

# Influence of Teaching Strategies on Students' Competences in Mathematics in Public Secondary Schools of Rwanda

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**Abstract:** This research assessed the influence of teaching strategies towards student's competences in Rwandan public secondary schools. Specifically, the study has to find out preferred mathematics teaching strategies in selected Rutsiro public secondary schools, and to assess the relationship between mathematics' teaching strategies and student's competences in Rutsiro public secondary schools. The study intends to assist teachers to improve their teaching strategies that directly empower students' competences. The researcher used descriptive survey design for the first and the second research question and the correlation research design was used to find the relationship between the variables, where both quantitative and qualitative approaches were used, as well as questionnaires and guided interview to collect data. The survey was involving 132 Mathematic learning students that were sampled by using simple and stratified random sampling techniques from 440 mathematic learning students aged eighteen and above. And seven mathematics' teachers, seven Head of schools in public secondary schools that teach mathematics in A 'level in the schools of Rutsiro district which was sampled purposefully. The results showed that students learn mathematics effectively when in group and 50% responded strongly agree, 58% responded agree, while the total of 5.2% was in disagreement side. The confirmed that learning Mathematics helps them to solve problems in daily life as it was confirmed by 35% responded strongly agree and 38.6% responded agree. The same teachers confirmed that the use of ICT in teaching mathematics motivates learners in effective learning of mathematics and this is confirmed by 42.8% that responded strongly agree, 28.6% responded agree. The relationship between teaching strategies and students' competences in Mathematics showed that the regression a coefficient of the group learning of mathematics not statistically significant in explaining critical thinking and problem solving except the use of ICT in learning mathematics. The relationship was high and significant. Afterward, the ministry of education that should work hand in hand with different stakeholders in education so that a lot of effort be put in learning science especially mathematics, while the teacher were recommended to keep exploring the new strategies that can help learners learning mathematics effectively.

**Keywords:** Mathematic competences, teaching strategies.

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## 1. INTRODUCTION

### 1.1 Introduction

In the nineteenth century, education theorists like as Jean Piaget, John Dewey, and Lev Vygotsky believed that because students are regarded vital participants when it comes to the process of teaching and learning, they ought to be in charge of deciding what they want to accomplish in class. As a result, various countries around the world have called for the adoption and implementation of learner-centered pedagogy, as well as the deployment of new innovative approaches to education and learning, especially in science and math education. Although there is no universal statement about the outcomes of tutoring, Hattie and Anderman (2019) state that students' learning "has always been the most important outcome of tutoring at whatever level.". As a result, finding effective techniques to support and foster students' learning is

an important issue in educational research. To increase students' learning, researchers must first identify the primary factors that may influence different techniques that influence students' outcomes/competences (Victoria Department of Education, 2017).

According to Visible Learning Plus (2017), there are 252 variables on students' learning achievement, according to a study that integrated over 800 meta-studies involving over 80 million students. The instructor is at the top of the list. Teachers have been highlighted as "important participants in the educational process" in recent research (Victoria Department of Education, 2017). Educational research involving secondary school teachers around the world has empirically demonstrated that a variety of teacher characteristics can have a significant impact on outcomes. They include teachers' qualifications, teaching experience, and professional development, all of which have the potential to influence students' academic achievements (Bonney et al., 2015). Quality teaching is the most important component for students' learning processes and abilities among teacher factors (Munna & Kalam, 2021). This research focuses on delivering assignments, supporting group works, and encouraging ICT. In addition to teaching strategies and according to new research, mathematics is a critical subject of the school curriculum and is important in daily life as well as the study of other subjects.

### 1.2 Problem Statement

Mathematics subject is one of a kind and essential portion of school educational programs. According to some researchers, mathematics is a tool for the advancement of all other sciences (Peter, 2011). We use mathematics in every aspect of our lives, whether we realize it or not (Gafoor & Kurukkan, 2015).

However, majority of students across not only the world but also in Rwanda dislike mathematics. The reason for this disliking is that students do not interact with the educators in the setting of teaching and learning mathematics practically (Mania & Alam, 2021). For example, 75% of American students abandon mathematics as a preferred course of study and avoid many careers that may be related to mathematics (Gafoor & Kurukkan, 2015). However, REB introduced competence-based curriculum it is has not been yet successfully implemented.

Rwanda Basic Education Board have put an efforts aimed at realizing such expectations of teaching methods of mathematics in all basic education schools of Rwanda in reviewing the curricula in meeting the desored slikks, knowledge and attitudes in practical ways and bwing consistant in the use of required information in including learners in effective and practical learning of the sciences (Ndiokubwayo, *et al.*, 2020). The Rwanda Education Board also agreed that preparing students with essential hands on skills and development of knowledge based economy allowing Rwandans to compete in the global market (Group & Rwanda, 2020).

Many factors, including teaching strategies, teachers' and students' cognitive and beliefs, affective and psychomotor characteristics, subject matter and the learning environment influence students' mathematical competence (Robas et al., 2018). Consequently, less competence of students in mathematics affects students' thinking capacity, developing understands skills and knowledge and solving problems capacity.

### 1.3 Purpose of the Study

The objectives of this study were:

- (i) To find out preferred teaching strategies that can affect students' competences in Mathematics in selected Rutsiro public secondary schools.
- (ii) To assess the relationship between teaching strategies and students' competences in mathematics to Rutsiro public secondary schools.

### 1.4 Significance of the Study

The subject of Mathematics is believed to instill fear in both students and teachers. The main challenges for mathematics teachers are changing students' behaviors and attitudes toward mathematics learning. As a result, teachers must be aware of their students' emotional beliefs and how they relate to mathematics learning in order to employ more effective teaching strategies and improve students' mathematics competency by eliminating negative views. Since the study intends to determine the influence of teaching strategies towards student's competences in mathematics in Rwandan public secondary schools, the findings of the study will be important to strengthen competences of student in mathematic course

not only in Rutsiro public schools but also a whole country's school both public and private. The objective of this study is to find effective teaching practices that can influence students' mathematics skills in Rwandan public secondary schools, with a focus on the Rutsiro District.

### 1.5 Geographical Scope

The research was restricted in Rutsiro District in secondary schools especially in public general education schools in Western Province of Rwanda. The research was limited to identifying effective teaching practices that may influence students' competences in mathematics in Rwandan public secondary schools.

## 2. LITERATURE REVIEW

Homework is a typical instructional strategy that is intended to engage students, enhance their studying abilities and habits, inform parents about their children's learning, and raise student accomplishment NEAR of the 2015-16 Representative Assembly (2016). Homework is described as "any assignment assigned to pupils by school teachers and intended to be completed outside of school hours (Maharaj-Sharma & Sharma, 2016) and "a crucial extension of in-school learning opportunities (Biddle & Mette, 2016). Homework is a useful tool for extending education and monitoring student progress in several subject areas, and homework activities benefit both students and teachers. When students work on homework, they renew and strengthen their problem-solving skills, as well as help them prepare for tests (Kalchman & Marentette, 2012).

Furthermore, by examining students' work, teachers can utilize homework as feedback to determine whether or not their educational techniques are effective. Homework allows students to review daily themes and enhance their comprehension of math ideas and problem-solving skills. It also allows students to learn from their mistakes and prepare for assessments (Swaran Singh et al., 2017). Even while providing homework is thought to be a good way to help students study more, there is disagreement on its value and relevance to student progress (Güven & Akçay, 2019). Moreover, teachers have different opinions about the effect of homework. While some teachers assign homework regularly, others rarely use it, and others even believe that homework should be outlawed in elementary schools since it is a waste of time for students, teachers, and parents (Davidovitch & Yavich, 2017). Teachers have been assigning homework to children for a long time, yet the impact of homework on student progress is debatable (Güven & Akçay, 2019). Previous research on the positive impacts of homework is inconclusive because some studies found that homework had a good influence on student achievement while others found that it has a detrimental effect (Güven & Akçay, 2019).

Previous research into the correlation between homework and student progress, particularly in math education, has yielded mixed results. For example, Keith (1982) showed a favorable relationship between high school. The studies were conducted on the influence of the teaching techniques on students' academic performance and achievements and showed in the middle income countries and high income countries group works have played a distinctive roles in knowledge and skills discovery of the students in schools.

According to Güven and Akçay (2019), many studies were conducted and argued that there is a very strong links and benefit between the homework and the students achievements in the schools. For examples; Areepattamanil and Kaur, 2013; Cheema and Sheridan (2015); Fernandez-Alonso, Suarez-Alvarez, & Muniz, 2015; Ladson, 2012; Pelletier, 2005; Riley, 2007), confirmed that when the homework are well designed they awaken students positive changes in their daily learning regardless the gender, age and capacity for learning which can boost students' academic achievement as well as their academic skills (Ramdass & Zimmerman, 2011). Studies also suggest that assigning homework at a young age has little impact on a student's academic progress and fosters negative views toward education among students (Cooper, Robinson & Patall, 2006).

Kalenkoski and Pabilonia (2017) discovered that kids in grades 7-12 have stronger correlations between homework and achievement than students in grades K-6. Homework time has a beneficial effect on academic progress for high school students, According to a recent study in Spanish, providing homework that takes one hour each day to finish is the best amount of homework.

According to Department of Education research, focusing on assignment for 2 to 3 periods per one can significantly improve student proficiency in science, mathematics and English Language (Vasagar, 2012). However, a Stanford University study indicated that too much schoolwork might lead to increased stress, physical health problems, unbalance,

and social isolation (Boddison, 2015). Despite the potential benefits of homework, there is no agreement among teachers on how often it should be assigned. According to previous TIMSS survey data, the frequency of assigning homework for mathematics and the length of time it takes to complete homework differ from nation to country and even from teacher to instructor. Because teachers have differing perspectives on the benefits of homework, homework practices vary from one teacher to the next. Distinct countries have different policies about assigning homework, which results in different applications of providing homework (Mullis et al., 2012). In addition, homework creates issues for teachers, students, and parents, since teachers complain about students' lack of effort in completing assignments, and kids grumble about spending time on homework rather than entertainment (Xu, 2013). Parents are also unhappy about doing homework since they cannot agree on when, or how the task should be completed (Güven & Akçay, 2019).

## 2.1 Group work for learning

As confirmed by the different studies, educators have many techniques used in imparting learners with required skills. According to Anderson (2000) argued that in the group work activities the teachers and the learners interact effectively in mathematics sessions. The researcher continued by arguing that there is not different between the teaching and learning mathematics and assessment. The evaluation of learners also boost their awareness in the journey to improve their competences in science learning especially in mathematics learning as the engine of the of the course development in the setting of the classroom cooperation and the use of the effective materials (Anderson *et al.*, 2000).

Social learning style of applying mathematics impart students with the effective methods of practicing the subject of mathematics by allowing students interacting in the group and supporting one another. The researcher Aktepe & Coskun (2014) declared that the application of mathematics is likely to be easy and allow the learners having fun during the class setting or in the neighboring comrades where both the students and the facilitator or students to students share the experiences in learning. Group work is a great method of keeping students together and communicate various aspects related to their academic journey. Some students try to interact and build relationships in order to occupy some part of the content assigned by the teacher.

According to the Koçak *et al.*, (2009), group work assist the individual development and team development in transforming their learning into reality and more creative. In each group everyone is responsible for as supporting another so that they perform together as a team. That is why the group participants are eager to get responsibilities of succeeding together and correcting each other's mistakes in purposes of group achievements (Aktepe & Coskun, 2014).

Traditionally teaching and learning mathematics methods have played a major role in assisting students getting important skills for developing memories and participants were passively learning but were not able to share knowledge due to the fact that they were not motivated to work in group but the competitions were playing a big role in schools. The researchers kept exploring the best methods which can equip students with the collaboration and communications.

The researcher Koçak *et al.*, (2009), conducted a study on the alienation and studying mathematics subjects and came up with the power of putting people who want to learn mathematics sessions together and encouraged them to learn independently but later encouraged them to share their outputs with the other colleagues until each one gets the required skills shared by the colleagues. Through their methods, according to the same researcher, the students used social learning methods in order to help each other learn effectively by asking questions and providing the answers to the open discussions and students were free to express themselves depending on their level of understandings. The research kept arguing that the methods equipped learners with a great atmosphere and learners were performing well in mathematics and the science-related courses.

In this area of teaching and learning mathematics, the study conducted by the other theorists showed that people were competitive in learning the science courses including mathematics. The group learning assisted by the integration of ICT tools in education has become the catalyst in the modern education settings where students were advised to interact with the gadgets without the presence of the teachers. According to Vigosky (1978), these courses bring the anxiety among the learners the ICT tools should be involved in order to increase the social learning via conversations and discussion and collaboration rather than competition. The purpose of the teacher to integrate the ICT gadgets in the class is that the essential points get mastered by the beneficiaries. The study concluded that learners like other media resources in their learning rather than chalk and talk with the black or white board.

## 2.2 The Relationship between Learning Mathematic and ICT Integration

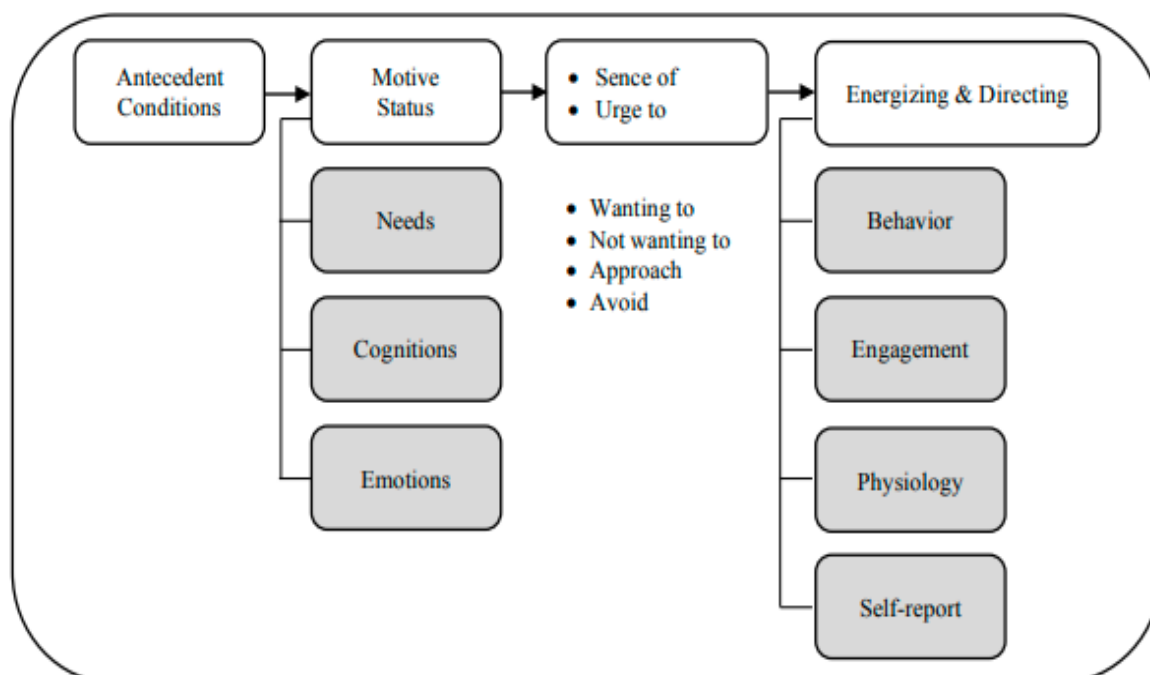
New technologies, in general, and new educational technologies, in particular, provide teachers with advanced and user-friendly tools that students can use to gain a better knowledge of the subject matter. Furthermore, these tools "allow teachers to collaborate with students while allowing students to become more engrossed in their own learning (Duhaney & Ph, 2000).

ICT inclusion in teaching and learning mathematics has changed the history of traditional learning. The study done by Baya'a and Daher (2013) clarified that the studies were active only when the teachers were able to value the use of the devices containing some resources digitalized to attract students feeling comfortable. The study showed that the use and inclusion of the ICT materials made the students active and affordable materials were students were assisted in deep understandings of the concepts where the capacity of the learners was motivated by the interaction of the Information Technology tools in practicing the given exercises even in the absence of the educators. Students were asked how they managed to develop their skills at such high level and they reported that they were not only interacting with the ICT gadgets but also where exchanging them with the other colleagues engaging them in collaboration, communication and critical thinking by respecting each other's views, other reported that they were good to go to the next level because they were confident enough to present the prior knowledge (Trujillo-Torres *et al.*, 2020).

## 2.3 Reeve's theory of self determination

Reeve's theory shows how intrinsic motivation is related to students' competences. Since when a student is self-motivated can also be self-confidence and active engaged. This Theory shows the self-determination on the interaction of the motivation resources and people's needs, the framework of the motivation and self-regulation motivate learners to evaluate their understating in their daylily performance (Ryan & Deci, 2018)

According to Reeve and Feng (2017), motivation is dynamics tool to assist students in the learning mathematics and teachers are motivated in interacting with their beneficiaries (Feng *et al.*, 2017).



Source: (Reeve, 2008, p. 22).

Figure 2.1 : Theory of Reeve



### 3. RESEARCH METHODOLOGY

The descriptive research design was used to describe the competences of the students in mathematics subject. Marshall and Rossman (2006) claim that the descriptive design provides a clear answer to the following questions: what, who, why, where, and when (Wilson, 1998). It's the most effective technique to show a connection between two variables. In addition, the correlational study design was used to describe the degree to which variables are related.

#### 3.1 Sample Size

A total of 132 Mathematic learning students, all seven mathematics teaching teachers, seven Heads of Schools were chosen from a sample of 454 people in four sectors of Rutsiro district to be part of the study where the total of sample size of 146 respondents were determined.

#### 3.2 Data Collection Methods

For data collection, a one-on-one interview was carried out in accordance with a pre-tested semi-structured interview schedule. The questionnaire was written in English to find interpretation and help respondents with English background. Six Data collectors, including one principal were involved in data collection. The surveyed students were divided into three groups, i.e. those who study in senior four, senior five, and senior six classrooms then further interview continue with their respective classes.

##### i. Questionnaire

As a data gathering tool, a questionnaire was chosen. A questionnaire is a list of questions that has been printed out designed with the objective of gathering information from respondents' written responses and teachers. To measure the influence of teaching approaches on students' mathematical abilities, the researcher administered questionnaires to teachers and students. Closed-ended questions make up the questionnaires.

##### ii. Interviews

An interview is defined as the discussion and analysis between different people with the aim of gathering data about the factor under study. Interviews demand an interaction between two people namely the researcher and the respondent (Al-Thumali, 2011 & Ghauri, 2010).

The researcher used the open ended questions interview to gather information from head teachers and deputy head teachers. The researcher had a list of questions that were addressed in a predetermined order during the session. The interview schedules were considered appropriate to head teachers and provided additional information to those from teachers and students in the questionnaires.

### 4. RESEARCH FINDINGS, INTERPRETATION AND DISCUSSIONS

The research interested in assessing working experience of teachers and head teachers and deputy head teachers to understand how they put in action different strategies in teaching and learning mathematics. This study showed that 3 of 14 had working experience between below 3 years, that 5 of 14 had working experience between 4 and 7 years' experience, that 4 of 14 had working experience between 8 and 11 years' experience, while that 2 of 14 had working experience above 21 years. This implies that the majority of teaching staff had enough years of experience in teaching in secondary schools of Rwanda.

#### 4.1 Presentation of the Findings

In this part, the researcher presents the findings of the study conducted in Rutsiro District Rwanda in secondary public schools, and the general objective was to identify effective teaching strategies and other factors that may influence students' competences through mathematics in Rwandan public secondary.

#### 4.2 Preferred teaching strategies that can affect students' competences in Mathematics

In this table, the researcher identified learners views the teaching strategies used in teaching and learning Mathematics in public secondary schools of Rutsiro District:

**Table 4.1: Teaching strategies that can affect students 'competences in Mathematics**

Statement	Str.Dis		Dis		Neut		Agr		St. Ag	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
I learn math effectively when in group	2	1.5	5	3.7	17	13	58	44	50	37.9
Mathematics helps me to solve problems in daily life	15	11.3	5	3.7	15	11.3	51	38.6	46	35
Mathematics helps in thinking critically	8	6	6	4.5	20	15.1	40	30	60	45
Learning from many resources helps learning mathematics with internet	1	0.7	24	18	9	6.8	56	42.4	42	31.8
<b>Mean</b>	6.5	5	7.5	30	15	11.3	51	39	50	37.5

Source: Primary Data (2023).

The results in the table 4.1 describes the preferred teaching strategies that can affect students 'competences in teaching and learning Mathematics subjects. The respondents students were asked if they learn mathematics effectively when in group and 50% responded strongly agree, 58% responded agree, while the total of 5.2% were in disagreement side. The same group was asked if learning Mathematics helps them to solve problems in daily life; 35% responded strongly agree, 38.6% responded agree, while the total of 15% were in disagreement side. They were asked if learning Mathematics helps in thinking critically; 45% responded strongly agree, 30% responded agree, while the total of 10.5% were in disagreement side. Students were then asked if learning from many resources like using internet connectivity helps in learning mathematics; 31.8% responded strongly agree, 42.4% responded agree, while the total of 18.7% were in disagreement side. This means that when students learning through groups they enhance their cooperation and ideas sharing by critically solving their problems.

According to Aktepe and Coskun (2014), group work is a great methods of keeping students together and communicate various aspect related to their academic journey. Some students try to interact and build relationship in other to occupy some part of the content assigned by the teacher.

**Table 4.2: teachers view on mathematics making enjoyment in learning**

Statement	St. Dis		Dis		Neut		Agr		St. Ag	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Math quizzes and examinations yielded excellent results	0	0	1	14.3	1	14.3	3	42.8	2	28.6
Use of ICT in teaching mathematics motivates learners	0	0	2	28.6	0	0	2	28.6	3	42.8
Teacher uses plays and games	0	0	0	0	2	28.6	0	57	5	71.4
Teacher encourages in doing math homework	0	0	1	14.3	1	14.3	4	57.1	1	14.3
<b>Mean</b>	0	0	1	14.8	1	14.8	2.2	32.1	2.8	39.2

Source: Primary Data (2023).

The table 4.2 describes the teaching strategies that can affect students 'competences in teaching and learning Mathematics subjects. The respondents teachers were asked if provision on mathematics quizzes and examinations yielded excellent results; 28.6% responded strongly agree, 42.8% responded agree, while the total of 14.3% was in disagreement side. They were asked if the use of plays and games in teaching Mathematics helps in developing critical thinking; 71.4% responded strongly agree, while the total of 28.6% were neutral. Teachers were then asked if students were encouraged in doing math homework; 14.3% responded strongly agree, 57.1% responded agree, while the total of 14.3% was in disagreement

side. Since the majority of the respondents were in agreement side this means that teaching mathematics subjects using more techniques promotes competences among students.

**Table 4.3: Teacher's teaching strategies to students 'competences in Mathematics**

Statement	St. Dis		Dis		Neut		Agr		St. Ag	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
I teach mathematics using group works	1	14.3	1	14.3	1	14.3	0	0	4	57.2
Mathematics help to have enjoyment with my students	0	0	1	14.3	2	28.6	3	42.8	1	14.3
Use of different resources like internet in teaching mathematics	1	14.3	0	0	1	14.3	4	57.2	1	14.3
<b>Mean</b>	1	14.3	1	14.3	1.25	17.8	2.2	31.4	2.3	33.3

Source: Primary Data (2023).

The table 4.3 showed the teaching strategies used by teachers to improve students' competences in Mathematics subjects. The teachers were asked if they teach mathematics using group works; 57.2% responded strongly agree, while the total of 28.6% was in disagreement side. Teachers were also asked if students have enjoyment during learning mathematics; 14.3% responded strongly agree, 42.8% responded agree, while the total of 14.3% were in disagreement side. They were also asked if the use of different resources like internet in teaching mathematics helps in improving competences; 14.3% responded strongly agree, 57.2% responded agree, while the total of 14.3% were in disagreement. Since the majority of the respondents were in agreement side this means that teaching mathematics subjects using more techniques promotes competences among students.

Qualitatively, the data were analyzed in order to get more information about the application of mathematics using different strategies where the researcher has analyzed interviews from heads and deputy heads of schools of Rutsiro District. The results were described as follow:

*During the study the respondents were asked the strategies teachers use in order to impart skills to their students and they responded that some of the strategies were encouraging students discussions and independent learning, where the students get encouraged to share views regarding to their subject. According to them, mathematics need practices and interaction that student of public secondary schools learn well when the first learners share with the weak learners. Therefore, as they answered, the students enjoy and have fun in learning mathematics when they interact with ICT tools. These gadgets attract them in learning using different strategies live simulation, explanations, and imitation.*

*The other head teacher was asked about the ways they use to motivate their teachers to provide enjoyment lessons of mathematics and responded that teachers are motivated intrinsically y and extrinsically, because teaching is like competition in Rutsiro district, because the best performer teachers get rewards either from schools level, district levels, and national level. The head teachers added that appreciating the work done by teachers also motivate them intrinsically.*

*The school leaders were asked about the ways they use to encourage teachers assisting students developing their competences during mathematics lessons and they responded that students develop required competences via learning mathematics subjects such as critical thinking and problem solving, and logical mathematics skills. This helps them thinking critically before they start an idea and prevent the risks before they occur. Students who are bright in mathematics, they added, become good problem solvers.*

*They were asked the extend they think using ICT instruments helps students performing effectively in mathematics and they responded that ITC is an ingredient and gear in teaching and learning mathematics because it (ICT) attracts students learning and exploring ways that can ease learning via fun and enjoyment ways.*

#### **4.3 the relationship between teaching strategies and students' competences**

The researcher has assessed the relationship between teaching strategies and students' competences in Mathematics in Rutsiro public secondary schools.



**Table 4.4: Regression coefficients between group learning mathematics and critical thinking, and problem solving**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.982	.150		6.561	.000
	Students group learning in mathematics	-.007	.108	-.007	-.062	.951
	Use of ICT in learning mathematics	.311	.104	.363	2.983	.003
	Assignment and quizzes in mathematics	-.027	.127	-.030	-.216	.830
	Learning mathematics in enjoyment	-.144	.128	-.156	-1.122	.264
	Using internet connectivity	.160	.113	.176	1.423	.157

a. Dependent Variable: Group learning and ICT inclusion for critical thinking and problem solving

#### Source: Primary Data (2023)

Results presented in table 4.4 show the regression a coefficient of the group learning of mathematics not statistically significant in explaining critical thinking and problem solving except the use of ICT in learning mathematics. It implies that students learn mathematics well when interact with their colleagues did not significantly affect critical thinking and problem solving where  $B=-0.007$ ;  $p$  value= $0.951$ ), enjoyment in learning mathematics significantly affects critical thinking and problem solving where  $B=0.363$ ; and  $p$  value= $0.003$ ). Furthermore, using gestures did not significantly affect critical thinking and problem solving ( $B=-0.30$ ;  $p$  value= $0.830$ ). Therefore, using group work and assignment did not significantly affect critical thinking and problem solving ( $B=-0.156$ ;  $p$  value= $0.264$ ). Without a doubt, started as an idea imply that teachers' knowledge, teaching methodology, convictions, and elucidations of school intuitive may interrelate in a vibrant, interconnected framework that influences a diverse range of hones and approaches (Guerriero, 2013). The College of Michigan's Mathematic Educator Information and Students Accomplishment Analysts pioneered the use of scientific data in education (Ball, Thames, & Phelps, 2008).

## 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

In this part, the researcher presents the summary of the findings of the study conducted in Rutsiro District Rwanda in secondary public schools. The results showed that students from Rutsiro district schools get developing competences through different teaching and learning strategies implemented by their teachers. This was also confirmed by the head teachers of the schools and deputy head teachers of the same sample schools of the district. The results showed that some of the strategies were integrating games plays and group works activities in daily learning of mathematics subjects. The subject of mathematics require more attention and different techniques to assist students learning by having fun, the teachers try their efforts in putting in action what they offer to learners.

### 5.1 Teaching strategies that affect students 'competences in Mathematics

The question was to identify the teaching and learning strategies used by the teachers in teaching mathematics in secondary public schools of Rwanda. The results have shown that learning Mathematics helps learning developing in thinking critically; as confirmed by 45% responded strongly agree, 30% responded agree. The results showed again that students learn from many resources like using internet connectivity in learning mathematics. It was shown that some of the strategies used by the teachers to help students develop their competences in mathematics were cooperation, encouraging students' discussions and independent learning, where the students get encouraged to share views regarding to their subject. They confirmed that mathematics need practices and interaction that student of public secondary schools learn effectively.

### 5.2 The relationship between teaching strategies and students' competences in mathematics

The researcher has assessed the relationship between teaching strategies and students' competences in Mathematics in Rutsiro public secondary schools. The results presented in table 4.3 showed the regression a coefficient of the group learning of mathematics that was not statistically significant in explaining critical thinking and problem solving except the use of ICT in learning mathematics. There was a strong relationship between teaching strategies used by the teachers in secondary schools and the students' competences.

### 5.3 Conclusions

The researcher has concluded the work regarding to the three research questions which were asking about mathematics teaching strategies preferred by selected Rutsiro public secondary schools and how they affect students' competences; the current status of teaching strategies and students' competences in Rutsiro public secondary schools, and the a relationship between mathematic teaching strategies and student's competences in Rutsiro public secondary schools. The results showed that teachers assist students developing their competences during mathematics lessons and they responded that students develop required competences via learning mathematics subjects such as critical thinking and problem solving, and logical mathematics skills. They emphasized on the think using ICT instruments which helped students performing effectively in mathematics and they responded that ITC inclusion is the important resources to boost students independent learning of mathematics.

### 5.4 Recommendations

The Ministry of education should work hand in hand with different stakeholders in education so that a lot of effort be put in learning science especially mathematics that is the basic skills to study other lessons,

The district of Rutsiro has to enforce the daily supervision regarding to the teaching and learning using ICT to encourage learners learning mathematics with confidence,

Teacher should keep exploration the new strategies that can help learners learning mathematics effectively since there are basic strategies,

Students should enhance the discussion in small groups in order to share experience in learning mathematics and helping each other in their daily assignment either at their home or at school,

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