

# The Analysis of Effectiveness and Challenges of Information Communication Technology in Teaching and Learning Endeavors in Secondary Schools

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Date of Submission: 18-11-2021

Date of Acceptance: 02-12-2021

## ABSTRACT

The incorporation of technologies in education, particularly ICTs will help educators to the overall essential to supersede standard showing systems with innovation-based instructing and learning gadgets and conveniences. The current review utilized blended engaging examination plans specifically quantitative and subjective plans. The review thinks about two optional schools found in Rwamagana district of the Eastern territory of Rwanda. An aggregate of 300 and fifteen understudies, 315, and 41 staff individuals, 41, from Groupe Scolaire Saint Aloys Rwamagana shared their opinions, on the opposite side, 200 and five understudies, 205, and 33 staff individuals, 33, from Groupe Scolaire Rwamagana Catholique partook in the review.

An online designed questionnaire containing statements related to the study objectives and research questions using google form was distributed randomly among study participants and a five-point likert scale was used collect views of both students and staff members. The data was dealt with SPSS, interpreted and presented using tabulation

method, pie charts and inferences were drawn based on SPSS generated frequencies and percentages.

The findings indicated that students expressed sights on the rationale of ICT utilization and the impact on their attitudes and motivation. 50% and 14.8 % agreed and strongly agreed respectively that ICT has positively influenced their attitudes and motivation/interest towards learning. Moreover, creativeness and invention correlate to proper use of technology in education as confirmed by 168 apprentices consistent to 32.3% and 67.7% agreed and strongly agreed respectively that the later elements facilitate the use of flipped environment in education. For the future studies, there is a need for consideration of extra facets of ICT embracement especially from practicing these tools in educational quotidian actions and subsequent measurement of influence on overall academic performance of students in institution.

**KEYWORDS:** Technology, quality learning, ICT integration, academic performance, technological tools, creativity and innovation

## I. INTRODUCTION

The twenty first century has been characterized by vibrant technologies in various fields. The practice of machinery has not left behind the education sector, the interconnection between technology and learning outcomes is of focal point in the process towards long lasting knowledge and skills. (Van Jaarsveldt & Wessels, 2015) consider student related works as complex processes requiring multiple tasks, efforts and flexibility of trainers and learners. As pointed out by (Elihami & Ibrahim, 2020), teaching refers to knowledge transfer while learning refers to changes that would be taken into individuals' behavior.

The importance of ICT in training and learning progressions is unquestionably for the reason that ICT may be regarded as "intermediary or a bond" among factors prevailing in teaching effort

as well as learning exercise (Vandeyar, 2015). Rwanda as a middle-income country and a developing country has been greatly impacted by integrating technological devices in the service delivery to the people. For instance, ICT integration in education has been seen remarkable improvement and in turn, recent years, Rwanda has been stepped forward in technology-mediated income.

A key factor in utilizing ICT is sufficient computer labs and ICT equipment. This is to ensure that subject teachers easily access to ICT tools whenever needed (McCulloch et al., 2018). Lack of adequate ICT equipment and internet access is a key problem that schools specifically in rural areas are facing now. The researcher has carried out an observation prior to deep research in the matter of ICT integration in education. Finally, the study is proposed to conduct research on the analysis of the effectiveness and challenges faced by ICT users in

the pedagogy career, particularly in intermediate schools set in Rwamagana district. The current research is responding the following questions; What is the degree of viability of the utilization of ICTs in educating and learning practice? What are key components influencing the adequacy of the utilization of ICTs in instructing and learning? What do instructors and understudies look at as the difficulties during the coordination of ICTs in educating and learning exercises?

## II. LITERATURE REVIEW

Regular research is undoubtedly facilitated by technological utensils explicitly connected computers, smart phones, and designed platforms for having full access to information. The endeavors manifested by the regime of Rwanda provides evidence that the society of today greatly depends on the potential benefits of digital technologies in various domains (Danso-Abbeam et al., 2021); (Twizeyimana et al., 2018). Traditionally, people were used to use written books to gain knowledge but this has been gradually improved by technology-based education facilitated by PCs and their decorations, telephones, television, radios, photography, databases and websites that provide information in various fields (Gray et al., 2020).

Despite the encountered challenges, the education sector in Rwanda continuously embraces a way forward to designing and putting into place programs to maintain the speed of integrating ICTs for improving the process of providing instructions. According to previous studies (Twizeyimana et al., 2021), computer-intermediated coaching and studying has been seen as advantageous though there still some challenges that hinder its proper use in some schools.

The Ministry of education and stakeholders have been working tirelessly towards better use of ICTs in various sectors across the country (Nsekandizi et al., 2020). Different activities have been undertaken to take the utilization of ICTs to another level as confined in the agenda of vision 2020-2050. The integration of ICTs in education is a techno-centric view, it is argued that technology has the power to change the practice in context and can cause changes in various sectors. The following is the quote emphasizing the techno-centric view of technology. "Our computer future could be made in many different forms. At the point when we talk about computer devices in schooling, we ought not ponder a machine having an impact. We should to discuss the chance offered us, by this PC presence, to reconsider what is truly going on with learning by (Reedy, 2019).

## III. RESEARCH METHODOLOGY

### 3.1 Research design

This study was conducted among students of public owned secondary schools located in Rwamagana district, namely, GS St Aloys and GS St Vincent de Paul Rwamagana Catholic. Mixed approaches were selected, and qualitative and quantitative designs were used due to the fact that both non-numerical and numerical data will be obtained.

### 3.2 Sample size and selection of sample

The sample population will be determined based on common characteristics. For teachers, simple randomization will be used and for students, the sample will be randomly determined and will be calculated by the theory of selecting the study population.

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

Where N = Total population, and e = 0.05, level of significance

### 3.2 Data analysis and presentation

The assembled data from respondents will be carefully analyzed and kept to ensure trustworthiness. The adopted methods of data analysis included comparative method and historical method for quantitative data. Moreover, data analysis was performed by SPSS version 21.0. Data were then presented in the form of tables and histograms and were interpreted based on generated frequencies and percentages.

## IV. FINDINGS AND DISCUSSION

This section presents the investigation of the evidence gathered and its translation corresponding to the goals and points of the examination. The research was conducted among Senior Two and Senior Five learners of PCB and PCM at GS St Aloys Rwamagana; For teachers, we considered two parameters of demographic information, which are experience, and age of staff members.

In our study the lower experience was in the range of 1-3 years while the highest experience of study participants was above 9 years of experiences with a higher percentage of older staff members that represents 56.1% corresponding to 23 out of 41 participants, refer to table 2.

#### 4.1 Preliminary results from personal observation

With the help of the following predetermined specific research objectives: To disclose the effectiveness of the application of ICT tools in teaching and learning activities. To find out key factors influencing the effectiveness of the application of ICTs in teaching and learning. To examine potential challenges faced by teachers and students during the integration of ICTs in teaching and learning activities.

#### 4.2 Results from questionnaire administered to students

The emphasis of this academic work was to discover the success of ICT at the selected two secondary schools. The researcher designed survey encompassing various preset assumptions in the line with the researcher's objectives. The following

assumptions were set to recognize how students perceive the rationale of ICT tools utilization during the learning process.

Statement1. ICT utilization in learning process assists students in continuous learning after normal classroom sessions

Statement2. Creativity and innovation are directly interconnected with the proper use of ICT tools during learning process

Statement3. My attitudes toward learning as a secondary school student has been positively impacted by being exposed to ICT mediated teaching and learning

Statement4. The use of ICT in learning has greatly enhanced my interest and motivation in learning

Statement5. The use of ICT tools such as connected computers facilitates students to timely finish the assigned homework requiring individual research

**Table 1:** Views of students on the rationale of ICT utilization and impact on attitude and motivation

S/N	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
1			20 (3.8)	111 (21.3)	389 (74.8)	520 (100.0)
2				168 (32.3)	352 (67.7)	520 (100.0)
3	35 (6.7)	109 (21.0)	39 (7.5)	260 (50.0)	77 (14.8)	520 (100.0)
4		65 (12.5)	56 (10.8)	249 (47.9)	150 (28.8)	520 (100.0)
5				247 (47.5)	273 (52.5)	520 (100.0)

As depicted in table 5, up to five statements were set. Continuous learning is the fruit of the presence of ICT tools as asserted by most of the students, refer to statement one, 21.3% agreed and 74.8% strongly agreed to correspond to 111 and 389 students respectively, that lifelong learning mediated with technological tools after normal school period. They also positively reflected on the contribution of technology in terms of creativity and

innovation as indicated by a high percentage of those who agreed and strongly agreed with statements 2, 32.3%, and 67.7% corresponding to 168 and 352 respondents. 50% of respondents agreed that their attitude was positively impacted by the use of ICT while the rest of the respondents seem not to be impacted by it; this is explained by the lack of enough tools or insufficiency of practical activities in their respective schools.

**Table 2:** Computed correlations of independent and chosen dependent variables

		Correlations					
		EIT	CL	CI	SA	IM	IR
EIT	Pearson Correlation	1	-.739**	.126**	.337**	-.586**	.644**
	Sig. (2-tailed)		0	0.004	0	0	0
	N	520	520	520	520	520	520
CL	Pearson Correlation	-.739**	1	.125**	-0.012	.710**	-.519**
	Sig. (2-tailed)	0		0.004	0.791	0	0
	N	520	520	520	520	520	520

	Pearson Correlation	.126**	.125**	1	.165**	.516**	-.262**
CI	Sig. (2-tailed)	0.004	0.004		0	0	0
	N	520	520	520	520	520	520
	Pearson Correlation	.337**	-0.012	.165**	1	0.032	.246**
SA	Sig. (2-tailed)	0	0.791	0		0.469	0
	N	520	520	520	520	520	520
	Pearson Correlation	-.586**	.710**	.516**	0.032	1	-.682**
IM	Sig. (2-tailed)	0	0	0	0.469		0
	N	520	520	520	520	520	520
	Pearson Correlation	.644**	-.519**	-.262**	.246**	-.682**	1
IR	Sig. (2-tailed)	0	0	0	0	0	
	N	520	520	520	520	520	520

\*\* Correlations are significant at 0.001 level for each statement with effectiveness of ICT tools

Notwithstanding the results collected from other assumptions in the questionnaire administered to students and teachers, we intentionally considered these five dependent variables as ones directly reflecting to intervention of ICT usage in the teaching and learning process, as neatly presented in table 6, Pearson Correlations were significant and for all variables a 2-tailed significance was .000 implying that correlations are significant at 0.001 level in comparison with standard level of significance which is .05. Therefore, we conclude that ICT integration in education is strongly correlated with the five mentioned dependent variables in the research model.

#### 4.2.1 Perception of students on ICT tools availability and prior knowledge and skills

We came out with a number of statements from which views were gathered and analyzed accordingly. In this study, respondents asserted that they do not have full access to the internet during their personal searches and this may hinder proper

exploitation of benefits of ICT usage in secondary schools. It is clear that most teachers possess their own computers and they lack other useful accessories. The results indicated that students are aware of the benefits of using ICT tools.

Statement6: I am familiar with the use of computers and their accessories during self-study

Statement7: I am aware of browsers that I can use to search for information during self-learning.

Statement8: I have full access to internet during learning process requiring personal searches.

Statement9: I have my own computer that I can use every time it is necessary.

Statement10: I have good background in information communication technology with enough skills about the utilization of ICT tools

Statement11: My teachers demonstrate adequate knowledge and skills about the use of ICT tools

Statement12: My teachers have own ICT tools to use during classroom sessions (Computers, projectors).

Table 3: Views of students on ICT tools availability and prior knowledge and skills

S/N	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
6	80 (15.4%)	279 (53.4%)	23 (4.4%)	138 (26.5%)		520 (100.0%)
7	13 (2.5%)	119 (22.9%)	14 (2.7%)	363 (69.8%)	11 (2.1%)	520 (100.0%)
8		334 (64.2%)	31 (6.0%)	113 (21.7%)	42 (8.1%)	520 (100.0%)
9	129 (24.8%)	255 (49.0%)	98 (18.8%)	38 (7.3%)		520 (100.0%)
10		89 (17.1%)		120 (23.1%)	311 (59.8%)	520 (100.0%)
11	48 (9.2%)	275 (52.5%)	71 (13.7%)	126 (24.2%)		520 (100.0%)
12		51 (9.8%)	53 (10.2%)	394 (75.8%)	22 (4.2%)	520 (100.0%)

### 4.3 Results from questionnaire administered to staff members-teachers and administration

Similarly, the participants used a five-point Likert-type scale (i.e., 5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, and 1=Strongly Disagree) to rate their level of agreement on 15 statements about the effectiveness, awareness, availability, and barriers all of which interconnected with ICT adoption and usage in teaching and learning activities in the selected secondary schools. Strong agreement and moderate agreement on statements 2 & 4 mediate the effectiveness of ICT application and effective time management, and staff members' willingness to learn new technological skills.

Statement 1: I have necessary computer skills and I confidently apply these skills in teaching and learning process.

Statement 2: The use of ICT helps teachers to effectively manage time.

Statement 3: I have enough time to provide care to every student if ICT is used in teaching and learning activities.

Statement 4: I am willing to learn new computer skills.

Statement 5: It is easier for me to teach by using ICT tools.

**Table 4:** Views on teachers' skills and willingness of acceptance of ICT tools utilization

S/N	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
1		45 (60.8%)		20 (27.0%)	9 (12.2%)	74 (100.0%)
2		1 (1.4%)		11 (14.9%)	62 (83.8%)	74 (100.0%)
3	1 (1.4%)	28 (37.8%)		45 (60.8%)		74 (100.0%)
4					74 (100.0%)	74 (100.0%)
5		38 (51.4%)		36 (48.6%)		74 (100.0%)

It is of vital significance to see the value in the job of ICT in upgrading after-typical class learning. In this review, 89.2% of all members firmly concurred on explanation 8, and most of them concurred correspondingly. Additionally, imagination and advancements are key components in the training of the youthful age, it is fascinating that all members attested that ICT is essential for sped up innovativeness and development in the schooling area (Refer to statement 10)

With reference to Statement 13, about a half of all staff members opposed it as they disagreed that they enough computers in their schools. This could be seen in different perspectives, as we know all public schools have been given computers to be used in teaching and learning however there are **several factors** that hinder the proper utilization of them including but not limited to: Inadequacy of computers used by learners is also found as a barrier and this makes students not to be easily adapting technology during ICT integration in the teaching-learning process. No one component in itself is sufficient to provide good teaching. The presence of all components increases the possibility of excellent integration of ICT in teaching and learning opportunities. Therefore, schools should provide ICT resources including hardware and software,

effective professionals' development, and technical support need to teachers and create a friendly environment for students in ICT usage.

Statement 6: Teaching and learning may still be effective without the use of ICT tools in the process.

Statement 7: Students' motivation can be boosted through the use of ICT in teaching and learning endeavors.

Statement 8: Students explore beyond teacher's instruction and acquire more skills through their own discoveries by the help of ICT tools.

Statement 9: The process of acquiring practical skills can be facilitated by the use of ICT in secondary schools

Statement 10: I am aware that ICT facilitates creativity and innovation in the sector of education.

Statement 11: I am sure that students learn better with the use of ICT tools

Statement 12: Students are distracted when ICT tools are used in teaching and learning process.

Statement 13: In my work institution there are enough computers to be used by students and administrative staff members.

Statement 14: ICT mediated teaching and learning makes lessons more interactive and effective.

Statement 15: The use of ICT tools enhances the visualization of the presented instruction

Table 5: Teachers' awareness of contribution of ICT tools utilization during teaching and learning process

S/N	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
6	15 (20.3%)	39 (52.7%)		20 (27.0%)		74 (100.0%)
7				10 (13.5%)	64 (86.5%)	74 (100.0%)
8				8 (10.8%)	66 (89.2%)	74 (100.0%)
9				50 (67.6%)	24 (32.4%)	74 (100.0%)
10					74 (100.0%)	74 (100.0%)
11		25 (33.8%)		49 (66.2%)		74 (100.0%)
12		41 (55.4%)		33 (44.6%)		74 (100.0%)
13		9 (12.2%)	22 (29.7%)	10 (13.5%)	33 (44.6%)	74 (100.0%)
14		20 (27.0%)		54 (73.0%)		
15					74 (100.0%)	74 (100.0%)

Furthermore, the information got, additionally shows that the utilization of ICT in instructing empowers the understudies to be more dynamic and taking part in the illustration arranged by the instructors and upgrades representation of the substance. In general, instructors know about the foremost significance of ICT coordination in schooling. Educators likewise showed the will to learn new PCs and other innovative abilities.

#### 4.3.1 Perception of ICT tools as teaching aid by teachers

In addition, most educators concurred that the utilization of ICT would give numerous chances to powerful instructing just as ICT-upheld showing makes learning more successful with the level of 86.5 % of study members affirming that the legitimate utilization of ICT apparatuses can support understudies' inspiration. In this examination, 100% of study members attested those understudies investigate past educator's guidance and procure more abilities through their own disclosures with the assistance of ICT apparatuses. This shows that educators see the utilization of ICT in the instructing and learning measure as something positive where ICT is the learning apparatus required by understudies to guarantee the viability of both the educating and learning measure. As demonstrated in table 8, 100% of study members stated that ICT works with imagination and advancement among understudies. This finding is in concurrence with past investigations led by Ghavifekr & Rosdy (2015).

#### 4.3.2 Teachers' efficacy towards utilization of ICT tools

Aftereffects of a past research showed that educators are having high certainty and skill in

utilizing ICT in homeroom despite the fact that it does not addresses the sorts of ICT utilized. The discoveries of this examination revealed that educators see how simpler could be their showing exercises when ICT is appropriately utilized allude to table 7, the articulation 2, 4 and 5. This is because they accept that ICT as an instrument could help in learning measure particularly to relate with genuine practices. This factor has improved the training strategy to incorporate ICT to make and build information for the understudies.

#### 4.4 Availability of ICT tools

As described in the literature review, various ICT tools are expected to be applied in teaching and learning context. We formulated a statement in order to gain information on availability of technological tools in secondary schools under the study. With reference to table 8, statement 13, though high percentage of respondents asserted that these tools are available, there still some staff members without their own computers and projectors as it is indicated by respondents who disagreed to the statement and those remained neutral, about 29.7% and 12.2% corresponding to 22 and 9 staff members respectively. The fact that some staff members do not possess their own ICT tools could lead to poor implementation of ICT mediated teaching and learning thereby hindering its effectiveness.

#### 4.4.1 Challenges hindering the proper utilization of ICT tools

Even though, great effort to implement technology-mediated directives has been made there exist some challenges, which may lead to inadequacies towards the exploitation of technical tools in preaching. The connection between

capability and certainty could mirror the harmony among preparing and instructively mediated methodologies in ICT proficient turn of events. With this, the school board could ensure that there are adequate backings for the instructors to incorporate ICT in the study hall. The information stipulated in Table 8, concerning staff members' impression of ICT in teaching and learning, shows that most educators know about the integrity and value of ICT in education. Most teachers understood that the ICT interceded teaching ways and learning make illustrations more intelligent and viable and assists educators to further develop teachings with more refreshed materials, with reference to table 9, Statement14.

## V. CONCLUSION AND RECOMMENDATION

### 5.1 Conclusion

In conclusion, the very first stage of ICT implementation must be effective to make sure that, teachers and students are able to make the best use of it. Thus, preparations of a technology-based teaching and learning begin with appropriate implementation and supports by the school top management. If the implementation process of technology integration in schools take place appropriately from the very beginning stage and the continuous maintenance are adequately provided, ICT integration in schools will result in a huge success and benefits for both teachers and students.

ICT utilization particularly in academic works is more about practicality as compared to theories and that is why teachers must be given time to learn and explore it, face the "trial-and error" phase before they are completely comfortable with its usage and able to make use of it for teaching and learning. Finally, the integration of ICT in classroom needs serious consideration in order to increase the competency of the country's education system to increase the world ranking of the national education and produce the better future work force. By taking into consideration the views of students and staff members from representative secondary schools, they confirmed that ICT-mediated teaching and learning process presents many benefits. In order to enhance the use of ICT in classroom, the government needs to improve and foster the teachers' belief about the integration of ICT in classroom.

Furthermore, the necessities for educators to be proficient and have great abilities and information in utilizing ICT to further develop their showing strategies and approach is wanted to advance powerful learning just as to satisfy the need of the 21st century instructing abilities.

### 5.2 Future perspectives for further research

This evaluation was restricted to investigation of perspectives on understudies and staff individuals alluded to as staff executives and educators on the viability of utilizing mechanical apparatuses in instructing and learning, we propose that approaching specialists might complete examinations on utilizing these devices and show what they can mean for the two mentalities, inspiration, and premium of understudies during associating with these devices, a review on the impact of ICT application on by and large scholarly execution is likewise expected.

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