



The Influence of School Factors on Students' Mathematics Performance in Gicumbi District, Rwanda

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Abstract: This study set out to investigate school factors that influence students' academic performance in Gicumbi schools. This study aimed to determine how Continuing Professional Development (CPD, library use, group discussions, parental support, exercises, assessments, corrections and feedback affect academic performance in mathematics in Gicumbi District. Study sample included 6 teachers, 6 deputy head teachers in charge of studies and 120 students. This study used quantitative approaches and descriptive statistics to learn more about the learning and teaching environments at the school. School resources, school discipline, study habits, health status, parental support, teacher math education competency, mathematics teacher professional development, absenteeism, use of the school library, more exercises, end-unit assessment and feedback were the factors influencing student performance.

Keywords: Education, school, factors, performance, Gicumbi

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1.Introduction

Education is one of the most important aspects of human resource development. Standardized test scores, graduation rates, and classroom performance are frequently used by educators to gauge student achievement. Several factors, including students' learning abilities, parents' backgrounds, peer pressure, teachers qualifications, and learning infrastructure, have an impact on students' academic achievement (Vesić et al., 2021).

Students who perform well in school are better prepared to transition into adulthood and to attain economic and professional success. Academic success is important for the successful development of students (Ternenge & Agipu, 2019). In today's world, mathematics is a vital tool in many disciplines, including natural science, engineering, medicine, and the social sciences. The branch of mathematics known as "applied mathematics,"

which deals with the application of mathematical knowledge to other domains, encourages and makes use of new mathematical discoveries and occasionally results in the creation of whole new sciences. Additionally, as a required subject, mathematics is taught in both primary and secondary schools (Union, 2010).

Society views mathematics as the foundation of scientific and technological knowledge, which is essential to a country's economic and social development. Not only can an educated person achieve his or her goals and ambitions, but they can also effectively contribute to the community's well-being (Onyango, 2022). This is due to the fact that it is necessary for problem solving and outcome prediction across all academic disciplines. In reality, researches indicate that mathematics as a discipline has varying effects on all aspects of human life (Ayebele et al., 2020). One of the oldest academic disciplines in human history, mathematics has long been a foundational aspect of human intellect. Since ancient

times, people have held the belief that mathematics develops the logical thinking, reasoning, and spatial abilities of humans. It affects a one's personal growth and adds to the nation's financial prosperity. This is primarily due to the fact that it is at the foundation of many successful lives and careers(Srinivasacharlu, 2019).

Schools have been able to develop cutting-edge methods because of the demand placed on teachers and administrators by parents and other stakeholders to improve academic performance. These include encouraging students to take extra classes, implementing innovative teaching-learning techniques and instructional strategies, utilizing ICT in teaching and learning, rewarding students for good performance serves as a motivating factor, and when they receive low grades, they typically work harder to improve(Onyango, 2022).By implementing professional development strategies into the lesson planning, formative assessment supports both teachers' professional growth and students' learning (Koh, Lim, & Habib, 2010). As part of formative assessment, teachers use a variety of assessment tasks and strategies in the classroom to acquire a thorough understanding of how much students learn. In addition to giving the students feedback, they analyze the information, make comments, and use it to plan and review the teaching. Students are involved in providing information. Along with participating in learning and teaching activities, they also use assessments data to set goals, decide on their own personal development, and determine the level of competence required for a work(Alnoor et al., 2007).

Most students believe that mathematics is a difficult subject, especially in Sub-Saharan Africa (SSA) where standards have been so low. For this reason, Rwanda reviewed its curriculum (Rwanda Education Board, 2015) to make sure that it is in line with national goals and that students are learning knowledge, skills, attitudes, and values that are compatible with the demands of the 21st century. Additionally, it is thought that providing students with the skills they need could result in the growth of a knowledge-based economy, which would enable people to compete on a worldwide scale(Nam et al., 2022). However, all of this is only possible if school factors influencing students' mathematics performance is properly addressed.

The term "continuing professional development" (CPD) refers to formal and/or informal learning that advances the information, abilities, and personality characteristics required to perform professional duties. Teachers change their teaching during the course of a career in order to better meet the needs of their students. Learning in the classroom will benefit from the teacher's knowledge and skill improvement. Professional development is essential for maintaining and improving teacher quality, which has

a positive impact on the classroom. As a result, CPD activities carried out by math teachers will benefit students learning mathematics in the classroom. The purpose of teacher professional development is to increase teachers' understanding of mathematics and their ability to teach students in mathematics successfully(Voorhis et al., 2013).

Use of ICT in teaching and learning, library use, Continuing Professional Development (CPD) in schools, reductions in absenteeism, and use more exercises, end-of-unit exams, and assessment feedback are all strategies that Rwandan educators are putting forth to improve student academic performance. The quantitative findings of this study can be used to determine the degree to which school-related factors have an impact on students' mathematics performance.

Academic success is influenced by all of the following: participation in class, assignments, assessments, exams, and extracurricular activities. Some of the strategies used to encourage math performance include the use of technology, effective teaching and learning methods, promoting extra coaching, and rewarding students for high achievement.

2. Literature Review

2.1 Introduction

There is a widespread stereotype that "Math is for men" and that mathematics is only for adult males in every culture in the world. This has led to the underrepresentation of women in the fields of science, engineering, and mathematics. Children's educational interests and job choices have been influenced by this preconception(Raj Acharya, 2017).

One of the most important subjects in our lives as humans is mathematics. Nothing in the world is possible without a strong foundation in mathematics. Today's mathematics is useful worldwide but useless locally. From the time of the ancients to the present, mathematics has been acknowledged as an essential part of formal education. Our history demonstrates that ancient scholars had practically to solve everyday problems in order to establish mathematics. Great shepherds in antiquity contributed to the development of mathematics. The body of knowledge in the field of science and technology is called mathematics. Math is a fascinating and attractive subject because it has its own symbols, language, words, technology, etc. The backbone of the human lifestyle is mathematics. Student academic performance has a direct impact on the social and economic growth of the nation. The performance of the students is crucial in creating the top graduates who will serve as good leaders and laborers

for the nation, contributing to the economic and social development of that nation (Mine et al., 2001). Student math achievement may be impacted by factors related to the school, including school resources, the discipline and safety of the school environment, parental involvement and support in school-related activities, the experience and education of the school principal, and the availability of library and instructional resources. According to studies, school resources have a good effect on students' academic progress and learning. The atmosphere at school may have a big effect on how well students learn and achieve in math or other

Subjects (Wardat et al., 2022). This climate fosters a supportive environment in the classrooms, which may have an impact on students' academic performance. It also increases safety and student discipline. The academic achievement of students is also said to be significantly impacted by parental involvement in school (Wardat et al., 2022).

According to (Asikhia, 2010), strong academic performance can be accomplished by working as a team with parents, motivating students, and motivating teachers to collaborate in order to achieve the shared objective of improving the quality of learning outcomes. The learning environment at school has a significant impact on students' mathematics academic performance. The student can acquire better academic results in mathematics if the learning environment at school is more supportive. Classrooms, labs, libraries, playing grounds, and textbooks are just a few examples of teaching and learning tools. Physical resources do in fact contribute significantly to the development of favorable conditions that encourage successful teaching and learning. Academic success is influenced by a number of factors, such as the effectiveness of the teacher's communication, the learning environment, guidance and counseling, family stress, socioeconomic considerations, health status, discipline, user behavior, and study habits that can affect students' academic performance (Ternenge & Agipu, 2019).

2.2 School financial resources

When it comes to financial resources, research done to identify the factors affecting student performance has shown that the total school budgets as well as recurrent expenses at the school are the major factors affecting academic achievement. For instance, Figlio's (1997) study found that the amount of recurring spending at the school is a major factor in determining how well the school performs, with higher spending schools performing better than lower spending schools. Additionally, the overall income of the school is a significant factor in determining how well it performs, with higher income schools

performing better than lower income schools (Raj Acharya, 2017).

2.3 Teacher math education competency

The main influence on the mood of the classroom setting is the teacher. The views that students have toward a subject are shaped by their teachers. Teachers create a welcoming environment in the classroom with the help of their students, encouraging them to feel comfortable and at ease while taking part in various teaching and learning activities. In the classroom, the teacher always has the final say. The classroom environment is shaped by the teacher's knowledge, personality, attitude, and abilities (Ahmad et al., 2018).

A structured understanding of mathematical topics, reflective learning, critical thinking, and ultimately mathematical performance are all mapped out for students by competent math teachers (4). As change agents, teachers play an important role in advancing high standards of education in classrooms. To be able to participate locally and globally in decisions impacting their teaching environments, teachers at all levels of the educational system should have access to training and continual professional development (StudyCha, 2013).

Good teachers are committed to their subjects, lifelong learners themselves, and self-reflective about how they teach. Through effective communication, diagnostic abilities, comprehension of various learning styles and cultural influences, knowledge of child development, and the capacity to marshal a wide variety of techniques to meet student needs, they transfer knowledge of their subject matter and the learning process (Ternenge & Agipu, 2019).

All five of the following strands should be strong points for a successful mathematics teacher:

(Wardat et al., 2022) Conceptual Understanding of the Core Knowledge Needed in the Practice of Teaching (Ayebele et al., 2020) Fluency in Performing Basic Instructional Routines (Union, 2010) Strategic Competence in Planning Effective Instruction and Solving Problems that Occur During Instruction; Adaptive Reasoning in Justifying and Explaining One's Instructional Practices and in Reflecting on One's Instructional Practices in Order to Improve Them.

Productive attitude toward mathematics, teaching, learning and the improvement of Practice (Alnoor et al., 2007)

Every institution or organization, including academic institutions, depends on the growth and performance of the administrators (Ternenge & Agipu, 2019).

School administrators use planning, a decision-making process that involves setting goals and deciding what has to be done to attain them, to make sure that their institutions will continue to be successful and effective in the future(Mawudeku & Ankumah, 2021).

Planning, organizing, and staffing, controlling, and problem-solving are all steps in the management process. Effective head teachers typically prioritize planning, coordinating, and facilitating the work without sacrificing interpersonal relationships with the staff, pupils, and subordinates. More effective head teachers are more likely to set high performance standards for their institutions and serve as liaisons with other groups and higher management(Rosen et al., 2015).

2.4 Mathematics teacher professional development

An essential condition for a nation's development is education. It is a well-known truth that education is the primary means by which one can influence others to get a thorough understanding, positive attitudes, and values, as well as to take part in rational decision-making and develop skills that contribute to society welfare(Wardat et al., 2022). The builder of society and the foundation of the educational system is the teacher. An organization's development is based on the quality of its teachers. The nation's citizens of tomorrow are today's children. Nothing can compare to or exceed a teacher's excellent work in building a child's future.

Mathematics Continuous Professional Development programs are therefore organized attempts to alter mathematics teachers' practices, attitudes, and beliefs in the classroom in order to affect students' academic achievement and familiarize teachers with changes in the curriculum(Rosen et al., 2015).An essential component of managing and developing human resources is teacher professional development. The difficulty is that there is still a knowledge gap in terms of teachers' professional development, despite the current government's efforts to generate highly prepared mathematics teachers. Effective professional development initiatives for teachers should allow collaboration among teachers, learning with and from other teachers, shared inquiry, and incorporate opportunities for reflection that help to transform their teaching practice, according to Saylor and Johnson (2014). These include written reflection, oral and written narratives, and self-regulated learning as examples of reflections that are edifying and promote teachers' professional learning(Rosen et al., 2015).

2.5 Discipline, study habits, and health status

Students' good behavior, the efficiency of teaching and learning activities, effective time management, and a successful code of conduct are all examples of how discipline in schools can show up and ultimately contribute to academic performance (Ternenge & Agipu, 2019).

Student health has an impact on their academic performance because illness may interfere with their ability to concentrate during lessons, force them to miss class, or prevent them from completing assignments (Ternenge & Agipu, 2019).

Participation in sports and games has a positive effect on students' academic achievement or success because it fosters confidence, discipline, unity, and cooperation. These qualities enable students to interact with others through group discussions and various seminars and workshops as well as to simply socialize with others while learning or acquiring skills, experience, and knowledge. By giving students who participate in sports and games energy, confidence, refreshment, and joy, sports and games also protect students from sicknesses and mental problems and help them develop physical fitness. Sports and games have been linked to attend class more frequently, democratization, organizational learning, assignment and learning reinforcement in students.

2.6 Performance in mathematics is affected by student absenteeism

Academicians from all over the world, especially those who work in the education sector, such as in schools and higher education institutions, frequently discuss the subject of absenteeism. A person who consistently fails to show up for a program or event without a valid justification is said to be an absentee, and someone who is missing from a task in a personal capacity is referred to as an absentee(Union, 2010).

In the academic world, absenteeism has been identified as a major risk factor for crime, injury, drug use, malnutrition, psychiatric disorders, and economic instability, all of which are linked to poor academic performance(Mawudeku & Ankumah, 2021).The final exam marks are anticipated to decrease by an average of 2.124% if the student misses one class(Union, 2010).

According to studies, absenteeism is viewed as a type of dysfunctional behavior, along with violence, drug abuse, and related behaviors (Kearney, 2008). In this method, absenteeism is viewed as one of the signs of a more

serious disorder that affects an individual, the family, and the community. On the other hand, absenteeism is thought to increase the chance of academic failure and early dropout (Raj Acharya, 2017). This is why Rwanda uses the School Data Management System (SDMS) to manage student absenteeism and performance because lower academic performance is likewise linked to absenteeism from school.

3. Methodology

3.1. Research design

Descriptive research is a type of study technique that is used to examine a variety of situations and occurrences. It always seeks to respond to questions about the circumstances around the event, including how it happened, when it happened in terms of time or date, where it happened, and what the issue or phenomenon is (Allen Senguo & Ozias Ilomo, 2020).

This study used quantitative approaches and descriptive research design where by data collection tools that was used was questionnaire. A questionnaire is a form or tool with a series of questions and answers that participants fill out to provide the researcher with the data they need for the study (StudyCha, 2013).

3.2. The study population and sampling procedure

Defined target population refers to the total population of people, things, or events that have in common observable characteristics and are required for the researcher to acquire the study's results.

According to McCombes (2019), sampling strategies refer to the strategy you have for choosing the study samples. The sample for this study was chosen using the stratified sampling technique of probability sampling. Because the study population was divided into three categories depending on their occupations, including students, mathematics teachers, and deputy head teachers, this approach was adopted. A sample size is defined as a small number of a selected group from the population, according to Desmone et al. (2011). According to Chanuanet al. (2021), the sample size for this study was determined using the Yamane formula (1973), which is $n = N / (1 + N(e)^2)$, where n stands for sample size, N is the population size, and e is error (0.05) and reliability level (95%). By using 95% confidence level and a total number of 172 students as research population, the sample size was calculated as shown below:

$$n = \frac{172}{1 + 172(0.05)^2} = 120$$

Sample size = 120 respondents

Thus, the sample size of 120 respondents was considered as representative of the total population of students. While Simple random sampling technique was used to determine 6 mathematics teachers' and 6 deputy head teachers in charge of studies to take part in research.

3.3. Data analysis

Data analysis is the process of classifying, organizing, interpreting, and summarizing data to discover the answers to research questions (StudyCha, 2013).

The primary source of data for the study was data collected from students, teachers, and the deputy head teacher in charge of academic studies on factors influencing students' mathematics performance in Rwanda's Gicumbi District. In this study, descriptive statistics were used to analyze quantitative data in order to determine the frequency level and percentage.

4. Results and Discussion

4.1. What role does continuing professional development (CPD) play in enhancing academic performance in mathematics?

this is the approach of ongoing professional development for teachers that is most often accepted and renewed. It is a skill-based strategy where teachers are taught skills by professionals. Both on-site and off-site training is possible. However, the teachers are frequently given off-site training. This model's primary emphasis is on the standardization of the educational process. This paradigm disregards what teachers require. The best model for introducing new information is this one. In this model, the expert plays a proactive role while the teacher plays a passive one. (Umar, 2018). Poor academic performance is mostly caused by incompetent and demoralized teachers.

According to the study's participants, teachers, CPD programs help them advance professionally, learn more about the subject, enhance the quality of their teaching, feel respected at work, enjoy their jobs more, and advance their careers.

Table 1: Role of continuous professional development (CPD)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Helps us to grow professionally	1	16.7	16.7	16.7
Helps us gain more knowledge	1	16.7	16.7	33.3
Improves our quality of teaching	3	50.0	50.0	83.3
Helps us develop our carrier	1	16.7	16.7	100.0
Total	6	100.0	100.0	

Source: Researcher, 2022

4.2. Use of library

One of the services required to improve students' understanding is library services. It is a location for personal growth. The results are consistent with previous research that was done to comprehend the idea of library services in a school environment. The majority of research provided various descriptions of library services; generally speaking, a library is a location where necessary materials (both printed and non-printed materials) are

arranged for personal growth. believes that a library is a collection of periodicals that are preserved for students and teachers to use both during and after school hours(Ofem et al., 2021). Additionally, found that the library has a significant role in the learning process.

This study also sought to determine how frequently student's the Gicumbi district used the library. Few of them (10.8%) reported to use the library twice a week, while majority (63.3%) indicated they never use it for learning.

Table 2: Use of library

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Once per week	31	25.8	25.8	25.8
Twice a week	13	10.8	10.8	36.7
Never	76	63.3	63.3	100.0
Total	120	100.0	100.0	

Source: Researcher, 2022

4.3. Absenteeism

The performance of candidates in national examinations seems to be severely affected by students' frequent absenteeism from school (Voorhis et al., 2013)

In this study Most of day-school students (15%) make an absenteeism of at least once per week and 7.5% absent

themselves at least twice a week.

Table 3: Absenteeism

	Frequency	Percent	Valid Percent	Cumulative Percent
Once per week	18	15.0	15.0	15.0
Twice per week	9	7.5	7.5	22.5
Valid More than three times per week	2	1.7	1.7	24.2
Never	91	75.8	75.8	100.0
Total	120	100.0	100.0	

Source: Researcher, 2022

4.4. End unit assessments

Table 4: End unit assessments

Items	Frequency	Percent	Cumulative Percent
No end unit assessments	9	7.5	7.5
Few end unit assessments	81	67.5	75
End unit assessments for each unit	30	25	100
Total	120	100	

Source: Researcher, 2022

As a result, assessment for learning strategies enables the teacher to monitor and assess the progress of the class, as well as to set objectives and keep check of the students' learning requirements. In order for teachers to plan where their students need to go next, it is made sure that they are fully aware of where each student is at in their learning.

The teacher can evaluate the students' understanding and improve their learning through good questioning and attentive observation. Students can only complete a

learning objective if they understand it and can determine what they must do to complete it.(Raj Acharya, 2017). Self-evaluation is therefore essential to learning.

In the study, the majority of the students reported that they receive few end-of-unit tests in mathematics (67.5%).

5. School financial resources

Table 5: School financial resources

Items	YES / Frequency	NO/ Frequency	Total Frequency	YES / percentage	NO/ Percentage
1. Students are encouraged to perform well in mathematics by utilizing the school's financial resources.	2	4	6	33.3	66.7
2. Our school Teachers are motivated to teach mathematics by utilizing the financial resources available to the school.	1	5	6	16.7	83.3
3. Financial resources at the school have an impact on our students' academic performance	4	2	6	66.7	33.3

Source: Researcher, 2022

In the study, the majority deputy head teacher in charge of studies reported that Students are not encouraged to perform well in mathematics by utilizing the school's financial resources (66.67%) Our school Teachers is not motivated to teach mathematics by utilizing the financial resources available to the school (83.3%) and financial resources at the school have an impact on our students' academic performance (66.67%), previous Findings suggested that student academic performance is influenced by the financial structure of the school, namely how much teachers are paid. The amount of money allotted, used, and spent in school infrastructure improves educational possibilities, which has a knock-on effect on academic performance (StudyCha, 2013).

5. Conclusion and Recommendations

5.1 Conclusion

The deputy head teacher in charge of studies interview demonstrated that students do not actively engage in debate because they acknowledged it in their statements. This causes them to not complete exercises and assignments on time because they lack motivation to learn

mathematics because the majority of them are not interested in the subject.

Regarding school resources, the majority of schools lack sufficient resources for both teaching and learning mathematics, which prevents the use of teaching aids in teaching mathematics. They also claimed that some teachers lack motivation in their teaching activities because they don't regularly assign and grade homework.

There isn't a math club in every school, which would benefit students' familiarity with the subject. According to Washington Student Mathematics Association (2009), a typical mathematics club meeting is enjoyable and includes competitive games that any student can take part in. It is a fantastic technique for students to hone their intuitive thinking abilities and discover new approaches to solving mathematical problems.

Numerous studies show that challenging school curriculum, significant learning objectives, efficient assessments, responsive feedback for students, and parental involvement are crucial for improving student achievement, attendance, behavior, and other important school outcomes at any grade level, including secondary schools (Voorhis et al., 2013).

Most schools do not have sufficient resources for both teaching and studying mathematics, which is a school-related problem. There aren't math clubs in every school, which would benefit students' familiarity with the subject. Few parents actively participate in their children's learning by being present in the classroom, which is unfavorable for math learning.

5.2 Recommendations

Positive learning environment: In order to raise students' mathematical performance to a high level, efforts must be made to improve the school climate so that it fosters students' social skills, physical well-being, and moral standards as well.

Learning resources: According to the study's findings, the government and its educational partners are urged to provide schools with more funding so they can buy more textbooks and other learning materials. Financial support is especially needed for the schools in the Gicumbi district because it will help them buy the majority of the learning and teaching resources required for forceful math performance.

Parental involvement: School administrators and policymakers should continue to look for ways to improve parents' attitudes toward their children's education and show them how their attitude affects their performance in school. Future policy should concentrate on creating and supporting educational initiatives that give parents the tools to improve their children's perceptions of their cognitive abilities. Given the significance of the student-teacher relationship in a child's academic achievement, school leaders should think about strategies to strengthen it. For instance, curriculum time may be allocated by school administrators to team-building activities involving students, teachers, and parents.

Math clubs ought to be established in classrooms: School administrators should make an effort to start, maintain, or restore a functioning mathematics club at their secondary schools. Encouragement should be given to students to join and take an active part in the mathematics club. Policymakers in charge of education should compel school administration to establish and maintain the operation of mathematical clubs in their schools. Schools should set time for Math club events where students and teachers can interact in different activities related to mathematics.

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