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LEVELS OF SECONDARY SCHOOL STUDENTS' ATTITUDES AND ANXIETY TOWARDS MATHEMATICS IN MUSANZE DISTRICT IN RWANDA: AN EXPLORATORY STUDY

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ABSTRACT

Mathematics is still considered as a subject that causes fear to Students in Rwandan schools. This study aimed at exploring the levels of Mathematics attitudes and anxiety manifested by secondary students in urban and rural secondary schools in MUSANZE District. Tapia & Marsh's (2004) instrument was used to collect data and descriptive statistics was used to analyse data. The study showed the students' attitudes were mostly high and female students were less anxious than their counterpart males in urban and in rural secondary schools.

Keywords: Anxiety, Attitudes, Levels, Secondary Schools, Students

1. INTRODUCTION

In Rwanda, there is still an assumption that Mathematics is considered as a subject that causes fear to students. This was again evoked on the 14thMarch 2018 when the country of Rwanda was celebrating the International Day of Mathematics when the Management of the University of Rwanda called students to like Mathematics since it is not a subject to fear because it was difficult but rather it is a subject which requires enough time (Igihe.com, March 15, 2018).

Various studies have been undertaken on this subject and some of them have been largely reviewed in Habineza (2016) when he was exploring students' attitudes at INES-Ruhengeri. He found that students displayed attitudes towards mathematics at medium level and no significant gender-based differences were found in the sampled students. In the same perspectives, Mohamed and Waheed (2011) found that the students' attitudes were medium level which implied that there was still room for more improvement; their research also showed that "the students' attitudes towards mathematics do not have significant difference between male and female students" (p. 280). Kannam et al. (2015) found that "secondary school female students have a better attitude towards mathematics than that of male students" (p. 216). Buckley (2013) evoked the myth related the stereotype threat about the "girls' higher levels of mathematics

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anxiety. This stereotype says that girls are exposed to low attitudes towards mathematics, and are more vulnerable to feeling anxious when dealing with mathematics. Kannam, Sivapragasam & Senthamarai (2015) found that there is no significant difference between urban and rural secondary students' attitude towards mathematics. Finally, Yasar (2016) found that the attitudes of the students towards mathematics are at medium level, and that there is a meaningful difference between the attitudes of the students towards mathematics classes and the students' high school types.

Currently, at my knowledge, there is no specific study that analysed the current status of attitudes and anxiety towards mathematics in Rwandan Secondary schools. This study aimed at availing initial findings that explore students' attitudes and anxiety in the said schools in order to, later on, find ways of dealing with upgrading students' attitudes and decreasing their anxiety towards mathematics. Some preliminary strategies that can contribute to this effect have been explored in Nsanzumuhire, Habineza, Nahimana, & Mpakaniye (2018).

The study aimed at determining levels of attitudes and anxiety of secondary school students in Musanze district both in the urban and rural areas. It also aimed at determining whether there were significant differences on mean scores based on Gender and Location of their schools. Three research questions andtwo hypotheses were formulated.

1. What the levels of student' attitudes towards mathematics in Secondary schools of Musanze District?
2. What are the levels of students' anxiety towards mathematics in Secondary schools of Musanze District?
3. Is there any statistically significance in attitudes and anxiety between urban and rural students in Musanze District?
4. H01: The levels of students' attitudes and anxiety towards mathematics are medium level
5. H02: There Is no statistically significance in attitudes and anxiety between urban and rural students in Musanze District

2. METHODOLOGY

Research design

This study was designed as a cross-sectional survey to explore the levels of secondary school students' attitudes and anxiety towards mathematics and compare them based on their personal information such as gender and location as independent variables. The dependent variables were two factors, namely, Attitude and Anxiety which are defined from "The Attitudes towards Mathematics Inventory" created by Tapia and Marsh (2004).

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Research population and sampling technique

The population under investigation concerned secondary school students from various urban and rural areas of Musanze district. A convenience sampling technique was used to get the research sample for this study. A total of 763 students from various secondary schools participated in the study. The table 1 presents the numbers of students disaggregated by gender, location, status and type.

Table 1: Number of participants disaggregated by Gender, location, status, and type

Gender		Location		Status			Type		
	N (%)	Urban	Rural	Public (GoR-Funded)	Subsidized by GoR	Private (self-financed)	Boarding schools	NonBoarding schools	TVET
Male	301 (39.4)	64 (38.1)	237 (39.8)	73 (28.3)	164 (42.5)	64 (53.8)	4 (3.9)	157 (35.4)	140 (64.2)
Female	462 (60.6)	104 (61.9)	358 (60.2)	185 (71.7)	222 (57.5)	55 (46.2)	98 (96.1)	286 (64.6)	78 (35.8)
Total	763 (100)	168 (22.0)	595 (78.0)	258 (33.8)	386 (50.6)	119 (15.6)	102 (13.4)	443 (58.0)	218 (28.6)

Note. GoR= Government of Rwanda, TVET=Technical and Vocational Education and Training

Data collection and analysis

The Attitudes towards Mathematics Inventory, created by Tapia and Marsh (2004) was to collect data and the Statistical Package for Social Sciences (SPSS) version 17.0 as presented by Muijs (2004) was used to deal with the analysis of the data. Further details on data collection using Tapia and Marshall's (2004) tool and the analysis by SPSS version 17.0 can be found in Habineza (2016).

3. RESULTS AND DISCUSSION

The table 2 presents the levels of attitudes and anxiety of secondary school students desegregated by levels and by gender in the whole district of Musanze while Table 3 and 4 present the secondary students' attitudes and anxiety disaggregated by levels and gender, respectively in urban and rural areas.

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Table 2: Levels of attitudes and anxiety for all sampled secondary student in the whole MUSANZE district desegregated levels and by gender

	High level (M >= 3.67)			Medium (2.34 <= M < 3.67)			Low (M < 2.34)			Total		
	Female (%)	Male (%)	Subtotal (%)	Female (%)	Male (%)	Subtotal	Female (%)	Male (%)	Subtotal (%)	Female	Male	General Total (%)
Attitudes	251 (54.3)	114 (37.9)	365 (47.8)	186 (40.3)	154 (51.2)	340 (44.6)	25 (5.4)	33 (11.0)	58 (7.6)	462 (60.6)	301 (39.4)	763 (100)
Anxiety	54 (11.7)	42 (14.0)	96 (12.6)	162 (35.1)	113 (37.5)	275 (36.0)	246 (53.2)	146 (48.5)	392 (51.4)	462 (60.6)	301 (39.4)	763 (100)

Table 2 shows that in the whole Musanze District, female secondary students have more positive attitudes than the counterpart males. More females than males have higher levels of attitudes while less females than males have medium levels and low levels category. Concerning anxiety, this table shows that female students are less anxious than males since females demonstrated low levels of anxiety at 53.2 % while males were 48.5 % in these levels. These findings look like to the findings of Mohamed and Waheed (2011) who found that the secondary students' attitudes in Maldives were at medium level. In the same perspective as Mohamed and Waheed (2011), Habineza (2016) and Yasar (2016) found that the attitudes of the students towards mathematics were at medium level. This situation, as Mohamed and Waheed (2011) said, implies that there is "a room for more improvement" (p.280).This is the case for most of the schools in Musanze District. This is also similar to the conclusion drawn by Kannan et al. (2015) that secondary school female students have a better attitude towards mathematics than that of male students. The findings of the preceding studies do not confirm the stereotype evoked by Buckley (2013) as long as female's anxiety towards mathematics is concerned. This discussion applies to table 3 and 4 below despite they present findings from urban and rural areas respectively.

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Table 3: Levels of attitudes and anxiety for sampled secondary students in urban area of MUSANZE District desegregated levels and by gender

	High level (M >= 3.67)			Medium (2.34 <= M < 3.67)			Low (M < 2.34)			Total		
	Female (%)	Male (%)	Subtotal (%)	Female (%)	Male (%)	Subtotal	Female (%)	Male (%)	Subtotal (%)	Female	Male	Total
Attitudes	62 (59.6)	21 (32.8)	83 (49.4)	42 (40.4)	40 (62.5)	82 (48.8)	0 (0)	3 (100)	3 (1.8)	104 (61.9)	64 (38.1)	168 (100)
Anxiety	4 (3.8)	8 (1.3)	12 (7.1)	37 (35.6)	33 (51.6)	70 (41.7)	63 (60.6)	23 (35.9)	86 (51.2)	104 (61.9)	64 (38.1)	168 (100)

In urban area of Musanze district, Table 3 shows that female secondary students have more positive attitudes and are less anxious than males since female students in urban area demonstrated low levels of anxiety at 60.6 % while males were at 35.9 %.As mentioned above, the discussion done previously applies also to this case of urban schools.

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Table 4: Levels of attitudes and anxiety for sampled secondary students in rural area of MUSANZE District desegregated by gender

	High level (M >= 3.67)			Medium (2.34 <= M < 3.67)			Low (M < 2.34)			Total		
	Female (%)	Male (%)	Subtotal (%)	Female (%)	Male (%)	Subtotal	Female (%)	Male (%)	Subtotal (%)	Female	Male	Total (%)
Attitudes	189 (52.8)	93 (39.2)	282 (47.4)	144 (40.2)	114 (48.1)	258 (43.4)	25 (7.0)	30 (12.7)	55 (9.2)	358 (61.2)	237 (39.8)	595 (100)
Anxiety	50 (14.0)	34 (14.3)	84 (14.1)	125 (34.9)	80 (37.8)	205 (34.5)	183 (51.1)	123 (51.9)	306 (51.4)	358 (61.2)	237 (39.8)	595 (100)

Table 4 shows that in the rural area of Musanze District, female secondary students have more positive attitudes than the counterpart males. However, in contrast with urban area, female students slightly more anxiety than males since female students in rural area demonstrated low levels of anxiety at 51.1 % while males were at 51.9 %. However, there is need to increase strategies that reduce the students' anxiety since the gap of 48.1% who demonstrated high level of anxiety is a big number. Here again, the discussion done for table 2 applies also to this case of rural schools

In addition to previous findings, Table 5 below shows findings from a t-test run to test whether there is a statistically significance in attitudes and anxiety between urban and rural students in Musanze District.

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Table 5: t-test for comparison of Mean scores of students' attitudes and anxiety disaggregated by location

	Location	N	M	SD	t	p	SL	ES	IES
Attitudes	Urban schools	168	3.506	.621	.109	0.913	Not significant at 0,05 level	-	-
	Rural schools	595	3.499	.777					
Anxiety	Urban schools	168	2.473	.808	.074	0.941	Not significant at 0,05 level	-	-
	Rural schools	595	2.467	.937					

Note. SL=Significance Level, N=number of students, M=Mean score, SD=Standard Deviation, t=t-test p=p value SL= Significance Level, ES= Effect Size, IES=Interpretation of Effect Size

Table 5 reveals that shows that there is no significant difference of Mean scores of students' attitudes and anxiety between secondary students attending urban and rural schools in Musanze districtat $p<0.05$.The null hypothesis is then confirmed. Similar results have been found by Kannamet. (2015) as far as students' attitudes are concerned.

4. CONCLUSION AND RECOMMENDATIONS

The levels of attitudes of sampled secondary students were found in the three categories of analysis, that is, High level, Medium level and Low level. Many secondary students demonstrated high levels of attitudes, others demonstrated medium level attitudes and only few displayed low level of attitudes.

Female students showed lower levels of anxiety than they counterpart males and there was no significant different difference on means scores based on location.

In order to pursue the downward trend of anxiety towards mathematics and the upward trend of positive attitudes demonstrated by the participants of this study, teachers need to develop the students' understanding of the importance of mathematics in Science, Technology, Engineering and Mathematics Education (White, 2014) in Rwanda's future needs of skilled population without distinction between females and males. Concerning Schools of MUSANZE District, it is advisable to introduce some problem-based learning strategies in order to develop skills of problems solving as introduced by MINEDUC in the new curriculum based on competences. Improved levels of confidence and more emotional resilience will contribute to ease the

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"transition from learning what other people once discovered to making own discoveries" (Schwartz, 2008, p.1771).

For further researches in the attitudes and values component of competence-based curriculum of Mathematics (MINEDUC, 2015), the data collected in this study are being analysed by using SPSS to run a t-test and Analysis of Variance (ANOVA) to check whether there are statistically significant differences based on gender, location, status and type of the schools.

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