The relationship between smart classroom and learners' academic performance in public boarding schools of Gicumbi District, Rwanda

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Abstract

The purpose of this study was to investigate the relationship between smart classrooms and learner's academic performance in public boarding schools in Gicumbi District, Rwanda. The first objective was to assess the relationship between the availability of instructional facilities and learner's academic performance in Rwandan public boarding schools. The second objective was to explore the relationship between IT-trained staff and learner's academic performance in Rwandan public boarding schools. The study targeted 12 public boarding schools from Gicumbi District, where 4 public boarding schools were selected. The study population comprised 1334 respondents, while the final sample size was 308, people who had been selected using Yamane sample size determination. Reliability was ensured through a pilot study and by using Cronbach's Alpha to measure co-efficient of internal consistency, which yielded good results for approving the study, of 85%. Data were analyzed using SPSS software version 21. Findings of the study revealed that there is a significant relationship between smart classrooms and learner's academic performance in Rwandan public boarding schools. All the involved variables had a significant relationship with dependent variables which were the availability of instructional facilities ($r=.923$ and p-value=0.000), IT-trained staff ($r=.949$ and p-value=0.000). Researchers recommended that teachers need regular Continuous Professional Development to help them update knowledge on the use of smart classrooms. Parents should be mobilised on how to create a technological atmosphere at home for their children because any academic achievement of students depends on how parents have helped them at home. It would be better if parents were able to afford electronic devices to expose their children to technology. Government should make frequent schools supervision on the use of smart classrooms and make sure that sector education officers and head teachers do not keep those machines in hte store instead of letting learners use them. The implication is that if smart classrooms are increased and monitored in Rwanda, academic achievement will improve in boarding schools.

Keywords: smart classroom, learner's academic performance, boarding schools, Gicumbi, Rwanda.[1]

Introduction

There are many ways of defining smart classrooms. **P**hoong, Moghavvemi, and Sulaiman (2019) described smart classrooms as teaching and learning activities designed to use technology whose aim was to bring a solution to poor quality of education and increase the capabilities of learners to be self-relient in their studies. This method of teaching made the education system very conducive and attractive to the learners and teachers. Teachers were empowered to establish and use active methods. The use of the computer started in education in the 1970s, when teachers and student used computers for education purposes. From that time, teachers and students used computers as a new technology, but its effectiveness was not perfect because it was a revolution in education which needed continuous intensive professional training (Tatnall 2014). Information, communication and technologies such as radio, television, Internet, computers, and telephones are regarded as instruments to introduce change to the education system. Access to education became easy and so also the workload of teachers was reduced; teaching and learning became easy, and the quality of education was improved. Through ICT, the education system could produce products needed in the international market (Steinmueller 2001). According to Koehler and Mishra (2014), the use of computers and Internet currently is a means of developing education, which makes it very meaningful to address the problems of a dynamic society. According to Collins and Halverson (2018), even though today there is less attention to the use of radio, television, and telephone, fax, and mailing, people cannot ignore that they had a history in the past as instruments that could be used as educational utilities.

Around the world, there is a problem of introducing ICT in education, particularly in less developed countries. Learning outside traditional classrooms is now bringing new ways of doing research; technology is making it easy, as the number of beneficiaries of distance learning is being increased at a high level, access information is now possible and teachers' workload is minimised. ICT stands for a package of resources and technological instruments that are mostly used to share, diffuse and keep, and control information (Oduma and Ile 2014). Those instruments are the Internet, computers, telephones and radio. Most of these things are applied in schools, and are then called smart classrooms. Fouts (2000) indicated that computers and their associated technology are everywhere, in classrooms across the world. Different governments are updating their national curriculum to integrate technology in education systems. Globally, technology is being developed depending on the economic capacity of each country. Developed countries started using smart classes long ago because they had the means to enable them to purchase materials, provide continuous professional development training to instructors and also in building the infrastructure that could support the installation of smart classrooms (Hilliard 2015).

In Africa, the learners are learning in analogue methodology in which teachers use verbal transmission of information and writing or drawing on chalkboards. However, with the introduction of the smart class, learners gain access to audio-visual teaching and learning materials which are saved online. Through smart classrooms, learners are very motivated and the lesson becomes practical as long as they are observing the content on the interactive whiteboard (Sife, Lwoga & Sanga 2007). Africa still has a long journey of elaborating smart classes in their schools, but the process has started despite challenges in implementing this new policy. Challenges include insufficient financial means, lack of electricity in remote areas, family backgrounds of the learners, little experience among teachers and a lack of or insufficient ICT skills. If this problem persists, education of less-developed countries will continue to be in a shambles. There should be partnerships between stakeholders and local government to

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encourage people to work together to mobilise funds to build infrastructure and buy all the equipment needed to introduce smart classes at schools because it requires a lot of capital. Teachers should be trained in the use of ICT (Yildirim 2007).

In Rwanda, the government has made significant changes in introducing ICT in education, specifically in all schools at all levels: primary, secondary, university, and other higher learning institutions. At the beginning of 2008, MINEDUC started a program of one laptop per child (OLP) and computer labs in secondary schools. During that time 250 000 OLP devices were distributed in 764 schools that took 10% of primary students depending on the numbers of learners recorded in all schools during that time. This policy experienced many challenges like empowering teachers, insufficient computers depending on the children's numbers. For computer labs, only 5% of schools accessed this program (MINEDUC, 2016, April). This is a very small proportion of beneficiaries; then a policy was framed to provide one digital identity per child and smart classrooms.

The study objectives are as follows

1. To assess the relationship between the availability of facilities and learners' performance in boarding secondary schools of GICUMBI District.
2. To explore the relationship between staffs trainings in IT and learners' performance in boarding secondary schools in GICUMBI District.

Literature review
Texts related to the problem we need to explain and analyse in depth

Relationship between availability of instructional facilities and learner's academic performance

Technology has made the life of a human being very enjoyable and luxurious (Katz 2010). This is the reason most educational institutions are introducing smart classes in their schools. The introduction of smart classes has brought creativity and also innovation in the education system. The latest technological programme in education is smart classrooms, creating a conducive environment in teaching and learning. This type of learning is also called digital learning. In the new evolutionary teaching system, teaching and learning are using an interactive whiteboard which is replacing traditional systems of using chalkboards. Using an interactive whiteboard made learning very easy and motivated learners. Via a smart class one can access learning resources by using the Internet, videos, audios, websites, software and games. Interactive whiteboard is where the whiteboard is connected to projectors and computers; also a teacher can control every activity taking place in the class while he/she is teaching using those tools. The interactive whiteboard made education easy for both teachers and learners, education become fun (Warwick, Mercer, Kershner & Staarman 2010). Academic performance has as its foundation the use of technology among the people of the world. Technology has been seen as the main issue which can match education with the new movement of globalisation. There are similarities among the researchers as they all agree that using interactive whiteboard increases learner's engagement and motivation. Teaching and learning become fun when a teacher is using an interactive whiteboard. This shows that there is a relationship between learner's academic performance and the use of technological instructional materials in a classroom, as many researchers continue to clarify that interactive whiteboards help in the introduction of active methods where teachers become a guide or facilitator instead of spoon-feeding the entire content to the learners (Tety 2016).

According to Spector (2013) updated information around the world is that many countries are making education more successful by encouraging the learners to engage in teaching and learning activities. Recently, education is being more technologically developed, the reason being the introduction of an interactive whiteboard which engages the learners in activities of

teaching and learning. So, the information from computers should appear on the whiteboards for learners to see and follow and then they can write the summary. Teachers and learners showed positive intentions on the utilisation of this new method of teaching since it is in the interest of learners and teachers (Teo, Huang & Hoi 2018). It is advantageous that the work of teachers is being reduced by interactive whiteboards; even the risk of having respiratory illness reduces because the chalkboard can have a negative impact on learners' and teachers' health. Apart from that, the content can be saved and updated for future use. This helps the teacher have full control over the learners and raising them from one step to another in an easy way. Hence, an interactive whiteboard can have a positive impact on learners' academic performance. However, on the other hand, people say that interactive whiteboards cannot increase students' performance when it is not well managed by facilitators. For example, some advance the idea that learners can lose concentration while others can be watching irrelevant contents; reasons the teacher must pay attention to see whether learners are doing what they are supposed to do. Kennewell and Morgan (2003) and Smith, Higgins, Wall and Miller (2005) reveal that instructors and students like technology in the teaching and learning process. Miller, Glover and Averis (2003) declare that the use of whiteboards is a strategy of engaging and motivating the students while learning is taking place using whiteboards.

Relationship between IT-trained staff and learners' academic performance

Computer-based learning is currently developing teaching and learning activities, ICT is being used giving instructional material, many researchers are investing money in making education digital and searching the ways computers can represent teachers' importance in teaching and learning (Strømme & Furberg 2015). Continuous professional development of teachers in information communication and technology is among the main factors that can enhance the integration of technology in education. Some leaders have claimed that inadequate teacher's knowledge in ICT is the most important problem that is hindering their academic performance related to ICT as a medium of teaching delivery (Razak, Ab Jalil & Ismail 2019).

Teachers who are trained in teaching and using ICT in what we call smart classrooms will help to develop learners' motivation both (intrusive and extrinsic) and also the education system will be shifted from a knowledge-based to a competency-based curriculum as our dynamic society needs people who can be creative and innovative for making something new (Haigler & Owens 2018). Considering the international market, technology is at high speed in different services like in hiring new employees, in bank service and at the markets. Every country should produce competent citizens who can perform well in the international markets. Those who graduated from schools can be job creators instead of being job seekers. It means that technology is the most important area to be considered if we want to develop learners able to do research, attend seminars, share ideas with other scholars, attend workshops and conferences even by learning online (Xu & Morris 2007).

The research reveals that teachers in some countries always claim that having insufficient skills and knowledge on how to use ICT in education is still a problem which prevents them using smart classrooms in teaching and learning (Balanskat & Blamire 2007). Quite often teachers say that they do not have adequate knowledge about ICT. This pushes them to seek training which can enable them to gain such knowledge (Hew & Brush 2007). A smart classroom is an effective strategy for helping students to improve their academic performance but this can be achieved when teachers are well trained in ICT as they are focal persons to implement this policy of smart classrooms.

Research methodology

Research design describes all the procedures that the researcher used to conduct the study. In addition, research design describes where information was obtained and who provided that

information (Kothari 2004). Research design gives the maximum information about a project and all spending to be used in terms of money, space to be covered, and time-frame (Vogt, Gardner and Haeffele 2012). A case study through correlational research design was used to investigate the relationship between smart classrooms on learners' academic performance in Rwandan Public boarding schools in Gicumbi District. (2014/2020). According to Kombo and Tromp (2006), study population refers to the whole population, items, or elements that a sample is to be retrieved from. This study was conducted in four public boarding schools. They are namely: KAGEYO TVET School, MUKINDI TVET School, College REBERO, and ES Bwisige, to represent 12 public boarding schools in Gicumbi District. The selected schools were sufficient to represent 12 public boarding schools in Gicumbi. For example Borg and Gall (2003) advise that at least 30 percent of the entire population for a sample is enough. The study population comprised 1334 respondents, which consisted of head teachers, students, and teachers from the selected school.

Each category was selected depending on title, positions and the responsibilities that are related to the information that the study required. Head teachers were selected because of their leading positions in the schools, the directors in charge of studies were selected because they were specifically the ones who had all the information relating to the learner's academic performance before and after the introduction of smart classrooms. They are simply the ones in the best position to assess academic decline or increase in secondary schools. Teachers were selected because they were the main implementers of this programme of smart classrooms; they knew to what extent this programme affected the education system and learners' academic performance. Sample size is a specified number that is selected from the whole population to represent it (Nigh & Masuku 2014). The study used probability and non-probability sampling while non-probability sampling was purposively done because we had to maximise the information kept by specific people.

We used Yamane sample size determination as expressed below (Louangrath 2014):

$$n = \frac{N}{1 + (0{,}05)^2}$$

Considering the capacity of precision of $\pm\pm 5$ % and confidence level rate at 95% this indicated that 95% samples will have accurate population within range of $\pm 5 \pm 5$ percent as precision.

Sample size. N $= \frac{1334}{1 + 1334(0{,}05)2} = 308 = \frac{1334}{1 + 1334(0{,}05)2} = 308$

In each school the head teacher and director in charge of studies were picked purposively while the study used simple random sampling to select 4 schools which were included in the study. Borg and Gall (2003) recommended that at least 30% of the target population is sufficient as sample size, hence we sampled four public boarding schools among 12 schools in the Gicumbi District, selected randomly. For each school, a list of students was taken and every name was given a number written on a small piece of paper; those folded papers were put in a container. Those who retrieved numbers from the container became respondents in the study.

This study used questionnaires given to the head teachers, directors in charge of studies, teachers and students, because all these respondents are educated, literate enough to understand the questions asked in the questionnaire. The questionnaire was made up of closed-ended questions for the benefit of the respondents and the researcher in terms of saving time and managing a large number of people.

Eight respondents who took part in the pilot study were 2 head teachers, 2 directors in charge of studies and 4 teachers. This piloting study contributed to the improvement of the instrument's reliability. We used Cronbach's Alpha to measure the reliability of the research instruments. The alpha value ranges between 0 and 1 with reliability increasing with the increase

in value. A coefficient of 0.6-0.7 is a commonly accepted rule of thumb that indicates acceptable reliability and 0.8 or higher indicates good reliability.

Table 1 Reliablility			
Variables	Number of items	Cronbach's Alpha	Comments
SM	4	0.937	Approved
AC	4	0.947	Approved
SM: Smart classroom, **AC:** Academic performance			

The Cronbach alphas were above 85%. This signifies that items on the questionnaires had sufficient correlation, which means that the questionnaire was highly reliable. Cronbach alpha above 0.7 is approved as adequate (George & Mallory 2003).

According to Kothari (2014) validity was the way the instruments were presented to the people to assess if they were measuring what was supposed to be measured. Questionnaires were given to the supervisor to appraise its validity of content and to check if the research instruments were appropriate. Kothari has further indicated that content validity reveals the level to which a measurement instrument gives satisfactory coverage of the problem and objectives of the research and is found by utilising a group of people to justify if the measuring of a smart classroom questionnaire is arranged with a standard that is unique in its strategy. It was given to a group of people who were English teachers and one expert (supervisor) in the department of school of education. The review emphasised the representativeness of the element in relation to the set objectives and variables in the research. The appropriate corrections were made according to the comments provided by the experts.

Data collected through questionnaires were sorted, edited, coded, tabulated, and synchronised using coding sheets and a computer system called Statistical Package for Social Science (SPSS) version 21 and then later Microsoft Excel and Microsoft Word for further writing and analysis. This program is very useful for analysing the statistical data with large amounts of data. Quantitative data were interpreted utilising SPSS version 21.

Findings
This section comprised the respondents profiling and the findings which were organised for each objective. The findings are described under the following topics: the relationship between the availability of instructional facilities and learners' performance in public boarding secondary schools in Gicumbi District and the relationship between IT-trained staff and learners' academic performance in public boarding schools in Gicumbi District.

Demographic profiling
Over half of the respondents were male (54.5%; 193) while females represented 37.2% (125) of the whole population. The distribution of respondents by age indicated that the majority of respondents were less than 20 years old (81.8%, 252), respondents who ranged between 21-30 years old were 12% (37), respondents who fall between 31-40 years old were 1.3% (4). Other groups of respondents who fall between 41-50 years old were 2.3% (7) while those who range between 51-60 years old were 1.99 % (6). Those who were over 61 years old were 0.6 % (2).

The educational background of respondents of teachers and administrative staff is described as follows: 52.94% held bachelor's degrees, 23.53 had an advanced diploma in education, while respondents with master's and high school graduate certificates represented 5.88%. People who had postgraduate diplomas in education (PGDE) represented 11.76%. The majority of respondents had five and more years in teaching and learning: 5 (29.4%), while

respondents with less than one year represented 4 (23.5%), respondents with two years represented (11.8%) while those with three were 1(5.9%).

Q1. What is the relationship between the availability of instructional facilities and learners' performance in boarding secondary schools of Gicumbi District?

Table 2 indicates the level of agreement and disagreement of statements which was mentioned by the respondents while answering the questions.

Table 2 Availability of instructional facilities and learners' performance in boarding secondary schools in Gicumbi District.

Statements	SD	D	N	A	SA	Mean	STD
Interactive whiteboard helps in effective teaching-learning process.	12 (3.9%)	23 (7.5%)	26 (8.4%)	92 (29.9%)	155 (50.3%)	4.3409	.99707
Use of projectors motivates learners in teaching and learning activities	18 (5.8%)	30 (9.7%)	22 (7.1%)	92 (29.9%)	146 (47.4%)	4.3117	.89530
Using smartphones in teaching assists learners' academic performance	16 (5.2%)	28 (9.1%)	27 (8.8%)	79 (25.6%)	158 (51.3%)	4.1851	1.13064
Enough computers at school enhances effective use of smart classroom	11 (3.6%)	20 (6.5%)	3 (11.4%)	81 (26.3%)	161 (52.3%)	4.1721	1.09169
Using syllabus pen impacts learners' academic performance	9 (2.9%)	15 (4.9%)	19 (6.2%)	84 (27.3%)	181 (58.8%)	4.1688	1.14035
ICT room contributes to learners' academic performance	14 (4.5%)	24 (7.8%)	22 (7.1%)	84 (27.3%)	164 (53.2%)	4.1526	1.10349
Vantiled ICT room is a key factor for learner's academic performance	5 (1.6%)	12 (3.9%)	24 (7.8%)	108 (35.1%)	159 (51.6%)	4.0877	1.19531
Giving learners sufficient time in a smart classroom improve academic performance	17 (5.5%)	26 (8.4%)	43 (14.0%)	67 (21.8%)	155 (50.3%)	4.0714	1.20859
Learners' academic performance can be raised by school Internet	16 (5.2%)	29 (9.4%)	31 (10.1%)	73(23.7%)	159(51.6%)	4.0325	1.21026
Using electronic devices contributes to the learners' academic performance	18 (5.8%)	11 (3.6%)	32 (10.4%)	82(26.6%)	165(53.6%)	4.0292	1.21706
Overall						4.1552	1.118976

Note: Strongly Disagree = [1[= **Very Low mean;** Disagree= [1-2[=**Low mean;** Neutral= [2-3[=**moderated mean**; Agree= [3-4[=**High mean**; Strongly Agree= [4-5[= **Very High mean**

The findings depicted in Table 2 indicate that the majority of respondents strongly agreed with the following factors. They are namely: The interactive whiteboard helps in an effective teaching-learning process (μ= 4.3409 and STD=.99707), the use of projectors motivates learners in teaching and learning activities (μ= 4.3117 and STD=.89530), using smartphones in teaching assists learners' academic performance (μ=4.1851 and STD=1.13064), having enough computers at school enhances the effective use of smart classrooms (μ=4.1721 and STD=1.09169), Using syllabus pens impacts on learners' academic performance (μ=4.1688 and STD=1.14035), ICT room contributes to learners' academic performance (μ=4.1526 and STD=1.10349), a Vantiled ICT room is a key factor for learners' academic performance (μ= 4.0877 and STD=1.19531), giving learners sufficient time in the smart classroom improves academic performance (μ= 4.0714 and STD=1.20859), learners' academic performance can be raised by school Internet (μ= 4.0325 and STD=1.21026), using electronic devices contributes to the learners' academic performance (μ=4.0292 and STD=1.21706). The overall mean indicated that the majority of respondents strongly agreed that the availability of instructional facilities has a strong relationship with learners' academic performance (μ=44.1552 and STD=1.118976).

Q2. What is the relationship between IT Trained staff and learners' performance in boarding secondary school of GicumbI District?

The data indicates the level of agreement and disagreement of statements which was mentioned by the respondents while answering the questions.

Table 3 IT-trained staff and learners' performance in boarding secondary schools in Gicumbi District

Statements	SD	D	N	A	SA	Mean	STD
Having ICT training influences a learner's academic performance	6 (1.9%)	10 (3.2%)	26 (8.4%)	100 (32.5%)	165 (53.6%)	4.4935	1.02594
Having an IT manager in charge of a smart classroom influences a learner's academic performance	16 (5.2%)	9 (2.9%)	29 (9.4%)	80 (26.0%)	174 (56.5%)	4.2565	1.08699
Induction week in IT for new teachers influences learners' academic performance	11 (3.6%)	21 (6.8%)	21 (6.8%)	103 (33.4%)	152 (49.4%)	4.1818	1.06134
Giving teachers ICT seminars influences learners' academic performance	18 (5.8%)	16 (5.2%)	32 (10.4%)	81 (26.3%)	160 (51.9%)	4.1429	1.16367
Experienced teachers in IT influence learners' academic performance	22 (7.1%)	22 (7.1%)	27 (8.8%)	61 (19.8%)	176 (57.1%)	4.1266	1.25569
Qualified teachers in IT influences learners' academic performance	25 (8.1%)	16 (5.2%)	19 (6.2%)	92 (29.9%)	156 (50.6%)	4.0974	1.22551

						Mean	STD
Giving teachers computers influences learners' academic performance	22 (7.1%)	18 (5.8%)	31 (10.1%)	75 (24.4%)	162 (52.6%)	4.0942	1.22444
Trained IT teacher influences learners' academic performance	26 (8.4%)	18 (5.8%)	23 (7.5%)	86 (27.9%)	155 (50.3%)	4.0584	1.25424
Attending IT workshops by teachers influence learners' academic performance	28 (9.1%)	23 (7.5%)	30 (9.7%)	83 (26.9%)	144 (46.8%)	3.9481	1.29792
Giving teachers E-learning courses influences learners' academic performance	25 (8.1%)	31 (10.1%)	27 (8.8%)	81 (26.3%)	144 (46.8%)	3.9351	1.29984
Overall						4.13345	1.189558

Note: Strongly Disagree = [1[= **Very Low mean;** Disagree= [1-2[=**Low mean;** Neutral= [2-3[=**moderated mean**; Agree= [3-4[=**High mean**; Strongly Agree= [4-5[= **Very High mean**

The table shows that the majority of respondents strongly agree that the following factors influence learners' academic performance. They are namely: Having ICT training influences learners' academic performance (μ=4.4935 and STD=3.02594), having an IT manager in charge of a smart classroom influences learners' academic performance (μ=4.2565 and STD=1.08699), an induction week in IT for new teachers influences learners' academic performance (μ=4.1818 and STD=1.06134), giving teachers ICT seminars influences learners' academic performance (μ=4.1429 and STD=1.16367), experienced teachers in IT influence learners' academic performance (μ=4.1266 and STD=1.25569), qualified teachers in IT influences learners' academic performance (μ=4.0974 and STD=1.22551), giving teachers computers influences learners' academic performance (μ= 4.0942 and STD=1.22444), trained IT teacher influences learners' academic performance (μ=4.0584 and STD=1.25424). The results from the table also show that the majority of the following factors affect the learners' academic performance. Attending IT workshops by teachers influence learners' academic performance (μ=3.9481 and STD=1.29792), giving teachers E-learning courses influences learners' academic performance (μ=3.9351 and STD=1.29984). Overall, results proved that most of the respondents strongly agreed that IT-trained staff have a significant relationship with learners' academic performance in Rwandan public boarding schools (μ= 4.13345 and STD= 1.189558).

Table 4 Descriptive statistics on learners' academic performance							
	SD	D	N	A	SA	Mean	STD
Marks of learners increased in last five years	3 (1.0%)	7 (2.3%)	42 (13.6%)	76 (24.7%)	180 (58.4%)	4.3734	.87316
The number of learners who get rewards because of performance increased	4 (1.3%)	11 (3.6%)	50 (16.2%)	68 (22.1%)	175 (56.8%)	4.2955	.95179
The numbers of learners who repeat a year reduced in last five years	7 (2.3%)	11 (3.6%)	35 (11.4%)	89 (28.9%)	166 (53.9%)	4.2857	.95987

In last five years, academic performance increased in national examination	9 (2.9%)	4 (1.3%)	39 (12.7%)	104 (33.8%)	152 (49.4%)	4.2727	.90076
The number of unclassified learners in national examination reduced	9 (2.9%)	4 (1.3%)	39 (12.7%)	104 (33.8%)	152 (49.4%)	4.2532	.93476
In last five years learners repetition reduced	5 (1.6%)	14 (4.5%)	38 (12.3%)	99 (32.1%)	152 (49.4%)	4.2305	.94582
In last five years performance in school-based exams increased	5 (1.6%)	8 (2.6%)	49 (15.9%)	96 (31.2%)	150 (48.7%)	4.2273	.92044
In last years learners who get letter for boarding schools increased	10 (3.2%)	9 (2.9%)	36 (11.7%)	110 (35.7%)	143 (46.4%)	4.1916	.97810
Learner's performance raised in district test in last five years	6 (1.9%)	20 (6.5%)	43 (14.0%)	85 (27.6%)	154 (50.0%)	4.1721	1.0239
The number of learners who get admission to under-graduate studies increased in the last five years	11 (3.6%)	23 (7.5%)	42 (13.6%)	78 (25.3%)	154 (50.0%)	4.1071	1.1176
Overall mean						4.24091	0.9606

Note: Strongly Disagree = [1[= **Very Low mean;** Disagree= [1-2[=**Low mean;** Neutral= [2-3[=**moderated mean**; Agree= [3-4[=**High mean**; Strongly Agree= [4-5[= **Very High mean**

The shown in Table 4 reveal that the following factors influence learners' academic performance as follows: Marks of learners increased in last five years (μ=4.3734 and STD=0.87316), the number of learners who get rewards because of performance increased (μ=4.2955 and STD=.95179), the numbers of learners who double in same years (repeat) reduced in last five years (μ=4.2857 and STD=0.95987), in lthe ast five years, academic performance increased in national examinations (μ=4.2727 and STD=0.90076), the number of unclassified learners in national examinations reduced (μ=4.2532 and STD=0.93476), in last five years learners repetition reduced (μ= and STD=), in the last five years performance in school-based exams increased (μ=4.2273 and STD=.92044), in the last years learners who get letters for boarding schools increased (μ=4.1916 and STD=0.97810), learners' performance raised in district test in last five years (μ=4.1721 and STD=1.02395), the number of learners who get admission for undergraduate studies increased in the last five years (μ=4.1071 and STD=1.11762). Overall results indicated that the majority of respondents strongly agreed that academic performance have increased since the time the smart classroom was elstablished (μ=4.24091 and STD=0.9606).

Conclusion and recommendations

Findings related to objective number one indicated that there is a very strong correlation between the availability of instructional facilities and learners' academic performance(r=0.938[**] and p=value=0.000). According to Akomolafe and Adesua (2016), there is significant relationship between the availability of physical facilities and student's level of motivation and academic performance. The researcher came up with recommendations that more materials should be distributed in public schools so that they can become conducive to teaching and learning

processes. The researcher mentions that facilities such as infrastructure, laptops, Internet, furniture, are very important to enhance smart classrooms and increase learners' academic performance because they get the opportunity to use smart classrooms without putting three students on one computer or finding a large number of students in one room with poor oxygen. Availability of instructional facilities is among the important factors that contribute to a student's academic performance. This means that schools should have well-equipped computer labs, sufficient chairs and tables and places where they can connect machines to the power (Hallak 1990). In Rwanda many schools have smart classrooms but in some schools, facilities are not enough to support large number of students per each class. Even if they are not adequate, the introduction of smart classrooms has changed many things in terms of academic performance, student numbers and motivation.

Objective two provided the results which indicated that there is a very strong correlation between the provision of IT and the continuous professional development and learners' academic performance in Rwanda (r=.923[**]and p=value=0.000). According to Muguwe and Mushoriwa (2016), provision of Continuous Professional Development plays a significant role because they alert teachers to the content that they don't know and increase knowledge of new programs. This suggests that all teachers must be trained in the use of smart classrooms and also train themselves on how to use computers because some of teachers do not know how to use smart classrooms as new technology in education which helps in developing the quality of education. According to Ell, Furey, Scott-Evans, and Terrell (2003), teaching and administrative staff perceive continuous professional development to be significant because teachers benefits can enhance the teaching and learning process that take places in a smart classroom. Many other researchers like Byrd (2013) believe that continuous professional development contributes to a student's performance when it is done well, because as you train teachers, they gain knowledge, skills and improve their confidence and motivation. It is necessary to improve smart classrooms by increasing in-service training of teachers.

This study was limited by the period of pandemic which is ravaging the world (Covid-19); it was not easy to reach the respondents because of a curfew in targeted areas. In Rwanda the area which was sampled was among the most badly affected areas with Covid-19. We had to wait until the measures were relaxed and people were allowed to move from one place to another. The study was limited by Rwandan culture, as it is well known in Africa that people do not like to read and to research different problems. It was not easy for the researchers to get information because of limited national research in the domain.

Rwanda is a hilly country which does not favour easy movement, especially in rural areas where there is no modern road, the roads are full of mud in rainy season and even transport costs in those places are high. Researchers mitigate the challenges by using Internet and asking permission to the authorities for going to the field.

This study emphasises the importance of smart classrooms in every school across the country. As has been shown, smart classrooms help learners do research on contents which were not understood while engaged in classroom teaching and learning activities. The implementation and effective use of smart classrooms will increase learners' academic performance because through this policy learners are exposed to the skills and knowledge which are available around the world. Ultimately, government and education planners, among others, are likely to benefit from this study for the development of smart classrooms in the country. Thus,if smart classrooms are increased and monitored in Rwanda, academic performance will improve in boarding schools.

The study recommends the following:

Teachers need regular Continuous Professional Development to update their knowledge on the use of smart classroom as they get regular CPD, learner's academic performance will be increased.

Parents should be mobilised on the need for creating a technological atmosphere at home for their children because academic achievement for students depends on how parents support them in their homes. It is suggested that parents try their best to buy electronic devices which can expose their children to technology.

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