Turkish Online Journal of Qualitative Inquiry (TOJQI)

Volume 12, Issue 5, June 2021: 2600- 2613

Research Article

Qualitative and Quantitative Analysis of Factors Effecting Student's Attitude Towards Teaching and Learning Mathematics

Belay Fikadu Gerba[1], Ramgopal Nallan Chakravarthula[2, *]

[1]Department of Mathematics, Dambi Dollo University, Dambi Dollo, Ethiopia.

[2]Department of Mathematics, Bule Hora University, Bule Hora, Ethiopia.

*Address all correspondence to: Ramgopal Nallan Chakravarthula, Department of Mathematics, Bule Hora University, Bule Hora, Ethiopia.

E-mail: [2, *]ramgopal.nch@gmail.com

[1]belayfikadu2015@gmail.com

ABSTRACT

This investigation examines attitude of the students towards teaching and learning mathematics in secondary schools of West Guji Zone in Ethiopia. The problems faced by students in mathematics achievement and factors effecting 11th grade students in learning mathematics has been studied. Identified different ways to develop positive attitude towards mathematics. Several studies have been conducted to find out the relationship among students, attitude towards mathematics, academic achievement of students and factors affecting students learning. A survey has been conducted in secondary schools of West Guji Zone. The data has been collected using a set of questionnaires and analyzed by importing the statistical methods.

Keywords*: Quantitative and Qualitative analysis, Student's achievement in mathematics, Factors effecting student's attitude, Teaching and learning mathematics.*

1. INTRODUCTION

Mathematics is foundation in many ways that informs our decisions in areas of our lives. Teaching and learning mathematics are at the heart of education. Learning mathematics aims to link school to everyday life, provide skill acquisition, prepare students for the workforce, and foster mathematical thinking. Mathematics involves learning to problem-solving, investigate, represent and communicate mathematical concepts and ideas and making connections to everyday life [1]. With the rapid growth of science and technology a strong background in mathematics is very important. The knowledge of mathematics is essential in our daily life and also in most of our human activities. To cope up with newly emerging technology and computerized world, we need to have a strong background in mathematics [2]. The development of science shows that more mathematical methods and mathematical approaches are penetrating everywhere.

Napoleon remarked that "The progress and improvement of mathematics is linked to the prosperity of the state". Although there is no standard definition of the term attitude, in general it refers to a learned predisposition or tendency on the part of an individual to respond positively or negatively to some object, situation, concept or person [3].

The Principles and Standards for School Mathematics developed by the National Council of Teachers of Mathematics emphasize the importance of problem-based mathematics instruction. Mathematical problem solving refers to "the cognitive process of figuring out how to solve a mathematics problem that one does not already know how to solve. Problem solving is vital because of its importance in daily life. It provides the context for learning new concepts and for practicing learned skills. Improving students' problem-solving skills has been proved to be a significant challenge [4].

Attitude refers to a learned tendency of a person to respond positively or negatively towards an object, situation, a concept, or a person. It is also regarded as a belief held by individuals that reflects their opinions and feelings, and can be sometimes manifested in behavior. Attitudes, behavior, and feelings are interrelated in such a way that people's attitudes determine their behavior towards objects, situations, and people. They also influence the relationships that exist among these variables with themselves [5]. Based on experiences with mathematics at school, students develop general attitude about its nature and value, and about their own abilities and interest in doing it. Attitudes and behaviors are frequently measured using self-report which enable economic survey method to be employed on a large scale which holds those instructional methods which are highly effective with novice learners. Furthermore, students' attitude and behavior have been found to be influenced by school and class room factors. Attitude seen as cognitive and effective orientation or disposition towards an object, idea, person, situation [6].

Educational Psychologists have recognized the importance of motivation for supporting students' effective learning. Because, initiative was identified as the life and career skills necessary to prepare students for education and the work force. Motivation provides source of energy that is responsible for why learners decide to make an effort, how long they are willing to sustain an activity, how hard they are going to pursue an activity and how connected they feel to the activity. It is known that ignite and sustaining a source of positive energy is so vital to get ultimate success.

Shrinking achievement gap is very important in educational and social progress. It provides information on the achievement gaps among different countries in mathematics. In Taiwan, based on the result of TIMSS 2003, there was an excellent average performance by the students. However, the proportion of low achievers was high and the overall students' learning interest and self-efficiency were quite low. In order to narrow the achievement gaps in Taiwan, the policy of After School Alternative Program (ASAP), was proposed by Ministry of Education (MoE) and National Science Council (NSC), which aimed at ensuring both academic excellence and equity by providing new opportunities and challenges for Taiwan to advance the goal of closing the achievement gap [7].

According to the Ethiopian curriculum, Mathematics is compulsory subject. But many students get less than 'C' grade in both at university and national level. For students who are competing to get a job in many offices, institutions and organizations, 'C 'is the minimum requirement at mathematics & natural sciences. As, many students dislike mathematics, many times they are losing this advantage of getting right job at right time.

As Mathematics is basic foundation for many fields, it is very essential for every student and the efficiency of student must increase in this subject. But, the acceptability of this subject by students is very low and there is psychological war on this subject. Most of the students are not focusing on this subject. Studying mathematics at secondary level is the foundation stage of Higher Education. Every secondary school student study mathematics as a compulsory subject, so that he/she gains a basic quantum of mathematical knowledge as a part of general education (Ethiopian curriculum), even though in our society there is a false generalization that mathematics is a difficult subject.

Problems related to learning Mathematics are common phenomenon among students in Ethiopia. This holds true in Bule Hora context too. A number of factors do influence students' Mathematics achievement positively or negatively. One among these factors is student's attitude towards Mathematics. The direct relationship between Mathematics achievements and attitude as well as their reciprocal influence well documented. In the Bule Hora context, the number of schools and number of students is incompatible. There are a large number of students in each class where this became a barrier to the learning of Mathematics. Many studies indicated that reduced class sizes lead to improved student achievement. Some prominent factors that contributed to difficulties in learning mathematics are students dislike mathematics that they may have stem from psychological incidences such as fear endurance, perseverance and other associated factors. Socio-economic, culture and school-based factors with method of teaching, availability of teaching-learning materials work load and motivation are final strategies to be adopted to improve learning and achievement [8]. Students' attitude towards problem solving in terms of patience, confidence and willingness had positive relation with students' mathematics achievement [9].

2. RELATED WORK

F. Khatoon has studied the relationship of mathematical aptitude among boys and girls with interest and vocational preferences [10]. A. Rosaly has found that the attitude of high school students towards the learning of mathematics and achievements in mathematics is highly correlated and that urban boys and girls have a more positive attitude towards mathematics than rural boys and girls [11]. The relation between the factors effecting student's Performance in Engineering Educational Teaching System has been studied by Ramgopal Nallan Chakravarthula et. al [12]. W. J. Mckeachie and Y. Lin studied the relationship between student gender, teacher's instructional strategies and student's achievements and found that appropriate teacher instructional strategies resulted in higher mean achievement measured by grades of students [13]. D. Stipek and H. Granlinski concluded that girls have lower expectations for themselves in mathematics than boys [14].

Over the past four years, Australasian researchers have focused on MLD from a range of perspectives including the medical model of disability (deficiencies), the cognitive-based inefficient learner model (inefficiencies) and the environmental factors model (ineffective teaching). It has been found that without early identification and intervention, low-attaining students are at risk of longer-term underachievement in mathematics. Although there was a lack of consensus about the causes of underachievement and what constituted effective instruction, researchers across the three fields agree that education systems face challenges in ensuring diverse populations of learners become mathematically proficient [15].

In this paper, several studies have been conducted to find out the relationship among students, attitude towards mathematics, academic achievement of students and factors affecting students learning. In West Guji Zone, Bule Hora Town secondary school student's attitude towards mathematics has been examined. Mainly concentrated on why the students dislike mathematics, how to create positive attitude towards mathematics. The main purpose of this research is to find ways to solve problems facing by the students on their mathematics achievement, solution to factors affecting 11^{th} grade students in learning mathematics and ways to develop positive attitude towards mathematics.

3. METHODOLOGY

3.1 STUDY AREA

The study has been carried out in high schools of Bule Hora Town. The zone is found in south Ethiopia Oromia region. It is 470 Km from Addis Ababa, the capital city of Ethiopia.

3.2 RESPONDENTS OF THE STUDY

The respondents of the study are randomly selected secondary school students of Bule Hora Town, West Guji Zone, Ethiopia.

3.3 DESIGN OF THE WORK

The design of this research work is cross-sectional study and random selection of the students and mathematics teachers of some selected schools. We focused on finding the psychological, technical and school environmental solution of teaching and learning problems of those randomly selected schools of Bule Hora Town by mobilizing the students through teaching on basic mathematics.

3.4 DATA COLLECTION AND STATISTICAL ANALYSIS

The data has been collected from students, teachers, schools, parents, etc. Both qualitative and quantitative data have been collected from primary and secondary sources. In addition to quantitative analysis data generated, information was collected through visual observation both in field and using photographs. The data generated using the questionnaire have been organized and coded to investigate the means of teaching and learning mathematics and natural sciences. The questionnaires used to unveil the root causes of the misconception on mathematics and natural sciences. Statistical Package for the Social Sciences (SPSS) version 20 was used to analyze the data.

4. DISCUSSIONS AND CONCLUSIONS

4.1 DISCUSSIONS

In Ethiopia, the educational back ground of students' parents who have less than grade 10, are more than half. This has negative impact on the student's attitude towards mathematics. In addition to this, there is no after school for students. Gender, parents' educational level and student's socio-economic status are some of the demographic factors that affect student's attitude. Very important factor involved in motivating students towards education is the parent. Parental involvement and student's success in education are strongly correlated.

The summary of the information collected are analyzed by statistically and graphically.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
Gender of respondent	60	1	2	1.35	.062	.481	.645	.309	-1.640	.608
Grade level of the Respondent	60	1	3	2.67	.088	.681	-1.804	.309	1.718	.608
Economic status of the family per year	60	1.00	3.00	2.9000	.04572	.35415	-3.837	.309	15.523	.608
Father's Educational back ground	60	2.00	4.00	3.3167	.08401	.65073	-.422	.309	-.671	.608
Mother's Educational back ground	60	1.00	4.00	2.7667	.12205	.94540	-.380	.309	-.681	.608
If educated Diploma and above	60	1.00	3.00	1.9667	.12112	.93820	.068	.309	-1.898	.608
Valid N (listwise)	60									

Table 2: Gender of Respondent

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Male	39	65.0	65.0	65.0
	Female	21	35.0	35.0	100.0
	Total	60	100.0	100.0	

Table 3: Grade Level of the Respondent

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Below 10	7	11.7	11.7	11.7
	10	6	10.0	10.0	21.7
	11	47	78.3	78.3	100.0
	Total	60	100.0	100.0	

Table 4: Economical Status of the Family Per Year

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Below 2500	1	1.7	1.7	1.7
	2500-5000	4	6.7	6.7	8.3

	Above 5000	55	91.7	91.7	100.0
	Total	60	100.0	100.0	

Table 5: Father's Educational Back Ground

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Up to grade 10	6	10.0	10.0	10.0
	Up to diploma	29	48.3	48.3	58.3
	Degree and above	25	41.7	41.7	100.0
	Total	60	100.0	100.0	

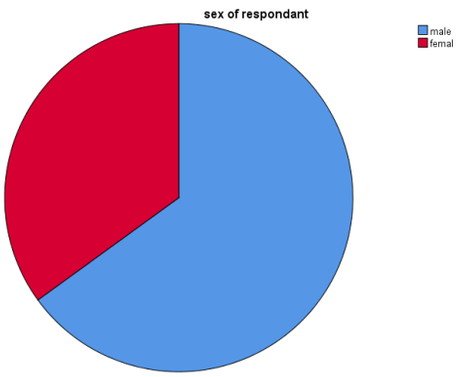
Table 6: Mother's Educational Back Ground

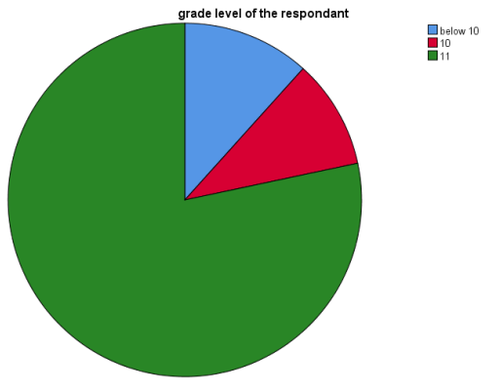
		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Not Educated	7	11.7	11.7	11.7
	Up to Grade 10	14	23.3	23.3	35.0
	Up to Diploma	25	41.7	41.7	76.7
	Degree and above	14	23.3	23.3	100.0
	Total	60	100.0	100.0	

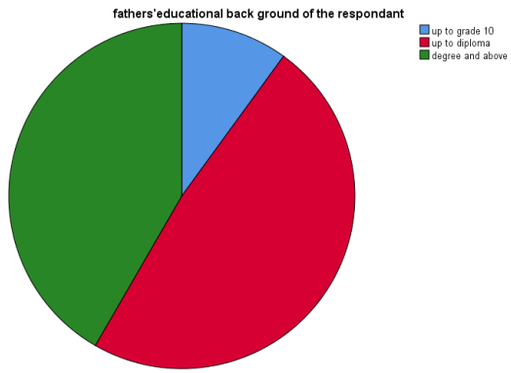
Table 7: If Educated Diploma and above in the Field He / She Graduated.

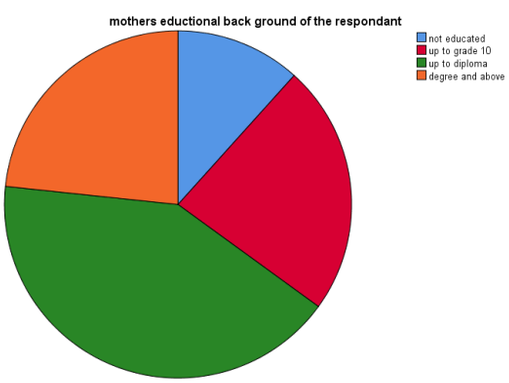
		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Related to Mathematics	27	45.0	45.0	45.0
	Not Related to Mathematics	8	13.3	13.3	58.3
	Below Diploma	25	41.7	41.7	100.0
	Total	60	100.0	100.0	

Belay Fikadu Gerba[1], Ramgopal Nallan Chakravarthula[2, *]









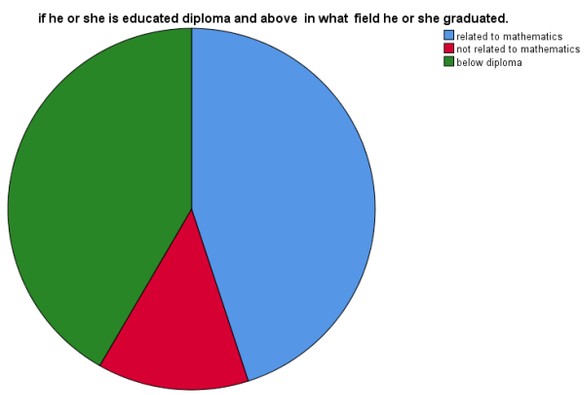


Table 8: Perceived Usefulness of Mathematics					
	N	Range	Minimum	Maximum	Mean
Knowledge in Mathematics is helpful	60	3.00	2.00	5.00	4.2667
Mathematics is not important in Life	60	2.00	1.00	3.00	1.6667
Mathematics is needed for future work	60	3.00	2.00	5.00	4.2833
I do not expect to use much Mathematics when I get out of school	60	4.00	1.00	5.00	1.8167
Mathematics is a Worthwhile, necessary subject	60	4.00	1.00	5.00	4.2667
Taking Mathematics is a waste of time	60	4.00	1.00	5.00	1.7667
Will use Mathematics in many ways as an adult	60	4.00	1.00	5.00	3.9500
I need a good understanding of Mathematics for my future work	60	4.00	1.00	5.00	3.2667
Performance in mathematics is not important for my future	60	4.00	1.00	5.00	2.7667
Valid N (list wise)	60				

Table 9: Self Conceptual in Mathematics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
I am satisfied with Mathematics	60	4.00	1.00	5.00	3.9333	.13627	1.05552	1.114
I usually quite when my work is hard in Mathematics	60	4.00	1.00	5.00	3.5833	.14708	1.13931	1.298
I am failure at Mathematics	60	4.00	1.00	5.00	3.0000	.14261	1.10469	1.220
I like to be called on by teacher to answer questions	60	4.00	1.00	5.00	3.1333	.17217	1.33362	1.779
I often feel like quitting Mathematics	60	4.00	1.00	5.00	3.2667	.14035	1.08716	1.182
I am the best school mathematics that I can	60	4.00	1.00	5.00	3.7667	.14135	1.09493	1.199
My teacher feel that I am not good enough in Mathematics	60	4.00	1.00	5.00	3.1667	.15974	1.23737	1.531
I am proud of my Mathematics	60	4.00	1.00	5.00	3.3000	.16858	1.30579	1.705
Valid N (list wise)	60							

Table 10: Motivation in Learning Mathematics

	N	Minimum	Maximum	Mean	Std. Deviation
I usually spend great effort to accomplish my work in Mathematics	60	1.00	5.00	3.4167	1.30568
I enjoy learning new things in Mathematics class	60	1.00	5.00	3.0333	1.31441
I have strong desire to excel with Mathematics	60	1.00	5.00	3.1667	1.32980
I do not like challenging question when I learn Mathematics	60	1.00	5.00	3.2833	1.49680
I learn simply for the sake of pass mark in Mathematics	60	1.00	5.00	3.2500	1.34826
Valid N (list wise)	60				

Table 11: Confidence in Mathematics

	N	Minimum	Maximum	Mean	Std. Deviation
I am sure that I can learn Mathematics	60	1.00	5.00	3.2500	1.28386
I don't think I could do advanced Mathematics	60	1.00	5.00	3.3833	1.12131
Mathematics is hard for me	60	1.00	5.00	4.0000	1.05766
I can get good grade in Mathematics	60	1.00	5.00	2.9333	1.33869
Mathematics has been my worst subject	60	1.00	5.00	3.3833	1.19450
I know I can do well in Mathematics	60	1.00	5.00	3.0000	1.27559
Valid N (list wise)	60				

Table 12: Anxiety in Mathematics

	N	Minimum	Maximum	Mean	Std. Deviation
I am afraid to ask questions in Mathematics class	60	1.00	52.00	4.3667	6.37518
I tend to zone out in Mathematics class	60	1.00	5.00	3.5833	1.12433
I fear more for the test in Mathematics	60	1.00	5.00	3.2833	1.20861
I do not know how to prepare for the test in Mathematics	60	1.00	22.00	3.7000	2.73273
Valid N (list wise)	60				

Initial coding of this research question resulted in five categories. They are, usefulness of Mathematics, self-conceptual in Mathematics, motivation in learning Mathematics, anxiety in Mathematics and confidence in Mathematics.

In the first category, usefulness of Mathematics, it is observed that some respondents like Mathematics because of its usefulness in their lives as it could be applied in real-life situations too. Also, most of them are agreed that without the knowledge of Mathematics, one cannot solve those Mathematical problems arise in other subjects (See table 9). In the second category-self-conceptual in mathematics, it is identified that mathematics has become difficult for those students, because, some were not good at mathematics, not being able to pass, failing to attempt some questions, lack of understanding of topics, less exercise and less practice, etc., Also, it is observed that most of the students don't have conceptual mathematics due to different problems such as; teacher, economy, educational back ground of parents (see table 10).

As a result, for the survey on self-confidence in mathematics, some are lacking confidence in themselves as mathematics learners and believed that they were not good at mathematics. This illustrates the importance of self-confidence and that lack of confidence had a negative influence on the student's attitude towards mathematics. Thus, teachers should use strategies that will boost up students' confidence in mathematics (see table11).

The responses indicate that some students did not like mathematics as they are getting poor results in examination as compared to other subjects. So, it can be quoted that "it causes someone to lose hope when he/she has failed while they have passed in other subjects. This highlights the importance of positive results in

one's life, implying that negative results discourage students regarding mathematics hence they dislike the subject (See table12).

4.2 CONCLUSIONS AND RECOMMENDATIONS

The study found that students have a positive attitude towards mathematics. However, the attitude start changing when students enter secondary schools. Despite the number being small, negative attitudes may have a greater effect on students' learning.

Despite the fact that most of the students exhibit positive attitude towards mathematics, the majority are failing their mathematics examinations. From the present investigation, it can be understood that the problem is not only on the students' attitude toward the subject but also on other factors affecting their grades. As per the present findings, these factors include family back ground, insufficient teachers to deliver instructions, institutional resources, economic back ground, involuntarily involvement, contrabands and the lack of understanding the language of instruction.

Based on the findings, the study recommends that, teachers should appropriately adopt instructional techniques that include learners' diversities or barriers to learning, minimize fear, enhance active interest and enjoyment in what is being taught and learnt. They should apply corrective measures that will reduce tension and provide support to their students whenever they are required. This will foster mutual understanding in a non-threatening teaching and learning environment.

Furthermore, students should use their time wisely so that they can have enough time to practice and internalize mathematical concepts that they have learnt in classroom. They should be taught to apply the appropriate strategies for learning as well as to appearing examinations. Students should be assisted to enhance their English language skills from primary schools. This may help them acquire competencies and thus improve their mathematics performance too. The government should provide teaching and learning resources. These should include enough qualified teachers, books, computers and other instructional materials for effective learning of mathematics.

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