

# USE OF IMPROVISED MATERIALS AND ACADEMIC PERFORMANCE OF LEARNERS IN MATHEMATICS SUBJECT IN PUBLIC SECONDARY SCHOOLS IN RWANDA: A CASE OF GICUMBI DISTRICT

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**Abstract:** This study investigated the relationship between using improvised materials and learners' performance in mathematics subjects in public secondary schools in Gicumbi, Rwanda. The specific objectives were to identify the improvised materials used in teaching mathematics in public secondary schools in Rwanda, to assess the academic performance of learners in mathematics that is due to the use of improvised materials, and to determine the relationship between using improvised materials and learners' performance in mathematics subjects in public secondary schools in Rwanda. This study is useful to all stakeholders in the education sector, such as public institutions, decision-makers, district authorities, head teachers, teachers, learners, and scholars. The researcher applied a descriptive correlational study, targeting 252 students, 36 teachers, eight head teachers, and four sector educational inspectors. This study selected respondents and key informants both purposefully and randomly. A study sample of 145 respondents was obtained by using Yamane's formula. Information was analysed using the statistical package for social sciences version 26.0 to generate descriptive statistics in terms of frequency, percentage, mean, and standard deviation. Inferential statistics were produced in terms of correlation and regression coefficients for determining the size of the effect between variables.

The improvised materials used in teaching mathematics respondents indicated that 84.6% strongly agreed that the measuring tapes in geometry and trigonometry represent improvised materials for teaching mathematics; 92.3% strongly agreed that coins and playing cards in probability are improvised materials for teaching mathematics; 84.4% strongly agreed that the balls of different colors in probability are improvised materials for teaching mathematics; and finally, 65.5 strongly agreed that the colored papers in analysis represent improvised materials for teaching mathematics.

Results on the academic performance of learners in mathematics subjects indicate that 79.8% strongly agreed that learning using improvised teaching materials made the learners confident and improved grades; 86.5% strongly agreed that learning using improvised teaching materials improved the learners problem-solving skills; 78.8% strongly agreed that learning using improvised teaching materials helps them to complete their homework; 84.6% strongly agreed that their mastery of mathematics content improves class participation; and 84.6% strongly agreed that the provision of school learning materials improves class participation.

**Keywords:** Mathematics, Problem-solving, Performance, Improved materials, Learners.

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## 1. INTRODUCTION TO THE STUDY

### Problem statement

Mathematics as a subject is very important to the daily life of every individual as it aids the development of knowledge and the required skills in problem-solving situations. Mathematics is seen as the science of structure, order, and relations that has evolved from counting, measuring, and describing the shapes of objects. It deals with logical reasoning and quantitative

calculations. Mathematics encounters the power of reasoning, creativity, abstract or spatial thinking, critical thinking, problem-solving ability, and even effective communication skills. It is observed that some learners fear mathematics because of its abstractness and the fact that it must be memorized.

Kurumeh and Achor (2008) attributed the causes of poor performance to factors such as the abstractness of mathematical concepts, the way these concepts are presented to the learners, and poor foundations, among other things.

Performance in mathematics is due to factors such as the notion among pupils that mathematics is an abstract and difficult subject, inadequately qualified teachers to teach the subject as specialists, improper methods of teaching mathematics, a lack of a mathematics laboratory, insufficient instructional aids, and poor use of improvised materials.

### Objectives of the Study

#### General objectives

The main objective of this research was to investigate the relationship between using improvised materials and learners' performance in mathematics subjects in public secondary schools in Rwanda.

#### Specific objectives

Specially, the study is

- (i) To identify the improvised materials used in teaching mathematics in public secondary schools in Rwanda
- (ii) To assess the academic performance of learners in mathematics that is due to the use of improvised materials.
- (iii) To determine the relationship between using improvised materials and learners' performance in mathematics subjects in public secondary schools in Rwanda.

#### Research Questions

The following research questions were asked to provide guide for the study

- (i). What are the improvised materials used in teaching mathematics in public secondary schools in Rwanda?
- (ii). How do learners' performance in Mathematics depend on use of improvised materials in teaching Mathematics?
- (iii). What is the relationship between using improvised improvised materials and learners' performance in mathematics subjects in public secondary schools in Rwanda?

## 2. REVIEW OF RELATED LITERATURE

### Theoretical Literature

#### Improvised materials used in teaching mathematics in public secondary schools

Science teaching in underdeveloped and developing nations around the world generally, and especially in Nigeria, is not producing the desired results (Badmus & Omosewo, 2018). This is evidenced in the various comments passed by governments and stakeholder groups on the students' academic performance in public examinations (Badmus & Omosewo, 2018; Omorogbe & Ewansiha, 2013). The students' failure has been attributed to the typical pedagogical pattern employed by teachers, which is mainly the talk-chalk approach (Badmus & Omosewo, 2018; Omorogbe & Ewansiha, 2013). The simple reason alluded to by classroom teachers for adopting the teaching approach even in situations where practicals are required is the lack of instructional materials to teach science (Ayua, 2012; Akinkugbe, 2007).

#### Improvised material and Students' academic performance in mathematics in the public secondary schools.

The concept of Mathematics is quantitative and geometrical in nature. This has given rise to diverse approaches to the teaching and learning of the subject in accordance with different purposes for which it is used (Williams, 2007). In trying to emphasize the importance of Mathematics to human activities, Bangbose (2011) says that it is used as a measuring tool for calculation and numerical analysis in our everyday life. While Olatin and Aquioibe (2007) highlighted Mathematics instructional materials as all geometry objects or the means of communicating process that stores and distributes human experiences through quantitative reasoning. Under the 6-3-3-4 educational system in Nigeria, Mathematics is one of the

core subjects for students at the senior secondary school level (NPE, 2004). It is a compulsory subject for all students at the Senior School Certificate Examination (SSCE).

### **Relationship between using improvised materials and learners 'performance in mathematics subjects in public secondary schools**

Mathematics is one of the compulsory subjects that students must offer in the school system, not minding whether such students intend to be professionals in science, commerce, the arts, or social science. In the secondary school curriculum, according to the National Policy on Education (Varughese, 2017), mathematics is one of the core subjects that, for students to further their studies in institutions of higher learning, especially universities, they are expected to have credit for. However, mathematics is one of the subjects that is taken very seriously in the school system, irrespective of country or level of education. It has been described as a model of thinking that encourages learners to reflect, reason logically about a problem, and communicate ideas, making it the central intellectual discipline and a vital tool in science, commerce, and technology. Mathematics learning gains (MLGs) are the outcomes and performance of students in the mathematics tests and examinations they have been exposed to. MLGs is a concept that has always been used synonymously with some concepts such as mathematics learning outcomes, mathematics academic achievement, mathematics academic performance, and mathematics academic success, among others (Mayanchi et al., 2019).

### **Empirical Literature**

#### **Improvised materials used in teaching mathematics in public secondary schools**

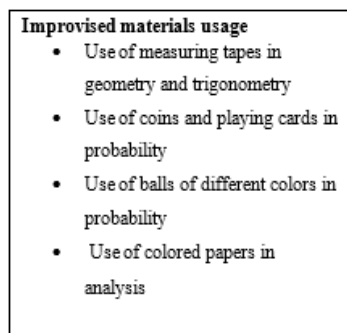
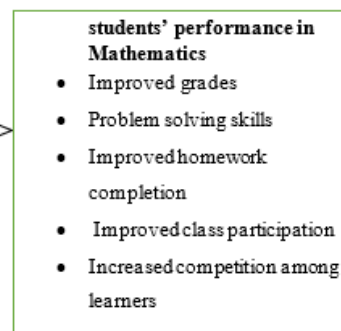
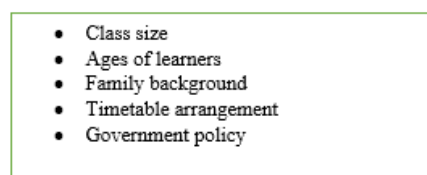
Pinto (2017) explicitly linked expert mathematics teaching to jazz improvisation in the title of his paper delivered at the CERME conference that year. Improvisation appears to be a recurring theme in discussions of teacher expertise, including expert mathematics teaching, and the brief account offered above draws on a much wider body of work. Despite these frequent references, however, there are very few detailed descriptions of what improvisation might actually look like in the classroom and even fewer suggestions about how teachers might develop their skills in this area. This seemingly casual approach to defining such a key concept is because Borko and Livingston are not primarily concerned with the practice of improvisation but with the nature of mathematics teacher expertise.

#### **The academic performance of learners in mathematics is due to the use of improvised materials.**

Education helps in the development of an individual's intellectual ability and functions functionally in society. Education prepares individuals to face problem situations and offer meaningful solutions to them. This indicates that there is a total need to improve the quality of education in any nation so as to produce quality individuals who will contribute positively towards the development of the nation. Gbolagade, Waheed, and Sangoniya (2013) opined that a complete education, otherwise known as qualitative and functional education, is the one that equips a man to be vast in literacy and numeracy, thus enabling him to reason logically and critically and apply his affective, cognitive, and psychomotor skills, thereby contributing positively towards the development of his immediate domain and the nation in general. Adeyanju (2009), in Gbolagade et al. (2013), stated that education is an amalgam of multifarious processes, techniques, strategies, references, experiences, etc., by which individuals or groups of human beings, male or female, young or old, rich or poor, etc., are deliberately exposed to a wide and deep field of knowledge, ideas, skills, attitudes, norms, and beliefs of their immediate geopolitical environment and those of other cultures near and far

### **Relationship between using improvised materials and learners 'performance in mathematics subjects in public secondary schools**

In the study by Chukwuemeka (2016) the concept of Mathematics is quantitative and geometrical in nature. In trying to emphasize the importance of Mathematics to human activities, Bangbose (2014) says that it is used as a measuring tool for calculation and numerical analysis in our everyday life. While Olatin and Aquio (2007) highlighted Mathematics instructional materials as all geometry objects or the means of communicating process that stores and distributes human experiences through quantitative reasoning. Under the 6-3-3-4 educational system in Nigeria, Mathematics is one of the core subjects for students at the senior secondary school level (NPE, 2004).

**Conceptual framework****Independent variables****Dependent variables****Moderating variables**

Source: Researcher's construct (2023)

**3. RESEARCH METHODOLOGY****Research Design**

A cross-sectional survey design was used to collect data about levels of availability of ICT facilities and the effect of information communication and technology use in teaching and learning mathematics on learners' academic performance in public secondary schools in Gicumbi District. Phenomenology was also used to provide an in-depth understanding of the teachers' lived experiences with the use of ICT in administration. According to Willis (2007), phenomenology argues that in order to arrive closer to knowing what is real, one needs to find out how humans perceive themselves and the world around them. Generally, the researcher optimized the strengths of a mixed-methods research design by using both quantitative and qualitative methods specifically in data collection.

**Target Population**

The target population in the study was be in 8 public secondary schools, the 300 students, and teachers head teachers of the 8 schools. Head teachers were targeted because they bear the responsibility of carrying out administrative tasks and allocating improvised materials in their schools. Teachers of mathematics are implementers as well as users of improvised materials. Furthermore, teachers also execute duties related to administration as delegated to them by head teachers.

**Sample size**

There are many different ways to work out a sample size; two types of formulas that are used are Cochran's formula and Yamane's formula. The researcher used the simple Joskow and Yamane formula in this study. Since the population of the study is known, the confidence level of 95% and the level of precision of 10% will be taken into consideration.

**Table 3.1: Summary of sample size**

No	Category of respondents	Target population	Sample size
	Sector educational officers	4	4
	Head-teachers	8	7
	Teachers	36	26
	Students	252	108
	<b>Total</b>	<b>300</b>	<b>145</b>

#### 4. RESEARCH FINDINGS, INTERPRETATIONS AND DISCUSSIONS

##### The improvised materials used in teaching mathematics in public secondary schools in Rwanda

The following table indicate the perception of the the improvised materials used in teaching mathematics in public secondary schools in Rwanda

**Table 4.1: The perception of the teachers on The improvised materials used in teaching mathematics in public secondary schools in Rwanda**

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total	Mean	Sdv
	N	%	N	%	N	%	N	%	N	%			
use of measuring tapes in geometry and trigonometry represents improvised materials for teaching mathematics	0	0.0	0	0.0	0	0.0	4	15.4	22	84.6	26	1.153	.367
Use of coins and playing cards in probability indicate improvised materials for teaching mathematics	0	0.0	0	0.0	1	3.8	1	3.8	24	92.3	26	1.115	.431
Use of balls of different colors in probability represents improvised materials for teaching mathematics	0	0.0	0	0.0	1	3.8	3	11.5	22	84.6	26	1.192	.491
Use of colored papers in analysis represents improvised materials for teaching mathematics	0	0.0	0	0.0	2	7.7	7	26.9	17	65.5	26	1.42	.643

**Source: Primary Data (2023)**

Results showed Shown that the use of measuring tapes in geometry and trigonometry represents improvised materials for teaching mathematics, 84.6% strongly agreed. Results indicated that use of coins and playing cards in probability indicates improvised materials for teaching mathematics, with 92.3% strongly agreeing, 84.4% strongly agreed that use of balls of different colors in probability represents improvised materials for teaching mathematics, and finally, 65.5 strongly agreed that use of colored papers in analysis represents improvised materials for teaching mathematics.

**Table 4.2: The teacher's perceptions on the academic performance of learners in mathematics that is due to the use of improvised materials**

Statement on Students' academic performance in mathematics	Strongly Disagree		Disagree		Not Sure		Agree		Strongly Agree		Total	Mean	Sdv
	N	%	N	%	N	%	N	%	N	%			
Teaching mathematics subject using improvised materials improves students' independence in learning.	2	7.7	3	11.5	0	0.0	4	15.4	17	65.4	26	1.8	1.357
Teaching mathematics subject using improvised materials improves students' exams and tests results.	3	11.5	2	7.7	1	3.8	1	3.8	19	73.1	26	1.8	1.470
Teachers' uses of ICT in teaching mathematics reduces students' absenteeism.	1	3.8	3	11.5	1	3.8	3	11.5	18	69.2	26	1.69	1.22
Teachers' mastery of mathematics content improves class participation	2	7.7	0	0.0	3	11.5	8	30.8	13	50.0	26	1.5	.946
Teachers' classroom management skills facilitate homework completion.	0	0.0	2	7.7	2	7.7	3	11.5	19	73.1	26	3.53	1.5

**Source: Primary Data (2023)**

Table 4.2 indicated that teaching mathematics using improvised materials improves students' independence in learning; 65.4% strongly agreed, 15.4% agreed, and 73.10% strongly agreed that teaching mathematics using improvised materials improves students' exam and test results. 69.2% strongly agreed that the use of ICT in teaching mathematics reduces students' absenteeism; 50.0% strongly agreed that their mastery of mathematics content improves class participation; and 73.1% strongly agreed that teachers' classroom management skills facilitate homework completion. Umuhoza (2021)

conducted research on the impact of instructional materials on classroom interaction through semi-structured interviews and classroom observations of 15 mathematics teachers from five primary schools in Rulindo district, the analysis indicates a lack of instructional materials for teaching mathematics overall. Most teachers use course books, but report that there are not enough books available. The use of ICT is limited due to the lack of power supply in some schools. Teachers in this study either did not use available instructional materials at all or, if they did, they did not use them appropriately. Teachers also did not allow students to actively use the materials; thus, students were not given the opportunity to enhance their active learning and participate in constructing their knowledge of the mathematics content.

**Table 4.3: Regression Coefficients between Independents variables and The provision of school learning materials Improved class participation**

Model	Unstandardized Coefficients		Standardized Coefficients		T	Sig.
	B	Std. Error	Beta			
1 (Constant)	-.060	.167			-.360	.720
Use of measuring tapes in geometry and trigonometry	.018	.088	.015		.202	.840
Use of coins and playing cards in probability	.517	.100	.442		5.163	.000
Use of balls of different colors in probability	.252	.097	.200		2.607	.010
Use of colored papers in analysis	.344	.103	.235		3.331	.001

a. Dependent Variable: The provision of school learning materials Improved class participation

**Source: Primary Data (2023)**

Data presented in Table 4.3 evidenced that regression coefficients related to the provision of school learning materials Improved class participation and use of measuring tapes in geometry and trigonometry were not significant ( $B = .015$ ,  $p$ -value = .840). The result indicated positive significance for the provision of school learning materials. Improved class participation and use of coins and playing cards in probability were positively significant ( $B = .442$ ,  $p$ -value = .000). Results show that there is a positive relationship between the provision of school learning materials and improved class participation and the use of balls of different colors in probability ( $B = .200$ ,  $p$ -value = .010), and finally, the provision of school learning materials improves class participation and the use of colored papers in analysis ( $B = .235$ ,  $p$ -value = .001).

**Table 4.4: Regression analyses between independents variables and Improved grades**

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
1 (Constant)	2.888	.309			9.348	.000
Use of measuring tapes in geometry and trigonometry	-.166	.162	-.603		-1.023	.008
Use of coins and playing cards in probability	.105	.186	.365		.567	.002
Use of balls of different colors in probability	-.311	.179	-.179		-1.732	.046
Use of colored papers in analysis	-.335	.191	.266		-1.754	.000

a. Dependent Variable: Improved grades

**Source: Primary Data (2023)**

Data presented in Table 4.4 indicates regression coefficients for improved grades and use of measuring tapes in geometry and trigonometry were negatively significant ( $B = -.603$ ,  $p$ -value = .008). The result indicated that improved grades and the

use of coins and playing cards were positively significant ( $B = .365$ ,  $p\text{-value} = .002$ ). Results show that there is a Negative significant relationship between improved grades and the use of balls of different colors in probability ( $B = -.179$ ,  $p\text{-value} = .046$ ), and finally between improved grades and the use of colored papers in analysis ( $B = .266$ ,  $p\text{-value} = .000$ ).

**Table 4.5: Regression analyses between independents variables and Improved grades**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.013	.304		6.631	.000
	Use of measuring tapes in- geometry and trigonometry	-.129	.160	-.081	-.810	.419
	Use of coins and playing cards in probability	.599	.182	.376	3.286	.001
	Use of balls of different colors in probability	-.370	.176	-.216	-2.098	.038
	Use of colored papers in analysis	-.045	.188	-.023	-.241	.810

a. Dependent Variable: Problem solving skills

**Source: Primary Data (2023)**

Data shown in Table 4.5 indicated that regression coefficients related to problem-solving skills and the use of measuring tapes in geometry and trigonometry were not significant ( $B = -.081$ ,  $p\text{-value} = .419$ ). The result indicated positive significance for problem-solving skills and the use of coins and playing cards in probability ( $B = .376$ ,  $p\text{-value} = .001$ ). Results show that there is a negative significant relationship between problem solving skills and the use of balls of different colors in probability ( $B = -.216$ ,  $p\text{-value} = .038$ ), and finally, the results indicate that there is no significant relationship between problem solving skills and the use of colored papers in analysis ( $B = -.023$ ,  $p\text{-value} = .810$ ).

**Table 4.6: Regression analyses between independents variables and Improved homework completion**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.276	.250		5.098	.000
	Use of measuring tapes in- geometry and trigonometry	in-.091	.532	-.070	-.691	.012
	Use of coins and playing cards in probability	-.140	.150	-.108	-.931	.035
	Use of balls of different colors in probability	.330	.145	.237	2.272	.025
	Use of colored papers in analysis	in.154	.155	.095	.994	.322

a. Dependent Variable: Improved homework completion

**Source: Primary Data (2023)**

Data presented in Table 4.6 evidenced that regression coefficients related to improved homework completion and use of measuring tapes in geometry and trigonometry were significantly negative ( $B = -.070$ ,  $p\text{-value} = .012$ ). The result indicated positive significance for improved homework completion and use of coins and playing cards in the probability shown as negative significant ( $B = -.108$ ,  $p\text{-value} = .035$ ). Results show that there is a positive relationship between improved homework completion and the use of balls of different colors in probability ( $B = .237$ ,  $p\text{-value} = .025$ ), and finally, improved homework completion and the use of colored papers in analysis ( $B = .095$ ,  $p\text{-value} = .322$ ) show that they are not significant.

**Table 4.7: Regression analyses between independents variables and Increased competition among learners**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.384	.201		6.905	.000
	Use of measuring tapes in geometry and trigonometry	.030	.105		.282	.023
	Use of coins and playing cards in probability	-.045	.120	.342	-.377	.001
	Use of balls of different colors in probability	.007	.116	.356	.056	.000
	Use of colored papers in analysis	.096	.124	.076	.777	.038

a. Dependent Variable: Increased competition among learners

#### Source: Primary Data (2023)

Data presented in Table 4.7 evidenced that regression coefficients related to increased competition among learners and use of measuring tapes in geometry and trigonometry were significantly negative ( $B = -.029$ ,  $p\text{-value} = .023$ ). The result indicated positive significance for increased competition among learners and the use of coins and playing cards in probability ( $B = .342$ ,  $p\text{-value} = .001$ ). Results show that there is a positive relationship between increased competition among learners and the use of balls of different colors in probability ( $B = .356$ ,  $p\text{-value} = .000$ ), and finally, the result indicated positive significance between increased competition among learners and the use of colored papers in analysis ( $B = .076$ ,  $p\text{-value} = .038$ ).

## 5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

### Summary of the Findings

The present research investigated the relationship between using improvised materials and learners' performance in mathematics subjects in public secondary schools in Rwanda. A representative group of 145 were chosen among the target population. The data were obtained utilizing descriptive and inferential statistics of evidences from questionnaire and interview guide.

### The improvised materials used in teaching mathematics in public secondary schools in Rwanda

The first objective of this research was to determine the improvised materials used in teaching mathematics in public secondary schools in Rwanda. To achieve this objective, the researcher required the respondents to show their views by filling the questionnaire. The following statements were used in the real examination: "use of measuring tapes in geometry and trigonometry represents improvised materials for teaching mathematics, Use of coins and playing cards in probability indicate improvised materials for teaching mathematics, Use of balls of different colors in probability represents improvised materials for teaching mathematics and Use of colored papers in analysis represents improvised materials for teaching mathematics.

The findings show that the use of measuring tapes in geometry and trigonometry represents improvised materials for teaching mathematics; 84.6% strongly agreed. Results indicated that the use of coins and playing cards in probability indicates improvised materials for teaching mathematics, with 92.3% strongly agreed; 84.4% strongly agreed the use of balls of different colors in probability represents improvised materials for teaching mathematics; and finally, 65.5 strongly agreed that use of colored papers in analysis represents improvised materials for teaching mathematics

### Analysis of the students' performance in national exams that is due to local language use

The second objective of the study was to analyze the academic performance of learners in mathematics due to the use of improvised materials. The following statements were used in the real examination: "Learning using improvised teaching materials made us confident and improved grades; learning using improvised teaching materials improved my problem-solving skills; learning using improvised teaching materials helped improve the completion of my homework; the provision of school learning materials increased my performance at school; and the provision of school learning materials improved



class participation. The findings indicate that learning using improvised teaching materials made them confident and improved grades; 79.8% strongly agreed, and 86.5% strongly agreed that learning using improvised teaching materials improved their problem-solving skills. 78.8% strongly agreed that learning using improvised teaching materials helps them to complete my homework; 84.6% strongly agreed that their mastery of mathematics content improves class participation; and 84.6% strongly agreed that the provision of school learning materials improves class participation.

### **The relationship between using improvised materials and learners 'performance in mathematics subjects in public secondary schools in Rwanda**

The third objective of the current study sought to assess the the relationship between using improvised materials and learners 'performance in mathematics subjects in public secondary schools in Rwanda. The correlation and regression results established the existence of positive correlation between using improvised materials and learners 'performance in mathematics subjects for students the p-value and significance were justified by the p-value which were less than 0.05, the study evidenced a positive correlation between using improvised materials and learners 'performance in mathematics subjects in public secondary schools Gicumbi District Rwanda

### **Conclusion**

Based on the study findings discussed in chapter and the contrast made with previous empirical studies, the study elucidated the following concluding remarks:

To the first objective and research question, the study concludes that the findings from the present research show that the improvised materials used in teaching mathematics in public secondary schools in Rwanda are: measuring tapes in geometry and trigonometry, Use of coins and playing cards in probability, balls of different colors in probability as well as colored papers.

To the second objective and research question, after analyzing student performance in Mathematics subjects , the study concludes that Learning using improvised teaching materials made the students confident and Improved grades, Learning using improvised teaching materials approach improve the Problem solving skills of students , Learning using improvised teaching materials help the learners to Improve completion of my homework, the provision of school learning materials increased the students' performance in mathematics at school and The provision of school learning materials Improved class participation

Finally, to third objective and research question, the study establish relationship the relationship between using improvised materials and learners 'performance in mathematics subjects in public secondary schools in Rwanda. The correlation matrix between independent variables (use of measuring tapes in geometry and trigonometry, use of coins and playing cards in probability, use of balls of different colors in probability and use of colored papers in analysis) and dependent variables (Improved grades, Problem solving skills, Improved homework completion, Improved class participation and Increased competition among learners) show positive significance since the p-value were less than 0.05.

### **Recommendations of the Study**

On the basis of the findings, the researcher provided the following recommendations:

All people involved in the education sector in Gicumbi are recommended to work collaboratively in order to enhance the learner's performance among all secondary school students in public and private primary schools in both general education and TSS schools in mathematics subjects.

MINEDUC, through the Rwanda Education Board, is recommended to avail itself of enough mathematics teaching and learning materials, including charts, rods, spindles, beads, counters, chains, and cubes, that are adequate in enhancing mathematics skills among students at an early age. MINEDUC should provide enough training intended to boost teachers' ability to teach using instructional materials so that students can increase their skills and knowledge in mathematics.

All stakeholders in the education sector are recommended to support mathematics teaching and learning activities in Rwanda, as it is the only shortcut for making Rwandans mathematicians.

**Suggestion for Further Studies**

The researcher recommends further studies to be carried out in the following areas:

1. The effect of using mathematics on Rwandan economic developments
2. Use of the CLASS tool to improve mathematics teacher teaching quality
3. Increasing Female Pre-Service Teachers' Mathematics Self-Efficacy Through Integration of Mathematics History into Teaching During Lesson Study

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