



*Original Research Article*

# **Influence of school culture on students' attitude towards the learning of mathematics Subject: A Case of Ward secondary schools in Arusha District, Tanzania**

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This study sought to establish the influence of school culture on students' attitude towards the learning of mathematics subject among ward secondary schools in Arusha District, Tanzania, through descriptive statistics and Pearson Product Moment Correlational Coefficient, using the SPSS. The study sample was 297 respondents out of 1,300 form three students from seven out of 17 secondary schools. Validity was ensured through expert review and the pilot study's analysis yielded the Cronbach's Alpha of above 0.7 for each variable. Respondents disagreed that school administration avails computerized application for mathematics. However, teachers encouraged students to foster confidence in learning mathematics; they gave students opportunity to answer questions and used differentiate methods to explain mathematical concepts. Because of rewards given by teachers, students were encouraged to work hard and they liked working with numbers. There is a significant positive yet weak correlation between students personality and the learning environment (Sig=000,  $r=.245$ ), between personality and students' participation (Sig=.000,  $r=.385$ ) and between personality and guidance from teachers (Sig=000,  $r=.419$ ). The school environment and students' participation enhanced students' personality, while guidance from teachers enhanced the personality of students toward mathematics. The study recommends that the school management should maintain appropriate learning environment for better results in mathematics subject.

**Keywords:** School culture, attitude, mathematics, learning, Arusha, Tanzania.

## **INTRODUCTION**

Students' learning and performance in mathematics is affected by a number of factors, including students' attitude towards the subject, teachers' instructional practices and school environment (Yang, 2015). Mathematics, like any other examinable subject offered in both primary and secondary schools in Tanzania plays a key role in shaping how individuals deal with various spheres of private, social and civil life (Mazana et al., 2019). According to Presmeg (2017), a positive school culture can be defined broadly to include social climate aspects such as a safe and caring

environment in which all students feel welcomed, valued, and have a sense of ownership of their school; this helps students in their moral development. Another feature is intellectual climate in which all students in every classroom are supported and challenged to do their very best and achieve work of quality; this includes a rich, rigorous and engaging curriculum, and a powerful pedagogy for teaching.

Studies have been conducted worldwide on students' attitude towards mathematics subject. Sanchal and Sharma (2017) conducted a study on students' attitudes towards

learning Mathematics in New Zealand. Findings revealed that students' attitude comprised of their confidence, awareness of mathematics and engagement. These findings suggest that when students learn in a supportive context, their confidence, seeing the importance of mathematics and engagement increase. In Western China, a study by Yang (2015) revealed that rural junior secondary school students generally did not perceive their Mathematics classroom environment very favorable, and as a result, they did not hold very positive attitudes towards the subject. This suggests that inappropriate learning environment reduces the chances for learners to like mathematics. Shamaki (2015) studied on the influence of learning environment on students' academic achievement in mathematics subject in Yobe State-Nigeria. The results showed that students' attitudes towards mathematics were positive and many of them believed that mathematics teaching is a worthwhile and necessary subject which could help them in their future career. In South Africa, Mutodi and Ngirande (2014) in their study on the influence of students' perceptions on mathematics performance in selected high schools reported that weaknesses in mathematics, family background and support, interests in mathematics, self-confidence in mathematics, myths and beliefs about mathematics and learning materials influenced students' attitude towards the subject.

In Tanzania, Mazana et al. (2019) investigated on students' attitude towards learning mathematics. The results revealed that initially students exhibit a positive attitude towards mathematics, but their attitude becomes less positive as the students move forward to higher levels of education. A significant positive yet weak correlation between students' attitude and performance was also established. The factors influencing the students' liking or disliking of mathematics included instructional and social psychological environmental factors that surrounded the learners. Furthermore, Michael (2015) studied factors leading to poor performance in mathematics subject in secondary schools of Kibaha District. The study revealed that family background influences student performance in mathematics in a positive or negative way.

While there are several factors that may influence students to learn effectively, attitude towards learning is one of the potential factors. According to Dalin (2017), the right attitude towards something is what matters to motivate one to achieve the goal. If the attitude of the learner towards learning is positive, effective learning will take place; and if it is negative, it may become difficulty for learning to happen. While there are many factors which may affect students' attitudes, this study investigated on the influence of school culture on students' attitude towards the learning of mathematics subject among the ward secondary schools in Arusha district, Tanzania. The study was guided by the following research questions:

1. What is the students' perception on school culture in Ward secondary schools in Arusha District?
2. What is the students' attitude towards mathematics subjects in Ward secondary schools in

Arusha District?

3. Is there any significant relationship between school culture and attitudes towards mathematics subject in Ward secondary schools in Arusha District?

### **Supportive Environment and Students' Attitude**

School environmental factors are very important for learning effectiveness. This is revealed by the study findings of Godson and Ngussa (2020) who investigated on the effect of school environment on students' commitment toward learning among secondary schools in Monduli District, Tanzania. The study established an existing relationship between school environment and students' commitment toward learning and that effective school environment predicts the level of students' commitment toward learning. The study recommended that school management teams need to work hard to improve school environmental factors as such are essential for effective learning to take place.

While Zan and Martino (2007) have it that attitude plays a crucial role in learning and achievement in mathematics, studies have indicated that school environment can influence students' attitude towards the learning of Mathematics. A study in Zimbabwe by Nyoni, et al. (2017) for instance, concluded that proper school environment makes the students psychologically comfortable and enhances students' motivation in school related activities, making the learning efficient and interesting. The findings, further, indicate that teaching and learning become easy when students have positive attitude due to being comfortable with the school environment. The findings also revealed that availability of resources play an important role in determining students' attitude towards learning mathematics.

According to Flanders and Altındağ (2009), teaching should not be seen as just providing information for the learners to store information; rather it should be aimed at creating a suitable environment in which learners are engaged in meaningful learning tasks in order to construct knowledge for themselves. A study by Yavoz (1991) revealed that the attitude toward learning of students taught by discovery method was significantly higher than the students taught by lecture method. Eshiwani (1993) suggested that the availability of textbooks has a positive relationship with proper attitude and achievement in both primary and secondary schools. The author proposed that every learner should have a mathematics textbook which will inspire a positive attitude toward the subject matter. Therefore, the teaching methodologies creates an environment which can determine the attitude of the learners toward the subject matter.

### **Culture**

Positive school cultures provide a safe, supportive, encouraging, inviting, and challenging environment for students which in turn allow students' academic

achievement to evolve (Shamaki, 2015). Korir and Kipkemboi (2014) postulated that school culture includes school structure, school composition and school climate. School environmental factors may also include safe, positive relationships and engaging collaboration, academic expectations, effective leadership and teachers professional development. All these may have an influence on students' attitude towards mathematics. The school culture further includes classrooms, library, technical workshops, teachers' quality, teaching methods and peers that can affect the teaching and learning process.

### **Attitude**

Attitude is one of key aspects for effective learning to take place. According to Ngussa and Mwema (2021), attitude is an essential aspect through which the rate of learning can be determined. Mensah, Okyere, and Kuranchie (2013, p. 132) described attitude as "concerned with an individual's way of thinking, acting and behaving, having very serious implications for the learner, the teacher, the immediate social group with which the individual learner relates, and the entire school system. Ngussa (2020) studied about holistic aspects and students attitude toward learning among Adventist Universities in East and Central Africa and established that effective teaching strategies enhance attitude of students toward learning. It is also important to note that attitudes are not innate but are formed as a result of an individual's contact with the object and its environment (Supe, 2002). Chepcheing (2005) asserts that early socialization which children are taken through tends to make them develop attitudes that lend support against a mistaken notion that mathematics and sciences are not for girls. Therefore, it is important for educational stakeholders to instill proper attitude in students for them to learn effectively.

## **METHODOLOGY**

This section presents the research methodology which includes the research design, population and sampling as well as validity and reliability of the research instrument.

### **Research Design**

The study used descriptive research design in that some research questions were analyzed through descriptive statistics while one research question was analyzed through Pearson correlations. This is in harmony with Cohen et al. (2005) who defined descriptive design as conditions or relationships that exist, practices that prevail, beliefs, points of views, or attitudes that are held, processes that are going on, effects that are being felt or trends that are developing. Questionnaire was the major source of data collection. It had closed ended items to which respondents had to indicate their level of agreement or disagreement.

The criteria for interpreting the mean scores were as follows: 1.00 to 1.49 = strongly disagree, 1.50 to 2.49 = disagree, 2.50 to 3.49 = neutral, 3.50 to 4.49 = agree and 4.50 to 5.00 = strongly agree.

### **Population and Sampling Procedures**

The targeted population of this study included 1,300 form three students from seven out of 17 secondary schools which were selected through simple random sampling. The sample of the respondents was calculated using Krejcie and Morgan technique (1970). As reflected in Table 1, the sample for the population of 1300 is 297 respondents.

### **Validity and Reliability**

In this study, validity of the research instruments was ensured through expert review. The experts in research, including the research supervisor and the University of Arusha statistician went through the questionnaire and gave comments to ensure that the contents are well understood; and they match with the research questions that guided the study.

The researchers conducted a pilot study with 50 students from one school which was not part of the sampled schools prior to data collection to check the reliability of the questionnaire. The pilot study's analysis yielded the Cronbach's Alpha of above 0.7 for each variable as seen in Table 2.

### **Ethical Considerations**

In this study, ethical issues were considered. First of all, a team of research experts from the University of Arusha went through the research proposal and the questionnaire prior to data collection. Advices were given for further improvement. Secondly, research permit was granted by the Arusha District council before data collection took place. Finally, respondents were given freedom to participate or withdraw from participating. Anonymity and confidentiality were also observed in that respondents did not write their names on the questionnaire.

## **ANALYSIS AND RESULTS**

The analysis of data began with presentation of demographic characteristics of respondents, followed by descriptive statistics and finally the inferential statistics that determined the possible correlation between the independent and the dependent variables.

### **Demographic Characteristics of Respondents**

The analysis started with the demographic characteristics of respondents in terms of gender. The male respondents were 143 (48.1%) as compared to the female respondents who were 154 (51.9%). Therefore, the majority of the

**Table 1.** Population and Sampling

Selected School	Population	Sample
Ilkiding'a secondary school	340	77
Mateves secondary school	152	35
Oltrumet secondary school	72	16
Osiligi secondary school	87	20
Kiranyi secondary school	316	72
Oljoro secondary school	135	31
Sokoni II secondary school	198	46
<b>Total</b>	<b>1300</b>	<b>297</b>

**Table 2.** Reliability Test

SN	VARIABLE	CRONBACH'S ALPA
1	Environment	.702
2	Participation	.743
3	Guidance	.759
4	Beliefs	.804
5	Personality	.816

**Table 3.** Supportive Environment

SN	Items in the Questionnaire	Mean	Std. Dev.	Interpretation
1.	School study groups for the subjects help to improve my understanding of mathematics concept.	3.7703	1.04537	Agree
2.	My classroom has adequate black boards that encourage students to perform Mathematical tasks comfortably	3.6599	1.02775	Agree
3.	My school provides garden chairs that encourage conducive environment for students to perform learning mathematics	3.0743	1.23832	Neutral
4.	My teachers are provided with different teaching apparatus for mathematics subjects.	2.8328	1.19475	Neutral
5.	My school administration avail computerized application for mathematics teachers.	2.4527	1.24238	Disagree

respondents were females.

### Descriptive Analysis

The descriptive analysis targeted to establish the perception of respondents and was guided by two research questions. The questionnaire had five options from which respondents had to choose ranging from strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5). The criteria for interpreting the mean scores were as follows: 1.00 to 1.49 = strongly disagree, 1.50 to 2.49 = disagree, 2.50 to 3.49 = neutral, 3.50 to 4.49 = agree and 4.50 to 5.00 = strongly agree.

**Research Question 1:** *What is the students' perception on the school culture in Ward secondary schools in Arusha District?*

The School Culture was measured by three variables namely (a) Supportive Environment, (b) Students' Participation and (c) Teachers' Guidance.

### Supportive Environment

There were five items which measured the supportive environment in the schools under investigation as described in Table 3.

Respondents agreed with the first two items that school study groups for the subjects helped to improve their understanding of mathematics concept and that their classrooms have adequate black boards that encourage students to perform Mathematical tasks comfortably. This suggests availability of conducive environment for learning mathematics. The study of Godson and Ngussa (2020) established an existing relationship between effective school environment and students' commitment toward learning. They also established that effective school environment predicts the level of students' commitment toward learning.

However, respondents disagreed with one item that the school administration availed computerized application for mathematics teachers. This kind of deficiency could be harmful to the process of learning, and therefore calls for

**Table 4.** Students' Participation

SN	Items in the Questionnaire	Mean	Std. Dev.	Interpretation
1	I always do mathematics assignments with members of my class study group.	3.8788	.93656	Agree
2	I normally volunteer to take part in solving mathematical problems during class time.	3.6959	.92907	Agree
3	I take advantage to learn more during remedial periods that my teacher provides regularly.	3.6345	1.17537	Agree
4	I am inspired to learn mathematics because the books are available.	3.0273	1.20186	Neutral
5	I take advantage to practice mathematics because of the computers at the school library.	2.5374	1.30775	Neutral

**Table 5.** Teachers' Guidance

SN	Items in the Questionnaire	Mean	Std. Dev.	Interpretation
1	My teacher encourages me to foster confidence in learning mathematics.	3.8889	1.00561	Agree
2	My teacher always gives me the opportunity to answer questions	3.8855	.95879	Agree
3	When I get a wrong answer, my teacher will always corrects me kindly.	3.6465	1.24916	Agree
4	My teacher uses different methods to explain Mathematical concepts.	3.6284	1.16025	Agree
5	My teacher takes time to tell us the importance of mathematics.	3.5492	1.20237	Agree

the school administration to address it seriously. Furthermore, respondents were undecided whether the schools provided garden chairs that provided conducive environment for students to perform well and that the teachers are provided with different teaching apparatus for mathematics subject.

### Students' Participation

There were five items which measured the students' participation in the schools under investigation as described in Table 4. Students agreed with the first three items in the questionnaire.

They agreed that they always do mathematics with members of their classes study groups, that they normally volunteer to take part in solving mathematical problems during classroom sessions and that they take advantage to learn more during remedial periods that the teachers provide regularly. The noted students' participation is an added advantage for effective learning to take place as argued by Ngussa et al. (2020) whose study in Indonesia established that engagement of the learner is a key aspect for effective learning to take place. However, they were undecided whether they were inspired to learn mathematics because the books were available and whether they take advantage to practice mathematics because of the computers at the school library.

### Teachers' Guidance

Teachers' guidance is one of aspects that constitute the culture of the school as far as teaching and learning is concerned. There were five items which measured teachers' guidance in the schools under investigation as described in Table 5.

Students agreed that the teachers encouraged them to foster confidence in learning mathematics, that the teachers always provided the opportunity to answer questions, that the teachers differentiate methods to explain mathematical concepts and that the teachers take time to tell students the

importance of mathematics subject. While it is worth noting that respondents agreed with all items regarding guidance received from teachers, guidance from teachers is one of the key aspects that can lead to good performance of the learners (Nyoni and Bonga, 2017). Another study by Shamaki (2015) revealed that motivation and interest of students towards the subject matter a lot for better results.

**Research Question 2:** *What is the students' attitude towards mathematics subjects in Ward secondary schools in Arusha District?*

The students' attitude was measured by two variables namely (a) Students' Beliefs' and (b) Students' Personality.

### Students' Beliefs

There were five items which measured students' attitude in the schools under investigation as described in Table 6. Students' positive beliefs could be an important factor for their success or failure. Regarding attitude, students agreed that those who know mathematics are proud of the experience. The positive beliefs or attitude can lead to success while the negative belief can lead to failure (Mata, 2012). The right emotional dispositions have an impact on an individual's behavior, as one is likely to achieve better in a subject that one enjoys, has confidence in or finds useful. Hence positive attitudes towards mathematics are desirable since they may influence one's willingness to learn.

Students disagreed that mathematics is not made for them. This suggests that mathematics subject is valued as an importance subject for the learners under investigation. This is because the purpose of mathematics classes in schools is to help students gain problem solving skills and proper reasoning.

### Students' Personality

There were five items which measured student' personality

**Table 6.** Students' Attitude

SN	Items in the Questionnaire	Mean	Std. Dev.	Interpretation
1	Those who know mathematics are proud.	3.7789	1.10634	Agree
2	My community does not believe that mathematics subject is easy.	3.3857	1.23230	Neutral
3	My parents believe that mathematics is difficult.	2.8271	1.17829	Neutral
4	I believe mathematics is a difficult subject.	2.6130	1.28067	Neutral
5	Mathematics is not made for me.	2.4815	1.21942	Disagree

**Table 7.** Students' Personality

SN	Items in the Questionnaire	Mean	Std. Dev.	Interpretation
1	Because of rewards/praise given by teachers, mathematics I am encouraged to work hard.	3.8102	1.05844	Agree
2	I like working with numbers.	3.7492	1.18872	Agree
3	I like mathematics because the teacher understands.	3.5458	1.11443	Agree
4	I understand mathematical concepts well	3.3480	1.15444	Neutral
5	Mathematics is easy for me.	3.1741	1.23882	Neutral

**Table 8.** Correlations between Variables

		ENVIRONMENT	PARTICIPATION	GUIDANCE	BELIEFS	PERSONALITY
ENVIRONMENT	Pearson Correlation	1	.470**	.469**	.025	.245**
	Sig. (2-tailed)		.000	.000	.668	.000
	N	297	297	297	297	296
PARTICIPATION	Pearson Correlation	.470**	1	.540**	-.042	.385**
	Sig. (2-tailed)	.000		.000	.472	.000
	N	297	297	297	297	296
GUIDANCE	Pearson Correlation	.469**	.540**	1	-.055	.419**
	Sig. (2-tailed)	.000	.000		.347	.000
	N	297	297	297	297	296
BELIEFS	Pearson Correlation	.025	-.042	-.055	1	-.191**
	Sig. (2-tailed)	.668	.472	.347		.001
	N	297	297	297	297	296
PERSONALITY	Pearson Correlation	.245**	.385**	.419**	-.191**	1
	Sig. (2-tailed)	.000	.000	.000	.001	
	N	296	296	296	296	296

\*\* . Correlation is significant at the 0.01 level (2-tailed).

in the schools under investigation as described in Table 7. Regarding students' personality, students believed that because of rewards or praise given by teachers, they are encouraged to work hard, that they like working with numbers and that they like mathematics because their teachers understand it (OECD, 2013).

Since students like working with numbers and since they believe that their mathematics teachers are competent, these are positive factors that can lead to their success in the mathematics subject (Su et al., 2016).

**Research Question 3:** Is there any significant relationship between school culture and attitudes towards mathematics subject in Ward secondary schools in Arusha District according to students?

This research question called for hypothesis testing to determine the relationship between the independent and dependent variables. The hypothesis was tested through

Pearson Product Moment Correlational Coefficient as indicated in Table 8.

The nature of possible correlation would be either positive or negative and its interpretation based on the Cohen's formula as follows:  $\geq .70$ = strong relationship;  $\geq .50$  = moderate relationship and  $\leq .50$ = weak relationship. As seen in Table 8, there is a significant positive yet weak correlation between students personality and the learning environment (Sig=0.000,  $r=.245$ ), between personality and students' participation (Sig=.000,  $r=.385$ ) and between personality and guidance from teachers (Sig=0.000,  $r=.419$ ). This means that the school environment enhanced students' personality and that guidance from teachers enhances the personality of students toward mathematics.

### Conclusions of the Study

Based on the findings of the study, the researchers came up with the following the conclusions regarding the influence

of school culture on students' attitude towards the learning of mathematics subject among the ward secondary schools in Arusha district, Tanzania:

School study groups for the subjects help to improve students' understanding of mathematics concept. The classrooms have adequate black boards that encourage students to perform Mathematical tasks comfortably. While respondents disagreed that school administration avails computerized application for mathematics teachers, this kind of deficiency could be harmful to the process of learning and therefore calls for the school administration to address it seriously.

Students always do mathematics with members of their classes study groups; they normally volunteer to take part in solving mathematical problems during classroom sessions and they take advantage to learn more during remedial periods that the teachers provide regularly.

Teachers do encourage students to foster confidence in learning mathematics; they always give students the opportunity to answer questions and uses differentiate methods to explain mathematical concepts. Finally, they take time to tell students the importance of mathematics subject.

Those students who have mastered mathematics are proud of this accomplishment. Therefore, mathematics subject is valued as an importance subject in the contemporary world. Because of rewards/ praise given by teachers, students are encouraged to work hard and they like working with numbers since their teachers have mastered the subject matter. These are positive factors that can lead to students' success in the mathematics subject.

Finally it is concluded that there is a significant positive yet weak correlation between student's personality and the learning environment, between personality and students' participation and between personality and guidance from teachers. The school environment and students' participation enhance students personality and guidance from teachers enhances the personality of students toward mathematics.

### Recommendations of the Study

Based on the conclusions of the study, the researchers came up with the following recommendations of the study regarding the influence of school culture on students' attitude towards the learning of mathematics subject.

It is recommended that the school administration should avails computerized application for mathematics teachers to avoid the harmful results in the process of teaching and learning. The school management should also maintain appropriate learning environment for the better results in the students' final examinations. Teachers should encourage students to continue do mathematics with members of their classes study groups for better learning outcomes. Students should also be encouraged to volunteer to take part in solving mathematical problems during classroom sessions.

Teachers should continue to encourage students to foster

confidence in learning mathematics, give students opportunity to answer questions and use differentiate methods to explain mathematical concepts for better learning outcomes. Mathematics teachers should do their best to help students value the mathematics subject whose application cuts across all other subjects in secondary school curriculum. Since the school environment, students' participation and teachers' guidance and counseling enhances the personality of students toward mathematics, there is need for mathematics teachers to maintain appropriate learning environment, opportunity for students to actively participate and guidance and counseling to mathematics students.

The researchers recommend further studies especially students' interaction factor and attitude toward mathematics subject.

### Conflict of interests

The authors declare that there is no conflict of interests regarding the publication of this manuscript.

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