

Exploration of Societal Considerations about Rwandan Mathematics Teachers' Behaviours

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Abstract

There are various myths and perceptions about teachers' behaviours in popular culture, whereby some of these behaviours positively or negatively affect learners' emotions and decision making. We carried out the present study in Rwanda and employed 79 people of different educational levels and nationalities including pupils, students, bicyclists, motorists and vendors, who were purposively, randomly, and conveniently selected, to explore mathematics teachers' behaviours. The study's findings put out that in Rwandan society, like in other societies within the region, perceive mathematics teacher as someone with particular behaviours such as being harsh, good at managing time, and with high alcoholic drinks consumption habits, among other attributes. However, compared to the ancient and current mathematics teachers, a significant change has escalated so that today's mathematics teachers are not different from their fellow teachers in terms of their behaviours. The study recommends that teachers should behave responsibly to stimulate their learners.

Keywords: mathematics teachers' behaviours, myths and perceptions, societal considerations

Introduction

In Rwandan society, mathematics teachers used to excite people. Wherever students could meet sharing ideas, joking, and talking about their teachers, science teachers in general and mathematics teachers mainly, were in most of the time, at the centre of interest under discussions; for instance, in secondary school, students used to call their mathematics teachers 'philosophers', to explain, people whose thoughts, habits, and perceptions of the world are different from other normal people. The most and common shared speculating attributes were that mathematics teachers talk to themselves along the way, are careless, knowledgeable, have inappropriate dressing styles, do not care about slow learners, are serious, punctual, straight forward, hardworking, drunkard, among others. All these attributes should not be taken for granted, since ineffective mathematics teachers' behaviours harm and interrupt students' academic performance and decision making (Clements & Sarama, 2018). Similarly, teachers' moral values, in combination with effective teaching practices, lead to students' academic performance (Narvaez & Lapsley, 2008). The present study is not interested to tracking views as related to good teachers or bad, instead, it is intended to track mathematics teachers' image, which is often misinterpreted or exaggerated by the popular culture. That is why we were very much interested to systematically investigate if such myths and perceptions of mathematics teachers' behaviours persist in Rwandan society and abroad, and discuss their impact on students' learning of mathematics particularly, and to the individuals within society in general. There is a need to effectively prepare Rwandan pre- and in-service teachers to behave in appropriate ways that attract students to learn mathematics.

The purpose of teaching and learning is to engage students to live in the modern world of science and technology, mathematics, and engineering, as well as provide students with skills and values towards social and economic development (Ukobizaba et al., 2019). With Curriculum implementation principles as related to peace and values education (PVE), it is envisaged that education is a mechanism in which issues like the source of conflicts, absence of peace and spread of violence within communities are identified and handled. Similarly, education can enhance values and attitudes, which will encourage individual and social action and build peaceful families, communities, and societies where people generally live in a more peaceful world (Rwanda Education Board, 2015). That is why there is an emergent call on mathematics teachers' behaviours investigation. The way people perceive mathematics as a subject and mathematics teachers' behaviours, may harm and disturb our students in their academic performance and decision making (Banfield et al., 2007; Clements & Sarama, 2018). Thus, there is a need to explain to the public that mathematics education is there to enhance culture, society, and critical thinking, which later help students shape and orient their lives by performing successfully different careers in their future lives (Peck, 2018).

This study employed the behaviourism theory by Burrhus Frederic Skinner. It states that an individual's behaviour depends on his/her external environment (Skinner, 1983). For instance, in the classroom, students behave according to the consequences faced or expected. Such consequences may be either being awarded or punished, that results in engaging students to likely cope with the subject being taught, or to avoid it. "Behaviourism's focus is on the external observation of lawful relations between and among outwardly observable stimuli and the responses that follow" (Boghossian, 2006, p. 715). Therefore, an objectivist point of view should be put into place to recognize natural phenomena and characteristics of knowable things. For instance, we understand the relationships of things by conducting observation and experiment sessions (Boghossian, 2006). It is why different categories of individuals were employed within this study to generate their perceptions about mathematics teachers' behaviours through intensive observation and interaction with them within society.

Much of the research has been done to display the image of Mathematics teachers; however, there is a need to investigate this image by triangulating it through multiple individuals in terms of academic levels and contextualizing it on Rwanda. This study explores different myths, views, and perceptions related to mathematics teachers' behaviours. Secondly, the study is interested in alleviating different myths and so-called particular behaviours which are connected with teachers of mathematics since these misconceptions have a negative impact on learning and career choice. This study will provide a fruitful picture of mathematics teachers' behaviours, not only about Rwandan mathematics teachers, but also about other mathematics teachers in the region.

Literature review

Various myths and perceptions were identified on mathematics teachers in popular culture, whereby some are appreciated and others are criticized to be bad (Gieger, 2007). Mathematics widely contributes on people's

interactions and enhance how they solve both individual and civil life (Walshaw & Anthony, 2008). How teachers behave determines how people perceive them (Banfield et al., 2007; Clements & Sarama, 2018; Hardy, 2002; Jennings & DiPrete, 2010). "Teacher's behaviour is defined as a set of hypothetical constructs which have their focus in teacher decision making" (Ryans, 1963, p. 274). The social behaviourism operationally explains a social behaviour as a mechanism for discovering and learning social behaviours such as attitudes, the moral characteristics, the language that one uses (Woodward, 1982). The teacher-learner relationship is viewed as a key to successful teaching and learning, but beyond this relationship, ethical issues have not been explored (Price et al., 2009; Ukobizaba et al., 2020).

Theories of teaching and learning have continuously stressed on the role played by teachers not only in enhancing students' academic development, but also in other domains of life (Blazar & Kraft, 2017). A survey conducted by Manarte et al. (2014) on teacher and student interactions, showed a significant effect of the way teachers communicate non-verbally on students' interest and skills development. These non-verbal communications are about how teachers show affection, their tendency and attitudes towards their students. Similarly, Ukobizaba et al. (2020) in their study, showed that learners do not only like teachers who master the content to be delivered, but also, learners revealed that they need teachers who care and behave in ways that attract them to learn mathematics. That is why "the current curriculum initiatives in mathematics call for the development of classroom communities that take communication through mathematics as a central focus" (Walshaw & Anthony, 2008, p. 516), because a good teacher is that one who is able to enhance social and behavioural skills to enhance students' academic performance (Jennings & DiPrete, 2010). Likewise, in the study conducted by Viljaranta et al. (2015), it was confirmed that learners' positive classroom mood was positively correlated with their teacher's affection. Therefore, the social tie within school environment is indispensable, since students effectively learn when they are happy, considered as valuable people, and treated with care (Patricia & Mark, 2009).

In Rwanda, as well as all other parts of the world, students are still struggling with mathematics despite the effort teachers make to engaging them (Anthony & Walshaw, 2009). This problem harms the vision of the country whenever the skilled people in mathematics are not sufficient (Uworwabayeho et al., 2007). Practical teaching for moral values, along with best-practice instructions, leads to academic performance (Narvaez & Lapsley, 2008). However, not much literature is available related to teachers' behaviours and their impact on learners and the community as a whole (Hardy, 2002; Jennings & DiPrete, 2010; Patricia & Mark, 2009). Although, education should be viewed as an enterprise of values that are concerned with training teachers for positive character development (Narvaez & Lapsley, 2008). Thus, "teachers should be aware of the different effects that their behavioral control and psychological control have on children's skill development when dealing with students' low task orientation and high negative emotionality" (Viljaranta et al., 2015, p. 1206). The present study explores national and regional people's views about mathematics behaviours and their impact on learners and on the community as whole. This research will

benefit policymakers to train pre- and in-service teachers on how to create a conducive learning environment and carefully evaluate the success of learners by taking their teachers' behaviours into considerations.

Methodology

Research design and sample

The present study is survey-based research. It is a qualitative and exploratory design (Fraenkel et al., 2012). We have explored all levels of respondents' education from primary to university. Therefore, interviews, survey questionnaires, and focused group discussions were used to collect data. Purposive, random, and convenient sampling techniques were used (Fraenkel et al., 2012). The target population was different individuals with different educational backgrounds such as pupils, students, teachers, graduate students from different countries, and the community around the research site. We have generally involved all these individuals in the research because we wanted to track different perceptions about mathematics teachers' behaviours among different people's education levels. Specifically, we involved multinational respondents in tracking the variability among teachers' behaviours across the region.

While sampling, 79 individuals were sampled to participate in the present research. Eight lower primary three (Primary-3) and eight upper primary six (Primary-6) pupils from the School A were randomly sampled. Five ordinary-level students (Senior-3) and 21 advanced level students (Senior-6) were also randomly selected from School B. Eleven graduate students (masters' students) studying in the African Centre of Excellence for Innovative Teaching and Learning Mathematics and Science (ACEITLMS), University of Rwanda – College of Education (URCE), composed of seven Rwandans, two Tanzanians, one Kenyan, and one South Sudanese, were conveniently selected. Three primary teachers from School A and three secondary teachers from School B were sampled purposively. These six teachers are from different subjects (not necessarily mathematics teachers). Note that codes A and B were used for confidential reasons. Within the community, seven bicyclists, seven motorcyclists, and six vendors were sampled by a convenience sampling method, as they are working near the URCE Campus (see Table 1).

Table 1: Sample and data collection/analysis methods. Graduate students are Master students from ACEITLMS at URCE based at Rukara, Kayonza, Rwanda. Community: various types of people like vendors, motorcyclists, and bicyclists

	Respondents									Total
	Primary pupils		Secondary students		Teachers		Graduate students		Community	
	P3	P6	S3	S6	Primary	Secondary	Local	Regional		
Sample	8	8	5	21	3	3	7	4	20	79
Data collection methods	Group discussion (Kinyarwanda)		Questionnaire		Interview		Interview		Group discussion (Kinyarwanda)	
Data analysis methods	-Translated English -Qualitative		Qualitative, quantitative, and		Qualitative, quantitative, and quotations				-Translated English -Qualitative	

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Instrument and data collection

During data collection, we used two languages: Kinyarwanda and English. Kinyarwanda (mother tongue) was used to discuss (focus group discussions) with primary school pupils and the community around URCE. Besides, English was used for questionnaires delivered to secondary school students and interviews with teachers and graduate students. The survey instrument was generally qualitative (see Appendix). Our survey instrument was at first the same for all of our target respondents. However, we arranged and differed questions for a matter of trustworthiness according to each type of respondent. For instance, primary school pupils and the community were given few and only qualitative questions. They were asked in their mother tongue to allow them to express freely.

In the analysis phase, we translated Kinyarwanda responses into English to share the report's results with the wide readers. To analyse data, in the support to ratios of responses, we used descriptive analysis. Additionally, direct quotes from respondents and thematic analysis methods were mostly used to analyse data.

Research findings

Primary school pupils

We started our data collection with a focus group discussion with the primary school pupils. When we asked primary school pupils about what they used to hear about mathematics teachers' behaviours in the past, pupils seemed to know little about mathematics teachers. However, one Primary-6 pupil said: *"I used to hear saying that mathematics teachers were harsh and scared their learners to make them attentive."*

Secondary students

For secondary students, we used questionnaires. We first asked them about what they used to hear talking about mathematics teachers' behaviours in the past. The answers from Senior-3 and Senior-6 do not differ much. For instance, students said they heard from their parents and neighbours saying that mathematics teachers were harsh, severe, calm, and strict. Students added that mathematics teachers in the past were knowledgeable, hard workers, able to manage time compared to today's. However, one student from Senior-6 said: *"The community used to fear mathematics teachers because they had extraordinary knowledge."* Another student from Senior-3 added: *"What I heard talking about mathematics teachers' behaviours in the past, is that mathematics teachers were not good at teaching. Instead, they were used to punishing their students"*.

We asked students to compare the past and today's Mathematics teachers' behaviours. In other words, we requested them to compare what they were told and what they perceived about the behavioural change. Two out of

five Senior-3 students agreed that something has changed, while three said nothing has changed. However, 17 out of 21 Senior-6 students agreed that something has changed, and only four said nothing has changed (see Table 2).

Table 2: Students' position on Mathematics teachers' behaviours currently changed

Students' argument position	Classes		Total
	Senior-3	Senior-6	
There is a change	2	17	19
No change	3	4	7
Total	5	21	26

The explanations provided by both Senior-3 and Senior-6 students are that today, teachers of mathematics interact with students and try to help students understand mathematics. The respondents added that the current teachers teach using group work, give students exercises, allow students to use calculators, and give students some questions at the end of the unit. To confirm this pedagogical approach improvement, one student of Senior-6 said: *"Something has changed on mathematics teachers because they are not still harsh; they are social to us. We are free to ask them some questions about the lesson"*.

This study was also interested in finding the impacts mathematics teachers' behaviours may have on students and the entire community. That is why we asked students to tell the positive impacts of mathematics teachers' behaviours on Rwandan society. Both Senior-3 and Senior-6 showed that mathematics teachers' behaviours have an impact on them and on society. Students showed that mathematics teachers make them feel confident and encourage them to study mathematics. Mathematics teachers help improve students' skills and knowledge and enhance them to think big. Mathematics teachers influence the youth towards job opportunities and help them to manage resources in the society, since mathematics is used in trading and managing business. For instance, one student said: *"Mathematics teachers help the society to know about different things like counting, comparing different things, and using logic."*

The negative impacts found about mathematics teachers' behaviours were that a student might feel discouraged when the teacher is not responsive. For instance, the Senior-3 student said: *"Sometimes we fear the teachers because of being strict. This makes some students hate the subject and thus fail to understand mathematics"*. Students continued arguing that, if the teacher is not social, others fear or not be proud of studying or expecting teaching mathematics.

Finally, we asked students to evaluate at what level mathematics teachers consume alcohol. Senior-3 students seemed to know nothing about mathematics teachers' drinking habits. Only one Senior-3 student responded to this question and confirmed that mathematics teachers drink responsibly. For Senior-6 students, only one out of 15 said that mathematics teachers rarely consume alcoholic drinks, 12 said that mathematics teachers drink

responsibly, and two said that mathematics teachers are sometimes drunk (see Table 3), while six students did not react to this statement.

Table 3. Students' evaluation of Mathematics teachers on alcohol consumption

Students' ranking	Rarely take alcohol	Drink responsibly	Sometimes drunk	Often drunk	Always drunk
Senior-3	0	1	0	0	1
Senior-6	1	12	2	0	15
Total	1	13	2	0	16

Graduate students

When we asked graduate students about mathematics teachers' behaviours in the past, interesting responses were provided. The responses provided showed that mathematics teachers in the past used to be serious, committed, harsh, big thinkers, not tacking in, confident, look busy, having debts from people, not social, and drunkard. For instance, one Tanzanian student said: *"I used to hear people saying that in the past, once one was going to solve mathematical problems, he/she needed to take alcohol because alcohol activates the mind."* Within the same context, one Rwandan student reported: *"I used to hear saying that in the past, mathematics teachers isolated themselves from the society, respected but feared by people. Again, they could bring beer in class, pretending to call it a teaching aid, once found by inspectors drinking in class"*.

While talking about today's mathematics behaviours, graduate students said that mathematics teachers are currently well perceived by the society. The teacher-student relationship was improved. Currently, mathematics teachers look clean, flexible, and organized. Mathematics teachers are still perceived by the community as always busy preparing their lessons. On the other extreme, students revealed that today's mathematics teachers are not committed, are strict, complicate life, and do not master the content as it was in the past. For instance, one Tanzanian student said: *Today, mathematics teachers are still harsh. They do not like to make a relationship with others and with kids. They do not consider the level of their students.*

Graduate students revealed that there are positive impacts caused by mathematics teachers' behaviours. Students argued that good behaviours of mathematics reflect good feedback to the parents. The respondent confirmed that from mathematics teachers' behaviours, learners benefit from managing time effectively, working for a purpose, and helping people manage their money. For instance, one student said: *"In economics, students learn from mathematics teachers not to spend much money and buy what is necessary and needed; people learn from math teachers to be punctual."* However, graduate students' negative impacts are that poor mathematics teachers' behaviours make students dislike mathematics, not feeling free or being open up during instructions, feeling discouraged, and then fail the subject.

When asked graduate students to evaluate the current mathematics teachers' behaviours, they said that teachers nowadays usually look smart. About Mathematics teachers' alcohol consumption, many of them said that mathematics teachers drink responsibly; however, some of them said most of the mathematics teachers are drunk. For instance, one Tanzanian student said: *"Most of them are drunk, maybe because they are busy and do not have time to share with others their everyday life experience and thus feel frustrated and lonely"*. This claim was supplemented by a South Sudanese graduate student who said: *"Most mathematics teachers like to take alcoholic drinks. When they are stressed and things getting complicated, they decide to take them"*.

Primary and secondary teachers

During the interview, when primary and secondary teachers were asked about what they used to hear about mathematics teachers' behaviours, the responses were not much different. They said that they used to hear from their elder brothers and parents that mathematics teachers were careless, strict, drunkard, lousy person, unsocial, punctual, order givers, scared by people, and knowledgeable. For instance, one Primary teacher said: *"Our neighbours used to say that mathematics teachers did not recognise child's rights and used to beat children seriously, although they used to teach energetically on the other hand. They used to come to school drunk. They could bring a bottle of beer at school and then drink freely. People used to tell us that mathematics teachers are the only talented people and that they went crazy as mathematicians"*.

When we asked teachers what they hear people talking about mathematics teachers' behaviours of today, primary teachers agreed that mathematics teachers nowadays behave in similar way with other people. The respondents claimed that mathematics teachers are hardworking, knowledgeable, and flexible. However, one Primary teacher reported: *"Students used to call mathematics teachers 'bad people'. That is why you find that teaching mathematics is complicated"*. When we asked teachers if what is discussed about mathematics teachers' behaviours is true, four out of six denied. They explained that a mathematics teacher is an ordinary person as other subject teachers in terms of their common behaviours. *"Any person can behave in one way or another, math teachers inclusive,"* one teacher argued. *"This was just a misunderstanding"*, another teacher added.

When teachers were asked about the positive impacts of mathematics teachers' behaviours on the Rwandan society, teachers revealed that a mathematics teacher with good behaviours, may encourage parents to encourage their children to study mathematics. The respondents argued that mathematics is the foundation of other applied sciences, like flying an airplane, trading, and farming. Teachers also confirmed that the mathematics teacher is an influential and respected person in the community. For example, one primary teacher said: *"People believe that mathematics teachers are the most knowledgeable people. The society always prefers to consult mathematics teachers because the community believes that they are intelligent"*.

The negative impacts identified by teachers are that because of mathematics teachers' negative behaviours, students can hate mathematics and leave school. Thus, dropouts can increase, and the country consequently loses skilled mathematicians and scientists.

When we asked teachers to talk about their fellow mathematics teachers' hygiene, teachers said that they adequately look clean like others. Regarding alcohol consumption, asked teachers strongly affirmed that mathematics teachers drink responsibly, and added that isolated cases should be treated as an individual personality like any other person.

Community

In a focus group discussion, when we asked the community neighbouring the URCE Campus on what they heard talking about mathematics teachers, the generated responses were amazing. The respondents said that mathematics teachers were in most of the time, silent, good managers, and astronauts. For example, one bicyclist said: *"I used to hear that mathematicians are silent and think deeply. They invented many things from their research, and they are the ones who built pyramids"*.

When we asked the community around URCE about what they hear people talking about today's mathematics teachers, the respondents agreed that today's mathematics teachers are approachable to their learners, and share pieces of advice. However, only one motorist had a different view and said: *"Mathematics teachers are big-headed; they like to take much alcohol and think deeply"*.

When asked about the positive impact on mathematics teachers' behaviours on Rwandan society, the respondents claimed that mathematics teachers are role models to the youth. The youth learns from mathematics teachers to effectively manage time and available resources. Concerning the negative impacts of mathematics teachers on the Rwandan society, the people asked agreed that there will be a decline in the country's economy whenever mathematics is used to steal the country's wealth.

Discussion of Findings

In the present study, we intended to figure out how society perceives mathematics teachers' behaviours. These behaviours were in the form of their code of conduct. We looked at their influence on student's learning and to society in general. Surprisingly, not only in Rwanda that mathematics teachers were treated differently from other people who are in the teaching profession; even in other regional countries such as Kenya, Tanzania, and South Sudan, mathematics teachers were considered to be severe, harsh, knowledgeable, punctual, and drunkard among other characters. The different respondents said that they heard from their elders, parents, and neighbours saying that mathematics teachers could effectively teach when they consume alcoholic drinks. However, many secondary

students agreed that these behaviours have changed progressively, and students argued that mathematics teachers nowadays drink responsibly, for instance. Although many students mentioned they heard that mathematics teachers used to master the content, that is innovative and great thinkers; however, some of them said that they heard saying that mathematics teachers were too severe and feared by people. Clements and Sarama (2018) considered some of those characters as myths that should be avoided and suggested that people should instead build on research findings to serve both teachers and children well. Teachers should not make others fear them as this may picture a lousy image to parents who, in return, are educational beneficiaries and can result in refusing to send their children in science, technology, engineering, and mathematics (STEM) subjects. Similarly, learners can avoid studying mathematics because of how their teachers behave or are judged by the surrounding society (Banfield et al., 2007; Hardy, 2002; Jennings & DiPrete, 2010). As concluded by Ukobizaba et al. (2020), mathematics teachers have to make sure if they did not contribute in one way or another to negative attitudes that students may exhibit.

Students' information shows a positive perception of mathematics teachers' behaviours, since many students and teachers reported that teachers behave normally like other subject teachers. This shows the relevance of the outcomes of the training given to pre-service teachers in Teacher Training Colleges (Ndiokubwayo & Murasira, 2019) and in-service teachers through Professional Development Trainings (Ndiokubwayo et al., 2019) by the Rwanda Education Board. Some graduate students claimed that mathematics teachers are still calm, strict, and authoritarian. This affects students' learning since Gieger (2007) and Kearney et al. (2009) found that students feel shy and fail to ask questions in the classroom due to teachers who can insult them or undermine them in front of others. Students may thus fear looking stupid. Similarly, learners showed that they do not like teachers who beat them, insult them, do not give feedback for asked questions (Barrett et al., 2012).

When identifying the negative and positive impacts on mathematics teacher's behaviours, respondents revealed that parents would motivate their children to learn mathematics and perform well if mathematics teacher behaves well. Therefore, we concur with Narvaez and Lapsley (2008), who said that teaching learners moral values, in combination with effective instruction, would enhance the students' performance. However, there are also negative impacts where students feel less interested in learning mathematics, and therefore the country loses citizens who are mathematicians and scientists and great engineers. As it was argued by Peck (2018), "mathematics education should be active, cultural, historical, social, and critical helping students learn formal mathematics, while also learning that mathematics shapes their lives, that this shaping is a result of human work and choices, and that students are empowered to shape those choices" (p. 1).

Conclusion

The study showed that the society had perceptions and myths that were associated with mathematics teachers' behaviours. Mathematics teachers were found generally to be negatively perceived by society all around. Some of the mentioned misbehaviours included being harsh, strict, and drunkard. Those attributions and so-called particular

behaviours were found not only in Rwandan society but also in almost all regional countries. However, current teachers have been appreciated for being social, hardworking, and punctual. Mathematics teachers' behaviours have positive impacts on society and on students as well, as long as teachers exercises good teacher-learner relationships and show appreciable behaviours being at school environment or within the community as large. Participants also revealed that mathematics teachers' behaviours might negatively or positively impact youth and the society in general towards learning mathematics in schools. Thus, policymakers are called to train pre-service and in-service teachers on how to behave so that learners can trust and perceive them as their role models. Pre-service and in-service teachers may be trained and provided with different tips and techniques in these regards.

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