 'capacity' refers to the skills, knowledge, relationships, values and attitudes among many other attributes such as health and awareness (Matachi, 2006) "that enable countries, organisations, groups and individuals to carry out functions and achieve their

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development objectives over time" (ibid, p.4). Thus, Capacity Building (CB) is the establishment of conditions that will allow individuals to engage in the process of learning and adapting to change. In education technology leadership, such conditions include providing infrastructure, maintenance of ICT equipment and training of personnel for the integration of ICTs in teaching and learning.

Overall, leadership support for the use of ICTs in teaching and learning is driven by two schools of thought: one claims that 'if you teach teachers how to use a computer and give them unlimited access to that computer, they will then figure out for themselves how to apply their knowledge of ICT to their teaching practice' (SchoolnetAfrica, 2004). The other school of thought argues that 'it is necessary to teach teachers how to apply ICT to their teaching practice and that to simply teach teachers basic ICT literacy without applying it to pedagogy is a waste of time and resources' (ibid). According to Carlson (2002), teachers are the key to whether technology is used appropriately and effectively or not. While it is agreeable with Carlson (2002), in part, it is worth noting that both the teachers and the school leaders have key roles in successful ICT integration. School leaders play a pivotal role in influencing the teachers to take up the challenge of learning to use the technologies to improve their teaching and learning undertakings, and appropriate use of ICT can catalyze the paradigmatic shift from teacher-centred pedagogy to a more effective learner-centred pedagogy. Therefore, CB of teachers as well as administrators and managers can play a major role in enabling this shift.

In a study carried out in Asia-Pacific countries, Farrell and Wachholz (2003), cited in Ng, Miao and Lee (2009), identified three different approaches that policy makers stipulated for ICT use in education. Ng, Miao and Lee (2009) summarize these approaches as:

(i) teaching ICT as a subject in its own right, usually beginning at the upper secondary level, to develop a labour force with ICT skills; (ii) integrating ICTs across the curriculum to improve teaching and learning; and (iii) using ICTs to foster learning anywhere and anytime as part of the development of a knowledge society in which all citizens are ICT savvy. (p. 68).

They further note that each of these approaches calls for different infrastructural, personnel and management requirements. The second approach, key to this study, aims at enriching the quality of instruction, while the latter approach addresses the challenges of time and place of learning; which can be mitigated easily by use of the computer and the internet. The computer and the internet have enabled ubiquitous learning which enables learners to adapt their learning to individual convenience, believed to be beneficial to the learner. Teachers, therefore, need the pre-requisite ICT skills to be able to provide ICT mediated instruction to the benefit of the learner.


Conceptual Framework


This study was guided by the ICT-enhanced Teacher Development (ICTeTD) model of capacity building (Fig. 1) as advanced by Engida (2011). As contained in the foreword of the UNESCO-IICBA (2011) publication, 'the ICTeTD Model is grounded in the belief that teaching has its own unique knowledge base, which, in the 21st century, is the technological pedagogical content knowledge (TPCK)', (p. 5). The ICTeTD model is described as one which recognises that, in order for teachers to innovatively and effectively use ICTs in their teaching and learning they need an understanding in greater depth of the content of the subject matter they teach, the pedagogy related to that subject they teach and how that interacts with these concepts within the context of their schools and learning environment (UNESCO-Bangkok, 2012).

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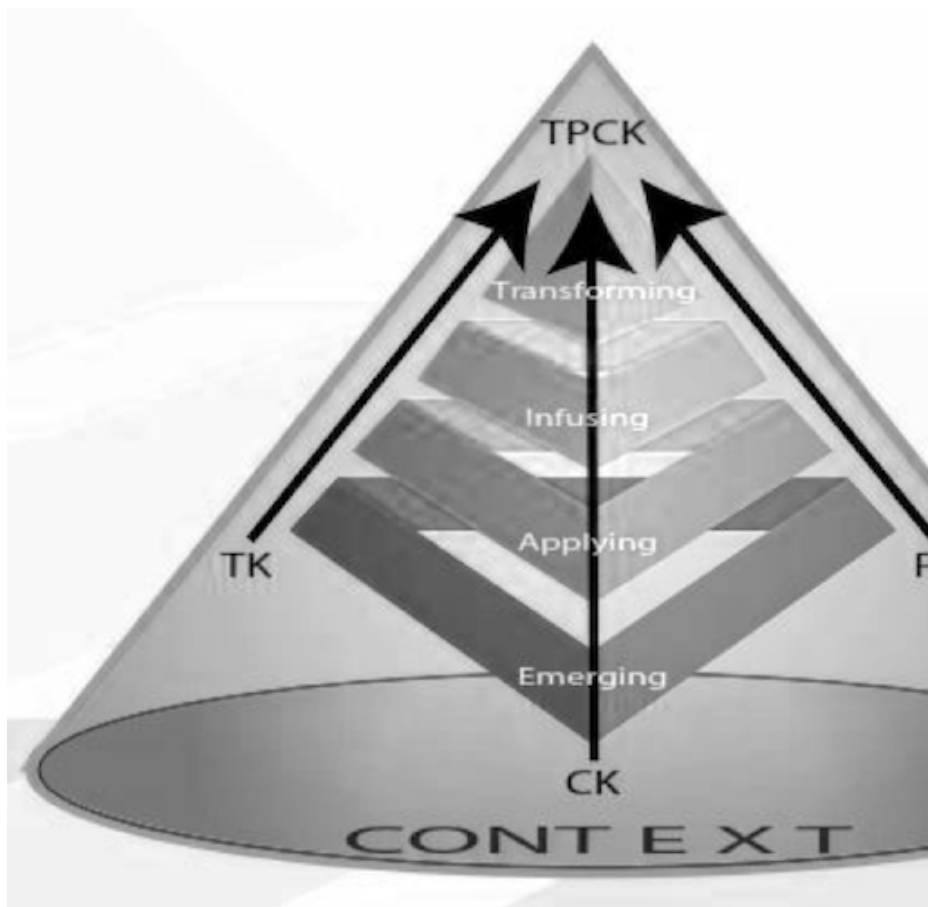


Fig. 1. ICTeTD model. (Source: Engida (2011))

The ICTeTD model integrates the four stages of ICT integration (Fig. 2) hereby conceptualised as a three dimensional pyramid, embedded in a cone, both tapering to the apex from the base where the Emerging stage is located, (that is for the pyramid), and the circular base of the cone represents the context. The apex of the CB pyramid includes the Transforming stage and is marked at the tip by the highest competence, characterised by technological pedagogical content knowledge (TPCK), which marks the highest level of CB.

Research Approach and Design

In order to get insights into the role school leaders played in the process of building the capacity of their teachers for ICT use in their teaching, it was necessary to carry out the study and observe this phenomenon in a natural setting. It was thus possible to record and analyse the views and experiences of school leaders and teachers. This study, therefore, adopted a qualitative approach and a case study design. The interview technique was used to collect primary data for the study.

Participants and Context of the Study

Purposive sampling was used to obtain a school that uses ICTs in teaching and learning since not all schools are equipped with digital ICT infrastructure. Purposive sampling also allowed for the appropriate selection of research participants such as the school leaders and teachers, whose qualities and experiences provided an understanding of how school leaders were engaged in the CB process for teachers' ICT integration, as espoused in their school. The school principal, four middle managers and four teachers participated in the study. The school chosen for study, Mazuri School (pseudonym), is a public secondary school that two years previously received ICT equipment and a training grant from the local Constituency Development Fund (CDF) for e-Learning. The school has a computer laboratory and an e-learning room where the teachers conduct their teaching and learning using ICTs.

Data Collection

Multiple methods of data collection were employed in this study namely; semi-structured face-to-face interviews, two direct, overt and non-participant observations, a focus group discussion and document analysis. This allowed for triangulation of data obtained and improved the credibility and validity of the study findings (Plano Clark & Creswell, 2008).

A total of eight face-to-face interviews were conducted, a focus group discussion was held with four teachers (to gather insights into their views and their first hand personal evaluation of the school leaders' initiatives of building their capacities to effectively use ICTs in teaching and learning) and evidence was sought about the holding of CB events and activities in the form of reports, letters of invitation, training schedules, school development plans and other written documents.

Data Analysis

All interviews conducted were immediately transcribed into text and, together with the other text data obtained (such as the expanded shorthand notes and comments made during observation), uploaded to NVivo-9 qualitative data analysis software for coding. This was done by initially organizing the text data into categories, named 'free nodes', which allowed for ease of review according to identified patterns. Then the 'free nodes' were re-grouped into 'sets' that were code-named to get sub-themes. These sets were re-viewed and further refined by merging closely related sets in term of data categories, which helped to eliminate overlaps in codes. Finally, themes were built out of these sub-themes that provided a deeper understanding and made meaning of the data collected for later discussion on findings.

Findings

Strategies used by school leaders to build capacities teachers for ICT use.

Conducting ICT awareness: Analysis of collected data from face-to-face semi-structured interviews and school official documents showed that, at the onset of procurement of ICT infrastructure, Mazuri School initiated and conducted ICT awareness programmes for teachers who were not computer literate and needed basic ICT skills to be able to use the ICT equipment available in the school.

Table 1. ICT Awareness.

Interviewee	Leadership Position	Response
Nuru	Principal	We didn't have a trained teacher (initially) but now (that we have one) we have started it again, so basically what we have been doing is mostly the awareness.
Mpendwa	Teacher	Initially we had awareness programmes at some time...where teachers were afforded that opportunity to come and hone their (ICT) skills...

According to Nuru (pseudonym), there was need to sensitize teachers about the importance of ICT in the contemporary practice and introduce them to basic computing skills as well as to how to use various ICT equipment. By so doing, the school leaders seemed to influence the teachers' appreciation of ICTs in education. Further, views from Mazuri school leaders and teachers showed that the school leaders attached value to technology development of the teaching staff, which is an aspect of CB, as a prerequisite for ICT use in teaching and learning. This echoes Chang, Chin and Hsu's (2008) views that 'staff technology development and training is an essential aspect of principals' technology leadership' (p.240). Flanagan and Jacobsen (2003) also contend that technological literacy in today's society symbolizes active participation in the global economy and success in the new information age. Therefore, by giving the teachers opportunities to learn computing skills at school level, the school leaders were not only influencing and empowering them to accept and implement the pedagogical changes but also providing a means of bridging the digital divide within the school context thereby helping, in part, the capacity building of the school organisation.

Provision of ICT infrastructure: The school leadership was committed to supporting teachers by providing ICT facilities equitably; such as desktop and laptop computers, projectors, smart-boards and sound systems among many other digital media, deemed necessary for the integration of ICT in teaching and learning. According to Nuru, her school planning and management team was committed to purchasing ICT equipment

annually. This is because they considered ICT infrastructure provision a vital strategy to build the teachers' capacity to use ICTs in their teaching and learning. Anderson and Dexter (2000) identify technology infrastructure and instructional practice using technology as two key areas school leaders need to exercise in six key decision types. Among these six decision types, are 'adequate technology budgeting' and 'equipment renewal plan' (*ibid*). It was observed that Mazuri school leaders plan for and provide ICT infrastructure to enable ICT integration in teaching and learning. Additionally, decision-making on ICT infrastructure procurement at Mazuri was participatory in both 'top-down' and 'bottom-up' approaches (Anderson & Dexter, 2000). This element of distributed leadership practice facilitates openness of boundaries of leadership (Bennett, Wise, Woods, & Harvey, 2003) that included the teachers in choosing what ICT infrastructure they require for teaching and learning, thus promoting participatory decision making for the attainment of a common school ICT vision. Equally important, this leadership practice and decision making approach helps teachers appreciate and own the CB initiatives, which is good motivation to the teachers for uptake of IT skills, while at the same time offers improved opportunities for the teachers to have hands-on learning of 21st Century skills, deemed essential for using ICT in teaching and learning.

Sponsoring training through workshops and seminars: Mazuri school leadership sponsored teachers to attend CB seminars and workshops outside the school as indicated in Table 2.

Table 2. Sponsoring training through workshops and seminars.

Interviewee	Leadership Position	Response
Nuru	Principal	First we took our teachers to Mombasa for three to four days training and then when we had our facilities installed... (later)... we got an expert, a trainer, to come and train the teachers on how to use the ICTs.
Zuhura	School Coordinator	...they (School Leaders) engage teachers in capacity building so that at least once in a while we have refresher courses for teachers, so that they can be trained on ICT. So, when they come back to school they can be useful to those left in school.

While employing the cascade model of training (Xaba, 2006), the school leadership required those teachers who attended such training to share the new knowledge and skills acquired with the rest of the department members. At the time of this study, about half the total number of teachers in the school had undertaken some ICT training courses, according to the school principal, who stated; "As at now we have around fifteen teachers that are computer literate out of twenty-nine..." (Interview on 7th May, 2012). The school leadership, hence, actively built the teachers' capacities to use ICT in their teaching and learning by investing in their ICT competencies. However, it was not possible to establish whether or not sponsoring the teachers to attend ICT seminars and workshops translated directly to improved pedagogic competencies by use of ICT, even though it was an ICT awareness initiative.

Freedom to access ICT facilities: Teachers at Mazuri enjoyed freedom to explore how to use the ICTs available in their school and experiment with how to best use them in their teaching and learning. This is because the school leaders deliberately allowed them freedom to access the ICT facilities whenever they had time in between their professional duties. This was evident from the comments of three of the four teachers who participated in the Focus Group Discussion:

Table 3. Response to the question: How best have the school leaders helped you gain the various competencies to integrate ICTs in teaching and learning? (FGD - 23rd May, 2012).

Interviewee	Leadership Position	Response
Mpendwa	Principal	By giving me that freedom to do anything possible...and efficiently make use of ICT in teaching.
Zuhura	Teacher	I think the freedom. A bit of it is very important ... I still feel that we need to do something more.
Khadija	Teacher	The school leadership has allowed us to be free

	in using the ICT and actually the leadership has put it, it is like ' <i>it is up to you to do it!</i> ' So go to the highest level...
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This revelation echoes sentiments by Bennett, Wise, Woods and Harvey, (2003), while citing Gronn's (2002) use of activity theory to explain the aspect of freedom as a concept of distributed leadership, that is, degrees of freedom opens opportunities to 'social actors', which 'enables change as small shifts from the present to one of a number of possibilities' (p.16). By allowing teachers to explore ways of applying their basic ICT skills in teaching and learning, the school leadership empowered the teachers to move from the emerging stage of ICT integration towards the applying stage (Engida, 2011). Further, Ng, Miao and Lee (2009) support the approach that teachers need hands-on activities 'involving the application of skills learnt (through formal training) in the classroom over an extended period of time' (p.72), where the teachers are allowed access to technology resources, support from technology managers and support from fellow teachers and school leaders (*ibid*). Evidence from classroom observations made suggest the teachers have gained various competencies to integrate ICTs in teaching and learning: one teacher had recorded a class role-playing session in literature, using a smart phone, and used the digital video recording to project it to the rest of the class where the learners critiqued the short play in terms of strengths and weaknesses of the performance. This approach to CB by school leaders at Mazuri embraces the latter school of thought according to SchoolnetAfrica (2004). It is evident that from the teachers' responses, this strategy seems to be effective in helping to build teachers' capacities, especially in schools generally at the emerging stage of the CB like Mazuri School.

It seems, by allowing the teachers access to the ICT facilities, the school leadership had empowered the teachers to develop their technological content knowledge without the school leaders' direct involvement, and this

Discussions and Conclusions

From this study, it is evident school leaders have put a lot of emphasis on technology leadership. By instituting strategies aimed at promoting ICT uptake for their improvement in pedagogy, the school leaders, in turn, built the school capacity for ICT use in teaching and learning, which is an institutional development undertaking. Professional Development for school leaders is therefore essential to help them gain knowledge on the latest information regarding ICT and technology use, since it is noted that rapid innovation in technology poses a challenge of constant new knowledge and skills, which the leaders need. Further, school leaders need to strive to bring all teachers on board for whole school improvement. For a school like Mazuri, which is generally at the emerging stage of the ICT integration continuum, it is essential that the school leadership develops an awareness of their unique school context to be able to effectively help build capacities of their teaching staff for ICT integration.

There is a need to shift the focus of ICT use in education from acquisition of basic skills (as is mostly the case in Kenya) to pedagogical competence using readily available digital technology, such as handheld devices, CD and DVD digital media, as well as use of social sites to facilitate teaching and learning that transcends time and space. Exploratory approaches to find different ways of using technology that is safe and reliable is encouraged and successful findings should be shared with fellow teachers and learners. This study recommends that school leaders encourage co-teaching using ICTs and peer coaching among teachers to share knowledge gained and also support one another to the benefit of the learner.

Lastly, the power of hand held ICT equipment cannot continue being ignored in teaching and learning by policy makers (as is the case of some African countries that have banned the use of mobile phones in schools). It is essential to note that teachers and learners can engage actively with internet content via hand held devices, thus promoting ubiquitous learning using the cheaper and more readily available internet connectivity through telephony providers.

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