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Original Research Article

Influence of Social Technical Factors on ICT Readiness for Primary Schools in Bungoma County, Kenya

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Since the 1980s integration of ICT in education has been compulsory in the developed nations where the access rate is one computer to 15 students. In developing nations such as Kenya it is more recent and experimental with the access rate of one computer to 150 students. Many government efforts and private initiatives tried to address ICT integration in the school level by carving out policies and strategies, providing computers and Internet access. Despite the huge investment in ICT infrastructure, equipment and professional development for teachers by the government and schools, developed countries have reported up to 41% of integration of ICT to teaching and learning, the proportion remains substantially low in Africa, Kenya included. This raises questions as to how well the integration was being done and how ready the environment was, if less than 40% of the available ICT infrastructure were being used. The purpose of the study was to analyze the influence of social technical factors on ICT Readiness for Primary Schools. The study established that for one to integrate ICT in schools, ICT usefulness, leadership support, professional development and technical support should be put in place. The study recommended that education stakeholders in the county should train all the teachers on how to integrate technology in teaching, guarantee technical support to ICT infrastructure, ensure leadership support and develop an elaborate professional development programme for educators.

Keywords: ICT readiness; ICT integration; information and communication, socio technical factors

INTRODUCTION

Primary education is the foundation and the beginning of formal education on which a nation's vital human resources are built. Technology use in this stage of the education process is suited to address the demands of primary schooling in some unique and powerful way and also is important for a country's participation in the global knowledge economy. Technology is a critical component of education in the 21st century; today's students live in a global world and need to compete intellectually with peers worldwide. Data suggest that digital tools and strong pedagogy may help schools employ the best strategies for student achievement of both traditional and 21st century skills (UNESCO, 2011).Global investment in ICT to improve teaching and learning in schools have been initiated by many governments. Since the 1980s integration of ICTs in education has been compulsory in the developed nations (GOK, 2006). This is not so in developing nations such as Kenya, where ICT integration in education is considerably more recent, small-scale and experimental.

Among the crucial factors influencing the adoption and integration of ICT into teaching are the teacher ICT professional development, perceived usefulness and perceived ease of use, accessibility of ICT resources, technical support and leadership support. Despite the huge investment in ICT infrastructure, equipment and professional development for teachers by the government and schools, developed countries have reported up to 41% of integration of ICT to teaching and learning, the proportion remains substantially low in Africa, Kenya included. This raises questions as to how well the integration is

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being done and how ready the environment is, if less than 40% of the available ICT infrastructure are used. Despite the strong emphasis given to ICT integration in education, it leaves one wondering whether the institutions take into consideration the social technical factors that influence ICT integration in education.

SOCIO TECHNICAL FACTORS

Professional development

Professional development is one of the most important factors influencing ICT integration in education in terms of beliefs and practice of teachers in most schools (Venezky, 2004). Baylor and Ritchie (2002) observed that professional development has a significant influence on how well ICT is embraced in the classroom. According to Schaffer and Richardson (2004), when technology is introduced into teacher education programs, the emphasis is often on teaching about technology instead of teaching with technology. Hence, inadequate preparation to use technology is one of the reasons that teachers do not systematically use computers in their classes. Similarly, research has shown that teachers require expert in technology to show them the way to integrate ICT.

Harris and Hoffer (2011) remarked that for teachers to integrate technology across different subject areas in the school curriculum, they need to demonstrate a firm mastery of TPACK. TPACK is an amalgamation of teachers' knowledge of curriculum content, general pedagogies, technologies, and contextual factors that influence learning (Koehler & Mishra, 2008).

Perceived usefulness and perceived ease of use and ICT integration

Among the factors that influence successful integration of ICT into teaching are teachers' attitudes and beliefs towards technology (Hew and Brush, 2007; Keengwe & Onchwari, 2008). According to Becta (2004) teachers' attitude towards the use of technologies is their understanding of how these technologies will benefit their teaching and their students' learning while Empirica (2006) observed that teachers who are not using new technology are of the opinion that the use of ICT has no benefits or unclear benefits. Similarly, Teo (2008) established that teachers were more positive about their attitude towards computers and intention to use computer than their perceptions of the usefulness of the computer and their control of the computer.

Accessibility of ICT resources and ICT integration

Effective adoption and integration of ICT into teaching in schools depends mainly on the availability, accessibility of ICT resources such as hardware, software and time. Obviously, if teachers cannot access ICT resources, then they will not use them. Preston and Cox (1999) found that teachers placed great importance on computer ownership and access to ICT for personal use as a factor that influenced their adoption of ICT in teaching.

Yildrim (2007) found that access to technological resources is one of the effective ways to teachers' pedagogical use of ICT in teaching. Empirica (2006) observed that lack of access is the largest barrier to ICT integration in teaching. While Pelgrum (2001) found out that insufficient; peripherals, numbers of copies of software, and Internet access were the main barriers of ICT integration in schools. Toprakci (2006) also observed that low numbers of computers, oldness or slowness of ICT system and scarcity of educational software in the school were barriers to the successful implementation of ICT into science education in Turkish schools. More so, Al-Alwani (2005) established that having no access to the Internet during the school day and lack of hardware were impeding technology integration in Saudi schools. Nevertheless, access to ICT infrastructure and resources in schools is a necessary condition for the integration of ICT in education (Plomp, Anderson, Law, & Quale, 2009).

According to Mumtaz (2000), lack of time is a factor that hinders technology integration in schools. Becta (2004) made observation that time is needed for Internet services, lessons preparation, exploration, practicing using the technology, dealing with technical problems and receiving adequate training. Results of a study conducted by the National Center for Education Statistics (2000) with in service teachers revealed that 82% of the participants felt that, with their regularly scheduled classes coupled with lack of time scheduled on the timetable to use computers with students, they did not have enough opportunities to practice using computers in their classes. Even though some of the teachers had a genuine need to use computers with their students. Sicilia (2005) observed that lack of time to plan technology lessons, explore the different Internet sites, or look at various aspects of educational software was the greatest challenge to integrate ICT in education.

Technical and Leadership support on ICT integration

Yilmaz, (2011) in assessing the technology integration processes in the Turkish education system reported that technical support with regard to repair and maintenance enables the continuous use of ICT in schools. Priscilla et al (2008) established that technical features of using computers for the teaching-learning process often confuse educators. The study reported that problems such as the breakdown of ICT devices led to insufficient class time. Teachers, who do not have quick support or

lack technical knowledge, encounter problems and frustrations concerning the technical management of ICT tools. It was noted that ICT support has great impact on teachers' use of technology as it can help boost the use of computers among educators in institutions of higher learning and this in turn can increase the likelihood of ICT integration in the teaching-learning interaction.

The National Center for Educational Statistics (2000) reported that about 68% of the teachers surveyed believed that lack of support regarding ways of using technology in the class hindered technology use. The Becta (2004) report stated that without technical maintenance, there is a higher risk of discouragement from using ICT in teaching because of the fear of equipment breaking down during a lesson. Therefore, lack of technical support may affect the teacher's willingness in the adoption of ICT (Tong & Trinidad, 2005).

Studies have shown that school leadership plays an increasingly important role in leading change, providing vision and objectives, as well as professional development initiatives in using ICT to bring about pedagogical changes (Schiller, 2002). According to Brannigan (2010), leadership is critical components in the successful integration of ICTs in Education. While effective leadership is one of the key variables that determine the success of an educational institution (Davis, 2003).The failure by educational institutions to integrate ICT in education has been attributed to lack of leadership capacity (Moyle, 2006).

A study by Rutledge (2009) found that schools reporting strong principal leaders had implementation levels over half a standard deviation above schools at the sample average. Findings suggested that effective and supportive leaders were most likely to both increase and deepen ICT implementation in a school. Wong & Li (2008) study revealed that leadership promotion of collaboration and experimentation and teachers dedication to student-centered learning influenced effective ICT transformation. Law & Chan (2003) found that in catalytic integration model schools, the school principal is the key change agent, exhibiting visionary leadership, staff development and involvement while in cultural innovation model schools, studies have shown that various levels of leadership such as principal, administrative leadership and technology leadership influence successful use of ICT in schools (Anderson &Dexter, 2005).

In summary, the reviewed literature indicated that social technical factors are critical components for ICT integration in institutions. However these studies did not examines the influence of Social Technical factors on ICT Readiness in primary schools. The gap this study sought to fill.

RESEARCH METHODOLOGY

The study used mixed method. The target population of the study consisted of 805 head teachers, 9000 teachers, one TSC County Director of Education (TCDE) and one County Director of Education (CDE) from Bungoma County. The study sample consisted of 39 head teachers, 390 teachers, one CDE and one TCDE. Head teachers and teachers were selected using simple random sampling technique, TCDE and CDE were selected using saturated sampling technique. The study used questionnaires and interview schedules as research instruments. To ensure face and content validity of the research instruments, experts in ICT and Education from the school of Computing and Informatics, Kibabii University College were consulted. Pilot study was conducted in 2 schools and Pearson product moment correlation coefficient was used to determine the reliability of the questionnaires at alpha level of significance of 0.05. Both qualitative and quantitative data was collected and analyzed. Quantitative data was analyzed using descriptive statistics, correlation and regression analysis. While qualitative data was analyzed thematically.

DATA PRESENTATION, ANALYSIS, AND DISCUSION

The influence of Social Technical factors on ICT Readiness

The study used likert scale with five points. Where 5 represented strongly agree, 4: agree, 3: undecided, 2: disagree and 1: strongly disagree. The study established that professional development had a significant influence on how well ICT was embraced in the classroom with a mean rating of 3.9077, Educators who integrated technology with new teaching practices gained through professional training could transform the performance of the students (4.1077) and professional training courses must be designed to identify beliefs about successful teaching, policies for enhanced teaching and learning and syllabus design for teaching purposes (4.1692).

The study also established that accessibility of ICT resources was crucial in ICT integration, whereby time was needed to explore and practice using the technology (4.2846) and ICT readiness in teaching in schools depends mainly on the availability of ICT resources such as computers (4.3769).

The respondents believed that ICT integration in teaching and learning would be easy for them (4.1000), easy to use (4.1308) and more so when ICT tools are used in teaching and learning, the process would be clear and understandable (4.0154).

The teacher respondents observed that experience with the use of technology had an influence on intention to use and actual use of ICT (3.9538), integration of ICT in education would improve pupil's grades (4.2385), enhance teaching effectiveness

(4.3385); improve the teaching productivity (4.2615) and lastly teachers would find ICT integration in teaching and learning useful (4.3385).

The finds indicated that the respondents were all in agreement that technical support was essential in successful integration of ICTs in teaching and learning. Technical support influenced the successful integration of ICT in teaching (4.2308), Teachers who had not had quick support encountered problems and frustrations concerning ICT tools (4.2308)and The breakdown of a computer could cause interruptions and fear of equipment failure which might result in teachers not using computers in teaching (3.7385).

The findings indicated that leadership was critical in successful integration of ICT in teaching and learning. Teachers observed that School Heads were the key change agent in ICT integration in schools (4.1385), leadership played an increasingly important role in bringing about ICT pedagogical changes (4.2000), effective and supportive leaders were most likely to both increase and deepen ICT implementation (4.2923). Finally, they observed that school leaders should be a role model and should make ICT a tool for everyday life (4.5154).

Most teachers indicated that given a chance, they intended to integrating ICT in teaching and learning in the future (4.4462). They also observed that given a chance, they predicted that they would frequently use ICT tools in teaching and learning (4.3923). And lasting they indicated that they would strongly recommend others to integrate ICT in teaching and learning (4.4538).

Factor analysis of social technical readiness factors

In order to understand the influence of different factors influencing ICT readiness, Pearson moment correlation coefficients were established between different factors.

Table 1: Socio Technical Factors

		X1	X2	X3	X4	X5	X6	X7
Professional Development	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	330						
Accessibility	Pearson Correlation	.423**	1					
	Sig. (2-tailed)	.000						
	N	330	330					
Ease Of Use	Pearson Correlation	.186**	.351**	1				
	Sig. (2-tailed)	.001	.000					
	N	330	330	330				
usefulness	Pearson Correlation	.507**	.454**	.533**	1			
	Sig. (2-tailed)	.000	.000	.000				
	N	330	330	330	330			
Technical Support	Pearson Correlation	.322**	.342**	.255**	.497**	1		
	Sig. (2-tailed)	.000	.000	.000	.000			
	N	330	330	330	330	330		
Leadership Support	Pearson Correlation	.419**	.345**	.273**	.534**	.598**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000		
	N	330	330	330	330	330	330	
integration	Pearson Correlation	.516**	.367**	.301**	.592**	.490**	.555**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	330	330	330	330	330	330	330

**. Correlation is significant at the 0.01 level (2-tailed).

Table 1 shows Pearson correlation coefficient between Levels of ICT readiness based on socio technical factors. The correlation between socio technical factors and ICT readiness levels were moderate and had positive correlations that were significant.

The correlation between Professional Development and ICT readiness levels was 0.516. This was a moderate positive correlation that was significant. The findings were in agreement with UNESCO (2011) that the preparation and continuing professional development of educators is a major element that is required for school transformation and appropriate use of ICTs.

The correlation between Accessibility and ICT readiness levels was 0.367. This was a moderate positive correlation that was significant. The correlation between Ease of Use and ICT readiness levels was 0.301. This was a moderate positive correlation that was significant. The correlation between Usefulness and ICT readiness levels was 0.592. This was a moderate positive correlation that was significant. The correlation between Technical Support and ICT readiness levels was 0.490. This was a moderate positive correlation that was significant. The correlation between Leadership Support and ICT readiness levels was 0.555. This was a moderate positive correlation that was significant.

The findings indicated that socio technical integration factors had significant positive relationship with ICT readiness levels in teaching and learning. However these does not show the contribution of each to integration. Table 2 shows the contribution of socio technical integration factors on ICT readiness levels.

Table 2: Model Summary of socio technical factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.694[a]	.481	.472	.48409

a. Predictors: (Constant), leadership Support, Ease of Use, Professional Development, Accessibility of ICT tools, technical Support, usefulness

From Table 2 it was revealed that the coefficient of determination was 0.481. This implied that 48.1% of variations in ICT readiness in teaching and learning was accounted for by leadership support, ease of use, professional development, accessibility of ICT tools, technical Support and usefulness. This implied that leadership support, ease of use, professional development, technical support, usefulness and accessibility of ICT tools had an influence on ICT readiness in teaching and learning. But the findings did not indicate whether leadership support, ease of use, professional development, accessibility of ICT tools, technical support and usefulness were significant predictors to integration of ICT in teaching and learning. Table 3 shows Analysis of Variance to establish the level of significance.

Table 3 : ANOVA of socio technical factors

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	70.286	6	11.714	49.988	.000[b]
	Residual	75.693	323	.234		
	Total	145.978	329			

a. Dependent Variable: integration

b. Predictors: (Constant), leadership Support, Ease of Use, Professional Development, Accessibility of ICT tools, technical Support, usefulness

From Table 3 the level of significance was 0.000 which was less than the set p-value of 0.05. This means that leadership support, ease of use, professional development, technical support, usefulness and accessibility of ICT tools are significant predictors of integration of ICT in teaching and learning. Among leadership support, ease of use, professional development, accessibility of ICT tools, technical support and usefulness it was not possible to establish which one was a significant predictor of integration. Table 4 provides Results of Multiple Regression Analysis of social technical factors

Table 4 : Coefficients of Socio Technical Factors

a. Dependent Variable: integration

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.364	.243		1.502	.134
Professional Development X_1	.217	.047	.231	4.672	.000
Accessibility Of ICT resourcesX_2	.016	.044	.018	.370	.711
Ease Of UseX_3	.009	.048	.009	.189	.850
UsefulnessX_4	.333	.072	.276	4.596	.000
Technical Support X_5	.147	.055	.140	2.684	.008
Leadership Support X_6	.243	.060	.218	4.033	.000

Table 4 shows the output of the regression model:
ICT integration = $0.364+0.217X_1+ 0.016X_2 +0.009X_3. + 0.333X_4 + 0.147X_5 + 0.243X_6$

From Table 4, professional development contributed positively to ICT integration of primary schools in Bungoma County. ICT integration for each school improved by 0. 217 with professional development as was signified by a coefficient of 0.217. Professional Development was significant predictors of ICT integration of primary schools in Bungoma County.

Accessibility of ICT resources contributed positively to ICT integration of primary schools in Bungoma County. ICT integration in each school improved by 0.016 with Accessibility of ICT resources as was signified by a coefficient of 0.016. Accessibility of ICT resources was not significant predictors of ICT readiness of primary schools in Bungoma County.

Ease of Use contributed positively to ICT integration of primary schools in Bungoma County. ICT integration in each school improved by 0.009 with Ease of Use as was signified by a coefficient of 0.009. Ease of Use was not significant predictors of ICT readiness of primary schools in Bungoma County.

Usefulness contributed positively to ICT integration of primary schools in Bungoma County. ICT integration in each school improved by 0.333 with Usefulness as was signified by a coefficient of 0.333. Usefulness was a significant predictor of ICT readiness of primary schools in Bungoma County. Usefulness was the strongest predictor of ICT integration in education. The findings were in agreement with Ervasti and Helaakoski (2010) who developed a model based on TAM and TPB to understand mobile service adoption, which states that perceived useful is the strongest factor in adoption.

Technical Support contributed positively to ICT integration of primary schools in Bungoma County. ICT integration in each school improved by 0.147 with Technical Support as was signified by a coefficient of 0.147. Technical Support was a significant predictor of ICT readiness of primary schools in Bungoma County.

Leadership Support contributed positively to ICT integration of primary schools in Bungoma County. ICT integration in each school improved by 0.243 with Leadership Support as was signified by a coefficient of 0.243. Leadership Support was a significant predictor of ICT readiness of primary schools in Bungoma County

The study established that for one to integrate ICT in teaching and learning professional development, usefulness, technical support and leadership support were critical. It is vital that one invests in professional development, usefulness, technical support and leadership support.

RECOMMENDATIONS

With regard to the levels of ICT integration in primary schools for Bungoma County, the study recommends that for the county to be ready to integrate ICT in teaching and learning, head teacher and county director of education should ensure the educators realize the Usefulness of ICT integration in teaching by ensuring teachers understand the benefits of integrating ICT in teaching ; get the support of school Leadership by ensuring leaders are well vast with ICT integration and they are the role models; have a clear and elaborate professional development strategy put in place where teachers are taken through an elaborate training including TPACK with ICT experts in their subject area and finally ensure technical support is provided in all primary schools by employing ICT coordinators or technicians in schools.

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