



# Factors Affecting Students' Performance in Mathematics in Upper Secondary Schools in Gicumbi District, Rwanda

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**Abstract:** In spite of the government efforts to promote Mathematics and Science, students' performance in mathematics in Rwanda has been low in upper secondary schools, especially in three different districts Gatsibo, Nyamasheke and Gicumbi. This study assessed factors affecting the performance in Mathematics of the upper secondary students in Gicumbi District. A correlational study was carried out in which the correlation between performance in Mathematics and different factors affecting it in upper secondary students of Gicumbi District was assessed. The study targeted a population of 120 students from 6 schools, 12 mathematics teachers and 6 deputy head-teachers. Questionnaires were administered in all above targeted populations so as to collect data for this study. Adequate learning resources ( $r=0.281, 0.105, 0.147, 0.413$ ), favorable school environment ( $r=0.547, 0.140, 0.121, 0.451, 0.321$ ), low use of school library ( $r=0.123, 0.252, 0.123$ ), parental encouragement ( $r=0.102, 0.361$ ), a distance to school in day students ( $r=0.402$ ), little interest in Mathematics ( $r=0.471, 0.254$ ), and revision exercises given to the students ( $r=0.182, 0.272$ ) have been identified as major factors. The establishment of a good environment favoring the study Mathematics in schools, the provision of adequate learning resources and much exercises, the role of parents to help their children to have interest in Mathematics subject and orientation of the students in schools near their families will help in bringing about a good performance of Mathematics in upper secondary school students of Gicumbi District.

**Keywords:** Performance in Mathematics, Upper primary students, Science, Performance, Gicumbi District

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## 1. Introduction

Education is key instrument that can be used to reduce nation poverty, inequality and improve the country's wealth (Omoniyi, 2013). Education qualities depend on the input resources such as school physical facilities, students, teachers, instructional resources, and financial resources.

Education is one of the tools for the integration of society and for the realization of personal development, national consciousness, promotion of unity, scientific cultural, political economy and technological development (Offorma, 2016).

Mathematics is science of computations and reasoning or study of numbers, quantities, and shapes (Yadav, 2017). Mathematics plays important role in education

system for future human life. Because it provides an effective way of building mental discipline, encourages logical reasoning and real life problem solving. Mathematics it is one of the subjects that has a direct implication and application to all sciences, technology, engineering, medicine and business. The lack of sufficient people who are well grounded in mathematics leads to the lack of effective Scientists, Engineers and Economists in the country.

Quality of education at all levels of education is based on teaching and learning process (Afzal Sayed Munna, Md Abul Kalam, 2021) and other direct factors such as teaching and learning methods, teaching strategies and school policy, teachers motivation, teaching experiences, content knowledge and behaviour, availability of resources, teachers and students' attitudes, parental involvement and medium of instruction of teaching and learning process.

Around the world, achievement in Mathematics remains a concern to the parents, teachers, school administrators, and stakeholders, particularly in upper secondary schools. Students' failure in upper secondary education is greater than those who fail in ordinal level. Low performance in mathematics in upper secondary schools has contributed to low or poor enrolment of students in applied sciences, health sciences, technology and engineering that require excellent performance in mathematics.

The students' performance in mathematics in Rwanda had been low in upper secondary schools due to my teaching experience of seven (7) years in three different district Gatsibo (2013-2017), Nyamasheke (2018-2020) and Gicumbi (2020) up to now).

This study aims at identifying potential factors affecting the academic performance in mathematics in upper secondary schools in Rwanda, formerly Gicumbi District as output of education quality. There are several considerations which motivated the researcher to undertake this research. Firstly, the aim of Rwanda vision 2020 shift to 2050, which is transforming the country from agriculture to knowledge-based economy where mathematics subject is considered as a driving force. Secondly, according to the teaching experience of the researcher where he has noticed that upper secondary school students have low academic performance in mathematics national examination. Thirdly, no previous research of this kind had been conducted in Rwanda.

## 2. Literature Review

Mathematics was viewed negatively where secondary school students took it as difficult, deadly, abstract and boring subject. Paul et al. (2020) showed that Math phobia can be caused by teacher's knowledge and values, teaching methods and assessment (Paula Varaidzai Makondo, Paula Varaidzai Makondo, June 2020). Michael (2015) reported that lower academic performance of learners in mathematics could be caused by teacher's classroom works and their feedback to the learners (Michael, 2015).

Ganyaupfu (2014) also indicated that there is a high positive relationship between student's performance and teaching methods (Ganyaupfu, July 2014). Mabena et al. (2021) study showed that lack and inadequacy of appropriate resources in teaching and learning led to lower academic performance in mathematics (Nomasa Mabena, Patricia Namayammu Mokgosi, Selina Serole Ramapela, 2021). Maria de Lourdes et al. (2020) argues that teacher, peer, and family attitudes toward mathematics either negative or positive influence learner's confidence in mathematic. The researcher's findings showed that learners who have positive attitude towards their teachers have high performance level compared to the learners with negative attitudes (Maria de Lourdes Mata, Vera Monteiro, and Francisco Peixoto, 2020).

## Teacher qualifications, experience and mastering of contents to student performance

The bottom line to better grades and high academic performance in mathematics is by engaging professionally qualified and highly experienced teachers in our schools (Nomasa Mabena, Patricia Namayammu Mokgosi, Selina Serole Ramapela, 2021).

## School guidance and counseling affects student academic performance in mathematics

Some student's failure in mathematics is caused by lack of self-confidence and personal adjustment to situation. Teachers would help students to know that mathematics at secondary level determine the course offer at the tertiary institutions and this helped to take mathematics more seriously and proved the level of performance. Teachers encourage students to form habit of practicing more questions relevant to each topics they have done and keep a breast with past mathematics topic learnt and also teachers creates mathematical club and encourage students to join and allows for exchange of mathematics ideas with others (Dabone, Kyeremeh Tawiah, Graham, Yaa Alberta and Fabea, Ineke Bossman, 2015).

## Teacher preparation

The key point to be taken into consideration in preparation of lesson should involve learners' experiences, abilities, interest, motivation and skills. Lesson preparation and presentation should follow a logical sequence that motivates individual learners (Anwer, 2019)

## Methods used in teaching mathematics

Mathematics teachers in advanced level secondary schools in Rwanda teach mathematics in different teaching methods including: teachers centered, learner's centered method, discovery, questions and answers and problem solving method. Instructional methodology of every teacher should be adaptive according to each unit, available resources, learning environment and strength of the students.

Curriculum of mathematics at A' Level secondary school in Rwanda is developed and updated by ministry of education, REB and NESAC. National curriculum of mathematics at secondary level has been divided into different topic areas, and topic area divided into small units in which benchmarks were clearly mentioned. These topic areas were Trigonometry, Algebra, Analysis, Linear Algebra, Geometry, Statistics and Probability. Teacher centered method is a method of teaching where knowledge is delivered through a speech, where a teacher is an active participant and learners are at the recipients most of the time.

Leaner centered method is one of the best methods in developing knowledge, skills, attitudes and values of learners to cope with the changing world (Darsih, January, 2018).

## **Student's attitudes towards mathematics**

Researches that have been conducted to determine the relationship between students' attitude towards Mathematics and performance in Mathematics have yielded contradictory results. The findings have thus lacked consistency on the subject. Some studies have demonstrated a strong and significant relationship between Mathematics attitude and performance. Positive attitudes among students will be a precipice for good academic result in mathematics and related sciences subjects (Sunghwan Hwang, Taekwon Son, 2021).

## **Availability of teaching and learning resources**

Teaching and learning resources are all those things which the teacher and student do or use in order to achieve teaching and learning objectives such as the textbooks, charts, computers and ICT and calculators. Those teaching and learning resources help the learners to hear, see, touch, smell and taste and conceive abstract information from concepts, practice and also help learners to be able to draw some conclusions and lack of any resources make teaching and learning mathematics very hard (Ukobizaba, Ndiokubwayo, Mukuka, Uwamahoro, 2019).

## **Environment factors affect academic performance in mathematics**

A supportive school environment can be seen in the form of supportive physical facilities such as classrooms, adequate desks and appropriate and relevant textbooks and other relevant instructional materials that have a direct positive impact on learner performance in mathematics. Similarly, schools with adequate physical facilities and teaching materials perform better than those that are not well equipped. He further concludes that the lack of physical resources and instructional materials is strongly correlated with learners' poor academic performance (Darsih, January, 2018).

## **3. Methodology**

### **3.1 Research Design**

According to Creswell (2003), research design refers to plan, structure and strategy of investigation conceived to obtain answers to research questions and control variance (Jongbo, 2014).

In this study, the researcher applied a correlation analysis with Pearson correlation coefficient as quantitative research methods. Quantitative data were collected through questionnaire. The researcher surveyed advanced secondary schools in Gicumbi district whereby students, mathematics teachers, deputy head teachers were involved to describe factors affecting student's performance in mathematics in upper secondary schools in Gicumbi district, Rwanda.

### **3.2 The study population**

The target population of the sample is the large group of people, which has one or more characteristics in common on which the research study was focused. The population targeted in this study was students, teachers, and deputy head teachers in charge of studies.

### **3.3 Sampling procedure**

In this study two types of sampling procedures were used; simple random sampling and purposive sampling methods. Purposive sampling means that respondents are chosen based on their knowledge of the information desired. This was used in choosing Deputy Head teachers in charge of studies in schools and one teacher teach mathematics in upper secondary. Moreover, random sampling was used in choosing sample unit from the entire population of students and mathematics teachers. In random sampling procedure each member of the population in the group had an equal chance of being selected, which was applied for students and mathematics teachers.

### **3.4 Data analysis**

In this study quantitative data was analyzed by SPSS via statistics analyses, where Pearson correlation coefficient was analysed in order to show the level of significance of different factors affecting the performance of Mathematics in upper secondary students of Gicumbi District.

## **4. Results and Discussion**

The objective of this research was to investigate the factors affecting student's performance in upper secondary schools in Gicumbi District. According to the analysis of variance, the factors which have a greater impact on the performance in Mathematics have been shown in the following table, along with their correlation coefficients.

SCHOOL	Factors affecting performance in Mathematics	R	P-Value Sig. (2-tailed)
E.S BWISEGE	Adequate learning resources	0.281	0.230
	Favorable_school_environment	0.547	0.013
G.S REBERO	Favourable school environment	0.140	0.556
	Use of the school library	0.123	0.032
G.S BSIKA	Interest in the subject	0.471	0.036
	Parental encouragement	0.102	0.669
	Favorable school environment	0.121	0.612
	Adequate learning resources	0.105	0.660
	Much exercises	0.182	0.444
	Learning with other teaching aids	0.177	0.454
	Use of a library	0.252	0.285
G.S INYANGE	To like the subject	0.254	0.279
	A distance to school	0.148	0.534
G.S NDBC BYUMBA	Parental encouragement	0.361	0.118
	Favorable school environment	0.451	0.046
	Adequate learning resources	0.147	0.535
	Use of a school library	0.123	0.606
E.S MUKONO EAR	Favorable school environment	0.321	0.168
	Adequate learning resources	0.413	0.070
	Much exercises	0.272	0.246

The schools of G.S. Rebero, Bisika and Inyange are day schools, where students do their studies going home. A low extent to like Mathematics, a lack of books of the subject, school environment not favoring the learning of Mathematics, a lack of time for a library, lack of adequate resources, a lack of parental encouragement to put efforts in Mathematics and few learning and teaching aids pose themselves as key factors hindering the performance of the students in Mathematics.

The above case is opposite in the schools of E.S Bisika, G.S NBC Byumba and E.S Mukono EAR. Those are boarding schools, where all students stay every day during learning and teaching activities. The tentative factors affecting the performance of the students in those schools include the extent at which they like Mathematics, parental encouragement to like the subject, lack of sufficient books and other learning resources, revision exercises given, learning with teaching aids and the use of library.

## 5. Conclusion and Recommendations

### 5.1 Conclusion

The study established that there are factors affecting the performance of the students of upper secondary level in Gicumbi district. Students showed that little interest in the mathematics subject, parents didn't encourage students to like mathematics, lack of course textbooks and related materials were not available, students did not

show interest in using the library, if students are to do well in mathematics, there is need for schools to create an attractive environment, the assignments given to students should measure what they are supposed to measure with teachers giving immediate feedback to students' assignments.

### 5.2 Recommendations

The following are recommendations established from the study.

1. There is need for different stakeholders to sensitize students to like Mathematics.
2. Parents need to encourage their children to work hard in Mathematics.
3. Students should be advised to own books of the subjects they study. Rwanda Education Board should avail sufficient books to the schools, so that each student may have a book during teaching and learning.
4. Teachers and school administrators should sensitize their students to use libraries, as places where they can find additional resources to the ones given in classrooms.
5. Schools should have a friendly environment for the subjects they teach, where all students feel the subjects due to the atmosphere of the school.
6. All schools should provide sufficient learning resources in Mathematics in order to help students raise their level of interest in mathematics.
7. Students in Mathematics are in need of sufficient assignments.

8. Teachers should give feedback for their work they have given students.

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