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Influence of Smart Classrooms Services on ICT Capacity Building in Secondary Schools in Rwanda: A Case of Gatsibo District

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Abstract

This paper sought to investigate influences of smart classrooms services on ICT capacity buildings in Rwanda secondary schools. Most of the secondary schools in Rwanda have smart classrooms for enhancing ICT integration in teaching and learning. Mixed methods approach research design was adopted and targeted all 45 public Gatsibo secondary schools with smart classrooms and 31 schools were sampled using random sampling method. Stratified sampling technique was applied. Using purposive sampling method, 93 respondents were selected. Questionnaires were used for teachers and interview template was used for head teachers. The researcher found that there was a significant influence of smart classrooms services on ICT capacity building in secondary schools. Though, the study recommended the ministry of education, school administrators, and teachers.

Keywords: *Smart classrooms, Services, ICT Capacity building, Secondary school.*

1. Introduction

Smart classroom focuses on educating and learning approaches with technologies based. It was discovered that smart classroom approach gives an effective teaching outcome, teaching quality and improved learning since it is innovation (den van Blink, 2009). Rwanda, according to (MINEDUC, 2016), Education ministry has promoted the practice of ICT in schools right from the junior classes going up and has as well coordinated the one laptop per child' country project, the Rwanda Government (GoR) believed that this could pay heavily in country development in the future, especially in education quality improvement.

Since the beginning of NICI process, Rwanda country made considerable progress towards becoming a knowledge-based economy and is now well positioned to become a regional ICT hub that can provide the highly competitive ICT services and products. Since 2008, MINEDUC has introduced the one laptop per child (OLPC) program at primary schools and computer labs for secondary schools; 250,000 OLPC devices were installed in 764 schools and achieving 10% only of primary students. The program met challenges about teachers' capacity because of this high learning curve, the price of disposition was also high while it only reached a few students and lastly, the lack of the program introducing in a regular learning and teaching activities was the major challenge. The secondary schools gained the program of computer lab were only 5% and only ICT classes used these labs (MINEDUC, 2016).

Referring to (MINEDUC, 2016), the program has been shifted to "smart classrooms concept" While a device for every child remains the end goal, MINEDUC is leaving from One Laptop Per Child (OLPC) to the concept of a "Smart Classroom" following changing technology to decrease costs and increase equity and access. More significantly, the policy ensures that technology is unified in all education procedure such as delivery of lessons, preparation, research, and assessments (MINEDUC, 2016). This study sought to investigate the influences of smart classrooms services on ICT capacity building in Rwanda.

2. Review of literature

2.1. Smart classroom model

Smart classrooms intend at providing an effective educational atmosphere which enhancing the students' performance in learning and providing diverse knowledge sources together with all required interactive tools. The concept of smart classroom has evolved from a broader concept of distance education system that had utilized the internet as a medium; or as a transferring of the conventional classroom into an intelligent environment equipped with several hardware and software components (Xie, Shi, Xu, & Xie, 2001). The Internet of things will enable the connectivity for anyone and anything from anyplace at any time (Reports, 2005). These rapid developments of the Internet and communication have direct effect on the educational technologies and smart classrooms concept.

2.2.1. The smart classroom services.

A smart classroom consists of several components to form an interactive and interesting learning environment that enrich the teaching methods and develop the students' skills and raise their academic level and allow them to participate more in the learning process.

Overall, the smart classroom consists of the following components:

- Interactive smart whiteboard.
- Classroom and multimedia control center.
- Computers and Mobile computing that serve the students inside or outside the classroom.
- Audio/video elements such as data show, projectors and recording systems.
- Classroom management system, which is highly efficient software that allows the teacher to have full control of the smart classroom components and students' equipment.

The smart classroom components interact with the other components of the e-learning system to form a unique learning environment that will cause a quantum leap in education in the Ministry of Education and will contribute effectively to move towards the 21st century education.

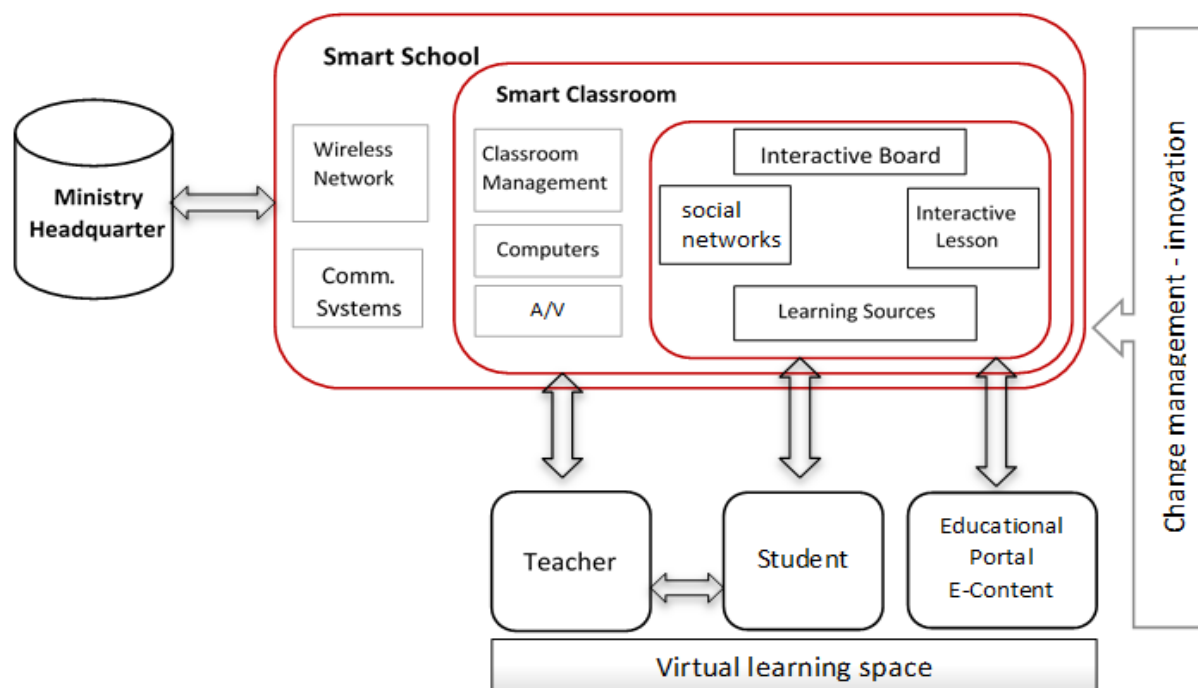


Fig 1: Smart Classroom Model

2.3. ICT capacity building

A critical discourse analysis on policies of Rwanda from higher level education perception

2.3.1 Instructional perspective

This dimension emphasises in improving capacities related to educational innovation (Owens, 2012; Owston, 2010). These comprise the progress of ICT literacy amongst the teachers (Awuah & Ojo, 2009) and students (Judd, Kennedy, Gray, Churchward, & Krause, 2008). Additionally, it would go beyond by developing capacities for generating and overseeing digital contents (Govindasamy, 2009; Bates, 2013; Tsai, Sun, Chen, Finger, & Yeh, 2008).

2.3.2. Institutional perspective

This feature concentrates on developing capacities by building collaborations and partnerships with the government s and external ICT specialist, plans development and plans to develop ICT infrastructure (Nachmias et al., 2009; Kozma, 2008; Marshall & Ruohonen, 2010; Murray & Larson, 2008) and IT training support personnel in progressive skills of ICT (Nichols, 2008).

This cluster also comprises the digital competences development for managers and the knowledge creation on the current available ICT tools (Lwoga, Sife, & Sanga, 2013; Bhuasiri, Rho, Zo, & Xaymoungkhoun, Ciganek, 2012). The organisational cluster also considers the accessibility of suitable basic resources of ICT as the key for successful ICT integration (Yildirim, Goktas, & Yildirim, 2009; Kidd, Keengwe, & Blankson, - Kyei 2009).

2.3.3. Investment perspective

Investment aspect may consist of the concept of understanding about how intentionally the schools can choose the suitable mixture of technical tools (InfoDev, 2010). At this level, the school must have modernized knowledge about the cost of chosen technologies (technologies of instructional and basic infrastructures of ICT).

The investing cluster should have also planned for incentives and motivations for innovation champ and formulate financial programs for the students and faculty to permit them to obtain their personal digital devices (Webb &, Plessis 2012). Similarly, education technology integration involves significant investments in infrastructures of ICT to certify maintenance, compatibility, wide access, complementarity, and functionality of instructive technologies (Bates, 2013; Tanrikulu, Tugcu, & Yilmaz, 2010).

3. Methodology

This study was mixed approach research design. Since the data was collected using both quantitative and qualitative method of data collection. In qualitative research approaches individuals ‘own accounts of their attitudes, motivations and behavior was observed. Quantitative research approach was used to analyse numerical terms. The population of the study was 45 secondary schools in Gatsibo with smart classroom and 31 schools was sampled by using simple random sampling method. The research was used stratified sampling technique to identify teachers and head teachers. The study used purposive sampling technique to select respondents. The study used 93 respondents comprise 31 ordinary level teachers, 31 advanced level teachers and 31 head teachers). Tools of data collection: the study used questionnaire to collect data from teachers and interview to collect data from head teachers.

4. Data analysis, findings, and discussion

The following section presents the results of current study on investigating the influences of smart classrooms services on ICT capacity building in Rwanda secondary schools are presented and analysed

4.1: Teachers’ findings

Table 1: A model summary box analysis of smart classrooms services on ICT capacity building (Teachers’ responses)

Model Summary ^b						
Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.647 ^a	.418	.373	.97		1.731
a. Predictors: (Constant), ICT resources access, IT support among end users, internet access, ICT training.						
b. Dependent Variable: ICT capacity building						

About influences of smart classrooms services on ICT capacity building, the findings indicated in table: 1 show that Durbin-Watson was 1.73. By using the Durbin-Watson analysis, the Durbin-Watson is the value between 0 and 4. in case the value is less than to 2 there is a positive autocorrelation between independent variables and dependent variable which is the case of this study. Therefore, there was a significant positive correlation between smart classrooms services and ICT capacity building in Gatsibo secondary school.

Table 2: A coefficient box analysis of smart classrooms services on ICT capacity building (Teacher’s responses)

Coefficients^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	20.647	.9.530		2.167	.140		
	ICT resources access	.295	.154	.333	1.911	.067	.735	1.360
	IT support among end users	.135	.117	.150	1.154	.253	.533	1.878
	Internet access	.205	.130	.205	1.581	.119	.531	1.883
	ICT training	.668	.285	.408	2.342	.027	.735	1.360

a. Dependent Variable: ICT capacity building

Also, the researcher used coefficients table to identify the influences of smart classrooms services on ICT capacity building in Gatsibo secondary schools. The findings in table: 2 indicate that tolerance was 0.644 and VIF is 1.996 about ICT resources access. Tolerance is 0.733 and VIF was 1.878 about IT support among end users. Tolerance was 0.731 and VIF was 1.883 about internet access and tolerance was 0.525 and VIF was 1.853 about ICT trainings. By using collinearity statistics analysis, the assumption to be met VIF scores to be well below 10, and tolerance scores to be above 0.

Head teachers’ findings

Table 3: A model summary box analysis of smart classroom implementation on ICT capacity building (head teacher’s responses)

Model Summary^b						
Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.699 ^a	.489	.453		.847	1.809

a. Predictors: (Constant), ICT resources access, IT support among end users, internet access, ICT training.

b. Dependent Variable: ICT capacity building.

Table 4 shows that the Durbin-Watson was 1.831 and Durbin-Watson which is less than 2 means that there is a positive autocorrelation between smart classrooms services and ICT capacity building. Table 5 shows the coefficient results of the study.

Table 5: Coefficients box analysis of smart classrooms services on ICT capacity building (Head teachers' responses)

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.648	.401		1.618	.111		
	ICT resources access	.596	.227	.504	2.630	.011	.644	1.996
	IT support among end users	.135	.117	.150	1.154	.253	.733	1.878
	Internet access	.205	.130	.205	1.581	.119	.731	1.883
	ICT trainings	.103	.283	.073	.364	.717	.525	1.853

a. Dependent Variable: ICT capacity building

Also, the researcher used coefficients box analysis to analyse the head teachers' findings. Table 5 shows that tolerance was 0.644 and VIF is 1.996 about ICT resources access. Tolerance is 0.733 and VIF was 1.878 about IT support among end users. Tolerance was 0.731 and VIF was 1.883 about internet access and tolerance was 0.525 and VIF was 1.853 about ICT trainings. Which shows that there is a significant positive correlation between smart classrooms and ICT capacity building as by using collinearity statistics analysis, the assumption to be met VIF scores below 10, and tolerance scores above 0. Similar, the governments and external ICT specialist plans development and plans to develop ICT infrastructure (Nachmias et al., 2009; Kozma, 2008; Marshall & Ruohonen, 2010; Murray & Larson, 2008) and IT training support personnel in progressive skills of ICT (Nichols, 2008).

5. Conclusion and recommendations

The current study concluded that the smart classrooms services have a significant influence on ICT capacity building in Rwanda secondary schools, therefore the following were the following were recommended:

1. MINEDUC should facilitate the way of getting IT technical support at schools, increasing ICT trainings, increase the smart classrooms equipment.
2. Schools' administrators should assist and empowering ICT trainings in their schools also encourage the smart classrooms implementation in daily activities at school.
3. Teachers should take enough time in using smart classrooms to build their level in ICT. The researcher recommends the future researchers to improve this research by assessing the knowledge needs teachers in Rwanda for successful smart classrooms implementation in teaching and learning.

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