

**Teachers' perceptions of their teaching strategies and their influences on students' academic achievement in national examinations in Burundi: Case of schools in Rumonge province.**

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**Abstract**

*This study investigated mathematics teachers' perceptions of their teaching strategies and their influences on students' academic achievement in national examinations in Burundi. This study adopted a parallel convergent mixed-method design. To collect data, a sample size of 60 teachers was selected through purposive sampling techniques for responding to the survey questionnaire in which, 12 teachers were randomly selected for classroom observations and interviews. Quantitative data were analyzed descriptively by using Microsoft excel spreadsheet 2016, while qualitative data was analyzed thematically. The findings of the study showed that teachers perceive that their teaching strategies influence students' achievement in national examinations. Most of the teachers perceive learner-centered strategy as effective in helping students to understand mathematical concepts and succeed in national examinations. However, it was found that mathematics teachers use teacher-centered teaching and teach for students to pass exams rather than teaching for deep understanding. The researcher recommends teachers to apply learner-centered teaching strategies to help students deeply understand mathematical concepts.*

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**Keywords;** *Mathematics, national examination, students' achievement, teacher teaching strategies, and perceptions*

**1. Introduction**

National examination plays an important role in determining whether teaching and learning took place, and informs what has been taught. It is also for certifying students and selecting them to continue their further studies (Ministère de l' Education de l' Enseignement Supérieure et de la Recherche Scientifiques [MEESRS], 2015). According to Whittle et al. (2018), national examinations are often used as tools for assessing the school system's achievement. It was declared that teachers' teaching strategies constitute a vital practice that influences students' academic attainments (Whittle et al., 2018). Moreover, students' achievement in the national examination may determine teachers' quality, competence, and performance of teaching strategies in the classroom (Stronge, 2007), and this remains true for mathematics subjects.

As Haefele (2001) put it, student academic achievement in the national examination is only one result of effective teaching. The results of students in national examinations might affect teachers' feelings, attitudes, and perceptions of teaching strategies they use. The results may affect how teachers plan and execute their classroom teaching strategies and lesson content. According to Elmurabet (2015), doing examinations forced teachers to review the existing teaching material. Cheng (2005) in his study noted that, teachers were nervous

and felt harassed by trying hard to finish all the materials on the syllabus, particularly when the date of the exam approaches. This gives an impression that the results of students' academic achievement might be affected by the teachers' perceptions about their classroom teaching strategies, and what is done in the classroom can be used to perfect and improve instruction in the future (Elmurabet, 2015). Therefore, once teachers have found challenging indicators, they might generate new teaching strategies that would evoke the students' conceptual understanding and deal with those challenges, towards enhanced teaching and learning (Saima & Qadir, 2011).

Since 2015-2016, there has been an educational reform in Burundi, whereby students are no longer sitting for national examinations at primary six, but they sit for these exams when they finish grade nine (senior three). These examinations open doors to schools where students are oriented in different learning combinations based on their results. Students are then oriented in three schools: excellent boarding schools, boarding schools, and non-boarding schools based on their scores (MEESRS, 2015).

In Burundi, the competence-based approach is the basis of the curriculum. Teachers are required to use learner-centered instruction strategies which allow students to be engaged in active learning, cooperative and problem-based learning, to promote their abilities of creativity, innovation, critical thinking, and problem-solving. MEESRS (2015) specifies that teaching aims at giving students the means to prepare for their future by enabling them to develop the ability to reason and solve problems of their everyday life.

Despite the shift from teacher-centered to learner-centered teaching strategy, students still exhibit poor performance in mathematics (Evaluation Bureau, 2020). The results from Evaluation Bureau in Burundi (2020) showed that students' academic achievement in the national examination in Rumonge province has been consistently decreasing right from 2016 onward.

Similarly, researchers like Bietenbeck (2011) and Clements (2013) connected students' lower performance in mathematics with teachers' teaching practices such as lecturing which promotes rote learning. It is assumed that if teachers use ineffective teaching strategies, perceiving them to be effective, may result in students' poor performance, especially during national examinations. Likewise, Adunola (2011) noted that students' poor performance might be caused by inappropriate teaching strategies. However, no study has been carried out in Burundi in this regard. That is why this study was found worthy to be conducted, since it would bring evidence on what strategies would be suitable or effective for mathematics teaching in Burundi.

## **2. Literature review**

Teaching strategies are practices used by the teacher to achieve educational aims focusing on developing the student's intellectual abilities (Amparo, Enríquez, Valencia, María, & Oliveira, 2018). While investigating Science, Technology, Engineering, and Mathematics (STEM) teaching and learning in Toronto, Sinay and Nahornick

(2016) found that teaching strategies used in mathematics classes are effective if used to teach for conceptual understanding, enhance reasoning skills, and promote problem-solving and creativity, encouraging and supporting collaboration.

Ayeni (2011) asserts that through appropriate methods that best suit specific objectives and levels, there exist outcomes that can bring desirable changes in students' achievement. Teaching strategies work well mainly when they are in line with students' needs. A learner-centered instruction strategy was confirmed as one that supports learners in developing mathematical reasoning (Brodie, 2000) For instance, it was found that student-centered instruction promotes students' understanding, deep learning, problem-solving, critical thinking, and communication (Walters et al., 2014). Likewise, Kober (2015), confirmed that student-centered instructional strategies are preferred to improve students' knowledge construction, conceptual understanding, and attitudes towards learning. Furthermore, Anderson and Krathwohl (2001) state that teaching strategy that engages learners in higher-order critical thinking like analysis, synthesis, evaluation, and creation is the most important in improving students' active learning.

Contrarily, teacher-centered instruction strategies of teaching mathematics are very unreliable and full of many inadequacies that do not allow students to construct their mathematical knowledge actively, and it is associated with students' poor performance (Mji, 2003). This strategy is characterized by lecture, demonstration, drill, and practice and does not make learners develop a conceptual understanding of mathematics (Nyaumwe, Bappoo, Buzuzi, & Kasiyandima, 2004).

Umugiraneza, Bansilal, and North (2017) stated that instructional strategies which are mainly based on teacher-talk, do not include much questioning, discussion, or individual development of understanding. This is why during the 2012-2013 academic year; Burundi's education system has shifted from teacher-centered to a learner-centered approach. In this regard, teachers are expected to focus on students' activities, whereby students construct their knowledge and understand mathematical concepts easily with the help of the teacher who acts as a facilitator (MEESRS, 2015). Le Donne, Fraser, and Bousquet (2016) highlight three teaching strategies that are mainly used:

1. The first is active learning which promotes students' engagement in the creation of their knowledge. Students' discussions, group work, co-operative are necessary activities that support active learning;
2. The second is cognitive activation which stimulates students' higher-order thinking, such as problem-solving, critical thinking, and decision making;
3. The third highlighted teaching strategy is teacher-directed instruction, which guides students by explaining mathematics concepts, providing feedback, and summarizing what they have learned.

Pantziara and Philippou (2007) argued that teaching strategies such as problem-solving and the use of visual aid in the mathematics classroom could increase students' motivation and morale to their performance.

Ali, Hukamdad, Akhter, and Khan (2010) confirmed also that problem-solving strategies help students perform better in mathematics than those taught by traditional methods. An experimental study by Muema, Mulwa, and Mailu (2018) showed that there is a positive correlation between teaching methods and students' academic achievement. Likewise, Walters et al. (2014) noted that using student-centered instruction in teaching mathematics transforms mathematics classrooms into lively and engaging learning environments. Students take control of their learning while making meaningful connections to the world in which they live and also allow students to interact, collaborate, negotiate and communicate with their peers.

Nizeyimana (2003) conducted a study on the impact of public examination on curriculum practices in Rwanda and the result showed that most of the teachers perceived public examination as the key factor of their teaching practices. Teachers were teaching targeting to be praised by the school authorities, parents, and community as long as students succeed in national examinations. Similarly, the study done by Mitana, Muwagga, and Sempala (2019) on the influence of national examination on classroom practice in primary schools in Uganda found that the teaching strategies used by the teachers are directly influenced by national examinations. The methods used in teaching were those that encourage rote learning and memorization of facts.

Furthermore, Kathare (2020) in the research done in Kenya found that interactive between teacher and learner such as personalized teaching and interactive learner to learner teaching such as peer tutoring are used by the teachers to alleviate some specific mathematics difficulties in learners. However, teachers wish to involve students in their learning through reliable tasks, and teachers are motivated to teach for understanding rather than to the test (Whittle et al., 2018).

### **3. Research methodology**

This study used a convergent parallel mixed-methods design that uses both quantitative and qualitative methods (Creswell, 2014). The present study was conducted in schools located in Rumonge Province, Burundi. The cluster sampling techniques were used to select the schools across the province. Since the target population was 197 mathematics teachers of the senior three classes, a sample size of 60 mathematics teachers was purposively selected using a scale of 30% of the target population.

According to Israel (1992), the choice of 30% and 10% sample size is commonly used in research to assist in compensating for non-response and for the persons unable to be reached by the researcher, respectively. Israel (ibid) further added that any sample size would be sufficient for a research study dealing with descriptive statistics. Therefore, in 197 teachers, a sample of 60 teachers was chosen to participate in this study, which means 30%.

These teachers were selected on the condition that they had at least two years of teaching experience. The survey questionnaires were used to explore teachers' teaching strategies and their perceived applications towards the students' academic achievement in the national examination. Teachers were given a list of 12 items

focused on teaching strategies to indicate their level of agreement using five Likert scale measure that ranges from Not Performed to Always Performed and a list of 7 items focused on teachers' application to national examination that ranges from Strongly Disagree to Strongly Agree. Teachers were also given open-ended questions toward the end of the questionnaires.

Besides, twelve teachers were randomly selected from those 60 teachers for interviews and classroom observations. Braun and Clarke (2013) agreed that a minimum sample size of at least twelve is required for a qualitative study.

The classroom observations protocol was used to look at different teaching strategies employed by teachers while teaching mathematics. The researcher had a list of teaching strategies, then observed and judged to what degree these strategies were employed by teachers. The observation was used to link the results from it with the survey questionnaire and interview results. Each teacher was observed for three lessons and each lesson took 45 minutes. Twelve teachers were observed, meaning that 36 periods were observed for this study.

The instruments were developed by the researcher and were checked for their validity by professionals in the mathematics education field. According to Bless & Higson (2000), the questionnaire, interview guide, and observation schedule are revised and adjusted according to the input received from the participants. Henceforth, for reliable data, the instruments were piloted in five selected schools that were not among the sample. Therefore, the instruments were improved where a few errors appeared.

Since the language of instruction in Burundi is French, the instruments used were in the French language. But they were translated into English to share our findings with the rest of the world. After getting ethical approval from the Innovation and Research Committee, based at the University of Rwanda, College of Education, the researcher looked for the field permission obtained from the Minister of Education, Director of Planning and Statistics, Director of Education in Rumonge province where the study was to be conducted, Directors of five Communal Education followed by Directors of schools respectively. Before data collection, teachers have explained the aim of the study and were thereafter given consent forms to sign and agree that they are going to participate voluntarily.

The data was exported in SPSS to be analyzed descriptively to see the level of responses on each statement using percentages. Qualitative data were analyzed thematically. This analysis was used to analyze classification and present themes and allow the researcher to associate analysis of the frequency of a theme with one of the whole content (Ibrahim, 2012). All verbal and written information was cross-checked several times to look for emergent ideas for interpretation. The data obtained was triangulated to find common findings.

## **4. Results and Discussions**

### **4.1 Teaching strategies used by mathematics teachers in teaching mathematics**

Through the survey questionnaire, teachers were asked to rank their responses on the five Likert scales that ranged from Not Performed to Always Performed for each item and analysis was carried out to see the extent to which teachers use a given teaching strategy.

#### **4.1.1 Teachers' presentation of the lesson**

The data from teachers' responses from the questionnaire showed that mathematics teachers summarize the major points presented in the class at the end of the lesson, which was frequently and always performed at 93.3%. Teachers frequently and always explain unfamiliar terms, concepts, and principles performed at 91.7%.

Teachers clearly explain the lesson's purpose and learning outcomes and demonstrate the link between the lesson of the day and the previous lesson, which were frequently and always performed at 90% and 83.4%, respectively.

These findings from teachers' survey questionnaires indicated that teachers present a lesson effectively. However, these agreements were in contradiction to what teachers do in the classroom while teaching mathematics. During class observations, only one teacher out of twelve tried to present the lesson's purpose and learning outcomes and demonstrate the link between the lesson of the day and the previous lesson but did not summarize the major points presented at the end of the lesson. The implication here is that, teachers teach students mathematics without letting students know what is expected to be acquired. Students are not engaged in their learning to construct their knowledge as they do not understand why they are learning some topic or what they have to achieve.

It is commonly agreed that once a student knows why s/he is doing things, s/he is more engaged and involved in what s/he is doing. Marzano and Anne (2017) highlight that learning objectives are a way to establish and articulate academic expectations for students to know precisely what is expected of them. When learning objectives are communicated to students, students would be more likely to achieve the presented goals. This is in line with Love (2013), who noted that the events that occur at the beginning and end of the class could influence students' engagement in their learning and their ability to synthesize the concept. When the teacher makes explicit connections between ideas, students' conceptual understanding and context transfer exponentially.

This study also found that teachers talk and write on the chalkboard while students are listening. It was frequently and always performed by the teachers at 78.4%. This is in line with what was observed in class, where the lessons were mainly dominated by the teacher talking and writing on the blackboard while students were listening. This is in concurrence with Niyukuri, Nzotungicimpaye, and Ntahomvukiye's (2020) findings who found that the teachers mostly used a teacher-centered approach in teaching geometry at secondary schools. The findings showed that the lecturing teaching strategy was used mainly by the teachers in teaching mathematics.

However, it was noticed that the lecturing instruction strategy leads students to an initial acquisition of information and does not allow students to engage in learning to retain it. Nyaumwe, Bappoo, Buzuzi, and Kasiyandima (2004) agreed that the strategy characterized by lecturing, demonstration, drill, and practice does not make students develop a conceptual understanding of mathematics. Thus, the teachers' teaching strategies are not effective for students' understanding of mathematical concepts.

Sinay, and Nahornick (2016), noted that teaching strategies used in mathematics classes are effective if used to teach conceptual understanding, enhance reasoning skills, promote problem-solving and creativity encouraging and support collaboration. Therefore, in this study, the way teachers presented the lessons is more of the traditional teaching that does not engage students to construct their knowledge of mathematical concepts.

#### ***4.1.2 Teachers and students' interaction during lesson delivery***

Whether teachers encourage students to ask questions and share responses with the whole class during lesson delivery was rated at 95% and was followed by whether teachers ask questions to the whole class and choose a student to answer and teachers give students ongoing feedback when teaching mathematics was rated at 90% and 70% respectively. The implication here is that, teachers use a question and answer strategy in teaching mathematics, which is a good approach to be encouraged.

Questions and answers (interrogative teaching strategy) enhances classroom interactions and involves students in their learning. Afurobi, Izuagba, Obiefuna, and Perpetua (2015) note that, active or collaborative interaction with questions strategies create opportunities and spaces for students' interaction, negotiation, collaboration, and thinking to occur in diverse ways. On the contrary, during classroom observations, there were minimal student-teacher interactions with questions. Students rarely asked questions to the teachers, students were unwilling to discuss their thinking and reasoning openly. Students were mainly listening to what the teacher was presenting, and students were not given the time to think about the questions before responding. Teachers were mainly choosing the students who raised their hands to respond, yet students who do not raise their hands, should also be encouraged to answer since some of them may be naturally or have gender bias shy.

#### ***4.1.3 Teachers' use of cooperative teaching strategy***

The item that stated that teachers provide clear instructions to students in their groups before performing group activities was frequently and consistently performed was rated at 81.7%. Whether teachers move around the class/groups, guiding ongoing student work, allowing students to work in their small groups, and allocating the roles to group members frequently and consistently was rated at 78.4% and 71.7%, respectively. Giving students time to think about a problem before joining group discussion was rated at 65%.

The findings from this survey questionnaire indicated that teachers use cooperative learning in teaching mathematics. On the contrary, during classroom observation, it was noted that teachers did not allow students to interact and collaborate amongst themselves, or allowing students to solve problems in their small groups.

Furthermore, teachers could not allow students to generate their ideas and justify their answers; wrong answers were not treated as valuable learning opportunities. This is in line also with Mukuka, Mutarutinya, and Balimuttajjo (2019) who found in their study that expository teaching methods dominated most of the classroom and none in the observed lessons used cooperative learning accordingly.

Indeed, when teachers are not using strategies that engage students to interact, it makes students recipient of the information rather than information making. Balasooriya, Corpo, and Hawkins (2010) stated that to foster a productive learning environment, the teacher must allow students to lead an activity, allocate roles to students and allocate time for reflection at the end of the lesson.

Stols, Kriek, and Ogbonnaya (2008) ascertained that, as students work in groups to solve problems and present their work to their groups, they get a chance to learn from each other. Collaborative group problem-solving activities allow students to become more deeply involved in their learning process and improve their higher-order thinking skills (Stols et al., 2008). Similarly, Stephens, Warren, and Harner (2015) found that where teachers collaboratively work with students to solve mathematical problems, students' performance was improved. However, the findings of this study indicate that teachers were not using cooperative teaching strategies.

#### 4.2 Teachers' perceived applications of their teaching strategies towards students' achievement in national examination

Mathematics teachers were asked to rank each item in the survey questionnaire that would reflect how they perceive the applications of their teaching strategies concerning the students' academic achievement in the national examination. The results are presented in Table 1 below.

**Table 1: Teachers' perceived applications of their teaching strategies about the national exam**

N/S	Statements	Level of agreement				
		SD	D	N	A	SA
		%	%	%	%	%
	In my teaching,					
1	I try to prepare students to pass the national examination	1.7	0	0	23.3	75
2	I refer to the past public examination questions	1.7	3.3	1.7	38.3	55
3	I give a lot of exercises and solutions to students to predict national exam questions	1.7	5	0	25	68.3
4	I give feedback to student's answers/responses in mathematics referring to national exams	0	0	1.7	38.3	60

5	I use cooperative learning, which enhances students' understanding and succeeds in national examination	3.3	1.7	1.7	53.3	40
6	I give opportunities to contribute, interact and share ideas in pairs/ small groups to help students understand the concept from one another	1.7	1.7	11.7	50	35
7	I allow students to use/interact with visual teaching materials to improve their conceptual learning and retention	3.3	6.7	5	50	35

Source: Field survey, September-December 2020

Legends: SD=Strongly Disagree; D=Disagree; N=Neutral; A=Agree; SA=Strongly Agree.

#### 4.2.1 Teachers teaching to the national examination

As per table 1 above, it is clear that, most of the teachers (93.3%) agreed and strongly agreed that they pay more attention to student's chances of passing public examinations. They give students a lot of exercises and solutions in anticipation of similar questions in the national examination. Eight out of twelve teachers believe that whatever is done by them is to prepare their students to pass the national examination. For instance, one teacher said: *"I try to help my students succeed in national examination by giving them a lot of exercises from past national examination papers."* Furthermore, quite often teachers benchmark and focus on the content covered in the past national examination papers during teaching mathematics. For instance, one teacher said: *"I teach all the content but mostly by focusing on the content covered in national examination."*

This is in line with Nizeyimana (2003) who revealed that teachers use unreliable practice while implementing curriculum by focusing on increasing the number of students who may pass the national examination by spending most of their time on past paper examination exploration. Consequently, Smith and Fey (2000) notes that practicing content known to be on the test can make a school look half a year better than a comparable school that did not employ teaching to the test preparation.

Besides, teachers perceive national examinations as influencing them to teach the way they teach. Eleven teachers out of twelve agreed that, they give students tests similar to the questions asked in the national examination, and encourage students to study past national examination papers. All the 12 teachers interviewed, perceive that their teaching strategies influence students' academic achievement in the national examination. They argued that, students' success in national examinations depends mostly on teachers' different strategies and efforts used.

In nutshell, these findings revealed that the teachers' strategies mainly focus on helping their students pass the national examinations. This means that teachers are teaching students to pass national examinations rather than teaching for understanding. In the same fate, Nizeyimana (2003) stressed that teachers in secondary

schools in Rwanda do not teach to make students understand the content but to pass national examinations. Indeed, when teachers are forced to teach to the test, opportunities for cooperation and discussion between students and teachers on creative classroom projects are lost (Salkind, 2008).

#### **4.2.2 Teachers' use of collaborative learning to help students succeed in national exams**

The majority of teachers (85%) reported that they give students opportunities to contribute, interact, and share ideas individually and in their small groups to help them understand the concept from their own experience and interact with visual teaching aids that improve their conceptual learning. This is in line with teachers' responses during an interview where they ascertained that their teaching strategies like participative, active, and interrogative are working well to help students to understand mathematical concepts and succeed in national examinations.

Furthermore, two teachers out of 12 reported that they use teaching strategies like encouraging active participation, using questions and answers (interrogative) approach, and using games during lesson delivery. These teachers stated that they allow students do the work by themselves and share ideas in their groups and justify their responses before presenting them to the whole class. Teachers confirmed that giving students a lot of exercises and solutions is effective because they prepare students to pass national examinations. These findings showed that teachers perceive learner-centered and active learning teaching as the most important strategy that improve students' understanding and leading them to succeed in the national examination.

The findings have clearly revealed that, teachers are aware of the importance of collaborative learning in terms of helping students understand mathematics and succeed in national examinations. This is in line with Kober (2015), who ascertained that, student-centered teaching strategies improve students' knowledge construction, conceptual understanding, and attitudes towards learning. However, during classroom observations in schools located at Rumonge province-Burundi, this reality was not well captured in teachers' teaching. It was found difficult for these teachers to apply this learner-centered pedagogy.

### **5. Conclusion**

The findings of this study explored teachers' teaching strategies and their perceptions on students' academic achievement in the national examination in schools located in Rumonge province-Burundi. It has been found that, these teachers mainly transfer content to students, while students are passive. Students in classroom just listen and take notes. This contradicts Mji (2003) view that, placing a teacher at the center of instruction, provides very little space for students' contribution to the teaching and learning process.

One hand, teachers are aware of the importance of learner-centeredness and how they can employ it as a teaching strategy to make students understand mathematical concepts. However; teachers do not practice it in classroom situations. Teachers teach students with an aim of passing national examinations at the expense of

deep understanding of mathematical concepts. Based on the findings of this study, it can be concluded that, teaching strategies used by teachers in Rumonge province are responsible for students' poor academic achievement in national examinations.

Passing national examination is good and every student and parents strive towards achieving that success. However, teachers in Burundi should teach mathematics paying special attention to conceptual understanding of mathematics rather than teaching to pass national examinations only. Schools in general, should work towards helping teachers overcome some hindrances such as pressure put on teachers for students to pass national examinations, heavy content in national curriculum, lack of CPD etc. Once these hindrances are cleared, teachers would have enough time to practice learner-centered pedagogies.

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