Effects of Teacher's Qualifications on Students' Academic Performance in Mathematics Subject in Public Boarding Secondary Schools in Rwanda. A Case of Rubavu District

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ABSTRACT

This research focused on examining the influence of teacher qualifications on students' academic performance in mathematics at public boarding secondary schools in Rwanda's Rubavu District. It aimed to identify which teacher qualifications in mathematics impact students' math performance, analyze how teacher qualifications affect math performance, and investigate the connection between teacher qualifications and student performance in mathematics. The study used a descriptive and correlational design with a mixed approach of qualitative and quantitative approaches to examine the impact of teacher qualifications on students' academic performance in mathematics subject in public boarding secondary schools in Rwanda, a case of Rubavu District. The target population included 343 respondents, including 225 mathematics teachers and 118 mathematics leaders. The researcher determined the sample size of 185 respondents using Yamane formula. Respondents were selected using a purposive sampling technique using questionnaires and documentary research techniques as data collection tools and taking into account pilot studies. The results were analyzed using SPSS version 21 and interpretations were made based on the results reported by the respondents. Key findings showed that independence in learning, exam and test results, homework completion, and class participation were positively associated with students' performance in mathematics. Moreover, teacher qualifications were significantly related to various research variables, such as mastery of math content, classroom management, use of ICT skills, and education level. These factors collectively had a positive influence on students' academic performance in mathematics. The study's recommendations include providing training for mathematics teachers to enhance their qualifications, improving the mathematics curriculum, increasing the availability of learning materials, and conducting further research on teaching methodologies and student perceptions of math education.

Keywords: Teacher qualifications, Academic performance, Mathematics, Rwanda

INTRODUCTION

The qualifications of teachers in secondary school play a significant role in improving the academic performance of students. Educational qualification of teachers leads to the effectiveness of teachers' content mastery, which all in all helps in the promotion of students' grades. The working experience of teachers is also viewed as a key indicator in the promotion of the schooling system, where schools experience a high level of student completion. Nevertheless, the content mastery of teachers also promotes active learning, which also leads to improved students' scores in class assignments.

The world over, there is widespread interest in improving the levels of mathematics performance in schools. Education in developing countries was at a critical juncture as international effects galvanized towards the attainment of internationally agreed targets to expand and improve education as part of the Education for All (EFA) movement. However, at the same time, a potential crisis in teaching threatened the ability of

governments in developing and developed countries to reach this target (MOE 2012).

Wordfolk (2014) described a teacher as an instructor expert who knew and identified teaching materials and methods to be used in class. A motivator who applied techniques that involved learners actively. A manager who timed and planned activities. A curriculum developer and an implementer could, hence, cause learning to take place.

In the East African region, there were also social benefits tied to improving access for larger numbers of younger people to post-primary education and training opportunities and laying stronger foundations for skills for lifelong learning. The interest in raising levels of achievement led to a focus on identifying the range of factors that shape achievement as well as understanding how these factors operate to limit or enhance the achievement of different groups of learners. Low academic performance had been defined as failing to meet the average academic performance in tests or examination scores, as determined by a set cutoff point. (African Population and Health Research Center Policy Brief, 2015)

Brumfit (2018) explained that the total process of teaching was a complex phenomenon based not only on the specific pedagogical behaviors but also on the administrative and social content of their activity, personal attitude, habits, and collective expectations. Teaching is an institutionalized activity in a way that learning cannot be. It was possible to identify and intervene in the formal teaching process with some precision because there were conventional sets of behaviors that were approved for the practice of particular subjects. Brumfit differentiated teaching and learning as follows: teaching was causative while learning occurred willingly or unwillingly; teaching was a linear process and observable but learning was internal; teaching could be planned while learning could not; teaching was syllabus-based while learning wasn't; teaching could be administratively controlled but learning could not; and lastly, effectiveness of teaching could not be measured but effectiveness of learning could be measured by observation and subsequent performance or behavior.

STATEMENT OF THE PROBLEM

Mathematics is one of the core subjects in the Rwandan education system; it prepares students for future careers related to applied sciences and computer-based technology. Regardless of that, students continued to perform poorly. That performance in mathematics is a worrying trend worldwide, as noted by Amuthelezi (2016). He noted that there was an urgent need to investigate the causes of poor performance in mathematics among students. That was with the view of finding a lasting solution to the problem.

Despite education programs producing qualified mathematics teachers for secondary schools, students have consistently performed poorly in mathematics for years. This prolonged low performance raises concerns about Rwanda's ability to achieve its industrialization goals as outlined in Vision 2035, which require a solid foundation in mathematics. The quality of teachers and their effectiveness in the teaching and learning process have come under scrutiny. Teachers are expected to make instructional decisions, address learning challenges, and create a conducive learning environment, which includes setting lesson objectives and organizing learning tasks. However, given the persistent low performance, even experienced teachers in schools exhibit poor performance trends, casting doubt on the quality of their contributions to the learning process and instructional planning. There is a lack of a specific and precise instructional guide to help students understand mathematical concepts and skills, which underscores the need for better instructional planning. These are the reasons why this study investigated the influence of teachers' qualifications on students' academic performance in mathematics subject in public boarding secondary schools in Rwanda, a case of Rubavu district.

Research Objective

The study aimed to investigate the effects of teacher's qualifications on students' academic performance in

Mathematics subject in public boarding secondary schools in Rwanda a case of Rubavu District.

LITERATURE REVIEW

Theoretical Review

Mensah and Agyei (2019) talk about two opposing perspectives on the philosophy of mathematics education. The absolute view, which adheres to the principles of deductive logic and sees mathematics as an objective and absolute body of knowledge, is one school of thought. Fallibilism is the second school of thought and a more recent philosophy. According to the critical theory of fallibilism, there is no higher evidence, no privilege, or safe path to the truth, so we can never be certain that any scientific claim is true. As a result, it is important to verify the validity of every scientific hypothesis (Lauster and Hansen-Casteel, 2018). Since philosophy provides a foundation for the claim that mathematical knowledge is a creation of human intelligence, philosophy is a crucial component of all disciplines. This runs counter to the teaching philosophy's absolute viewpoint. In addition, philosophy offers individuals a fresh perspective on reality, including how mathematics is taught and learned (Mensah & Agyei, 2019).

Mathematics performance in schools

Statistics in Rwanda (2015) states that the 2015 Millennium Development Goal Report holds that Rwanda has improved with respect to the following areas: towards achieving and securing pre-primary enrolment and a significant improvement in the national primary exams of 76% in 2014. Despite these improvements, national studies such as the Annual National Assessment (ANA) and international studies like the Trends in International Mathematics and Science Study (TIMSS) prove that Rwandan learners perform far below the international standard. Findings from national articles (Mojapelo, 2018) prove that key issues such as inadequate infrastructure, lack of resources at schools, and a lack of school management cause poor quality education.

Reddy et al. (2012) say that the Trends in International Mathematics and Science Study (TIMSS) points out that the following five contextual factors relate to learner achievement in mathematics: learners, teachers, classroom, school and curriculum. Studies (Carnoy,2012) support a positive relationship between teacher knowledge and learner performance in the mathematics classroom. Reddy et al. (2016) say that was the first time that Grade 5 learners in South Africa participated at this level in this international study. The study showed that 88% of Grade 5 learners reported having their own mathematics textbooks, but mathematics achievement scores remained 'low' at the Grade 5 level. The outcomes of the study proved that, although scores are 'low', change is possible to achieve higher scores. Learners are molded from a young age to develop particular mathematical skills in order to thrive in this subject. Furthermore, Reddy et al. (2016) state that good-quality pre-school settings are instrumental in boosting the levels of learners in independent and fee-paying schools. Also, both tangible assets such as books and calculators, and non-tangible assets such as attitudes and expectations, matter in the classroom (Reddy et al., 2016).

Empirical Review

Instructional methods influencing performance in mathematics

According to Nyongesa (2004), the difficulties that arise from teachers' methodologies include teacher's inadequate presentation, the pace of work, the unsuitability of learning resources, topic sequencing, and language levels. The Cockcraft committee (2012) reports about the teaching style and methodology that mathematics teaching at all levels should include opportunities for: exposition by the teacher; discussion between teacher and students and between the students themselves; appropriate practical activities;

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consolidation and practice of fundamental skills and routines; problem-solving, including the application of mathematics to very day situations; and investigational work. However, the report says that the list of opportunities does not guarantee good methodology. It is the context in which these activities take place, the importance attached to them, and the relationship between them that are the real determining factors. Activity-based methods of teaching depend significantly on the incorporation of suitable learning resources. The use of resources is critical in ensuring that learners develop an appreciation and enjoyment of mathematics through a variety of appropriate practical activities. The use of resources and the resulting activities enhance students' understanding of mathematical concepts. It is important for the teacher to identify well in advance the resources needed for a particular lesson and develop a clear understanding of the role the teaching and learning resources will play in the lesson. Textbooks, teacher's guides, and the syllabus are crucial in the teaching of mathematics.

Mereku (2003) found out that the general guidelines on the delivery of the curriculum in the syllabus and teacher's guidebooks recommend that teachers use investigational or activity methods that are directed towards learning tasks and encourage inquiry, creativity, manipulative skills, and manual skills. The analysis of the transcribed lesson activities indicated that instructions in the teacher's guidebooks follow a common pattern as classrooms disperse. In this common pattern, the teacher initiates a move for a response from the pupils. These were occasionally followed by feedback. The instructions in the teacher's guidebooks appear to indicate, though not always clearly, that teachers should make pupils learn through activity and not passive reception of what is taught and emphasize understanding rather than rote memorization. But the style of lesson presentation in the guidebooks stresses teaching strategies associated mainly with the exposition teaching method (Ibid.).

The overloaded mathematics curriculum affects the teachers' methodology. In an attempt to cover the syllabus, mathematics is taught theoretically, and students are not given time to discover things for themselves. Lack of learning resources and unsupportive head teachers may frustrate teachers (Ibid.). Several studies on the teaching methods of mathematics have been carried out. Forrester (2000) investigated the role, implementation, and effectiveness of practical activities in learners' post 16. The study concluded that practical activities enhance the understanding of mathematics, regardless of the learner's age.

Callahan and Clark (2010) define it as a method where the teacher tries verbally to give the learner knowledge she or he possesses but the learner does not. Groene Wegen (2013) concurs by defining it as an oral presentation of a pre-planned set of data, meaning examples, summaries, and evaluations, with or without visual support. There are two forms of lecturing: formal and informal. A formal lecture is purely verbal, and communication is basically one-way, from the speaker to the audience. An informal lecture is a modified form of a conventional formal lecture. Communication is two-way: from the speaker to the listener, and from the listener to the speaker. An informal lecture is normally interrupted by questions, comments, suggestions, viewings, observations, demonstrations, etc. Learners are given room to participate in various ways as the lecture progresses. Although a good lecture can be stimulating and challenging high interest level in audience, when given by a competent teacher, it can also be uninspiring and monotonous and tends to make the audience passive. It is not the appropriate method to use when one intends to change the values and attitudes of his or her audience because, in a lecture, one is expected to accept the facts presented with questions. It is important to note that materials taught through lectures are quickly forgotten. McLeish (2018) reported that 40% of the points were recalled immediately after the lecture and only 20% a week later. Given the importance of mathematics, it would be important that the teacher avoid pure lectures, making them more informal.

Callahan and Clark (2010) investigated that small groups or syndicates, and pair groups involve forming groups from the whole class. The group should consist of between 3 and 5 members for syndicate groups and 2 learners for quick-reference as pair groups. One can select learners based to groups using their

abilities, interests, friendship, gender, seating arrangement, ethnicity etc. In syndicate groups different topics are discussed and the finding shared by the rest of the class. During the group work, it should be ascertained that learners discuss or perform with a chairperson leading the discussion, and the teacher goes around checking or assisting where possible. After the group work, one should open up the discussion, pulling all points from the secretaries, restricting rephrasing, using correct terminologies, and writing the point on the chalkboard. In addition to this, the teacher should also allow time for questions, clarifications, and comments and ask the learner to copy the point down; give concluding remarks; and give the class follow-up activities if necessary. These groups could also be utilized in a wider project wherein groups 5–6, the audience could work on a project.

Brainstorming is a technique of generating ideas from learners. It involves posing a question or challenge to the learners, and either the teacher or the leader of the group takes note of all the possible answers or responses before disclosing and evaluating them. The ideas generated make excellent springboard for discussion and problem-solving. A project method has been defined by Callahan and Clark (2010) as an activity in which an individual or group is involved in the investigation and problems that are planned.

Attitudes of learners towards learning mathematics

A large proportion of studies about attitude do not provide a clear definition of the word attitude. According to McLeod (2012) attitude towards mathematics is just a positive or negative emotional disposition towards mathematics. If learners have a negative attitude towards a subject or a topic, the performance may be affected greatly. Daskalogian and Simpson (2011) define attitude towards mathematics as a pattern of beliefs and emotions associated with mathematics. Attitudes are acquired through experiences in our environment and learned in much the same way as skills and habits. As pupils develop through the different phases of schooling they become increasingly aware of mathematics as a subject and this awareness clearly affects the growth of their attitudes to mathematics (Bishop and Nickson, 2013).

Amato (2001) argues that the development of positive attitudes to Mathematics is dependent on the type of teaching. Negative attitudes can be generated by a mismatch which occurs when the teacher teaches instrumentally, and the student tries to understand relationally. Researchers believe that teacher's attitudes to Mathematics in some way influence their students' attitudes and Mathematical learning (Rehich and Way, 2014). In my view, I agree with his finding. Teachers attitudes are said to affect their approach to teaching and the classroom (Goulding, 2012). Teachers are said to rely on memories of themselves as school students to shape their teaching practices (Ball 1994). Teachers model their attitudes and beliefs during their teaching. The most direct influence of teachers' negative attitudes to Mathematics on their students learning appears to be allocation (Bromme and Brophy, 2016). Such teachers have been found to allocate more instruction time to subject matter areas that they enjoy, and less to areas that they dislike. It is important to note that none of the studies mentioned above investigated the experiences of incorporating learning activities that included: problem solving activities, playing games and group project work.

These activities take a constructivist approach to teaching and learning, which result to various instructional experiences. The study used observation schedules, questionnaires and interview schedule to collect data. Teacher's attitudes towards their work and interaction with students significantly influence students' academic achievements. According to Aaronson, (2013), students taught by teachers with positive attitudes towards their work who are friendly to students, significantly enhance achievements.

Teacher's length of teaching experience and students' achievement in mathematics

The study done by Ryan (2016) observes that in the first year of teaching, we witness the sad counterpoise of two sets of attitudes on how the teacher should act. The students are looking strong personalities and

leadership. The beginning teacher however seeks a gentler leadership style. For some few teachers, this works for legions it fails. This impact negatively on the teacher performance and consequently learner achievement. In an analysis of mathematics achievement and drop out in a sample of California high schools Fetler (2012) found that schools whose dropout rates were high, had more new teachers than did schools with low dropout rates. A comprehensive analysis by Greenwald, Hedges and Laine (2016) of 60 studies found a positive relationship between years of teacher experience and student test scores. Similarly, the UTD Texas schools project data showed that students of experienced teachers attained significantly higher levels of achievement than did students of new teachers i.e. those with one to three years of experience (Rivkin, Hanshek and Kain, 2015).

Increased proportion of trained teachers and improved teacher to pupil ratios are attempts by the Ministry of Education to provide quality education although the policy of the Ministry of Education is to maintain a low student-teacher ratio as a measure of maintaining quality education that appears too expensive to sustain (MINEDUC, 2012). Muller and Alexander (2014) in a study on teacher certification and middle school mathematics achievement in Texas found that students taught by certified teachers scored better on the Texas state mathematics achievement test than those taught by uncertified teachers. A study that examined the mathematics achievement of elementary learners also found that students taught by new uncertified teachers did significantly worse on achievement tests than did those taught by new, certified teachers (Laczko-Kerr & Berlier 2012). Likewise, Darling-Hammond (2013) found a significant positive association between achievement and teacher certification, she also found significant negative association between achievement and the presence of a high proportion of new or uncertified teachers in the school.

METHODOLOGY

The study used a descriptive and correlational design with a mixed approach of qualitative and quantitative approaches to examine the impact of teacher qualifications on students' academic performance in mathematics subject in public boarding secondary schools in Rwanda, a case of Rubavu District. The target population included 343 respondents, including 225 mathematics teachers and 118 mathematics leaders. The researcher determined the sample size of 185 respondents using Yamane formula. Respondents were selected using a purposive sampling technique using questionnaires and documentary research techniques as data collection tools and taking into account pilot studies. The results were analyzed using SPSS version 21 and interpretations were made based on the results reported by the respondents.

KEY RESULT AND FINDINGS

Rubavu District is one of the seven districts of the country's Western Province in Rwanda. The total area is km2. It is bordered by Nyabihu District to the east, the Democratic Republic of Congo to the west and north and Rutsiro District to the south and is 152 km from the city of Kigali. In this section, the findings were presented, analyzed, and interpreted. Interpretations were made basing on results given by respondents. This study sought to achieve the objective of determining the effects of teacher's qualifications on students' academic performance in Mathematics subject in public boarding secondary schools in Rwanda a case of Rubavu District.

Demographic Characteristics of the Respondents

Demographic characteristics like age group, year of study and respondents' school status were considered as aspects which might have significant influence on study findings. The demographic distribution of respondents' analysis includes all aspects needed in order to collect useful information. As the researcher distributed 185 questionnaires, but only 183 were filled properly and returned. This means that the response rate was 97.8%.

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Age Group of Respondents

The maturity of respondents is a considerable variable as it helped to ensure the maturity of responses enabled the researcher to ensure data credibility that is vital in the current study. The age group of public secondary school located in Rubavu District was very necessary in analysing their work ability.

Table 1 Age Group of Respondents

Age group	Frequency	Percentage
21-25 years	14	7.5
26-30 years	69	37.2
31-35 years	80	43.2
35 and above	22	12.1
Total	**185**	**100.0**

Source : Primary Data (2022)

The findings of the current study from Table 4.1 revealed that 14(7.5%) respondents were between 21 and 25 years old, 69 (37.2%) respondents were between 26 years and 30 years, 80 (43.2%) respondents were between 31 and 35 years old while 22 (12.1%) respondents were above 35 years old. This implies that a great number of respondents were mature teachers who can provide reliable information that is vital in the current study. According to (Yanjiu, 2016) state that the age structure of a population is a crucial factor in population research, affecting family size and structure. The younger age structure leads to larger family sizes, while the older age structure affects family size. In China, the 2013 census showed a nuclear family structure, with 64.7% being nuclear and 6% being aging.

The internal family age structure affects family size and structure. The younger population is dependent, with 90% living with parents, while the adult population is more affected by marriage, birth, and social economic action. The aging population, over 60, is becoming dependent, with 78.3% dependent on children or social welfare, while 21.7% were independent.

The teacher's qualifications in mathematics that affect students' academic performance in Mathematics subject in public secondary schools in Rubavu District

The following table indicate the perception of the mathematics teachers on the teacher's qualification in math lesson that affect the students' academic performance

Table 2 Mathematics teacher's answers on the teacher's qualifications in mathematics subject that affect students' academic performance in Mathematics in public secondary schools

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree				
	N	%	N	%	N	%	N	%	N	%	Total	Mean	Sdv
Mastery of mathematics content facilitates me to teach mathematics in a standard manner as proposed in the official curriculum.	3	2.5	3	2.5	3	2.5	28	23.3	83	69.2	120	1.458	.868
Classroom management helps me in managing teaching time.	3	2.5	3	2.5	4	3.3	19	15.8	91	75.8	120	1.4	.873

The use of ICT in teaching mathematics facilitates me to concretize mathematics concepts.	5	4.2	3	2.5	7	5.8	18	15.0	87	72.5	120	1.508	1.01
The professional qualification allows me to effectively and efficiently deliver the best of my knowledge	4	3.3	6	5.0	7	5.8	19	15.8	84	70.0	120	1.55	1.03

Source: Primary Data (2023)

Table 2 showed Shown that Mastery of mathematics content facilitates mathematics teachers to teach mathematics in a standard manner as proposed in the official curriculum, 69.2% strongly agreed. Results indicated that Classroom management helps teachers in managing teaching time with72.5% strongly agreed, while 15.0% agreed. Result evidenced 72.5% strongly agreed that The use of ICT in teaching mathematics facilitates mathematics teachers to concretize mathematics concepts, finally, 70% strongly agreed that The professional qualification allows mathematics teachers to effectively and efficiently deliver the best of their knowledge. From this result it proved that Mastery of mathematics content, Classroom management, the use of ICT in teaching mathematics and the professional qualification indicated the teacher's qualification.

Brunner, (2017) made research on the efficacy of instructors' diagnostic abilities in lesson planning, grading, and monitoring students' knowledge. The accuracy of assessments of motivation, achievement distribution, and degree of accomplishment was shown to be low in a large German sample of secondary mathematics instructors. According to the findings, diagnostic abilities are a multifaceted construct that have a beneficial impact on pupils' increases in arithmetic proficiency. For accurate grade assignments and student advancement, training and development of these abilities are essential.

Table 3 Heads of mathematics department perception on the teacher's qualification in mathematics lesson in Rubavu District

Statement on Teachers qualifications	**Strongly Disagree**		**Disagree**		**Not Sure**		**Agree**		**Strongly Agree**				
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Total**	**Mean**	**Sdv**
Mastery of mathematics content facilitates me to teach mathematics in a standard manner as proposed in the official curriculum.	2	3.2	2	3.2	0	0.0	14	22.2	45	71.4	63	1.44	.911
Classroom management helps me in managing teaching time.	3	4.8	0	0.00	2	3.2	9	14.3	49	77.7	63	1.42	1.01
The use of ICT in teaching mathematics facilitates me to concretize mathematics concepts.	4	6.3	1	1.6	1	1.6	5	7.9	52	82.5	63	1.41	1.07
The professional qualification allows me to effectively and efficiently deliver the best of my knowledge.	0	0.0	2	3.2	4	6.3	9	14.3	48	76.2	63	1.36	.747

Source: Primary Data (2023)

The Table 3 showed the responses given by heads of mathematics teachers. 71.4% strongly agreed that Mastery of mathematics content facilitates them to teach mathematics in a standard manner as proposed in the official curriculum. 77.7% strongly agreed that Classroom management helps them in managing

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teaching time. 82.5% strongly agreed that The use of ICT in teaching mathematics facilitates me to concretize mathematics concepts, 76.2% Strongly agreed that The professional qualification allows them to effectively and efficiently deliver the best of my knowledge.

According to Mbarute (2022), despite government measures to boost science and math education, students in Rwanda's upper secondary schools—particularly those in Rubavu, Nyamasheke, and Gicumbi—perform badly in math. A decent learning environment, low library utilization, parental support, the distance to school, a lack of passion in mathematics, and review activities are some of the elements impacting this performance. According to the study, the Gicumbi District's mathematics performance might be improved by providing a congenial environment, enough learning tools, parental support, and student orientation in schools near homes.

The performance of mathematics in secondary schools in Rubavu district that is due to the teacher's qualification

The second objective of the study was to analyse the performance of mathematics subject in secondary schools in Rubavu district that is due to the teacher's qualification. To achieve this objective, the researcher asked the respondents to show their views by filling the questionnaire; the researcher also analyzed different documents about secondary school Mathematics levels in secondary schools of Rubavu District. Opinions of respondents are rated using strongly disagree (SD), D (Disagree), Not Sure (NS), A (Agree), SA (Strongly Agree). These rating were given values of 1, 2, 3,4 and 5 respectively.

Table 4 Mathematics teachers response on The performance of mathematics in secondary schools in Rubavu District

	Strongly Disagree		**Disagre**		**Neutral**		**Agree**		**Strongly Agree**				
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Total**	**Mean**	**Sdv**
Independence in learning indicates students' performance in mathematics.	7	5.9	6	5.0	3	2.5	7	5.9	96	80.7	120	1.458	1.148
Exams and test results indicate students' performance in mathematics.	7	5.9	6	5.0	3	2.5	2	1.7	101	84.9	120	1.453	1.473
Homework completion indicates students' performance in mathematics.	6	5.0	7	5.9	4	3.4	5	4.2	97	81.0	120	1.496	1.546
Improved class participation indicates students' performance in mathematics.	6	5.0	7	5.9	7	5.9	6	5.0	93	78.2	120	1.156	1.155

Source: Primary Data (2023)

Results from Table 4 showed from the table indicated that the view of mathematics teachers on students' academic performance in mathematics, 80.7% strongly agreed that Independence in learning indicates students' performance in mathematics., while 84.9% agreed that Exams and test results indicate students' performance in mathematics,81.1% strongly agreed that Homework completion indicates students' performance in mathematics, finally, 78.2 strongly agreed that Improved class participation indicates

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students' performance in mathematics.

According to (Yara, 2016) The Kenyan education system is plagued by challenges such as insufficient resources in secondary schools as a result of poor planning and corruption. An investigation on the impact of instructional resources on academic success in secondary school mathematics in the Bondo area revealed a positive relationship between eight independent factors and arithmetic performance. It was revealed that government financial help, qualified teachers, classroom/laboratory ratio, and textbooks/student ratio all predict performance. According to the findings, the curriculum should be reviewed, trained instructors should be in-serviced, competent teachers should be hired, student motivation should be increased, government assistance should be provided, excellent teaching techniques should be used, student-book ratios should be improved, and teacher salaries should be increased.

Table 5 Heads of mathematics teacher's perception on the performance of mathematics in secondary schools in Rubavu District.

Statement on Teachers qualifications	**Strongly Disagree**		**Disagre**		**Not Sure**		**Agree**		**Strongly Agree**				
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Total**	**Mean**	**Sdv**
Independence in learning indicates students' performance in mathematics.	1	1.6	1	1.6	0	0.0	8	12.5	54	84.4	63	1.234	.684
Exams and test results indicate students' performance in mathematics.	1	1.6	1	1.6	2	3.1	7	10.9	53	82.8	63	1.284	.744
Homework completion indicates students' performance in mathematics.	1	1.6	1	1.6	1	1.6	10	15.6	51	79.7	63	1.297	.727
Improved class participation indicates students' performance in mathematics.	0	0.0	0	0.0	4	6.3	8	12.5	52	81.3	63	1.25	.563

Source: Primary Data (2023)

Results from the table 5 showed the responses given by heads of mathematics teachers on students' academic performance in mathematics. Results showed from the table indicated that, 84.4% strongly agreed that Independence in learning indicates students' performance in mathematics., while 82.8 % agreed that Exams and test results indicate students' performance in mathematics,79.7% strongly agreed that Homework completion indicates students' performance in mathematics, finally, 81.3 % strongly agreed that Improved class participation indicates students' performance in mathematics. According to (Chukwuyenum, 2021) on the influence of critical thinking on mathematics performance among senior secondary school students in Lagos State. The study would assist students and instructors by encouraging creativity in problem solving. For the investigation, quasi-experimental designs were used. To produce a sample of 185 students for the study, multistage sampling was used. The Watson-glaser Critical Thinking Appraisal and the Mathematics Performance Test were employed in the study. The study also discovered that there was no statistically significant gender difference in Mathematics performance test. Thinking Critically, Skills were also beneficial in improving pupils' knowledge of mathematical topics. As a result, It is advised that critical thinking abilities be instilled in secondary school mathematics teachers. The teacher education curriculum designed to increase pupils' performance in mathematics.

Effects of teacher's qualifications on students' academic performance in Mathematics in public secondary schools in Rwanda

The third object which was used to investigate the effects of teacher's qualifications on students' academic performance in Mathematics subject in public secondary schools in Rwanda therefore the following tables indicates the correlation between independent variable and dependent variable and regression analysis.

Table 6 Correlation Analysis between the teacher's qualifications and students' academic performance in Mathematics in public secondary schools in Rwanda

		Mastery of mathematics content	classroom management	use of ICT	level of education	Independence in learning	Exams and tests results	Homework completion	Improve class participation
Mastery of mathematics content	Pearson Correlation	1	.317**	.163*	.115	.197**	.796**	.736**	.770**
	Sig. (2-tailed)		.000	.029	.125	.008	.000	.000	.000
	N	180	180	180	180	180	180	180	180
classroom management	Pearson Correlation	.317**	1	.596**	.591**	.263**	.272**	.197**	.243**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.008	.001
	N	180	180	180	180	180	180	180	180
use of ICT	Pearson Correlation	.163*	.596**	1	.495**	.156*	.211**	.182*	.118
	Sig. (2-tailed)	.029	.000		.000	.037	.005	.015	.116
	N	180	180	180	180	180	180	180	180
level of education	Pearson Correlation	.115	.591**	.495**	1	.217**	.367**	.254**	.224**
	Sig. (2-tailed)	.125	.000	.000		.003	.000	.001	.002
	N	180	180	180	180	180	180	180	180
Independence in learning	Pearson Correlation	.197**	.263**	.156*	.217**	1	.205**	.357**	.339**
	Sig. (2-tailed)	.008	.000	.037	.003		.006	.000	.000
	N	180	180	180	180	180	180	180	180
Exams and tests results	Pearson Correlation	.796**	.272**	.211**	.367**	.205**	1	.766**	.700**
	Sig. (2-tailed)	.000	.000	.005	.000	.006		.000	.000
	N	180	180	180	180	180	180	180	180
Homework completion	Pearson Correlation	.736**	.197**	.182*	.254**	.357**	.766**	1	.795**

	Sig. (2-tailed)	.000	.008	.015	.001	.000	.000		.000
	N	180	180	180	180	180	180	180	180
Improve class participation	Pearson Correlation	.770**	.243**	.118	.224**	.339**	.700**	.795**	1
	Sig. (2-tailed)	.000	.001	.116	.002	.000	.000	.000	
	N	180	180	180	180	180	180	180	180
**. Correlation is significant at the 0.01 level (2-tailed).									
*. Correlation is significant at the 0.05 level (2-tailed).									

Source: Primary Data (2023)

Data demonstrated in Table 6 showed an association between research variables. Independence in learning: there is a statistical association between independence in learning and mastery of mathematics content (r =.197** p-value = 0.008), independence in learning and classroom management (r =.263** p-value = 0.000), independence in learning and use of ICT skills (r =.156* p-value = 0.037), as well as independence in learning and level of education (r =.217** p-value = 0.003). These correlations were positively associated since the p-value was <0.5.

For exam and test results, there is a significant relationship between exam and test results; there is a statistically significant association between exam and test results and mastery of mathematics content (r =.796** p-value = 0.000), exam and test results and classroom management (r =.272** p-value = 0.000), exam and test results and use of ICT skills (r =.211**, p-value = 0.005); and exam and test results and level of education (r =.367**, p-value = 0.000). These correlations were positively associated since the p-value was <0.5. This correlation is insignificant since the p-value was >0.05.

For improved class participation, there is a significant relationship between improve class participation, a statistically significant association between improve class participation and mastery of mathematics content (r =.770** p-value = 0.000), improve class participation and classroom management (r =.243** p-value = 0.001), and an insignificant association between improve class participation and use of ICT skills (r =.118, p-value = 0.116), along with exam and test results and level of education (r =.224**, p-value = 0.002). These correlations were positively associated since the p-value was <0.5.

Therefore, this explained that these independent variable can affect Improved class participation. This study can be linked to the work of (Abere, 2015). The goal of this study was to see how much teacher qualification influences students' academic performance in SMT themes. According to the research, there was no significant difference in averages between teacher qualification and students' performance in SMT themes at the form four level F(1,37)=0.017, P>0.05. The findings of the survey also revealed that the majority of SMT subject teachers were trained graduates who had attended in-service or refresher courses, resulting in a small improvement in the students' performance in SMT subjects. More regular in-service and refresher training for SMT topic instructors is recommended in order for them to adopt and respond to developing technologies in teaching.

DISCUSSION

The teacher's qualifications in mathematics subject that affect students' academic performance in Mathematics in public secondary schools

The first objective of this research was to identify the teacher's qualifications in mathematics subject that

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affect students' academic performance in mathematics in public secondary schools in Rubavu District, Rwanda. The researcher applies the following statements to the real examination: "Mastery of mathematics content facilitates me to teach mathematics in a standard manner as proposed in the official curriculum; classroom management helps to manage teaching time; the use of ICT in teaching mathematics facilitates me to concretize mathematics concepts and The professional qualification allows me to effectively and efficiently deliver the best of my knowledge. Results showed that 84.4% strongly agreed that independence in learning indicates students' performance in mathematics, while 82.8% agreed that exams and test results indicate students' performance in mathematics; 79.7% strongly agreed that homework completion indicates students' performance in mathematics; and 81.3 strongly agreed that improved class participation indicates students' performance in mathematics.

Aliyu (2018) evaluated the academic qualifications of teachers and their impact on mathematics teaching and learning in secondary schools in the Gusau metropolitan area. Achievement Exam. Which are utilized to collect data for this investigation. The study found that professional teachers have no significant effect on qualified science teachers' academic performance of students in mathematics; gender has a significant effect on teacher qualification in the performance of students in mathematics; and gender has a significant effect on professional teachers' academic performance of students in mathematics. The research advised that the government and school authorities offer enough relevant teaching materials and mathematical equipment in all scientific secondary schools to inspire pupils to learn mathematics.

Analyses the performance of mathematics subject in secondary schools

The second objective of the study was to analyze the performance of mathematics subject in secondary schools in Rubavu district due to the teacher's qualifications. The following statements were used in the real examination: "Independence in learning indicates students' performance in mathematics; exams and test results indicate students' performance in mathematics; homework completion indicates students' performance in mathematics. As well as improved class participation, which indicates students' performance in mathematics. The findings indicate that 80.7% strongly agreed that independence in learning indicates students' performance in mathematics, while 84.9% strongly agreed that exams and test results indicate students' performance in mathematics; 81.1% strongly agreed that homework completion indicates students' performance in mathematics; and finally, 78.2 strongly agreed that improved class participation indicates students' performance in mathematics.

Magaji (2021) examines the performance of secondary school students in mathematics based on school size and gender differences. The findings show that school size and gender differences have a significant effect on secondary school students' performance in mathematics. The implementation of the given recommendations by teachers, parents, students, and the government will not only improve students' performance in mathematics and other science-related subjects but will also result in scientific and technological developments, the achievement of millennium development goals, and the fulfillment of Nigeria's mission to become one of the twenty developed economies by 2020.

Effects of teacher's qualifications on students' academic performance in Mathematics subject in public secondary schools

The third objective of this study was to determine the impact of teacher qualifications on students' academic performance in mathematics in public secondary schools in Rwanda, a case of Rubavu District. Therefore, as reflected in the key results and findings, the correlation between the correlation matrix between independent variables (mastery of mathematics content, classroom management, use of ICT and educational level) and dependent variables (independence in learning, exam and test results, homework) is too see Completion and Improving Class Attendance).

The study found a significant association between various research variables, including independence in learning, exam and test results, and improve class participation. Independence in learning was positively associated with mastery of mathematics content, classroom management, use of ICT skills, and level of education. Exam and test results were positively associated with mastery of mathematics content, classroom management, use of ICT skills, and level of education. Improve class participation was positively associated with mastery of mathematics content, classroom management, use of ICT skills, and level of education.

CONCLUSION

Based on the study findings discussed in the related literature and the contrast made with previous empirical studies, the study elucidated the following concluding remarks: To answer the first objective and research question, the study concludes that the findings from the present research show that the teacher's qualifications in mathematics in secondary schools in Rubavu District, Rwanda, are: Mastery of mathematics content, classroom management, use of ICT, and level of education To the second objective and research question, after analyzing student performance in mathematics, the study concludes that student independence in learning, exam and test results, homework completion, and improved class participation can show the students' academic performance in mathematics. Finally, to address the third objective and research question, the study aims to establish a relationship between the teacher's qualification and student performance in mathematics subject in public secondary schools in Rubavu District, Rwanda. The correlation matrix between independent variables (mastery of mathematics content, classroom management, use of ICT, and level of education) and dependent variables (independence in learning, exam and test results, homework completion, and improved class participation) And they finally show positive significance since the p-value is less than 0.05.

RECOMMENDATIONS

Based on the findings of the study, the researcher provided the following recommendations:

The government should give the scholarships to the teachers so that they can enhance their level of mathematics.

MINEDUC, through the Rwanda Education Board, should plan training, especially for the mathematics teachers, so that they can increase their level and ability in mathematics.

All stakeholders in the education sector are recommended to help students learn mathematics so that they can be future teachers of it.

The MINEDUC should plan an update of the mathematics curriculum according to the level of the learners.

The government should bring more materials that are used in learner's mathematics to help the learner understand well that subject.

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