Full Length Research Paper

The management practices of Information and Communication Technology integration in the curriculum of the primary schools in Uganda

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This study investigates how Information and Communication Technology (ICT) integration in the primary school curriculum is managed in Uganda. School management practices were conceptualized as planning, organization and coordination. The dependent variable is ICT integration. The study is a cross sectional survey using mainly quantitative data. The population comprised teachers and school head teachers in Mukono District in Uganda. Data were collected using self administered questionnaires using a likert scale. The major finding of this study was that planning, coordination and organization significantly impacts ICT integration. A multiple regression analysis revealed that all the management practices had a casual effect on ICT integration. Recommendations are made that the state should formulate and implement policies to schools to regulate ICT implementation and offer support to school management to enhance their management practices in order to manage the ICT integration process into the curriculum. Based on the research, we propose that more software and hardware should be made available to schools. Further research may measure the management styles and change management strategies that may be adopted in order to successfully integrate ICT into the primary school curriculum. Such a study may be triangulated with the qualitative views from the respondents.

Key words: ICT integration, school management practices, planning, coordination, organization.

INTRODUCTION

ICT is a combination of software and hardware as used in organizations (Kyakulumbye and Muhenda, 2012). Evoh (2007) espouses that Information and Communication Technology (ICT) integration in the curriculum enhances access to information about the global markets in this information society among learners. He adds that managing ICT integration into curricula to positively influence teaching and learning has been in a state of evolution over the past 20 years. Driven primarily by the hardware and software evolution, accessibility to computers in educational settings, popular instructional technology trends like e-learning, and the integration of technology has covered the continuum from instruction on programming skills, self-directed drill and practice, interactive learning software, online training, testing, instructional delivery and Internet-based accessibility to information, communication and publication (Dias and Atkinson, 2001). There are efforts to integrate ICT into curriculum in the secondary schools and institutions of higher learning. However, integration of ICT in primary schools in Uganda is still low (Adelman and Taylor, 2011). In this respect, school management becomes a crucial partner in effecting ICT integration in primary schools. The management of ICT integration falls under curriculum management. Curriculum management refers to decision-making on the processes of development and planning of the curriculum and materials development. Curriculum management is an ongoing exercise and it is

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applicable at various levels of the educational hierarchy, yet non-hierarchical in itself, nonlinear and internally interactive. Effecting curriculum management requires school managers to engage in four operational processes which include needs assessment, planning and development, implementation, and evaluation (ClaroNetwork, 2012).

In Ugandan context, ICT integration has been primarily driven by national policies on ICT such as the National Educational Sector ICT Policy (Uganda Ministry of Education and Sports, 2005), and the Communication Act and the draft version of the ICT in Education Policy (Uganda Ministry of Works, Housing and Communications, 2003; ICT draft policy, 2008). The key focus in these policies is that government investments in ICT should not be on the provision of equipment and facilities but on teachers, trainers, lecturers, and the implementation of ICT use in the curriculum used in schools. The policies reiterate the need for ICT literacy and the improvement in ICT use and human resource capacity building linked to ICTs.

The Uganda Educational Sector ICT policy underscored the need for investing ICTs from primary to tertiary level. Among the strategies for attaining this objective was the mainstream integration into school curricula as well as other literacy programmes so as to provide for equitable access for pupils and students at all levels of education (Uganda Ministry of Works, Housing and Communications, 2003). At primary school level, the policy aims at encouraging those schools that have acquired technology to use and integrate it in teaching and learning. This is done either by producing teaching materials or using technology with learners in the learning process.

In Uganda, ICT integration in the primary school curriculum is enhanced by computer awareness programmes at teacher training colleges. The programmes enable teachers to get equipped with skills to make use of ICT in primary schools. In the intended study, managing ICT in primary school curriculum involves questioning of managerial and instructional practices that school managers use to integrate it in their practice.

Problem statement

The primary school curriculum in Uganda has been undergoing change and reform since 1997. One major reform has been the integration of ICT in the primary school curriculum. Some primary school head teachers are making efforts to integrate ICT in the school curriculum, initiating and leading change processes needed in the local contexts and carrying through the adjustments that are required in compliance with the national education sector ICT policy though coupled with managerial challenges. These challenges are related to lack of ICT management skills and understanding, attitudes, procuring and deployment of resources, and technological know-how in curriculum management, and monitoring and evaluation of ICT development plans. These challenges affect the ICT reform process in primary schools.

Hence, there is the need for approaches that enable school management functions to effectively integrate technology into classroom instruction to meet the school's vision and goals in this information age (Kawooya, 2004; Kozma, 2010; Mehlinger, 1996). Therefore, the need to find out how school managers manage ICT integration is a beginning point for effective ICT project implementation.

Research questions

1. What ICT managerial practices do school managers adopt to streamline the integration of ICT in the primary school curriculum?
2. To what extent do these managerial practices support ICT integration in primary schools?
3. What is the casual effect of managerial practices of school managers on the integration of ICT in the school curriculum?

LITERATURE REVIEW

Here, literature related to this study pertaining management practices and ICT integration into the school curriculum is presented. It does not only focus on primary schools but also on post primary schools.

Curriculum management

Curriculum management is an important part of school management and is linked to ICT integration in schools because the latter requires curriculum management. Curriculum management is associated with positive effects on student performance (Kanjee and Prinsloo, 2005; Taylor and Prinsloo, 2005). Elmore (1999) argues that direct involvement in curriculum management and instruction by school managers create an enabling learning environment that improves the quality of teaching and learning with the ultimate purpose of improving students' outcomes. Further, Louise (2006) point out that the school management is crucial in making structural changes to support integration. Firstly, school managers establish and manage a school culture conducive to conversations about the core technology of instruction. In addition, they structure, procure and allocate school resources toward instruction, and build capacities of teachers, both individually and collectively; and provide both summative and formative monitoring of instruction and innovation (Hallinger, 2000). Thus, how the management of curriculum and instruction is undertaken across the school needs to be considered in this study.

Curriculum management and ICT policy

Curriculum management is central in managing and making decisions in schools in the context of the establishment of school policies that foster quality classroom instruction (Adelman and Taylor, 2000; Galabawa and Agu, 2001). School policies help to clearly map and sequence opportunities for the application and development of ICT in schools across the curriculum and to ensure that ICT is integrated in a way consistent with the National ICT policy. The key focus of the school's ICT policy approach is an articulation of specific instructional strategies that can support and connect the use of ICT to develop students' ICT skills for application during learning experiences (Cox et al., 2003). Hence, curriculum management is important because it enhances school management to establish structures and explicitly design criteria and procedures to monitor the instruction, gather and evaluate data to make sound decisions that will help improve pedagogical classroom practices (Cobb and MacClain, 2003; Kozma and Anderson, 2004). Therefore, monitoring, reviewing and evaluation of the use of ICT within the curriculum, analyzing areas that require further attention, as well as acknowledging areas of success, will enable teachers and children to maximize their use of ICT to support classroom instruction. However, effecting curriculum management requires school managers to engage in four operational processes which include needs assessment, planning and development, implementation, and evaluation (Anderson 2001; Tanna and Lisa, 2002). This study summarizes these processes as planning, organizing and coordination which form the basis for investigation.

Planning

Planning is one of the key aspects of the curriculum management. When planning the use of ICT in the classroom, it is important for teachers to identify the role that ICT can play in adding value to teaching and learning across the curriculum (Anderson, 2001). Literature further reveals that school managers play an increasing role in planning, leading change, providing vision and objectives as well as teacher development initiatives in using ICT to bring about pedagogical changes (Anderson, 2002; Cheng, 2009; Leach, 2005; Yee, 2002). Thus, planning necessitates ensuring that use of ICT is carefully planned so that the exact nature and timing of demands on ICT resources are clearly identified across subject and departments to inform future purchase and allocation of resources as well as ensuring that there is continuous technical support for teachers on use of computer applications in their classrooms (Dede, 1999; Tearl, 2004; Van der et al., 2004). Hence, integration of ICT in instruction cannot be managed. Neither can improvement be sustained easily without effective planning. The school management's mediation as well as the ability of the school managers to provide technical support and coordinate all the planned activities is crucial in managing change (Fullan, 2002; MacDonald, 2006). Therefore, medium- and long-term ICT plans, across all subjects, are crucial for schools to identify clearly how ICT will be used to move teaching and learning forward (Bush et al., 2006).

Organization

Teacher classroom instructional practices involve the use of computers for classroom activities and presentations, for management tasks and to acquire additional subject matter knowledge to enhance students' learning (Haddad, 2003; Higgins, 2006; Mooij, 2007). The use of computers can help teachers respond with needed changes in curriculum and instruction (Eadie, 2000; Fawcett and Nicolson, 2000; Jonassen, 2000; Soudien, 2001). The changes in instructional practices take into account the use of various computer-based tutorials, tools, and e-content as part of whole class, small group, or individual student activities but the use is often supplemental (Bennett, 1996; Lei and Zhao, 2007; Schiller, 2002). The use of computer-based tutorials has significant implications for the transformation of management structures and classroom instructional practices. Kosma (2010) attest that as teachers become constantly engaged in educational experimentation and innovation in collaboration with an extended network of colleagues and experts to produce new knowledge about learning and teaching practices, they become themselves master learners who model the learning process for their students (Bush and Heystek, 2007; MCEETYA, 2005; Phelps et al., 2004). Therefore, head teachers should continuously monitor their progress, review the school's vision and goals, and adjust to new circumstances to create and allow space for teachers and students to experiment and try out the ICT skills learnt (Hay, 2001; Spillane et al., 2004; Southworth, 2002).

Coordination

Coordination processes ensure smooth running of ICT integration in classroom instruction across the curriculum and provides for pedagogical, technological and administrative support to teachers, to enhance constant and effective use of computers for classroom-based students' learning activities (BECTa, 2002; Rowland and Adams, 2005). ICT co-coordination in schools whether carried out by head teachers, HODs or subject teachers, is therefore, very important. Steems and Mooij (1999) in their studies report that coordination of ICT integration in schools is a widely acknowledged role for teachers because they are the main change agents in the classroom. According to Lee and Dimmock (1999), coordination of the curriculum management in primary schools takes three themes. The first is the extent to

which the curriculum is actually managed, or whether it 'just happens' through teachers working interdependently. The second is the degree to which head teachers are involved in the management of curriculum, or whether it is left to HODs and teachers. Thirdly, when head teachers are involved, how they bring their influence to bear impact on learners' outcomes. For the intended study, all the three themes are considered important because the coming together of these parties is integral to the success of ICT integration. Moreover, a blend of curriculum management and classroom instructional strategies necessary for ICT integration and co-ordination rests largely with a pool of teachers' involvement to effect a whole school cultural change (Naace, 2002). Blasé and Blasé (1999) also argue that if ICT leadership is dispersed and supported among staff, they will be able to coordinate and apply the school plans consistently in their classrooms as well as play their instructional and technical roles more efficiently (Mosha 2006; Thomson, 2001). Thus, the measure of success of ICT co-coordination in schools is largely dependent on the support from school management (Gustafson, 2005; Harris, 2005).

METHODOLOGY

The study was conducted in 2013 and it employed a survey and quantitative research design in nature. For quantitative findings from the survey, close ended questionnaires were generated. The study was also cross sectional in nature where data were collected one point in time. Quantitative design further provided empirical data to test the hypotheses and provide answers to the research questions.

Methods of data collection

For quantitative data collection, a five point Likert-scale was used to develop survey questionnaire items. Specifically, the cross-sectional survey questionnaire was administered to school managers investigating about the various ICT managerial practices using scale labels "strongly agree," "agree," "not sure" "disagree," and "strongly disagree" with 5, 4, 3, 2 and 1 respectively. Respondents were asked to tick the number on a scale indicating the extent to which they agree or disagree with their school exhibiting a particular managerial practice (descriptor).

Sample

Research site of the schools was purposively selected on the basis of data-richness, that is, the availability of computers and ICT integration in the curriculum. This sample was stratified on the basis of the four major learning areas in the curriculum: English, Social Studies, Mathematics, and Science of which ICT is integrated

(Fowler, 2002). This sample was drawn from private and government aided schools in Uganda. The total sample size was 110 drawn from 160 teachers using Krejcie et al. (1970) statistical table for sample size selection. Individual respondents were selected by simple random technique.

Data analysis

The quantitative data were entered into SPSS (Version 16.0). Data analysis was done mainly at three levels: the first level was Univariate level presenting frequencies with data in frequency distribution tables and descriptive statistics, mainly mean, as a measure of central tendency and standard deviation as a measure of variability; the second level was Multivariate level mainly measures of relationships - Pearson's Product Moment Correlation Coefficient; and the third level was Multivariate level which is mainly Multiple Regression Analysis.

Ethical issues

All respondents of the study were assured of utmost confidentiality pertaining the information sought from them. Additionally, the researcher used informed consent to collect data from the respondents and assured them that no credentials (names) were required. This was for anonymity purpose.

Validity and reliability

Survey questionnaires were first tested for practicability to check for validity using the Content Validity Index (CVI). The tool was given to independent experts who crossed out the invalid questions. The CVI generated was 0.89 which is above the presupposed 0.7 by many researchers. Reliability was ensured by piloting ten copies, by hand delivery, and with ten teachers out of the research site. After data collection, SPSS was used to compute Cronbach Alpha which generated a value of above 0.8 for all the study variables implying that the tool was reliable and could be used for data collection since Amin (2005) recommends a Cronbach alpha of 0.6.

FINDINGS

Background variables

The study targeted 110 teachers from the selected schools. Out of that number, 30.8% were from private schools, and 69.2% were from government aided schools. This therefore implies that majority of the respondents were from Government aided schools which are perceived to be model schools in effecting curriculum implementation. Pertaining grades, this study revealed that 15.4% of the respondents were teachers of Grade 1, 15.4% were of Grade 2, 10.3% were of Grade 3, 17.9%

Table 1. The composite percentages, means and standard deviation of the responses.

Variable	Percentage (agreement)	Aggregated mean	Aggregated standard deviation
Planning	77%	2.92	0.42
Coordination	55%	2.84	0.53
Organization	62%	3.20	0.45
ICT Integration	32%	1.58	0.48

were of Grade 4, 23.1% were of Grade 5, 7.7% were of Grade 6 and 10.3% were of Grade 7. This implies that most of the respondents were teachers of Grade 5. Pertaining to a subject a teacher was teaching, 25.6% were teachers of English, 30.8% were teachers of Maths, 20.5% were teachers of Integrated Science and 23.1% were teachers of Social Studies. This therefore implies that all disciplines taught in the Primary School level could necessitate integration with ICT.

Descriptive statistics

Table 1 shows the composite percentages, means and standard deviation of the responses. Generally, respondents were in agreement that the school managers undertake the practices of planning, organizing and coordinating. The aggregated means for planning, coordination and organization are 2.92, 2.84 and 3.20 respectively which are above the perceived mean of 2.5. Their respective standard deviations are 0.42, 0.53, 0.45 and 0.48 respectively. This implies that respondents were in agreement with the management practices in place. Moreover, the standard deviations generated do not show very wide divergences in respondents' views towards the same. Pertaining to ICT integration into the curriculum, 32% of the respondents were in agreement leaving the rest (68%) in disagreement. The mean of 1.58 indicates a disagreement compared to a delimitation of agreement and disagreement of 2.5. This implies that ICT integration in the curriculum does not exist yet among the studied schools.

Relational statistics

The study further established whether there was a relationship between the school management practices and ICT integration based on Pearson's correlation coefficient model computed following the formula:

$$r_{xy} = \frac{n\left(\sum xy\right) - \left(\sum x\right)\left(\sum y\right)}{\sqrt{\left\{\left(n\sum x^2\right) - \left(\sum x\right)^2\right\}}\sqrt{\left\{n\left(\sum y^2\right) - \left(\sum y\right)^2\right\}}}$$

where n - is the number of paired observations, $\sum xy$ is the sum of the gross product of school management practices and ICT integration, $\sum x^2$ is the sum of all the squared values of school management practices, $\sum y^2$ is the sum of all the squared values of ICT integration, $\left(\sum x\right)^2$ is the sum of school management practices squared and $\left(\sum y\right)^2$ is the sum of ICT integration. Results of this statistics are shown in Table 2.

Table 2 shows that organization and ICT integration generated a sig. value of 0.001 and r-value of 0.511** which is statistically significant at 95% level of significance; planning and ICT integration generated sig. value of 0.000 and r-value of 0.687** also revealing strong relationship; coordination and ICT integration generated sig. value of 0.000 and r-value of 0.734** also revealing statistically significant relationship. This implies that all the three school management practices (planning, coordination and organization) strongly relate to ICT integration into the primary school curriculum.

Multiple regression results

On realizing that a strong relationship between the school management practices and ICT integration existed, this prompted the researchers to undertake multiple regression analysis to establish the causal effect based on the multiple regression model of

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \ldots \beta_n X_n + \varepsilon$$

where Y - is the dependent variable, X_{1-n} - are the independent variables, β_0 is the constant, and β_{1-n} - are the regression coefficients.

The model summary in Table 3 reveals r-squared to be 0.693 and the adjusted r-squared to be 0.666. This coefficient of determination implies that the success of ICT integration in the curriculum of primary schools in Uganda is explained by the school management practices of planning, coordination and organization by 66.6%. The remaining 33.4% is explained by other factors not covered in this study and could be studied in another study. In the ANOVA Table 4, a sig. value of 0.000 implies that the joint probabilities of the studied school management practices are statistically significant to ICT integration in the curriculum. To establish which of the school management practices is over and above to

Table 2. Correlation results.

Variable		Organization	Planning	Coordination	Integration
	Pearson correlation	1	0.419**	0.332*	0.511**
Organization	Sig. (2-tailed)		0.009	0.041	0.001
	N	110	110	110	110
	Pearson correlation	0.419**	1	0.523**	0.687**
Planning	Sig. (2-tailed)	0.009		0.001	0.000
	N	110	110	110	110
	Pearson correlation	0.332*	0.523**	1	0.734**
Coordination	Sig. (2-tailed)	0.041	0.001		0.000
	N	110	110	110	110
	Pearson correlation	0.511**	0.687**	0.734**	1
Integration	Sig. (2-tailed)	0.001	0.000	0.000	
	N	110	110	110	110

** - Correlation is significant at the 0.01 level (2-tailed); * - Correlation is significant at the 0.05 level (2-tailed).

Table 3. Model summary.

Model	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	0.832[a]	0.693	0.666	0.28212	1.506

a - Predictors: (Constant), Coordination, Organization, Planning. b - Dependent variable: Integration.

Table 4. ANOVA[b]

Model		Sum of squares	df	Mean square	F	Sig.
	Regression	6.098	2	2.033	25.540	0.000[a]
1	Residual	2.706	108	0.080		
	Total	8.804	110			

a - Predictors: (Constant), Coordination, Organization, Planning.

Table 5. Dependant variable: ICT integration.

Model		Coefficients				
		Unstandardized coefficients		Standardized coefficients		
		B	Std. Error	Beta	T	Sig.
	(Constant)	-0.027	0.386		-0.069	0.945
1	Organization	0.222	0.114	0.206	1.943	0.060
	Planning	0.411	0.140	0.344	2.941	0.006
	Coordination	0.432	0.100	0.484	4.305	0.000

a - Dependent variable: ICT integration.

predict ICT integration into the curriculum, Table 5 reveals that coordination yielded the highest beta value of 0.484, followed by planning with beta value of 0.344 and last is organization with beta value of 0.206. This implies

that coordination is the most crucial school management practice when integrating ICT in the primary curriculum, followed by planning and lastly organization.

DISCUSSION OF RESULTS

One key research question was to find out the school managerial practices school managers use to direct the integration of ICT in the primary school curriculum. The results revealed planning, organization and coordination as critical management practices. The results agree with Anderson (2001), who emphasizes that when planning for the use of ICT in the classroom, it is important for teachers to identify the role that ICT can play in adding value to teaching and learning across the curriculum. The results of this study are further in agreement with Kosma (2010), who attests that as teachers become constantly engaged in educational experimentation and innovation in collaboration with an extended network of colleagues and experts to produce new knowledge about learning and teaching practices, they become themselves master learners who model the learning process for their students and therefore become well organized. Meanwhile BECTa (2002) and Rowland and Adams (2005) postulate that ICT co-coordination in schools whether carried out by head teachers, HODs or subject teachers is very important. The study further agrees with Lee and Dimmock (1999), who suggest that coordination of the curriculum management in primary schools takes three themes. The first is the extent to which the curriculum is actually managed, or whether it 'just happens' through teachers working interdependently. The second is the degree to which head teachers are involved in the management of curriculum, or whether it is left to HODs and teachers. Thirdly, how head teachers bring their influence to bear impact on learners' outcomes when they are involved (Lee and Dimmock, 1999).

Conclusion

This study concludes that the success of ICT integration into the university curriculum is mainly dependent upon coordination, planning and organization. The first two were the most significant and should be addressed in the primary schools in Mukono and Uganda.

RECOMMENDATIONS

The following recommendations were made in line with the research questions: Government should formulate, disseminate and enforce policies to schools to integrate ICT in the curriculum of schools, address strategies to change users' negative perception of teachers towards ICT integration, and offer support to school management to enhance their management practices in order to manage the ICT integration process into the curriculum. More e-learning software and hardware should be made available to the various schools. Government should further attract more investors in ICT software and hardware to have ICT further implemented in the schools for effecting e-learning. A similar study can further be extended in the post primary schools in Uganda.

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