Factor Affecting Student`s Achievement in Mathematics: The Case of Agarfa Secondary School, Ethiopia

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Abstract: Students` academic problem in the achievement of mathematics education prevails persistently in Agarfa secondary schools. Performance in Mathematics by students has been lower in comparative to other science subjects. This study aimed to investigate the factors contributing to the low achievement of Mathematics by students. The study was to determine to what extent students' factors, parent factors, Mathematics teachers' factors and school factors and management factors affect students' Mathematics achievement and to establish the strategies that can be adopted to improve students' achievement in Mathematics. Descriptive survey research design was adopted for the study. The study was carried out on 221 students, 9 Mathematics teachers', 5 principals and vice- principals of the school. Respondent students were selected with random probability sampling techniques. Questionnaires', class observation and document analysis were employed for data collection. Data collected from the respondents were coded and entered in to the computer for analysis using SPSS version-20 for windows. The multiple linear regression result and descriptive statistics were applied for data analysis. Findings reveal that student' factors, students' parent factors, Mathematics teachers' factors, school factors and management factors were the factors that affects students' achievement in Mathematics. Students', Mathematics teachers', school administrators, parents and District Education office expected to benefit from the findings. Therefore, it was suggested that teachers, parents, school administrators, supervisors, communities and other stakeholders should be cooperatively more practical in this area of improvement.

Keywords: Student Performance, Attitudes, Teacher Competence, Teaching Methods, Multiple Linear Regression

1. Introduction

In the development of science and technology, mathematics plays a vital role. In daily life and in human activities the knowledge of mathematics was important to understand comprised world. But mathematics is the most complex discipline. As its complexity more than we think, the problem it faced also more complex than you think. As example, from Agarfa secondary school record office; 90% of grade 10 students scored at most C on Mathematics performance in their EGSECE 2016-2018.

The new education and training policy applied in Ethiopia in recent years addressed a number issue of which the introduction of standardized students was one (MOE, 1994, 2004). Concerning this point, there seems a gap between what ought to be and what exists in reality to bring in the intended outcomes of all class students' academic achievement that could be because of different factors. Factors of student achievement could be investigated in terms of many factors of which some of them were student`s activity, class size, school facilities and teacher competence and parent involvement. Achievement in mathematics and science education at secondary education is critical for every student`s lifelong learning or career paths. However it is an open fact that quite in large number of General Secondary and Preparatory School of Ethiopia, most female students` performance in mathematics is poor. This poor performance includes male students. They do not have sufficient and competence that conform to their grade level, especially in

mathematics and science subject [1].

Scholars define academic achievement differently in different situations. Academic achievement of students is ability of students to study and remember facts and being able to communicate his/her knowledge orally or in written for even an examination condition [2]. Students' mathematics achievement is often associated with the future economic power and competitiveness of a country. Therefore, the desire to understand and identify factors that may have meaningful and consistent relationships with mathematics achievement has been shared among national policy makers and educators around the world [3]. Educators, trainers, and researchers have long been interested in exploring variables contributing effectively for quality of achievement of learners. These variables are inside and outside the school that affect students' academic achievement. These factors are related to student, parents, leaderships, teachers, school and peer [4].

Several studies and research have been done in many countries to find out the factors that influence students' achievement in mathematics. Among these factors, students' interest towards mathematics is one important factor that has been consistently found out [5-7]. Despite the aforementioned related things mathematics education has, the quality of teaching and learning have been one of the major challenges and concerns of educators in different countries. Identifying the problems and striving to the solution for it would help to utilize limited resources including financial and time more effectively [8]. In consideration of the above concept, this study was attempted to explore the major factors those were affected students' achievement in mathematics of Agarfa secondary school which are related to the students' personal factors, students' parent factors, mathematics teacher factors, school based factors and management related factors.

2. Materials and Methods

2.1. Description of Study Area

The study area was Agarfa secondary school is found in Agarfa town, Agarfa woreda; Bale zone; in Oromia region; in South-East Ethiopia. The total population of Agarfa woreda according to 2006 census projection is about 144,541 among this 77,525 males and 67,016 were females. The majority of my woreda population was engaged in agriculture. The major agricultural activities were animal husbandry and crops farming for food and commercial purpose. Agarfa secondary school which found in the center of Agarfa town was the specific area of this study. The school established in 1967.

2.2. Research Design and Target Population

To achieve the objective of the study the stratified random sampling research approach would employee. In addition to this the qualitative data and quantitative data would use for this research. Concerning source of data both primary and secondary source of data would employee.

The target population of this study would Agarfa secondary Mathematics teachers (9 in numbers), 5 principals, 10th class students (221 sampled students), 29 educational experts of Agarfa woreda educational office, and one common supervisor. This would provide useful information for this study.

2.3. Study Variables

2.3.1. Dependent Variables

The dependent variable:- achievement of the students was measured using students achievement of one semester mark observed from record office. For this information on the determinant factors of students: the researcher assessed 10th grade first semester mathematics mark in 2019. It is continuous variables as mark out of 100% students' scores on class exam was considered. The purpose of the mark was to determine the performance of students in mathematics.

2.3.2. Independent Variable

There are many independent variables that can affect the achievement of students. The independent variables could be quantitative or qualitative.

2.4. Sampling Technique and Sample Size Determination

Sampling is the selection of a subset of individuals from within a population to estimate the characteristics of whole population. Simple random sampling is a basic probability selection. The two main advantages of sampling are the faster data collection and lower cost. The study was carried out with 494 students from grade 10 of which 240 were male and 254 were female. The sample was calculated sample determination formula [1]. A random method of selection was one which gives each of 'N' (total number of population) units in the population would be cover a calculable probability selection. In this study, the sampling frame was 494 and from this 240 males and 254 females 10th grade students in 2018/2019 academic year.

Sample size determination

Sample size from the study population was determined using a simplified formula proportion. This formula is used to calculate sample size from the target population and for each stratum proportional allocation rule was used to obtain better precision.

Target population $N = N_{10}$ stratum size (known from frame) and with the objective that to determine n_{10} with stratum. From the basis of confidence interval approach the formula would determine sample size of this study.

That is $n = \frac{N}{1+N(e)^2}$

Where n is sample size

N is the population size or sample frame = 494

Error (e) is margin of error at 95% confidence level. In this case margin of error equal to 5%

That means e = 5% = 0.05

Then $n_{10} = \frac{494}{1+494\times(0.005)^2} = \frac{494}{1+494\times(0.0025)} = 221.029 \cong 221$

The selection of number of Mathematics teachers, supervisors, directors (principals) and educational experts

could apply availability (purposive) sampling technique for secondary school. That means 9 Mathematics teachers, 5 principals or directors, 29 educational experts and one supervisor were important for the research and would employee that these individuals provide information to address the research questions.

2.5. Source of Data

Source of data is divided into primary source data and secondary source of data.

2.5.1. Primary Sources of Data

Primary source of data would obtain from 2018/2019, 10th grade sampled students and Mathematics teachers`, students parents`, school directors, educational experts and supervisors.

2.5.2. Secondary Sources of Data

The secondary source of data was achievement of the students would be observed from record office. To gather further information on the determinant factors of students: the researcher assessed first semester mathematics mark in 2019. It is continuous variables as mark out of 100% students' scores on class exam was considered. In conducting the research, different data gathering instruments should use to collect relevant information. These were questionnaire, document review and formal observation. The detail of each of these is presented as follows.

2.6. Method of Data Collection (Instruments)

2.6.1. Document Review (Analysis)

The study focuses on students' achievement of mathematics. Achievement of the students would be observed from record office. To gather further information on the determinant factors of students: the researcher assessed first semester mathematics mark in 2019. It is continuous variables as mark out of 100% students' scores on class exam was considered.

2.6.2. Questionnaire

This tool was helping the researcher to get perceptions (opinions) of the students, teachers`, directors, supervisor and woreda educational office about the factors that influence mathematical achievement and it was the major tool to collect the data. The items adapted from TIMSS based on observation readings and the comment of advisor. The instrument was consisting of two sections (in which the first section contains five parts and the second section contains one). The first part consist of teacher related factors, school related, parents related, management related, and student related factors. The items were measure using five point Likert Scales; "Strongly agree, Agree, Disagree, Strongly Disagree and undecided. For all items of sections, the respondents mark their responses in related columns on the charts. Finally in the second section of the questionnaires have consisted of an open ended question to allow the respondents give their intention up on the issues.

2.6.3. Formal Observation

Observation was an important tool that can be employed in descriptive research and other qualitative research types for gathering genuine and pertinent data in the actual setting cited [8]. Hence, in this research, formal observation should employee to cross check the information secured through other data gathering tools regarding the teachers' initiatives to provide assistance to students and students' class participation.

2.7. Method of Data Analysis

The data gathered through different instrument were analyzed using different methods based on the specific nature of the data. The descriptive statistics were to describe characteristics of simple based on the demographic survey. Data were analyzed using SPSS version 20 computer program. The descriptive and inferential statistics values such frequency, percentage, mean and regression analysis were computed to show the relationship the independent variable and dependent variable. Item of questionnaire were prepared in the five major indicators of each factor were selected and presented to the respondents rated on five Likert- type rating scale from 5 = strongly agree, 4= agree, 3= undecided, 2=disagree and 1= strongly disagree. Also qualitative data gathered through questionnaire, document review and observation was embedded to support quantitative explanation in the discussion section.

2.8. Methodological Norms

2.8.1. Validity as Instrument

Validity defined as the degree to which results obtained from the analysis of the data actually represent the phenomenon under the study [9]. Validity checks if the research instrument are doing what they were intended to do. That is questionnaires were submitted to advisor, co-advisor and mathematics department. The experts scrutinized the detail of these instruments and give their opinion in view of reviewing pilot study. Pilot study helped to make clarification and improved the content for use in the instrument that was administered for study.

2.8.2. Reliability

Reliability is an indication of consistency between two scores of the same instrument over time [10]. It signifies the issue of consistence measure, which is the ability of a measurement instrument to measure the same thing each time used. The process of developing and validating an instrument is in large part focused in reducing error in the measurement process. There are different means estimating the reliability of any measure. The value of Cronbach`s Alpha is used to determined the consistence of measurement. The reliability coefficients (Cronbach`s Alpha) range from 0.00 to 1.00 with higher coefficient of higher level of reliability. Therefore the researcher has obtained reliability coefficient which is equal to 0.751 for questionnaire, which indicate the reliability of research instruments. It is done by SPSS software.

2.9. Multiple Linear Regressions

Multiple linear regression models were a statistical tool that allows us to examine how multiple independent variables are related to a dependent variable. Regression model use when dependent (or study) variable depends on more than one independent (explanatory) variables; called multiple linear regression model. This model generalizes the simple linear regression in two ways. It allows the mean function E(y) to depend or relate more than one independent variable and to have shapes other than straight lines, although it does not allow for arbitrary shapes.

Let Y denotes the dependent variable (achievement) that is linearly related to k independent variables; Multiples linear regression models were a statistical tool that allows us to examine how multiple independent variables are related to a dependent variable.

$x_1, x_2…x_k$ through the parameter $\beta_1, \beta_2, …, \beta_k$.

The model is $Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon$ is called a Multiple Linear Regression Model with k – independent variables.

Where the parameters β_j, j = 0, 1, 2... k, are called the regression coefficients. This model describes a hyper plane in the k – dimensional space of the independent variables x_j. The parameter β_j represents the expected change in the dependent variable Y per unit change in x_j when all of the remaining independent variables x_i (i ≠ j) are held constant. For this reason the parameters β_j, j = 1, 2…k, are often called partial regression coefficients and ε is called the error term or residuals. Multiple Linear Regression Models are often used as empirical models or approximating functions. That is, the true functional relationship between Y and $x_1, x_2, …, x_k$ is the unknown, but over certain ranges of the independent variables the linear regression model is an adequate approximation to the true unknown function.

Assumptions for Multiple Linear Regression Model:

For any specific value of the independent variable, the value of the dependent variable was normally distributed.

This is called the normality assumption. The variance (standard deviation) for the dependent variable was the same for each value of the independent variable. This is called the equal variance assumption. There was a linear relationship between the dependent variable and the independent variables. This is called the linearity assumption. The independent variables are not correlated. This is called the non-multi co-linearity assumption. The value for the dependent variable was independent. This is called the independence assumption; assumptions about the error term (ε). To use regression analysis properly there are a number of criteria about the error term in the model that we must be able to assume reasonably that they are true. If one can't believe these assumptions are reasonable in the model, the results may be biased or no longer have minimum variance.

3. Results and Discussions

On this section the set of data collected through different methods stated in chapter three was described without going beyond the data. The collected data were organized and analyzed using both qualitative and quantitative methods. The Statistical Package for Social Sciences (SPSS) was used to tabulate the results from which the analysis was done. Objectives (1) to (2) generated quantitative data were analyzed and measured using descriptive statistics. The open-ended question yielded qualitative data were descriptively analyzed and presented using specific themes. Generally, the data obtained were presented using frequency distribution tables and percentages.

3.1. Student`s Demographic Characteristics

The general characteristics of the respondents or student`s demographic characteristics were presented below. Academic achievement could also be affected by parent education level, demographic condition, family encouragement, and family occupation (socioeconomic status). Analysis of each item presented in the table given below.

Table 1. Cross tabulation of socioeconomic and demographic variables by academic achievement of respondents (grade 10 mathematics result in 2019).

Item	Variables	Category	N	%	2019 first semester mathematics exam result	
					Mean	S. deviation
1	Sex	Female	92	41.6	44.97	9.437
		Male	129	58.4	51.44	10.183
2	Age	15-18	208	94.1	47.51	8.980
		19-22	12	5.4	70.5	7.073
		23-26	1	0.5	-	-
3	Your father`s education level	Illiterate	32	14.5	35.84	1.462
		Primary 1-8	134	60.6	46.63	6.851
		Secondary 9-12	28	12.7	54.39	4.848
		Certificate-degree	27	12.2	68.87	4.938
4	Your mother`s education level	Illiterate	49	22.2	37.47	2.142
		Primary 1-8	140	63.3	48.54	6.577
		Secondary 9-12	25	11.3	64.96	2.965
		Certificate-degree	7	3.2	74.43	1.134
5	Mother`s encouragement in education	Low	115	52.0	43.98	8.782
		Medium	68	30.8	47.53	2.857
		High	38	17.2	65.45	5.764
6	father`s encouragement in education	Low	111	50.2	44.02	8.938
		Medium	69	31.2	46.94	2.537
		High	41	18.6	64.68	6.190

Item	Variables	Category	N	%	2019 first semester mathematics exam result	
					Mean	S. deviation
7	Father`s occupation	Farmer	127	57.5	44.03	8.357
		Merchant	47	21.3	47.21	1.382
		Government employee	10	4.5	73.30	2.111
		Others	37	16.7	60.35	5.282
8	Mother`s occupation	Farmer	114	51.6	43.99	8.820
		Merchant	45	20.4	45.89	1.369
		Government employee	16	7.2	70.88	3.828
		Others	46	20.8	55.72	6.270

Item 1 of Table 1 as indicates that most of the sample students 129 (58.4%) were males and 92 (41.6%) were females. First semester mathematics average mark of male and female students were 51.44 (SD =10.183) and 44.97 (SD = 9.437) respectively. This result shows that, boy`s average mark seemed better than females. According to Trautwein et. al. (2009), quoted in Assefa Beyene (1991) also indicted that Amharic and mathematics scores of students were investigated; it was found out that girls' was relatively lower than boys [11 – 12]. This might be because of females" involvement in the household chores; as a result, they do not get time for study after school time in the household. Similarly achievement of mathematics has been documented with boys significantly performing than girls [13].

In the same table, item 2 shows that majority of the respondent students 208 (94.1%) were seem to be found between 15-18 years of age, whereas, 12 (5.4%) students were found between19-22 years of age One student (0.5%) is 23-26 years old. From tenth grade students 15-18 years of age shows that most of the students enrolled in the school were belongs to the age that the Ethiopian secondary school students. Students' beliefs about their competence and their expectations for success in school have been directly linked to their levels of engagement, as well as to emotional states that promote or interfere with their ability to be academically successful [14].

From the above Table 1 32 (14.5%) students were illiterate fathers` by their education level and their average mark was, 35.84 (SD=1.642). 134 (60.6%), those students whose father complete primary education and their average score was 46.63 (SD=6.851). 28 (12.7%) students were students whose father` have certificate up to graduate and their average score was 27 (12.2%). These indicate that students having father`s who are certificate up to graduated achieve greater than others. Depend on parents` education level students can achieve any subject more. Several studies indicate that family members, father, mother elder support for in the academic study is crucial factors affecting student's mathematics achievement [15].

In addition to the above 49 (22.2%) were students whose mothers` are illiterate and their average mark was 37.47 (SD=2.142). From the same item 140 (63.3%), those students have, mother`s education level is elementary 1-8 and their average score is 48.54 (SD=6.577). 25 (11.3%) of students were whose mothers` are secondary and their average score was 64.96 (SD=2.965). From item 4, 7 (3.2%) of mothers` were certificate up to graduate by their education level and

their average mark was 74.43 (1.134). Even, the average score of students whose their graduated from higher education have variation; they were achieve greater than others. According to Agabrian M., J. (2006), observed that education level of present but linkage to poor academic performance of their children [16]. A study conducted by David M. N (2014), showed that illiterate parents were unable to assist their children with home work. The importance of parental involvement in their children academic success is unquestionable assumption [17].

Based on Table 1 of item 5, 115 (52%) of fathers` were encourage their students (low) and students` average mark 43.98 (SD=8.782). From similar item 68 (30.8%) of father`s were encourage their students`(medium) and students` average score 47.53 (SD=2.857). 38 (17.2%) of fathers` were encourage their students and students` average mark 65.45 (SD=5.764). Item 6 of similar table shows that 115 (50.2%) of mothers` were encourage their students (low) and students` average mark 44.02 (SD=8.938). From similar item 69 (31.2%) of mother`s were encourage their students`(medium) and students` average score 46.94 (SD=2.537). From item 6, 41 (18.6%) of mothers` were encourage their students and students` average mark 64.68 (SD=6.190). This is an indication that despite the fact that some parents may have attained education, still they do not fully engage themselves in assisting their students to do their school assignment. It is consistent with Ogeye, H. (2007), family and community involvement frequently means helping reach goal defined by the schools (administrators and teachers) that reflect school values and priorities" [18].

From Table 1 above 127 (57.5%) are students with their fathers` occupation is farmer and their average score was 44.03 (SD=8.357). On the same item 47 (21.3%) are students` with their fathers` occupation is merchant and their average score of students was 47.21 (SD =1.382). In addition to this 10 (4.5%) are students having fathers` working is government employee and their average score was 73.30 (SD=2.111). From the above table 37 (16.7%) are students` having fathers working other`s field and their average mark 60.35 (SD=5.282). These results shows that students who have got fathers` were government employee have the opportunity to achieve a good result. From item 8 above 114 (51.6%) were students with their mothers` occupation is farmer and their average score was 43.99 (SD=8.820). Low income of parent`s link to students` poor academic achievement. It is also observed that the economically disadvantage parents are less able to afford the cost of

education of their children at higher levels and consequently they do not work at their full potential [19].

On the same item 45 (20.4%) were students` with their mothers` occupation is merchant and their average score of students was 45.89 (SD =1.369). In addition to this 16 (7.2%) are students having mothers` working is government employee and their average score was 70.88 (SD=3.828). From the same table 46 (20.8%) are students` having mothers working other`s field and their average mark 55.72 (SD=6.270). This result shows that students who have got mothers` were government employee have the opportunity to achieve a good result than others. One of the disadvantages of the Ethiopian girls face in education is due to the low income of their families. According to Tassew Woldehanna, Jones, N. and B. Tefera (2006) cited in Rouse, C. E and Barrow, L. (2006) explained that girls who come from economically advantaged families are more likely to enter and remain in schools than are girls from disadvantaged families [20-21].

3.2. Inferential Statistics

This section presents the regression analysis for the predictive power of independent variables (students' factors, parents` factors, Mathematics teachers' factors, school factors, directors` factors and educational expert factors) on mathematics achievement. To identify more predictor of the independent variables on mathematics achievement multiple linear regressions was used and the result analyzed. The Relationship between students' Mathematics Achievement and different factors could be explained by the combined effect of the independent variables explored using multiple linear regression analysis.

Table 2. *Statistics of the most significant predictors in Agarfa secondary School.*

Model		Un standardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	Constant	23.491	2.372		9.902	.000
	X_1 Sex	-16.657	.966	-.812	-17.252	.000
	X_2 Father education level	3.586	.700	.305	5.124	.000
	X_3 Mother education level	5.513	.698	.455	7.895	.000
	X_4 How do you rate your father`s encourage in education?	3.424	.391	.256	8.763	.000
	X_5 Students` do class work and home work Properly	.614	.305	.053	2.013	.045
	X_6 I regularly attend mathematics class	.776	.219	.081	3.542	.000
	X_7 My English language skills affects me on in understanding mathematics	.598	.202	.069	2.963	.003
	X_8 I attend tutorial and additional class	-.639	.229	-.065	-2.783	.006
1	X_9 Computer and computer software used as teaching aids to support mathematics	-.430	.205	-.049	-2.093	.038
	X_{10} I take discussion with my friend on solving difficult problem	.996	.320	.087	3.111	.002
	X_{11} mathematics teacher participate students in Class	-.402	.193	-.048	-2.081	.039
	X_{12} I have difficulty in relating new concepts to those previously learnt	.900	.290	.088	3.106	.002
	X_{13} There is pedagogical center for Mathematics instruction in our school.	.396	.195	.486	2.028	.044
	X_{14} Parents do not increase Parental follow up to their student's in teaching/learning process	.430	.200	.051	2.151	.033
	X_{15} School principal (Managements`) do not adjust relevant library materials	.452	.210	.051	2.154	.009
	X_{16} I use mathematics reference books	.650	.245	.061	2.655	.032
	X_{17} Father occupation	3.745	.496	.337	7.554	.000
	X_{18}. Mother occupation	2.940	.431	.286	6.816	.000

a. Dependent Variable: Achievement

As the assumption of multiple linear regression model`s was satisfied, the researcher used the model to analyze the data. After running SPSS software the achievement of students in mathematics in Agarfa secondary school was strongly affected by 18 independent variables among 35 variables entered in to regression. By looking at the co-linearity statistics in the Coefficients[a] box Table 2 above, the identified independent variable was: gender difference (sex) is significant to p-value .000 is less than statistically significant level p=0.05. Therefore, there was relationship between academic achievement and sex. By the case gender difference their academic achievement decrease by 16.657 points. According to Trautwein, U., & Ludtke, O. (2009), quoted in Assefa Beyene (1991), also indicted that Amharic and mathematics scores of pupils were investigated; it was found out that girls' was relatively lower than boys [11-12]. Similarly achievement of mathematics has been documented with boys significantly performing than girls [13]. Father`s

education level and mother`s education level were significant to p-value 0.000 is less than statistically significant level p=0.05. This shows that students from educated father and educated mother achieved high mark. Even, the average score of students whom their graduated from higher education have variation; they were achieve greater than others. The achievement of students increased 3.586 marks as the level education fathers` increase and the performance of students increased 5.513 marks as the level education of mothers` increase. According to Agabrian M., J. (2006), observed that education level of present but linkage to poor academic performance of their children [16]. A study conducted by David M. N (2014), showed that illiterate parents were unable to assist their children with home work. The importance of parental involvement in their children academic success is unquestionable assumption [17].

Fathers` encouragement on mathematics education was p-value =0.000. From the result of this analysis it could be

concluded that fathers` encouragement to ward mathematics education statistically highly significant as p-value 0.000 is less than statistically significant level p = 0.05. Therefore, there was statistically significant relation between Agarfa secondary students on academic achievement in mathematics and fathers` encouragement. From this we could decided that the achievement of students increased 3.424 by their father`s encouragement. According to Hyde, K. (1993), parental involvement is 'the parents' or caregivers' investment in the education of their children [22]. Parental involvement is parental intervention in their children's education in order to be able to obtain information about their children's academic growth. Students activity on home work and class work is significant to p-value 0.045, β =.614 is less than significantly level of p=0.05. Therefore, there is statistically significant relation between student`s academic achievement in mathematics and students activity on doing class work, home work and other activity. That means the score of students increased by 0.614 in each case of doing class work and home work. According to Wakesa, W. P (2013), homework and assignment have large consistent positive effect on students` achievement improvement [10]. On the other hand homework serves as two fold purpose. First, it is formative assessment tool that provides teachers with feedback that allow them to adjust their instruction and provides learners with a means improving their learning. Secondly, homework is a type of summative assessment tool that is for learner grading. Similar to this teachers use homework to maximize learners learning [23-24].

Regularly attending mathematics class on achievement of students is significant as p–value 0.043 is less than statistically significant level p = 0.05. Therefore, there is statistically significant relation between students academic achievement in mathematics and attend mathematics period. We can decide that the mark of student`s increased by 0.776 by each attending mathematics class. English language skill affects students` on understanding mathematics significant P-value 0.003, β=.598 is less than statistically significant level p = 0.05. Therefore, there is statistically significant relation between language skills of students and understanding teacher`s lesson or word problems. From their language skills the achievement students increased by 0.598 marks. Finding show that students` personal background knowledge affects their achievement. Their competence and their expectation for success in school have been directly linked to their levels of engagement, as well as to emotional states that promote or interfere with ability to be academically successful. Attitudinal factors in Mathematics are highly important in Mathematics education, because these variables are amenable to change by educational interventions [14].

Students daily attending tutorial class and additional class enable to do better in examinations significant p-value 0.006, is less than statistically significant level p =0.05. Therefore, there is statistically significant relation between students` academic achievement in mathematics and attending tutorial class and additional class. If students were lose attending tutorial class, then the score of students should decreased by

0.639 points. According Mikk, J. (2007), providing tutoring given to students' necessary support to help them catch up and learn the necessary study skills required to learn [25]. Computer and computer software used as teaching aids to support mathematics are relevant to mathematics instruction is significant to p–value 0.038, is less than statistically significant level p-value = 0.05. That is statistically significant relation between student academic achievement and computer and computer software. If students were not used computer and computer software then their mark would decreased by 0.430. Physical environment in which the formal teaching learning occur ranges relatively from modern and well equipped to open air gathering place [26]. Thus the school infrastructure includes the class rooms, office, toilet rooms, water supply, electricity services, technology services, computer laboratory, science laboratory, library, staff, lounges, attractive green area, swimming pool etc., showed that a positive relationship exists between availability of facilities and academic performances.

I take discussion with my friend on solving difficult problem is significant to p-value = 0.002 is less than statistically significant level p = 0.05. Therefore there is statistically significant relation between academic achievement of students and discussion with friends. From this, as the discussion of students were increase, their score of mathematics were increased by 0.996. According to UNICEF (2005), clearly states that home work can have both positive and negative effects [27]. It is reported that the positive effective of home work included "improved attitude toward school; better study habits and skills and learning was encouraged during leisure time"[27]. According to Cooper, H. (2009), has shown that the positive effects of home work. Mathematics teacher participate students in class is significant to p-value = 0.039 is less than statistically significant level p=0.05 [28]. Therefore there is statistically significant relation between academic achievement of students and the participation of students in class. That means if the participation of students decreased in the class, then their mathematics result decreased by 0.402. The role of Mathematics teachers as Mathematics specialist is classroom director and curriculum implementer. Therefore a teacher has a role of coach, acting as mentor, assistant collaborator who with blend of guides and instructs. Teacher`s beliefs, about Mathematics teacher play a major role in shaping their instructional practice and consequently influence their pupils` attitudes, interests, and achievement [29].

Students have difficulty in relating new mathematical concepts to those previously learnt is significant to p-value = 0.002 is less than statistically significant to p=0.05. Therefore there is statistically significant relation between students` academic achievement and relating new mathematical concepts to those previously learnt. This means that if students relate new concept to old concept their mark increased by 0.900. Students' beliefs towards mathematics influences the efforts they put in understanding and practicing mathematical concepts and skills. According to Kaahwaa J. (2012), students' beliefs

about their competence and their expectations for success in school have been directly linked to their levels of engagement, as well as to emotional states that promote or interfere with their ability to be academically successful [14]. Pedagogical center for Mathematics in our school is significant to p-value = 0.044 is less than statistically significant to p=0.05. Therefore pedagogical center for mathematics lesson and academic achievement of students are highly related. That means, their achievement was increased by 0.396. School facilities include water supply, latrines (male and female toilet) clinical laboratory, library, pedagogical center, and other educational laboratory. The facilities are required to be proportion to the number of teachers and students in the school for the provision of quality education in school.

Parental follow up of their student's in teaching/learning process is significant to p-value =0.033 is less than statistically significant to p=0.05. Therefore there is significantly significant relation between Parental follow up of their student's in teaching/learning process. If parents were follow their students, then the mark of students should increased by 0.430. Analysis of different researcher showed that there is considerable positive association between assistance with parental follow up and student`s achievement, regardless of the source of assistance. Indicating parents` inability to help with student's activity is thus one positive explanatory factor behind low achievement of students [30]. School principal

(Managements`) adjust relevant library materials to improve their understanding mathematics is significant to p-value =0.032 is less than statistically significant level p=0.05. That means, the score of students were increased by 0.452. Similar to this mathematics reference book from library is significant to p=0.009 is less than statistically significant to p=0.05. This shows that the relation between students academic achievement and reference book to improve their understanding mathematics. That means the achievement of students increased by 0.650.

Father`s occupation and mother`s occupation are significant to p=.000 is less than statistically significant to p=0.05. This shows that academic achievement is affected by parent`s occupation. Depend on parents` education level students can achieve any subject more. That means with the case of father`s occupation the mark of students` increased by 3.745 points and with the case of mother`s occupation the mark of students increased by 2.940. As the income of family increased, the achievement of students would increase. Several studies indicate that family members, father, mother elder support for in the academic study is crucial factors affecting students` mathematics achievement [15].

3.3. Class Observation

3.3.1. Number of Students Per-class

Class observation was included all Mathematics teachers and 9th grade, 10th grade, 11th grade and 12th grade students.
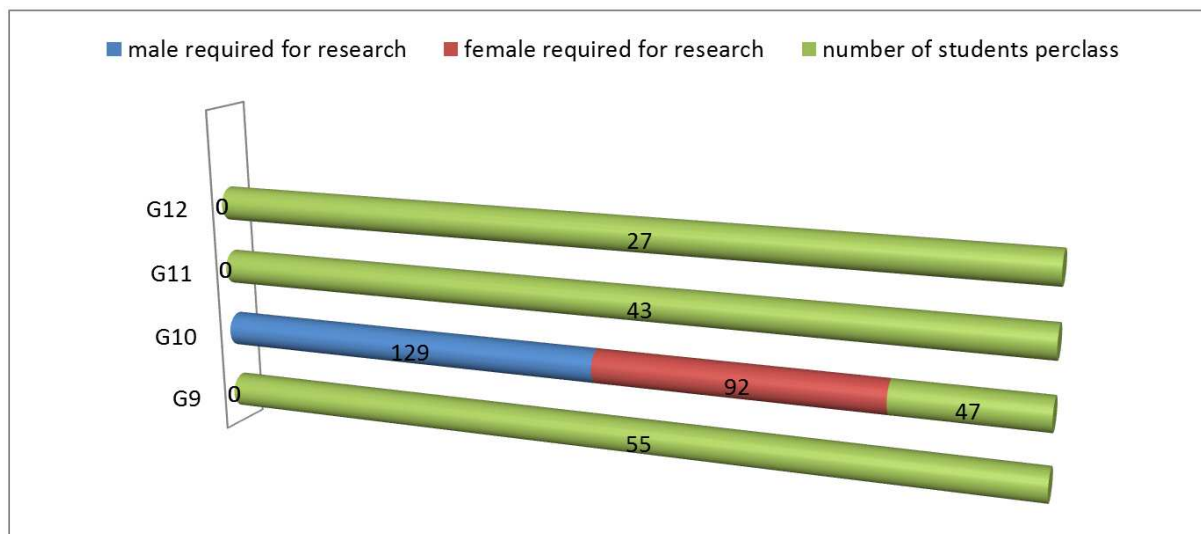

Figure 1. Number of students per class including male and female students.

From 221 sampled students, 129 were males and 92 were female students of grade 10. Sampling was related with the selection of a subset of individuals from within a population to estimate the characteristics of whole population. The two main advantages of sampling are the faster data collection and lower cost. Each observation measures one or more properties of observable subjects distinguished as independent individuals. In addition to this each class were visited during class observation. Depend on the class observation average number of students per class were 55,

47, 43, and 27 for grades 9, 10, 11 and 12 class respectively. Since G9 means grade nine, G10 means grade ten, G11 means grade eleven and G12 means grade twelve. Class room environment is conducive to a place where everybody feels comfortable and at ease. It is a place where mutual respect in a friendly and non-threatening atmosphere. The perception of class room environment is critical factor in determining students' action such as motivation achievement and satisfaction [31].

3.3.2. Teaching Methods

Teachers` responses about the teaching methods used in their mathematics periods were summarized and presented in Figure 2.
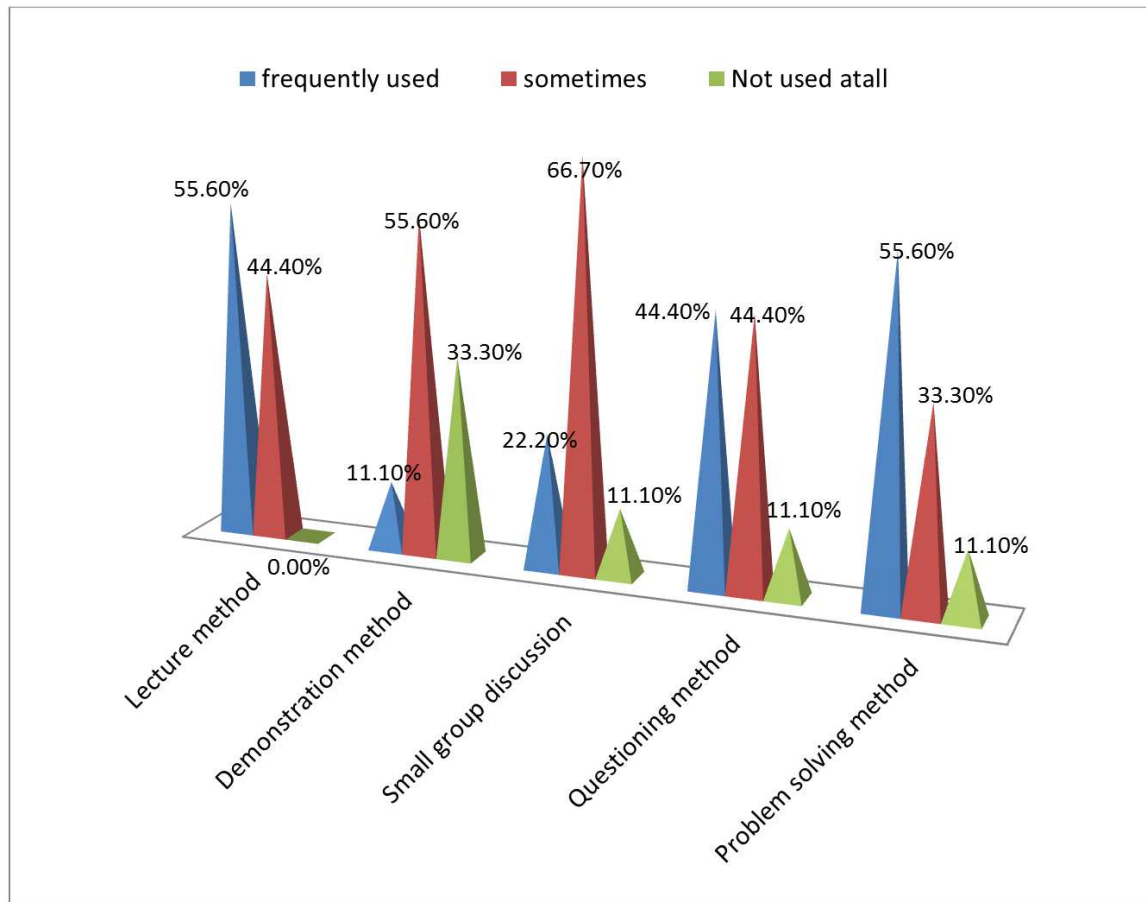
Figure 2. *Percentage of the Methods Used in Teaching Mathematics.*

Figure 2 indicates that above half of the sampled teachers used lecture method frequently. It shows that 55.6% were use lecture method and 44.4% were use lecture method sometimes. From this students rarely react to lecture method in the class room to achieve better achievement compared to those always and frequently consider teacher as source of knowledge rather than practice comments on the domination of old instruction approach focusing on lecture, chalkboard and text book still prevails and majority of teachers do not utilize the new as intended.

On the other hand the majority (55.6%) of the sampled teachers were use demonstration method sometimes, 11.1% was used frequently demonstration method and 33.3% were not used at all. In addition to this 22.2% of teachers were used frequently small group discussion, great proportion of (66.7%) of teachers were use sometimes small group discussion and 11.1% of teachers were not used small group discussion. From this the researchers believe that number of students in the class may cause this variation in mark. The difficulties that arise for teachers' methodology include: teachers inadequate presentation, limited methodology, unsuitability of learning resources, topic sequencing and language levels [32]. Most teachers today apply learner centered approach to promote the interest, analytical research, critical thinking and enjoyment among students. Therefore students must practice on the effective learning style that promotes independence.

From the above graph 44.4% of teachers were used frequently questioning method and sometimes used questioning method with the same percentage. But 11.2% of teachers were not used at all. The majority (55.6%) of sampled teachers were used frequently problem solving method, 33.3% of teachers sometimes applied problem solving method and 11.1% were not use this method at all. Students were bound to fail Mathematics if they lack motivation and interest. Lack in the language of instruction [33], lack problem solving techniques or problem learning styles and their attitudes towards anything related to Mathematics is negative including, what we can call `mathephobia`.

3.3.3. Classroom Interactions

In classroom different interaction is there between teacher-student, student-student and other activity may happen. In other condition this interaction and some activity may absent.
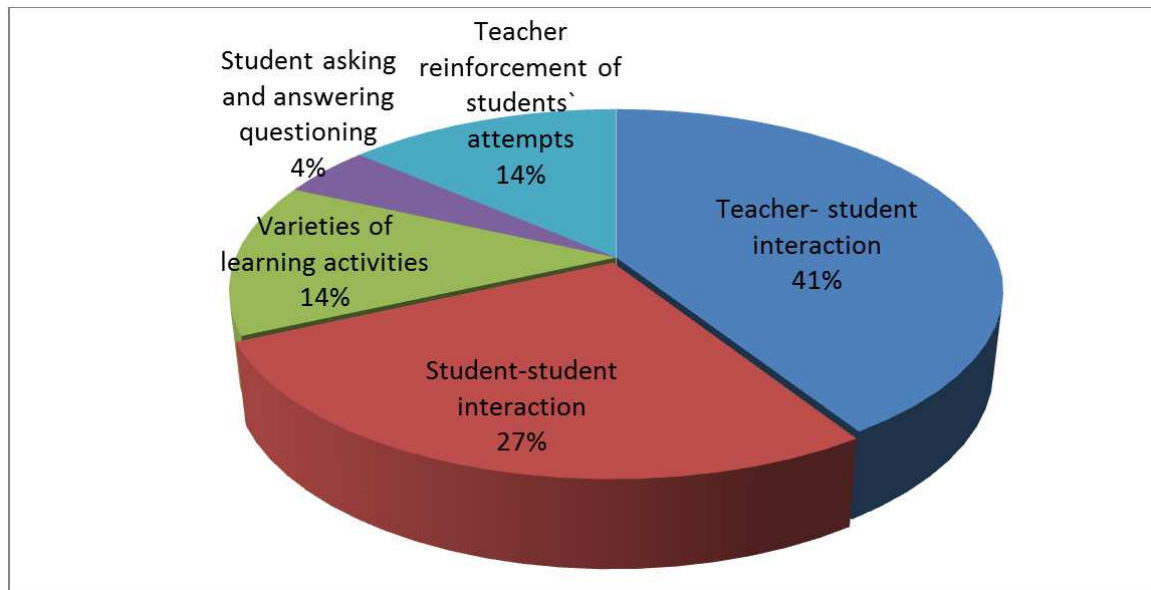
Figure 3. Percentage of classroom interactions presented in (%).

As indicated in Figure 3, 41% of teacher-student interaction was present in Mathematics class from total sector of interaction and 27% of student-student interactions were present from total sector of interaction. But from total interaction 14% of varieties of learning activities were present in Mathematics class, 14% of teacher reinforcement students` attempts and 5% of student asking and answering question were present. This shows that variety of learning activities, teacher reinforcement students` attempts and student asking and answering question were not sufficient. The role of Mathematics teachers as Mathematics specialist is classroom director and curriculum implementer. Therefore

a teacher has a role of coach, acting as mentor, assistant collaborator who with blend of guides and instructs. Teacher`s beliefs, about Mathematics teacher play a major role in shaping their instructional practice and consequently influence their pupils` attitudes, interests, and achievement [33].

3.3.4. Classroom Atmosphere (School Facilities)

Class room atmosphere is one important activity for Mathematics class. In addition their relation is decisive factor.
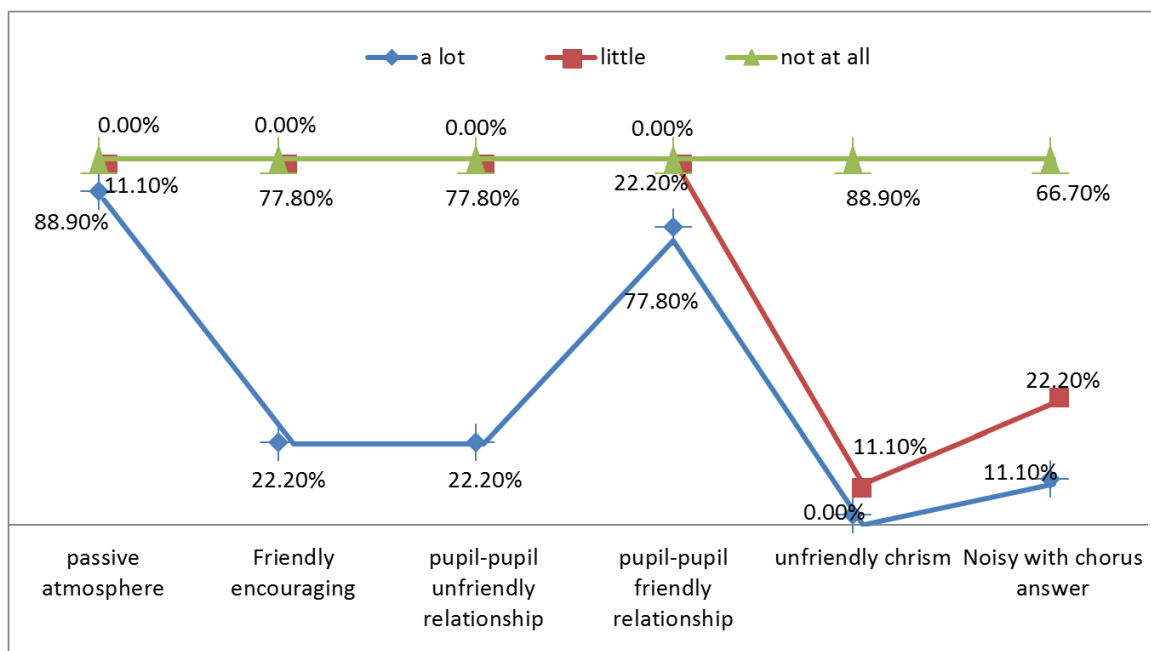

Figure 4. Percentage of classroom atmosphere.

From class observation indicates that there is a lot of   passive atmosphere (88.9%) and 11.1% of class atmosphere

was little passive. However, very little friendly encouraging was observed (77.8%) and 22.2% of class atmosphere was lot of friendly encouraging. In addition to that, there was no unfriendly relationship among the pupils. The majority of observed relation (77.8%) was friendly among pupil to pupil. On the contrary to this 88.9% of class observation was not show unfriendly chrism. There are four areas of well-being dimensional phenomenon of student's conceptualization as school condition, social relationships, and means for self-fulfillment and health status, which affects both their behavior and their examination results in school. In addition to this 66.7% of class observation was not noisy with chorus answer. But there was little noisy chorus answer (22.2%) and 11.1% lot of noisy chorus. The perception of class room environment is critical factor in determining students' action such as motivation achievement and satisfaction [31].

3.3.5. Feedback Provision (Teacher Competence) Presented Below
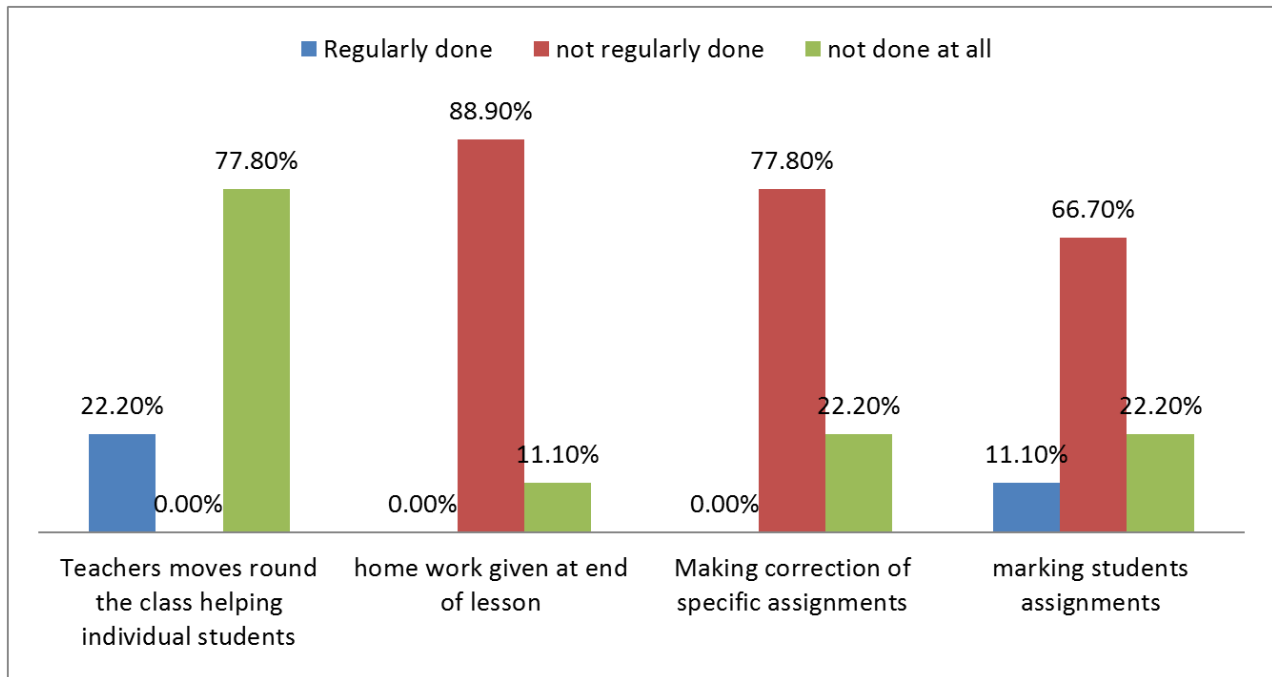

Figure 5. Feedback Provision (teacher competence) presented.

Figure 5 indicates that 22.2% of the teachers were regularly done moving round the class to help individual students. But 77.8% of teachers moved round the class helping individual students not done at all. This implies that teachers carried out above listed activities enhance students learning outcomes. In addition teachers actively monitor their learners' understanding during class work, by moving from desk to desk, guide difficulties and select appropriate learner work for whole class review and discuss. In the lessons 88.9% was not regularly done of homework given at the end of the lesson and 11.1% of teachers were not done at all homework given at the end of the lesson. More than 66% of the cases teachers did not regularly done marking students 'assignments'. Whereas 22.2% of teacher`s were not done at all marking students 'assignments'. In addition to this more than 77% of teachers were not regularly done making correction of specific assignments. More than 22% of teachers were not done at all making correction of specific assignments. Different researcher showed that there is considerable positive association assistance with homework/class work, assessment and students achievement. According to Wakesa, W. P. (2013), homework and assignment have large consistent positive effect on students` achievement improvement [10].

4. Conclusions

Based on the results and discussion, the following conclusions were drawn. Teaching methodology utilized by Mathematics teacher has significant effect on the achievement of students. This means lack of appropriate teaching methods, lack of tutorial class and passive learning methods affect the performance of students. Besides to this, school contexts and facilities were also significantly affecting the performance of students. It revealed to influence students' mathematics learning greatly. Adequate availability of school facilities, instructional materials and quality teachers of mathematics has more impact on students' achievement on mathematics by providing instructional materials. Parents' related factors were shown as one of mostly affecting students' academic achievement. Family occupation or socio-economic status of parents, level of education of parents, parent-student interaction were case of lower academic performance. Thus, potential stakeholders should pay

attention on the significant factors identified on the current study.

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