Use of Information Communication Technology Tools and Teacher's Performance in Rwanda: A case of secondary Schools in Rulindo District

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Abstract- This paper examined the relationship between information communication and technology tools and teacher's performance in secondary schools of Rulindo District-Rwanda. Specifically, the paper determined information communication technology tools, level of teacher's performance and relationship between information communication and technology tools and teacher's performance. The research was guided by Task=Technology Fit to ascertain the correlation between information communication technology and teacher's performance. A descriptive study with a mixed approach was used employed to collect data. The target population of 262 teachers and head teachers from secondary schools helped to draw a sample of 159 respondents and key informants. The sample size was selected purposively and randomly. This study used questionnaire, interview guide and observation protocol for collecting primary data. Secondary data was collected using a desk review. The researcher generated descriptive statistics in terms of mean, standard deviation and inferential statistics in term of correlational and regression analysis. To the first objective, results indicated that the most commonly used tools are computers (Mean=2.98, SD= 1.04), starboards/phones (Mean=3.49; SD=1.02>0.5), video clips in lessons (mean=2.58 SD=1.00). To the second objective, results demonstrated that ways of classroom teaching has been improved (Mean=0.067, SD=10.1) improvement of interpersonal relations (Mean=1.04, SD=0.43), students complete homework on time (Mean=1.67, SD=1.12). To the third objective the relationship between using information communication technology tools computer and the success of teaching job r= 0.843 between computer/tablets and classroom teaching. It was 0.871 between computer/tablets and the management of students, discipline and regularity and 957 between computer and tablets use and the interpersonal relations. Electronic textbooks is correlated with classroom teaching.962**.Results indicate that a correlation between the instructional software and classroom teaching was .827**. The study recommends that public institution would provide excellent centers to stimulate the use of information communication and technology tools. There is a need to organize in service trainings in order to improve the use of information communication and technology tools.

Index Terms- Competence, Information and Communication Technology, Public Schools, Teachers' ICT experience, Teachers' performance.

I. INTRODUCTION

Technological advancement had affected teaching process. Many researches worldwide had denoted the effect of ICT and the way in which it influenced how persons learn, how they disseminate information and how they do their everyday activities (Nazir, 2015). For execution of this policy, the Ministry of education started and distributed One Lap Top per Child Program in primary education and connected computer laboratories in several secondary schools since the year 2008 in order to facilitate teachers for using ICT in learning-centred method, conducting study and collaboration method (Ministry of Education, 2016).

In Rulindo District, a research carried out by Save the Children (2015) on in service training for teachers in Rwanda, reiterated a shortage of using ICT tools in secondary schools. The ways ICTs were adopted in classrooms may be one of those reasons. The Government continues to distribute computers to schools through the introduction of smart classroom at each secondary school with vision of making education effective (Steinberg & Garrett, 2016). However, this research investigated the contribution of the use of ICT tools in secondary schools in Rulindo District, Rwanda influence performance of teachers.

1.1 Research Objectives

i.   To determine information communication technology tools used within secondary schools in Rulindo District, Rwanda,
ii. To assess the level of teacher's performance within secondary schools in Rulindo District, Rwanda,
iii. To establish the relationship between the use of ICT tools and teacher's performance in secondary schools in Rulindo District, Rwanda.

II. LITERATURE REVIEW

2.1 Review of Empirical Studies

Pedrosa, *et al*. (2016) carried out a survey in USA and found that as the use of ICT helped a minority of teachers to apply a more constructivist pedagogy, it has not changed the way of teaching for a majority of secondary subject teachers. However, teachers accepted that in the right conditions, ICT became a precious teaching tool that has an effects on student's success in classroom and also on their external performance.

Thakral, P. (2015), in a study of 170 secondary school teachers of New Zealand, found that 82% of teachers took ICT as it has positive effects to teaching while not in methodology of skills provision and classroom practices. This means that ICT was not changing teachers' philosophy and their pedagogy but it changed good administration of teaching like lesson and scheme of work preparation.

The same results have been found by Andiema (2015) in their view on the effects of ICT in Europe. They reported that using ICT helped teachers for effective time management and enhance productivity in lesson preparation, updating the lesson plan and in maintaining student's records. Teachers emphasized that ICT use has improved collaboration and facilitated them to share ideas and teaching tools. Concerning the pedagogical practices, those teachers continued to use traditional approaches where ICT is taken as a tool to support their didactic approaches. Hence, researchers evidenced that teachers are exploiting the innovative potentiality of ICT and students are passively involved in capacity building.

Considering the effect of ICT on Bansal (2016) undertaken a research on importance of teachers when using information communication and technology in Czech Republic. He realized that ICT will bring some impacts on the class: Learning tools and learning spaces will be shared, they are the promotion of a collaborative learning and they are a step for have autonomy in learning. In addition, Wheeler explained the key reason for which the responsibility of teachers could be adjusted: With ICT, some teaching tools would become out of date and some assessment methods will become unnecessary and finally it was not possible for the teacher simply to teach the content knowledge. According to Blazar and Kraft (2017), teachers who use ICT can share learning tools in different ways: ICT helped teachers and learners to use video system to transmit information and television programs thought all infrastructure of the school even between schools of the same region. This way of working can minimize expenses and ameliorate the quality of teaching and studying process without sufficient teaching tools.

In Drossel, *et al*., (2017) carried out a research to assess correlation between integration of information communication technology in classroom and pedagogical opinions of teachers. After the study on 1139 elementary school teachers, Liu found that even though teachers were with the student based beliefs, they were unable to incorporate constructivists teaching with ICT utilization and this reveals contradictions between teacher's pedagogical opinions and teaching activities. The study showed that most teachers, regardless of their pedagogical beliefs in favour of ICT integration, were still utilizing lecture based teaching activities when integrating ICT. Moreover Trucano (2015), in the knowledge maps, carried out a survey on the effective of using ICT in education in under development countries. He identified main ICT related factors which are impacting on teacher's performance or service delivery: Pedagogy, teacher technical abilities and knowledge of ICT, teacher's confidence and motivation, and Teacher's professional development and an enabling environment. Trucano found that effects of ICT utilization on leaning and teaching results are not clear and brings too various debates because of unavailability of agreed standards methodologies and measurements to establish the effects of ICT in education.

Hammami (2016) in the context of e-learning, in Kingdom of Saudi Arabia, indicated that when one who wants to adopt ICT should consider the following: have sufficient infrastructure and ICT equipment's, availability of the internet connectivity and to ensure teachers have ICT knowledge. However, different barriers were still being observed in this the Kingdom of Saudi Arabia: lack of sufficient computers to give a computer to each student, teachers were

not working well as they were not asking students to deliver assignments even on CDs. According Lukindo (2016) in his study in mathematics and science teachers at Dar-es-salam University College of education in Tanzania, to teach and learn for mathematics and science pose challenges to teachers and students and this situation is setting an alarm to education stakeholders. To address learning challenges, the government adopted ICT in schools and competency based learning as alternative approaches.

A study done by Nazir (2015) on Secondary school's ICT competences suggested that teachers should be trained on the TPACK framework where they can share experience on how to choose appropriate technological tool for a selected content by using this tool in teaching and learning process with the modification of teaching relying on chosen instrument. The TPACK background evidences teacher's sills in pedagogy, content and technological fields and the way in which they are able to discern methodologically (Osang, 2015). It is a framework that helps to establish how to teach with technological devices that permits teachers to combine content, pedagogy and technology. Nwigbo and Madhu (2016), conducted in Bungoma District of Kenya, admitted that when you want to effectively adopt any educational technology, you should facilitate teachers to have complete confidence in them and the ability to use it in classroom instruction. To evaluate the motivation provided by technology in the classroom Pedrosa, *et al.,* (2016) assessed the influence ICT on students' motivation and achievement in English lessons. He found that in a class, 88 percent of learner confirmed that use ICT complete English lessons more exciting than how it was expected.

The adoption of ICT can also be based on the summary done by Shamim & Raihan (2016) on the results for the research titled "Information Technology works successfully" published by BECTA in 1994; It shows that flexibility of ICT to meet individual needs and ability for every learner can motivate students to enjoy learning. In addition, ICT is viewed to present information in new ways that help learners understand the concepts as they are well visualized and difficult ideas become easier. Basing on those results, the research may prove that the ICT user in teaching and learning activities motivates students to enjoy their lessons and to be involved in learning. ICT is acting as facilitator of cognitive development that augments the abstention of fundamental knowledge pertinent to the community. In Rwanda, it means that the provision of ICT materials to schools or teaching staff unable to provide a discrepancies but main component to be focused on in utilizing ICT in teaching and learning process is the teaching staff technological and pedagogical content knowledge and skills (Save the Children, 2015). Nevertheless, it is very important to conduct other researches to assess the current effects for ICT usage in teaching and learning activities and to suggest the way forward to facilitate and make the teaching more effective.

2.2. Theoretical Framework

This research was by task technology fit theory in learning or teaching process theory. The research use a task-technology model procured buy Good hue and Thompson to describe the association between information communication and technology and the success of teaching process. This approach refers to the level of technological assistance for a person or a teacher in achieving its target and completing their responsibilities. This theory denoted that IT was capable of producing favourable outcome in any institution including secondary schools (Osang, 2015). Finally, this theory was relevant to the present study since it has analyzed the level of teacher's teaching outcomes in the framework of ICT as predicting factor of the level of success (Tripathi & Jigeesh, 2015). The level of success consequences associated with the realization of duties and responsibilities by a person are for instance classroom teaching, management of students, discipline and regularity, and interpersonal relations. The above theories enabled the researcher to establish the conceptual framework as follows:

2.3 Conceptual Framework
The conceptual framework is presented in Figure 1

Independent Variable   **Dependent Variable**

(i)

| **ICT Tools Usage**
• Computer /Tablets

• Starboards/Phones

• Electronic Textbooks

• Instructional Software | **Teachers Performance**
• Classroom Teaching
• Management of Students, Discipline and Regularity
• Interpersonal Relations |

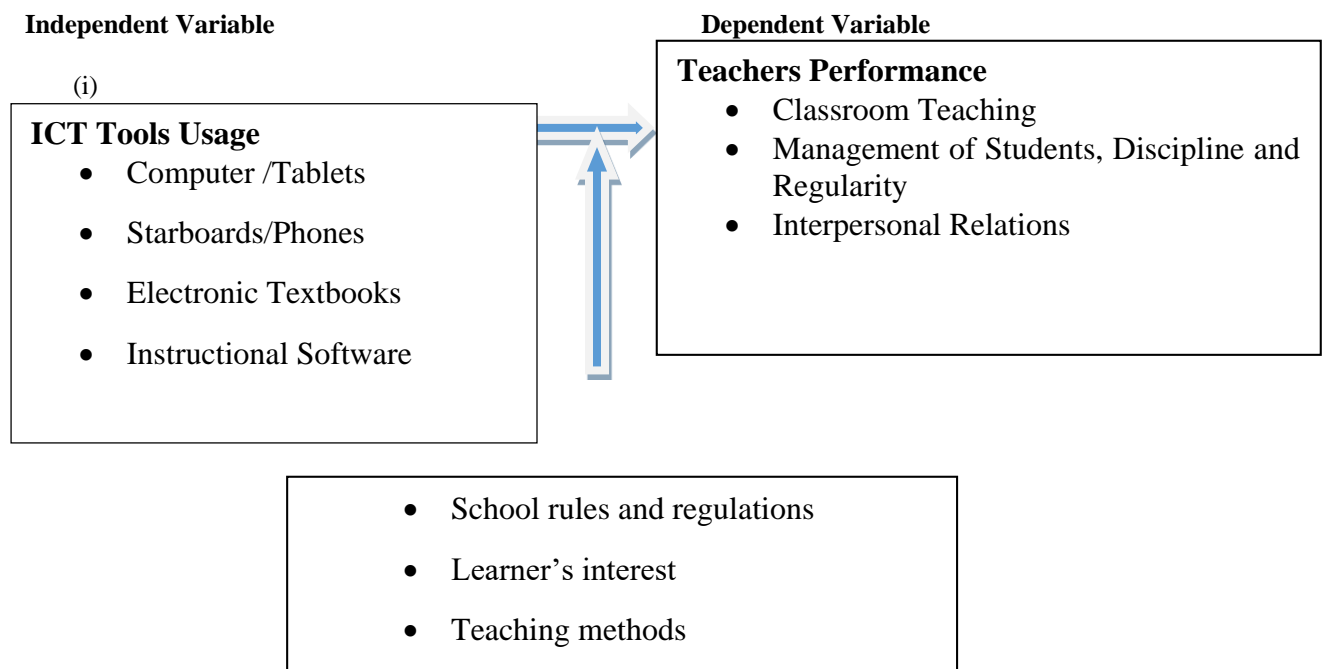| • School rules and regulations

• Learner's interest

• Teaching methods |

Figure indicates association between the use of ICT tools and teacher's performance. The use of ICT tools was measured using computer /tablets, starboards/hones, electronic textbooks, and instructional Software. The dependent variable (Teacher's performance) was measured using Teaching managing students, discipline and regulation or interpersonal. Both independent and dependent variables were moderated by intervening variables such as school rules and regulations, learner's interest, and teaching methods.

III. RESEARCH METHODOLOGY

The present research adopted a descriptive research design. A descriptive statistics was helpful for two objectives: one is to afford basic data on variables in a dataset and the second pinpoints pertinent correlation between variables. Therefore, the most commonly descriptive statistics used to measure variables.In order to carry out the present research, target population was formed by 262 secondary school teachers from five head teachers from secondary schools offering general education in Rulindo District of Rwanda (Rulindo District, 2022). Therefore, a sample size affects the precision of estimates and the power of the research to elucidate concluding remarks. Slovene's formula (1967) below was adopted to assess the sample size.

$$n = \frac{N}{1 + N(e)^2}$$

From this formula, when the researcher took the target population's size of 159 and the acceptable error of 0.05. During collection of information, the research used questionnaire, interviews and observation. Quantitative data given by closed questions was discussed through the adoption of descriptive and inferential statistics through a computer based software known as Statistical Product and Service Solutions (SPSS). The regression equation was used for quantitative data analysis $Y=b_0+b_1x_1+b_2x_2+b_3x_3+e$
Where Y= Teachers' performance in secondary schools of Rulindo District, Rwanda
b=constant
x=Measurement of independent variable
e=Scholastic figures.

In this regards,
X1=Computer /Tablets
X2=Starboards/Phones
X3=Electronic Textbooks
X4=Instructional Software

Qualitative data given by open end questions were categorized based on content analysis where some of them was written in a narrative way. The answers of questions with a Likert scales was analyzed using the corresponding numbers.

IV. RESULTS AND DISCUSSION

4.1 Determination of information communication technology tools used
Table 1 presents the views on information communication technology tools used

Table 1: Information Communication Technology tools used

Information Communication Technology tools used	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree	Total	
	%	%	%	%	%	Mean	SD
computers or tablets are used in teaching and learning process	10.7	8.9	8.0	37.5	34.8	2.79	1.04
Starboards/phones are used in teaching and learning process	12.5	6.2	7.1	25.9	48.2	3.49	1.02
Electronic Textbooks are used in teaching and learning process	0.9	8.0	4.5	55.4	31.2	3.03	1.08
Instructional Software are used in teaching and learning process	0.9	4.5	5.4	28.6	60.7	3.00	.98
Students watch video clips in lessons	3.6	5.4	2.6	49.1	39.3	2.58	1.00
Teacher used projector and PowerPoint in lesson	4.5	7.1	28.6	41.1	18.8	1.48	.71
There is internet in the school used for lessons	7.1	6.2	5.4	37.5	43.8	1.67	1.12

Results demonstrated that computers or tablets are used in teaching and learning process at moderate level (Mean=2.98, SD= 1.04). The findings indicated that Starboards/phones are used in teaching and learning process among respondents (Mean=3.49; SD=1.02>0.5). The study demonstrated that using electronic Textbooks are used in teaching and learning process. It has been agreed with a mean of 3.03, standard deviation was 1.049 where respondents strongly agreed with the use of electronic textbooks are used in teaching and learning process. It was indicated that electronic textbooks are used in teaching and learning process are at a very low level of usage and teachers refer to them rarely. According to the respondents, the mean of 3.0 and standard dvt of 0.98 agreed with instructional software use used in secondary schools within Rulindo District. Students watch video clips in lessons where the means of 2.58

and the standard deviation of 1.00 confirmed the statement. From the finding, it was found that with a mean of 1.48 and sdv of 1.48, respondents evidenced that the teacher used projector and power point in teaching process of the respective lessons among secondary schools in Rulindo District. Finally, the results indicated that there is internet in the school used for lessons. In this regard, 43.8% of respondents a mean was 1.67 and sdv was 1.12 confirmed the use of internet in the school used for lessons.

4.2 Level of Teachers' Performance in Secondary Schools in Rulindo District
Table 2 depicts views on the level of teachers' performance in secondary schools in Rulindo District.

Table 2: Level of Teachers' Performance in Secondary Schools in Rulindo District

Statements	Strongly Agree	Agree	Not Sure	Disagree	Storngly Disagree	Mean	SD
The ways of classroom teaching has been improved	49.4	41.9	7.9	0.8	1.01	.67	0.4
the management of students, discipline and regularity is effective	47.2	41.3	11.1	0.4	1.32	.69	0.2
There is an improvement of interpersonal relations	85.0	14.2	0.0	0.8	1.04	.43	0.01
Students participate in class discussions	0.0	85.8	12.6	1.6	2.31	.41	1.01
Students complete their homework in time	7.1	6.2	5.4	37.5	43.8	1.67	1.12
Student's average marks at the end of the term exams has been increased	9.8	3.6	1.8	48.2	36.6	1.29	.67

Findings The results demonstrated that the ways of classroom teaching has been improved. This was confirmed by 49.4%, a mean of 0.067 and 10.1 for sdv of 0.67. 47.2% strongly agreed that the management of students, discipline and regularity is effective on a mean of 1.32 and sdv of 0.43. Moreover, 85.0% strongly disagreed that   there is an improvement of interpersonal relations with a mean of 1.04 and adv. Of 0.43. Moreover, 85.6% disagreed with the participation of students in classroom with a mea of 2.31 and sdv of 0.41. Therefore, 43.8% strongly agreed with students complete their homework in time with a mean of 1.67 and sdv of 1.12. Finally, 48.2% of respondents agreed that the student's average marks at the end of the term exams has been increased with a mean of 1.29 and sdv of 0.67.

4.3 Relationship between ICT Tools and Performance of Teachers in Secondary schools
Table 3 illustrates the views on the relationship between ICT Tools and performance of teachers in Secondary schools

Table 1: Relationship between ICT Tools and Performance of Teachers in Secondary schools

		Classroom Teaching	Management Students Discipline Regularity	of Interpersonal relations and
Computer /Tablets	Pearson Correlation	.843**	.871**	.957**
	Sig.(2-tailed)	.000	.000	.000
	N	156	156	156
Starboards/Phones	Pearson Correlation	.852**	.873**	.949**
	Sig.(2-tailed)	.000	.000	.000
	N	156	156	156
Electronic Textbooks	Pearson Correlation	.962**	.934**	.863**
	Sig.(2-tailed)	.000	.000	.000
	N	156	156	156
Instructional Software	Pearson Correlation	.827**	.843**	.934**
	Sig.(2-tailed)	.000	.000	.000
	N	156	156	156

Results in Table 4.3, evidenced that computer/tablets and the success of teachers produced Pearson correlation coefficient r= 0.843 between computer/tablets and classroom teaching. It was 0.871 between computer/tablets and the management of students, discipline and regularity and 957 between computer and tablets use and the interpersonal relations. This shows that the relationships were all positive and statistically significant. Each of these elements significantly increase teachers' performance when they are improved.

Furthermore, the study findings evidenced that   the correlation between starboards/phones on one hand and classroom teaching on the other hand was 0.852**, the correlation between starboards/phones and managing student discipline and regularity was 873** and correlation between starboards/phones and the interpersonal relations was .949**.

Moreover, electronic textbooks is correlated with classroom teaching.962**, it has a significant relationship with managing student discipline and regularity was .934**, with interpersonal relations was at .863**. Results indicate that a correlation between the instructional software and classroom teaching was .827**, it was .843** between the instructional software and the management of students, while it was .934** between instructional software   and interpersonal relations.

V.   DISCUSSION OF THE RESEARCH FINDINGS

Results on the use of ICT tools in selected public secondary schools,   the findings from the present study concurs with Findings from the present study did not contradict with the observation of Pedrosa, et al. (2016) carried out a survey in USA and found that as the use of ICT helped a minority of teachers to apply a more constructivist pedagogy, it has not changed the way of teaching for a majority of secondary subject teachers. In this regard, teachers accepted that in the right conditions, ICT became a precious teaching tool that has an effects   on student's success in classroom and also on their external performance.

The present study concur with the work done by Thakral (2015) who evidenced that 82% of teachers took ICT as it has positive effects to teaching while not in methodology of skills provision and classroom practices. This means that ICT was not changing teachers' philosophy and their pedagogy but it changed good administration of teaching like lesson and scheme of work preparation. In the same vein, the results have been found by Andiema (2015) in their view on the effects of ICT in Europe. Teachers emphasized that ICT use has improved collaboration and facilitated them to share ideas and teaching tools. Concerning the pedagogical practices, those teachers continued to use traditional approaches where ICT is taken as a tool to support their didactic approaches. Hence, researchers evidenced that teachers are exploiting the innovative potentiality of ICT and students are passively involved in capacity building. Results on the level of teacher's performance in secondary schools owing to the use of ICT tools did not contradict the observations of of Blazar and Kraft (2017) who denoted that teachers who use ICT can share learning tools in different ways: ICT helped teachers and learners to use video system to transmit information and television programs thought all infrastructure of the school even between schools of the same region. This way of working can minimize expenses and increase teaching quality in secondary school education specifically in schools without sufficient teaching tools. In the same context of Drossel, et al., (2017) where they found that even though teachers were with the student based beliefs, they were unable to incorporate constructivists teaching with ICT utilization and this reveals contradictions between teacher's pedagogical opinions and teaching activities. The study showed that most teachers, regardless of their pedagogical beliefs in favour of ICT integration, were still utilizing lecture based teaching activities when integrating ICT. Finaly, Trucano (2015), in the knowledge maps, carried out a survey on the effective of using ICT in education in under development countries. He identified main ICT related factors which are impacting on teacher's performance or service delivery: Pedagogy, teacher technical abilities and knowledge of ICT, teacher's confidence and motivation, and Teacher's professional development and an enabling environment.

Results on the relationship between the use of ICT tools and teachers performance Results concur with the study of Nazir (2015) who established teachers should be trained on the TPACK framework where they can share experience on how to choose appropriate technological tool for a selected content by using this tool in teaching and learning process with the modification of teaching relying on chosen instrument. It is a framework that helps to establish how to teach with technological devices that permits teachers to combine content, pedagogy and technology..

VI.   Conclusion and Recommendations

Relying on results presented   and discussed in the fourth chapter, researcher attempted to provide concluding remarks.
In this regard, objective one, this concludes that the research felt the most commonly instructional materials usage in selected schools teaching Rulindo District were ICT tools. The most commonly tools were computer /tablets, starboards/phones, electronic textbooks, and instructional Software).

From the second objective and question, the researcher concludes that a big number of teachers were able to improve their classroom teaching. The results demonstrated that the ways of classroom teaching has been improved. This was confirmed by 49.4% with a mean of 0.67 and 10.1 and sdv 0.67. 47.2% strongly disagreed that the management of students, discipline and regularity is effective a mean of 1.32 and sdv was 0.43. Moreover, 85.0% strongly disagreed that there is an improvement of interpersonal relations at a mean of 1.04 and sdv was 0.43. Moreover, 85.6% disagree that students participate in class discussions with a mean of 2.31 and standard deviation of 0.41. Therefore, 43.8% strongly accepted that students complete their homework in time at a mean of 1.67 and standard deviation of 1.12. Finally, 48.2% of respondents agreed that the student's average marks at the end of the term exams has been increased at a mean of 1.29 and standard deviation of 0.67.

To the third objective, the researcher concluded that the majority of ICT tools used are more like to significantly affect the level performance of teachers in secondary schools located in Rulindo District. The ICT tool usage was measured using computer /tablets, starboards/phones, electronic textbooks, instructional software. On the other hand, performance of teachers was assessed through class, managing discipline and student attendance but also relationship between them. This research conclude that relationships are all positive and statistically significant. Each of these elements significantly increase teachers' performance when they are improved. Moreover, electronic textbooks is correlated with classroom teaching. It has a significant relationship with managing learners discipline and attendance and relationship between them. Results indicate that the correlation between the instructional software and classroom teaching, between the instructional software and the management of students

From the results, From this study, a number of recommendations were made possible: reconsidering concluding remarks from the study findings and information argued that the author attempted to make some recommendations to the study.
Public institutions must ensure that budgeting could focus on improving electronic-libraries   in education secondary.

The ministry of education has to seek enough financial means to stimulate teachers to have access to ICT tools that are capable to increase their teaching success. School principals are recommended to organize in service training and capacity building in order to enhance knowledge related to the use of ICT tools. Head Teachers would make awareness to parental involvement as well as the government on the role of increasing availability, accessibility and usability of suitable ICT tool usage in public secondary schools and that high or low teachers performance would not rely on the content that they obtain in classrooms as well as accessibility to ICT tools for future revision themselves. Teaching staff members must attempt on the generation of simple aids in order to see what they are discussing about in the lessons. Local communities must motivate parents to participate actively to the provision ICT tools use in public and day schools to improve teaching success.

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