

Factors Affecting Female Students Achievement in Mathematics:

The Case of Secondary Schools in Addis Ababa

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ABSTRACT

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The main propose of this study was to examine the factors that affect female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools. Causal relation research design was employed to investigate the problem. Using simple random sampling technique 312 participants were selected from a total of 1431 target population. Achievement test, questionnaire and interview were the instrument employed in data collection. From multiple regression analysis of data, the result indicated that coefficient of multiple determination ($R^2=0.412$), 41.2% of the variation in female students mathematics achievement test was accounted by variability in major socio economic variables (education, occupation and income) of parents. Similarly, ($R^2=0.674$), 67.4% of the variation in female students mathematics achievement was accounted by variability in both out of school and in school factors like, home related factors, personal factors and in school related factors. Therefore, it is better to intervene the problem especially; the Education office of Bole Sub-City and School Principals should coach to handle the problem (factors) that affect female students' mathematics achievement both in school and out of school by acting as facilitator with parents, stakeholders, concerned bodies and students.

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Chapter 1: Introduction

1.1 Background of the Study

In the rapidly changing world and in the development of science and technology mathematics plays a vital role. In daily life and in most human activities the knowledge of mathematics was important to understand the complex world and much with the newly developing information technology the strong background in mathematics was vital, emphasizing this Krutteskii (1976) as cited in Benbow & Arjmand (1990) the development of sciences has to become more mathematical method and mathematical system were penetrating everywhere. Studies by UNICEF (1992); Kwesiga (2002); Odaga & Henveld (1995) were tried to identify factors that affect equal educational opportunity particularly for females.

Moreover, the rise of the feminist movement in the 1970s produced educational researchers who wanted to examine sex differences in education Delamont (2002); Leach (2004); Kwesiga (2002); Unterhalter (2006). This time it was found that girls were falling behind boys in all three indicators of educational participation access (numbers enrolling), retention (length of time spent in school), and achievement (exam passes, especially in mathematics and science) Fangrlind & Saha (1989) as cited in Leach (2004). Furthermore, UNESCO (2000) indicated that achievement was related to wide range of variables among this the impact of school policies in areas such as retention and principal leadership, family, and community factors which includes parental education and involvement.

The summative evaluation conducted by Institute of Curriculum Development and Research ICDR (2001) also pointed out that the Secondary School students' achievement in mathematics were the least compared to other subjects. It supports argument of Aiken (1970) which indicated that the cause of more school failure was by arithmetic than any other subject. Moreover, Genet (1991) sounds that Girls performance was poor in mathematics and science in national examination. In addition to this, Fennenma (1980)

also mentioned that the entire field of mathematics might be enriched if more young females were given the opportunity to grow in to mathematical skills and able to play a crucial role in every educational activities.

Based on this fact, this study has attempted to investigate major factors that may affect mathematics achievement of female students' in Bole Sub-City first cycle secondary schools and ultimately tries to forward some possible solutions that would improve their achievement in mathematics.

1.2 Statement of the Problem

Significant advances have been made in techniques for assessing educational achievement including performance across national and regional level. Major research projects have been launched to investigate patterns of educational achievement and to explore both in-school and external factors. However, there is still influential factors are attached to female students both in urban and rural areas of Ethiopia including Addis Ababa.

Moreover, MOE (1996) revealed that the complexity of the disparity in academic performance between male and female students in ESLCE results. Among the students who get 2.4 and above in 1994/95 ESLCE 80.54% were males while females constitute only 19.46%. In addition to this, MOE (2003) showed that among the students who's GPA 2 and above in EGSECE 2002 females constitute only 27.1%.

On the top of that, the statistical analysis on 2001 EGSECE (grade 10) results by NOE (2001) showed that the gender difference in achievement, among those with GPA 2 and above, 72.89% were males and 27.11% were females. It is assumed that the contribution of mathematics for this less achievement of female students was high, since mathematics has strong relationship with other subjects.

Thus, the purpose of this study was to investigate the various in school and out of school factors and elements that aggravate female students' mathematics achievement in first

cycle secondary schools of Bole Sub-City. Thereby to design intervention strategies that could reduce the factors if exist.

Moreover, this study was intended to answer the following basic questions:

1. What are the out of school factors that are significantly affect female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools?
2. Is there a significant relation between in school factors and female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools?
3. Is there a significant relation between personal factors and female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools?

1.3. Objective of the Study

The general objective of this study was to investigate factors that hinder female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools. To this end, this study has the following specific objectives which were tried:

1. To explore the extent to which the major socio economic status (education, occupation and income) of parents affect female students mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools. .
2. To examine the significance of personal factors like, motivation, aspiration, self-esteem and expectation of female students on their mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools. .
3. To identify the extent to which home related factors affect female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools. .

4. To explore to what extent school related factors affect female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools.

1.4 Significance of the Study

Mathematics is a basis for academic successes of an individual. It has a wide application in different fields of natural and social sciences. Better achievement in mathematics influences students to develop positive attitude towards learning the subject. This in turn rises in other areas. Moreover, achievement in mathematics helps learners to develop high order thinking skills and reasoning abilities in all other subjects. In relation to this Penner (1993) indicated that truly exceptional students in mathematics tended to have advanced skills in other areas as well. On the top of this, this study expected to explore the influencing factor of female students' mathematics achievement. Hence, the finding could be vital importance for Bole Sub-City education officials, educational personnel's, School principals', subject teachers, parents, and students to devise the appropriate measure in order to improve female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools.

1.5 Delimitation of the Study

This study was limited to Bole Sub-City Government First Cycle Secondary Schools (grade 9-10) in Addis Ababa. Specifically focus on investigating in school and out of school factors those affect female students' mathematics achievement. It also tries to see the effect of in school factors such as the availability of school library, pedagogical center, teachers experience and qualification, interaction of teachers with pupils, the effect of organized school instructional leadership and the effect of guidance and counseling on female students mathematics achievement in first cycle secondary schools will be assessed.

Similarly, out of school factors like home environment, parents' socio economic status and personal factors on female students' mathematics achievement would be assessed.

Quantitative approach with embedding qualitative data descriptions in discussion part of the study was used. To see the effect of aforementioned variables on female students' mathematics achievement multiple regressions was involved. Finally, even though there are a number of variables that affect female students' mathematics achievement such as school compound, school distance, the way to school and from school.

But this study due to time and financial constraints only focuses in aforementioned variables such as in school and out of school factors. But it does not focus on factors related to school compound, school distance, and the way to school and from school.

1.6 Limitation of the Study

Since it needs two hour to administer, the school principals were not willing to give permission for the researcher to pilot the achievement test. However, the item validly was checked by those teachers from the schools in the study area since they know better about their students' background in problem solving skill and ability. The other drawback of this study could be the potential respondents might hide key information. However, in order to elicit key information multiple data collection tools such as questionnaire and interview were used.

1.7 Operational Definition of Terms

In-school factors: refers to factors which are emanated from the school such as effects of rule and regulations of the schools, provision of facilities like libraries, laboratories, and teachers experience in teaching, educational qualification of teachers, attitude of teachers toward female students and role of guidance and counseling, Wondemeneh (2009).

Out-school factors: refers to factors which have not emanated directly from the school such as economic and educational background of parents and their attitude towards female education, parents support and encouragements of their daughters, students effort and activities to improve their result and distance related factor, Wondemeneh (2009).

First Cycle Secondary Schools: Grade levels which includes grade 9 and 10 only in the current Ethiopian Education System.

1.8 Organization of the Study

This study was organized and presented in six chapters. The first chapter gives a general idea on the backgrounds, statement of the problem, explains the significance of the study and describes the delimitation and limitation of the study. The second chapter review of literature section develops background of the study by discussing the relevant literature from international and national perspectives. In the third chapter, research methods were explained briefly how the study was conducted. The fourth chapter was about data presentation and interpretation. The fifth chapter stated briefly the findings of the study from the data analysis.

Finally, the sixth chapter was the summary, conclusion and recommendation part which tried to summarize briefly and conclude the whole study based on the main findings. Based on the conclusions drawn, some suggestions were also forwarded to concerned bodies and stakeholders in this section.

Chapter 2: Review of Related Literature

The review of related literature focuses on factors that affect students' academic achievement. It mainly discussed both in-school and out of school factors that affect female students' mathematics achievement.

Hence, the in school factors such as influence of school facilities, instructional leadership, teachers' qualification, experience and competence was assessed. Similarly out of school factors, such as, socio-economic status of parents and home related factors were also assessed in the review of literature. In addition to this the impact of personal factors on female students' mathematics achievement was indicated in literature section.

2.1 Gender Equity in Education

Sociologists paid little attention to gender until the 1970s as Delmont (2002) explained, during the growth in the sociological study of education from 1945 onwards many studies were conducted on 'male-only' samples and the gender divisions of labor in industrialized societies was taken for granted, not treated as a topic for investigation. The scholars discuss the issue by cited Acker's (1994) content analysis of major journal for the UK, who reviewed educational research in Britain from the 1950s to 1970s. Acker found that, gender issues were frequently ignored and that female experience and the outcomes of education for women were regularly left unresearched. It focus on integrating women into existing development models brought new attention to girls unequal access to education, which was linked to wide spread poverty throughout the developing world Leach (2004); Kwesiga (2002); Unterhalter (2006), Anderson (2006).

Accordingly, the UN Millennium Summit in September (2000) also set Millennium Development Goal (MDG) to promote gender equality and empower women with the target to eliminating gender disparities in primary and secondary education by 2015, and in all level of education by 2015 which complements other international declarations on gender equality in education Beijing, (1995); Dakar, (2000). Reaching this goal underpins success towards the other entire sector UNFPA (2005). Unterhalter (2006) also sounds that gender equality in educational opportunity entails more than the attainment of

equal numbers in school or parity in examination results; it implies a fuller meaning of equality, which includes conditions in school and post school opportunities.

Studies by UNICEF (1992); Kwesiga (2002); Odaga & Henveld (1995) were tried to identify factors that affect equal educational opportunity particularly for females. They classify these factors as demand side and supply side factors. Kwesiga (2002) also categorize these factors as family, societal and institutional factors. Whatever the factors are, what is important here is that these factors greatly affect equal educational opportunity and achievement of females in particularly mathematics and science subjects.

This implies that these factors need to be thoroughly studied and measures should be taken to improve female students' educational attainment in general and mathematics in particular.

2.2. Over view of Major Factors that Affect Student's Academic Achievement

Students' academic performance was positively correlated with school related factor and out of school factors. In school factors that correlate to students' achievement were physical facilities of school environment, availability of library, pedagogical center, laboratory, instructional leadership, teachers' qualification, experience and competence, Whereas, out of school factors were home environment, parent's socioeconomic status and personal factors.

Factors that affect the academic achievement of female students could be lack of study time and lack of encouragement both at home and at school. Which is highly influences mathematics achievement since it consumes much time to study and master concepts in mathematics Mekasha (2000).

2.3. School Environment /in School Factors/

In school factors known to influence students' achievement could be grouped in to teacher characteristics and school resources. Teacher characteristics were of paramount interest because the qualification, experience and competence of the teachers play a

critical role in the shaping the process of teaching and learning and because the interactions between pupil and teacher were the primary way of transmitting knowledge and skills.

According to UNESCO (2000) school related factors were a function of school policies defined by political and educational leaders at the national, district or local level.

These includes elements such as retention policies, the qualification of teachers, the length of the school year and homework polices, the availability of textbooks and other educational materials, and how convenient schools are to where pupils live. By definition, educational administrators and policy makers have considerable influence over school related factors. More specifically, Barbur (1997) showed that the factors that hamper female students' mathematics achievement were the attitudes values emanating from school and communities.

2.3.1. The Impact of Instructional Leadership and Management

Adhesive (1990) as cited in Yonas (2007) management in general can be defined as the organization and mobilization of all human and material resource in any system for effective achievements of the identified objectives of the system. In many organizations including the school systems, effective management was considered to be a prerequisite for successful accomplishment of the organizational objectives.

Moreover, increasing the effectiveness of educational inputs and improving the quality of teaching could improve students' academic achievement Yonas (2007).

In addition to this, Harris et al., (2003) indicates the role of effective principal.

Effective head teachers are responsible for defining the mission of the schools and setting goals. The goals were widely emphasized traditional students achievment and were widely shared both in and outside the school. Besides they were responsible for managing the routine functions within the school organization that support teaching and learning which consequently increase student's achievement.

Students' academic achievement was positively related with good school climate and creating this good climate was mainly the responsibility of the school principals. Secondary school principals can influence teaching activities positively by administrative support and collegial leadership Yonas (2007).

Similarly, Potter & Powell (1992) stated that effective secondary school principals were aware of teachers need, offers feedback in response to performance and encourages teachers long-term professional development and uses this development for the benefit of the school. He provides positive leadership, and sets goal and motivates the staff to be committed to students' achievement.

2.3.2. The Impact of Teachers on Students Achievement

According to UNSECO (2000) teacher related factors like experience and qualification of teachers was one of the in schools factors that influence student's achievement.

Moreover, Lockheed et al., (1999) as cited in Yonas (2007) teachers were central to delivery as well as the quality of education. The academic and professional training of teachers has a direct and positive effect on the quality of their performance and consequently on the academic achievement of students.

Similarly, study conducted in Colombia by National center for educational statistics NCES (1991) as cited in Yonas (2007) that seniority of the teachers', motivation, teachers' educational level and gender of teacher (female) have a positive relation to student academic achievement in general and female students achievement in particular.

Moreover, Saritas & Akdemir (2009) indicated that competent mathematics teachers provide a roadmap to guide students in general and female in particular to an organized understanding of mathematical concepts, to reflective learning, to critical thinking, and ultimately to mathematical achievement.

2.3.3. Impact of School Guidance and Counseling

According to Ukeje et al., (1992) guidance and counseling is a service designed to assist students to adjust their environment, develop an ability to set realistic goals for themselves and important to their total progress .

Researchers have established that guidance and counseling programs in schools can positively influence students' achievement. Brown (1999) indicated that in schools where comprehensive guidance programs were implemented the higher the students grade.

2.3.4. The Impact of School Facilities

Other than instructional leadership, teachers and guidance related factor the physical environment, school facilities have a great impact on academic achievement of the students in general and females in particular according to MOE (2005) the school facilities were tool to attract students in general and girls in particular.

However the study conducted by Amare (1998) as cited in Yonas (2007) indicated that libraries, laboratories, latrines, water latrine, and pedagogical center, etc were serious problem in most of secondary schools of the country. Of all school facilities, school library has an impact on students' academic achievement. Students who reported that they used the library more frequently were performed at high levels than the others.

2.4. Out School Factor /External Factors/

One of the theories that deal with why students leave the school is a "pull out theory" which refers to factors that makes students to measure the costs and benefits of staying in schools. Employment opportunities, family liabilities and other conditions that attract students to leave schools were "pull out" factor Nuri (2008).

2.4.1. Home Environment

Dornbush et al., (1987) stated that there seems to be a general consensus among theorists in psychology and education that a child's academic achievement is not a simple function

of her/his innate ability. In addition to ability, environmental factors play significant role in child's academic achievement. In particular exposure to different types of stimuli out of school may produce different level of academic achievement independent of ability. Among those out school variables which influence academic achievement were home environments.

Similarly, Tilaye (1999) indicated that the quarrelsomeness of the home environment (for instance, between father and mother, between mother and child etc), could also create a serious emotional disturbance among students in the form of tension, anxiety, fear or instability in their lives which in turn are hindrance to their concentrations in classes for school work in general.

2.4.2. Socio Economic Status

The other out school factor which influence school performance in conjunction with home environment were socio economic status of parents. The term "socio economic status" (SES) is used by sociologists to denote an individual or Family's overall rank in the social and economic hierarchy Mayer & Jencks (1989). In most research, socio economic status has been measured as a combination of parents' education, parents' occupational prestige, and family income Mayer & Jencks (1989); White (1982).

2.4.2.1 Socio Economic Status and math achievement:

Socio economic status, because of its effect on all aspects of students' lives, has been included in a large body of research on academic achievement. It is widely believed that socio economic status is strongly related to academic achievement at the individual level. White (1982), however, in his meta-analytic review of 143 studies, came up with results that are contradictory to this widespread belief. He concluded that when socio economic status was typically defined as a combination of (income, parents' education, and/or parents' occupation) and the student was the unit of analysis, socio economic status was only weakly correlated ($r = .197$) with math achievement. Yet the correlation between socio economic status and math achievement jumped to $.697$, when aggregate units of analysis (such as schools) were used. Many researchers reported similar findings that

families were college graduates most likely successful to enter colleges. For such student parents served as a role models and mentors in encouraging them to aspire. Powney (1996) concluded that parental aspiration and expectations are clearly linked with gender and social class and will affect pupils throughout the educational careers. Through by the kind of encouragement pupils are given to attend schools, do their homework, choose options, presume their higher education, and employment. The study evaluated family behaviors and characteristics and their effect on students' outcome revealed that parents' involvement has a significant impact on students' outcome throughout the elementary, middle school and secondary school years. In this regard Simon (199) indicated that the involvement of families in their children's education depends on the family's educational level. More specifically, Saritas & Akdemir (2009) indicated that parents educational level not only impact student attitudes toward learning but also impact their mathematics achievement. In addition to these studies repeatedly discovered that the parents' annual level of income was correlated with students' mathematics achievement scores Emon (2005) as cited in Saritas & Akdemir (2009). Paulin et al (1997) pointed out those costs of learning materials, transport and clothing influence parents to send their children in to school and make them to choose among their sons and daughters. Clothing for school is more expensive for girls than boys. Girls need underwear and sanitary protection during menstruation and the unavailability of this cause to perform less or leave school at all.

Similarly, sammors et al., (1983) stated that poverty is the most obvious feature and has a clear impact on reading and mathematics achievement of gender and ethnic groups and these is a positive relationship between socio economic status of parents and educational attainment of children. Children of low income family do not perform as well as children of middle and upper income families McCormic & Presley (1997). People with lower income origins are underrepresented in the pool of mathematics majors and in professions that require mathematics competency Maple & Stage (1991) as cited in McCormic & Pressley (1997). Eskstrom (1988) also indicated that students from low income families are more likely to repeat a grade and to drop out of school than a grade and to drop out of school than students from higher income families. Similarly Fennema & Leader (1990) showed that the lower achievement and participation of females in mathematics related careers is partially the cause of the economic problems faced by many women.

2.4.2.2 Family income and math achievement

Family income, another component of socio economic status, also plays a unique role in the relationship between socio economic status and math achievement. Financial capital, defined as the fiscal resources of the family used to meet the basic necessities of the student Coleman (1988), significantly affects student achievement. Families with greater Financial capital can provide their children with educational resources that would enrich their educational experiences, such as books and computers. From the perspective of student motivation toward success, students from middle and high socio economic status families are more likely to have higher levels of motivation for school success. For Example, students from middle class families usually expect that academic achievement will bring real-life awards in the form of good jobs and high salaries. These students have their parents and neighbors who have succeeded in school and already enjoying the benefits of their success. That is, they have their "daily reminders" both in their families and environments that school success will have social and economic payoffs Oakes (1990).

The problem of insufficient family income for individuals can be translated into a matter of poverty concentration at the community level. Poverty concentration has long been perceived as a big problem for poor minority neighborhoods in big cities. Statistics reveal that this is a continuing, or even an ever-growing problem. For example, although the numbers of students in urban schools have remained the same at approximately 11 million between 1980 and 1990, the percentage of students living in poverty increased over the decade. Data from the Schools and Staffing Survey, collected in the 1987-1988 school year, indicated that forty percent of urban students attended high poverty schools (defined as schools with more than forty percent of students receiving free or reduced price lunch), while only ten percent of suburban students and 25 percent of rural students did so. These high poverty schools have a long list of problems that have an extremely negative effect on academic achievement. Among these problems are limited English proficiency, violence, and poor health Lippman et al., (1996).

While students from families with high levels of income have their "daily reminders" that school success will bring real-life awards in the form of good jobs and high salaries, many minority children in big cities have little or no experience to support such beliefs and expectations Oakes (1990). These students may know few adults who have succeeded in school or who have translated school success into economic gain. Lack of social institutions in poor communities which would provide students with contact with positive role models can be added as another problem Oakes (1990); Lippman, et al.,(1996).

Previous research also points to the negative effect of poverty concentration on academic Achievement . Anderson, et al. (1992), in their study found out that low income students in schools with small concentrations of such students score higher than their counterparts in schools with high concentrations of low income students. Myers (1985), using data from the High School and Beyond study, found out that students in high poverty schools had lower scores than did students in low poverty schools, even controlling for family socio economic status.

2.4.2.3 Socio Economic Status and parental Expectations/Involvement

Before proceeding with the literature on how socio economic status affects parental expectations/involvement, it will be useful to clarify the difference between parental expectations and parental involvement. Although there is a positive correlation between parental expectations and parental involvement, researchers agrees that the relationship between expectations and involvement is mediated by two groups of variables. A categorization of parental involvement will be useful at this point. Muller & Kerbow (1993) categorize parental involvement as involvement in three different contexts, namely, within the home and family, in the community, and in the school. The first groups of variables that influence parental involvement are parents' characteristics. These are "parents' educational capabilities, their view of the appropriate division of labor between teachers and parents, the information they had about their children's schooling, and the time, money, and other material resources available in the home" Lareau (1987).

This group of variables affects the level of parental involvement in all three contexts. Another important point, made by Steinberg et al., (1992), is that "how parents express their involvement and encouragement may be as important as whether and to what extent they do". This claim is instrumental in understanding racial/ethnic differences in parental involvement. A good example is the findings by Muller & Kerbow (1993). They found out that White parents had the highest level of involvement when social activities or cultural enrichment were involved, such as talking with their children about current school experiences, knowing parents of their children's friends, volunteering in school. Asian Americans, on the other hand, had quite different ways of involvement. While they had the lowest level of talking with their children about high school programs and tended not to know the parents of their children's friends or volunteer in school, they were the highest in restricting their children's TV watching and enrolling their children in extra classes.

2.5. Personal Factors

Personal factor play a significant role In addition to in school factors and out of school factors in mathematics achievement. The students' motivation, expectation, self-esteem and self directed learning have effect on their mathematics achievement. These factors in conjunction with in school and out of school variables may influence female students' mathematics achievement either positively or negatively.

2.5.1. Achievement Motivation

In the field of education a number of studies have written about achievement motivation. According to, Aggarwal (1994), Woolfolk (1995) students pay attention in their work and study for test when they are motivated because motivation is critical for learning. Saritas & Akdemir (2009) also indicated that mathematics education requires highly motivated students, because it requires reasoning, marking interpretations, and solving problems, mathematical issues and concepts. Similarly, Broussard & Garrison (2004) had indicated that for a higher level of mastery, motivation was related to higher mathematics grades.

2.5.2. Self Esteem and Academic Achievement

Self-esteem is the experience of being competent to cope with the basic challenges of life and of being worth of happiness Branden (1987). Purkey (1988) also indicated that self-esteem refers to the totality of a complex, organized, and dynamic system of learned beliefs, attitudes and opinion that each person holds to be true about his/her personal existence. Branden (1987) showed that positive self-esteem is necessary because it is the immune system of the bounce back from adversity and hence it is critical during the turbulence of adolescence he also expressed that self-esteem built up on the experience of success and through these experience the individual's self-confidence is grew up. As individuals experience success they develop the capacity to cope with whatever life throws their way. This leads to further growth of self confidence, self-reliance and self-esteem. Similarly, Lawrence (1981) as cited in Bahiru (1999) argued that high self-esteem is closely related to higher success. Moreover, self-esteem affects the academic achievement of individuals Bandura (1977); Marsh et al., (1985) as cited by Bahiru (1999). In this regard, Costello (1991) explained that success in learning mathematics relies heavily on earlier experience and activities. Construction of toys, practical work, familiarity with technology and a variety of games are all accepted as useful in this respect. Girls are less likely to come with the benefits of this background and yet relatively little attempt has been made to rethink the mathematics curriculum to make better use of girls experience.

A number of studies have examined the relationship between self-esteem and academic achievement Chang (1976) as cited in Solomon (1999) using grade point average (GPA) to measure achievement they found that grades are positively associated with self-esteem.

Bachman and O'mally (1977) as cited in Solomon (1999) pointed out that educational success is positively correlated to self-esteem. Their eight years longitudinal study showed that the higher the level of education respondent eventually attained, the higher was his/her self-esteem throughout the course of study. Fennema & Sharman (1977) concluded that self-confidence has strong correlation with achievement. According to Fennema, one has to do those thinks that one feels confident to do and avoid activities

those arose anxiety. Badger (1981) reported that, the fact that girls were significantly less self confident in their mathematical ability before they showed any signs of poorer performance tends to confirm the influence of this variable on performance.

According to Baumeister and Tice (1985) as cited in Bahiru (1999) persons who score high in self-esteem were those who focus and emphasize their abilities, strengths and good qualities where as persons who score low in self-esteem were those who focus and emphasize their deficiencies, weakness, and bad qualities. Moreover, the primary reason that the females are afraid of the mathematics courses was the fear comes from the low self-esteem, rather than lack of liability Hachat (1996). The discrepancy between high and low self-esteem may arise either from differential levels of ability or differential patterns of selective perception and memory Bahiru (1999).

2.6. Summary

Students' academic achievement in general mathematics achievement in particular correlated with a number of factors. Among these, school factors, out school factors and personal factors were paramount on students' mathematics achievement in general and females' students' achievement in particular.

According to Barbour (1997) those factors influence female students mathematics achievement were the attitudes, values emanating from school and communities. School facility was also one of school related variable that influence students' achievement in general and female students achievement in particular. It includes well-organized library, safety toilet, pedagogical center, well organized instructional leadership, teachers and guidance related factors and etc. According to MOE (2005) School facilities have a great impact on academic achievement of students. The school facilities are tool to attract students in general and girls in particular. Similarly, students achievement in general females in particular can also affected by out-school factors and one of the out school factor that affect female students achievement was home environment. Tilaye (1999) indicated that the quarrelsomeness of the home environment (for instance, between father and mother, between mother and child etc), could also create a serious emotional disturbance among students in the form of tension, anxiety, fear or instability in their lives which in turn are hindrance to their concentrations in classes for school work in general.

Generally, this chapter gave an important overview of the variables related with students' academic achievement.

2.7. Conceptual Frame Work of the Study

Based on the review of literature, frame work or the schematic diagram for this study can be summarized as follows:

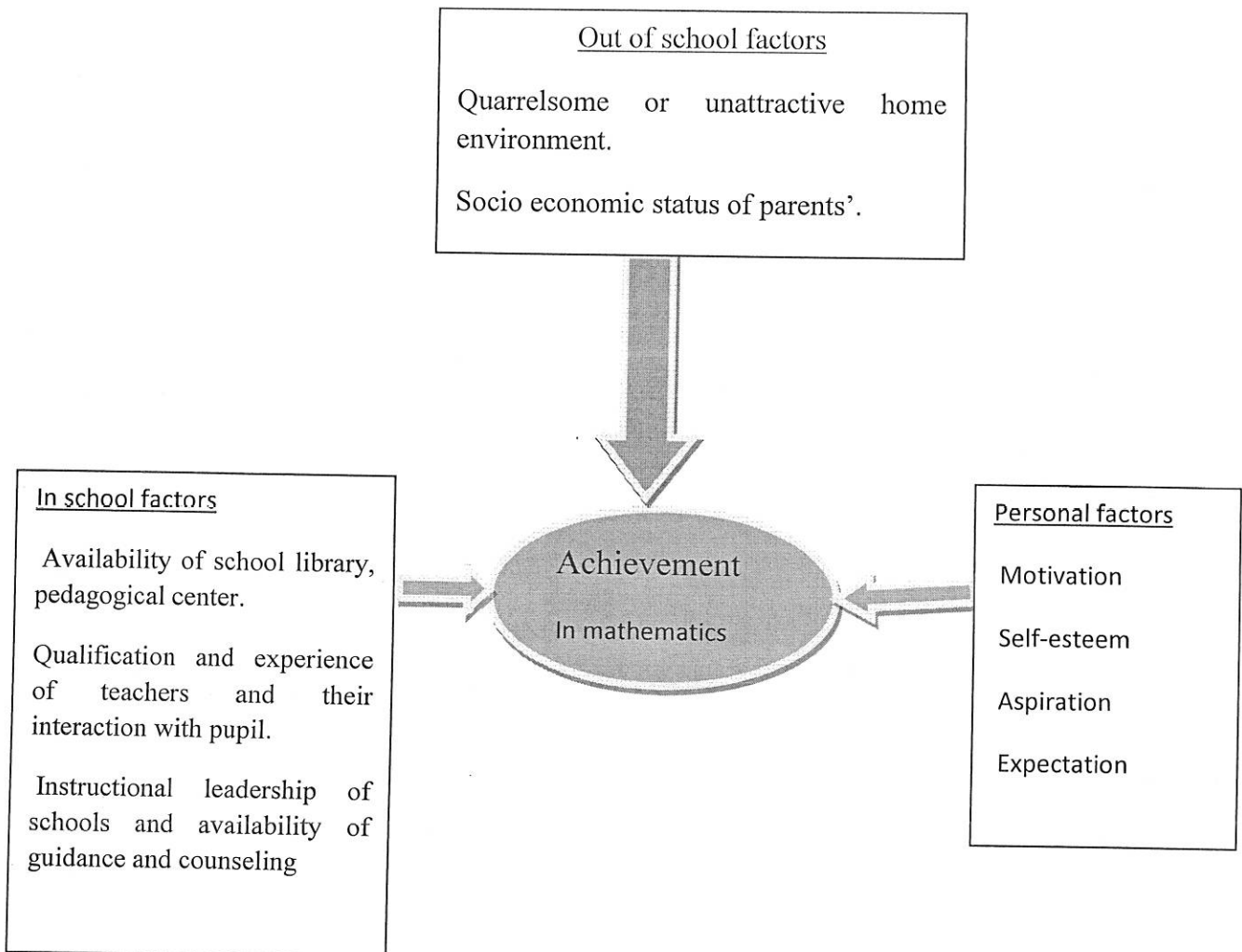


Fig 1 Conceptual model of the study

CHAPTER 3: Research Methods

3.1 Design of the Study

In order to address the research questions and objectives stated in chapter one, the causal relation research design was employed. Which was important, to assess the relative importance of independent variable as the causes of variation in the dependent variable. Michal (2004) explained that causal variables compete with each other to explain variation in an outcome variable. A good contender in this competition was an independent variable that was strongly correlated with the dependent variable. Moreover, Creswell & Clark (2007) also indicated that mixed method approach is more than simply collecting and analyzing both kinds of data; it also involves the use of both approaches in tandem so that the overall strength of a study was greater than either qualitative or quantitative research. Hence, interpretation of qualitative data collected through interview was embedded in discussion section to support quantitative data analysis.

3.2 Participants

Currently Bole Sub-City is divided into fourteen 'wereda'. There are five government first cycle and second cycle /preparatory/ schools. Among these, three of them were first cycle secondary schools with a total number of 1431 female students which were the target population of this study.

The sample frame of this study was all grade nine and ten government Secondary School female students. The sample size was determined for using krejcie & Morgan's (1970) as cited in Yonas (2010) formula of determining sample size for research activities (see appendix E). Using the formula 312 participants were selected which accounts about 21.8% of the total expected maximum sample size. Hence, it is possible to predict about the target population.

Moreover, the rational to use simple random sampling technique was that it was best suited for such homogenous and finite population and it gives equal chance for all students to be included in the study. Furthermore, based on their school and grade

stratified random sampling method was employed to select the representatives of the population group in each stratum. Finally, simple random sampling method /lottery method/ was used to select representatives of the stratum. For instance, out of the total of 599 female students in Lem First Cycle Secondary School, 31 out of 144 grade nine and 99 out of 454 grade ten female students were selected randomly. Sections were also chosen randomly. Hence, five sections from grade nine out of six sections and 11 sections out of 16 sections of grade 10 were chosen randomly. The same procedures were done to choose participants from Dr. Haddis Alameyehu and Bole Community First Cycle Secondary Schools. Accordingly, 126 from 576 female students of Dr. Haddis Alameyehu and 56 from 256 students of Bole Community First Cycle Secondary School were selected.

3.3 Instrument of Data Collection

Multiple source of information were required because of no single source of information could be trusted to provide comprehensive data. To accomplish the objective of this study, three data collecting instruments (questionnaire, achievement test, and interview) were employed. These instruments, without which the study would be incomplete, were appropriately used to elicit relevant information for the study under investigation. Hence, the questionnaire which was prepared for this study has five parts. Part one includes demographic information, part two includes indicator of personal factors, , part three includes indicator of home related factors, part four includes indicator of school related factors and part five includes open ended items. The questionnaire was validated by expertise judge.

The achievement test which consisted of 60 items was prepared by the mathematics expertise at Bole sub-city education office. Then the item accuracy was validated by three subject teachers from the schools in the study. To supplement the data obtained through questionnaire and achievement test, the researcher conducted interview with school principals, councilors, mathematics teachers and selected female students.

3.4 Procedures of Data Collection

The procedure for the achievement test was as follows: the achievement test was constructed by the mathematics expertise at Bole Sub-city education office and then the item validity was checked by three teachers from three schools in the study. Similarly, the validity of questionnaire was examined by expertise value judge and item reliability was examined by pilot test for 21 students from already selected school in the sample. The return rate of pilot test was only 14. The students involved in pilot test were not included in actual sample. From the feedback on pilot test after some correction and modification the questionnaires were administered for the whole (312) sampled respondents.

3.4.1 Pilot Testing

The questionnaire which consisted of 78 items was administered to 21 students so as to see their reliability. 7 students from each school were randomly selected and fill out the questionnaire. The reliability statistics indicated that cronbach alpha for total item was 0.83 and cronbach alpha for home related item was 0.705. Similarilly cronbach alpha for personal factor item category was 0.766 and cronbach alpha for school related item was 0.737. Moreover, after pilot test 18 items were discarded and 60 items were modified and distributed for actual data collections. The result of the reliability statistics brief discussion indicated in (appendix D).

3.4.2 Administration

Both achievement test and questionnaire were administered to respondents in face-to-face fashion with the help of assistants. Initially, orientation was given to assistant data collectors on how to handle questions raised from respondents. In addition, a brief explanation was provided to respondents about the instruction of the tools and confidentiality of the information. Finally, 60 items of a two hour achievement test were distributed for respondents.

After collecting the achievement test questionnaire was coded with the corresponding achievements test and distributed to the respondents to fill out. After collection of questionnaire, interview was administered for principals, councilors and selected female students to support quantitative data through achievement test and questionnaire.

3.5 Method of Data Analysis

The descriptive statistics were used to describe characteristics of the sample based on the demographic survey. Data were analyzed using SPSS for windows version 15.0 computer program. Quantitative data analysis were involved multiple regression. Variation of dependent variable in the variability of independent variables also explained using coefficient of determination and also qualitative data gathered through interview were embedded to support quantitative explanation in the discussions section.

CHAPTER 4: Data Analysis and Presentation

4.1. Data Analysis

The data were gathered from sampled respondents through questionnaires and achievement test. The presentation and analysis of the data were done to answer the basic research questions raised in chapter one understatement of problem section.

Therefore, descriptive statistics was used to analyze and interpret demographic variables whereas multiple regressions was employed to see the prediction power of personal factors, out of school factors and in school factors on female student mathematics achievement test.

4.2 Characteristics of respondents

The demographic variables were presented using descriptive statistics in Table 1, Table 2, Table 3 and Table 4 as follows:

Table 1: Grade and age

Variables	Categories	N	%
Grade level	Ninth	151	48.4
	Tenth	161	51.6
	Total	312	100.0
Age	14	38	12.2
	15	113	36.2
	16	48	15.4
	17	48	15.4
	18	31	9.9
	19	12	3.8
	20	2	0.6
	21	2	0.6
	Not Respond	18	5.9
	Total	312	100.0

As shown in Table 1 above three hundred twelve female students were participated in this study. Among these, 151 (48.4%) participants were from grade nine while the rest 161

(51.6%) of them were from grade 10. Table 1 also showed that of the total three hundred twelve respondents, 151(48.4%) participants were aged 14-15 and 127 (40.7%) of participants' age ranged from 16-18 and 16 (5%) of the respondents were from 19-21 years old. While 18(5.9%) of the participant were not respond.

Table 2: Residential Background and Parents' Educational Background

Variables	Categories	N	%
Residential background	Lived With father and mother	137	43.8
	Lived With father only	18	5.8
	Lived With mother only	40	12.7
	Lived With husband	15	4.8
	Lived With relatives or guardian	92	29.4
	Others	10	3.5
Total		312	100.00
Father's educational background	Illiterate	29	9.3
	Elementary(1-8)	77	24.7
	Secondary(9-12)	84	26.9
	Certificate and above	122	39.1
Total		312	100.0
Mother's educational background	Illiterate	51	16.4
	Elementary(1-8)	90	28.8
	Secondary(9-12)	70	22.4
	diploma and above	101	32.4
Total		312	100.0

When we examined residential background of participants; Table 2 showed that about 137 (43.8%) of respondents were lived with their father and mother and 18 (5.8%) of participant lived with their father only while 40 (12.7%) of them were lived with their mother only and 15 (4.8%) of participant lived with their husband and 92 (29.5%) of the respondent lived with their relatives and the rest of 10 (3.5%) of the participants were respond as other. One can also noticed that from Table 2 above 29 (9.3%) of respondents fathers were illiterate and 283 (90.7%) of respondents parents were literate while 51 (16.4%) of participants mothers were illiterate and 261 (83.6%) of respondents mother were literate.

Table 3: Parents' Occupation and Monthly Income

<u>Variables</u>	<u>Categories</u>	<u>N</u>	<u>%</u>
Parents occupation	Employee	135	43.3
	Merchants	45	14.4
	Daily laborer	27	8.7
	Other	105	33.6
	Total	312	100
Parents monthly income	Below 500	80	25.6
	500-1233	75	24
	1233-2220	86	27.6
	Above 2249	66	21.2
	Not Respond	5	1.6
	Total	312	100.0

Regarding parents' occupation as it was observed in Table 3, 135 (43.3%) of participants' parent were employee and 45 (14.4%) of participants' parent were merchants while 27 (8.7%) of participants' parent were daily laborer. The rest of 105 (33.7%) of the participants' parent were indicate as other.

Table 4: The Mean Value of Achievement Test with the Corresponding Fathers and Mothers Education

<u>Variables</u>	<u>Categories</u>	<u>Achievement test Mean value</u>
Father's educational Background	Illiterate	31.94
	Elementary (1-8)	37.63
	Secondary (9-12)	43.27
	Diploma and above	47.15
Mother's Educational Background	Illiterate	31.60
	Elementary (1-8)	37.00
	Secondary (9-12)	42.11
	Diploma and above	49.47

Table 4 revealed that female students, those who have illiterate fathers scored an average of 31.94 and those who have elementary school complete fathers scored 37.63 on achievement test. Similarly, those who have secondary school complete fathers scored 43.27 and female students whose fathers were diploma and above scored 47.15.

In addition to fathers' educational background, when we examined mothers' educational background, it indicated the following result:

Those female students who have illiterate mothers scored 31.60 and female students with elementary school complete mothers scored 37.00 on mathematics achievement test. Similarly, female students those whose mothers were secondary school complete scored 42.11 on mathematics achievement test. Finally, female students whose mothers had diploma and above, scored an average of 49.47 on achievement test.

Table 5: The Mean Value of Achievement Test with the Corresponding Major Socioeconomic Status of Parents Occupation and Income

<u>Variables</u>	<u>Categories</u>	<u>Achievement test Mean value</u>
Parents' Occupation	Employed	42.52
	Merchants	39.54
	Daily laborer	37.94
	Other	40.02
Parent's income	200-500	33.83
	500-1233	35.89
	1233-2249	42.97
	More than 2249	50.93

Table 5 above indicated that, female student whose parents' were employed scored an average of 42.52 on mathematics achievement test and female students whose parents' were merchants scored 39.54 on mathematics achievement test. Female students from daily laborer families scored an average of 37.94 on mathematics achievement test and those who scored 40.04 respond their parents' occupation as other. Similarly, from Table 5 above one can observed that female students from parents whose monthly income was below 500 Ethiopian birr per month scored an average of 33.83 and female students whose parents monthly income was from 500 to 1233 Ethiopian birr scored an average of 35.89 on achievement test. Female students whose parents' monthly income was from 1233 to 2249 Ethiopian birr were scored 42.97 on achievement test. Finally, female students whose parents monthly income was above 2249 Ethiopian birr scored an average of 50.93 on achievement test.

4.3 Results of Multiple Regressions

This section presents the regression analysis for the predictive power of independent variables on achievement test. To identify more predictor of the independent variables on achievement test, multiple regressions was used. Landau and Everitt (2004) suggested the following three important assumptions for a multiple regressions modeling and checked accordingly. These are:

1. The errors have the same variance (homogeneity). This assumption was checked by visual examination of a plot of the standardized residuals by the regression standardized predicted value.
2. The errors arise from a normal distribution. The distribution of the data was normal and it was examined by inspection from plot scattered in SPSS manipulation.
3. The relation between each explanatory variable and the independent variable is linear. Based on these assumption, in the present study the relation between dependent variable (achievement test) and the major socio economic status, personal factors , home related factors and school related factors was linear it is tested using scatter plot

4.3.1 The Relationship between Achievement Test and the Independent Variable (The Major Socio Economic Status)

The proportion of variance in mathematics achievement test that can be explained by the combined effect of the independent variables which were the major socio economic status variables (Father's educational background, mother's educational background, parents' occupation and parents' income) was explored using multiple regression analysis. Table 6 shows the result.

Table 6: Results of Regression of Mathematics Achievement Test on Independent Variable

Variables	Regression	Standard	Beta	t	P
	Weight (bi)	error	Coefficient		
Fathers' Education (x_1)	1.53	0.43	0.17	3.54	0.00
Mothers' Education (x_2)	3.96	0.48	0.42	8.32	0.00
Parents' Occupation (x_3)	0.32	0.34	0.04	0.95	0.34
Parents' income(x_4)	1.85	0.38	0.23	4.83	0.00

Constant =21.57, $p < 0.05$, $R = 0.642$, $R^2 = 0.412$

On the basis of data analysis result in table 6 for the raw score regression the estimation model equation is written as:

$$\hat{Y} = 21.57 + 1.53x_1 + 3.96x_2 + 1.85x_4$$

Table 6 shows that among the major socio economic status variables: mothers' educational background, fathers' educational background and parents' income had significant contribution to the changes in the female student mathematics achievement test. As observed in table 6 above for the mothers who improve their educational level by one cycle causes to increase their daughters' mathematics achievement test score by 3.96 grades. Similarly, fathers those who improve their educational level by one cycle resulted in 1.53 grade increment in their daughters' mathematics achievement test score. Finally, parents who promote their income rate by one professional science level increased their daughters' mathematics achievement test by 1.85 grades.

Moreover, multiple correlations ($R_{y \cdot 1234} = 0.642$) which shows strong positive relationship between female students' mathematics achievement test (Y) and the independent variable at Bole Sub-City Government First Cycle Secondary Schools. Bluman (1995)) stated that if there is strong relation between the dependent and independent variables then the correlation coefficient r will be close to +1. that is, the major socio economic status (father's educational background, mothers' educational background, parents' occupation

and parents' monthly income) strongly correlate with female students mathematics achievement at Bole Sub-City Government First Cycle Secondary Schools . Similarly, it is also indicated by coefficient of multiple determination ($R^2=0.412$),41.2% of the variation in female students mathematics achievement test at Bole Sub-City Government First Cycle Secondary Schools was accounted by variability in the major socio economic status of parents' as a group.

4.3.2 The Relationship between Achievement Test and the Independent Variables (Personal Factors, Home Related Factors and School Related Factors)

The proportion of variance in mathematics achievement test that can be explained by the combined effect of the independent variables such as: personal factor, home related factors and in school factors was explored using multiple regressions analysis. Its result was indicated in Table 7 below.

Table 7: Result of Regression of Independent Variables on Achievement Test

Variables	Regression	Standard	Beta	t	P
	Weight (bi)	error	Coefficient		
Personal factors (x_1)	0.11	0.02	0.25	6.17	0.00
Home Related Factors (x_2)	-0.12	0.02	-0.26	-4.94	0.00
School Related Factors (x_3)	-0.21	0.03	-0.43	-7.32	0.00

Constant=52.11, $P<0.05$, $R=0.821$, $R^2=0.674$

On the basis of data analysis result in table 7 the raw score regression of the estimation model equation is written as:

$$\bar{Y} = 52.11 + 0.11x_1 - 0.12x_2 - 0.21x_3$$

Table 7 showed that the independent variables (personal factors, home related factors and school related factors) had a significant contribution to female students' mathematics achievement test in Bole Sub-City Government First Cycle Secondary Schools.

Multiple correlations ($R_{yx_{123}}=0.821$.) which indicate strong relation between independent out of school variables (home related) factors, in school and personal factors and dependent Y variable achievement test. Bluman (1995) stated that if there is strong relation between the dependent and independent variables then the correlation coefficient r will be close to +1. Hence, personal factors, home related (out of school) factors and school related factors were strongly correlated with female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools.

It was also observed from coefficient of multiple determination that ($R^2=0.674$), 67.4% of the variation in female students mathematics achievement test at Bole Sub-City Government First Cycle Secondary Schools was accounted by variability in three of the predictors personal factor, home related (out of school) factors and school related factors as a group.

When we examined the above multiple regressions result in Table 7 for every increment in personal factors like attitude, motivations self-esteem and etc of female students was resulted in mathematics score by 0.11. That is if female students show a positive attitude or motivation to study or learn mathematics subject their achievement test score would increase by 0.11 grades. Whereas, for every increments of home related factors female students' mathematics achievement test score would decrease by 0.12 grades. That is if the parents of female students are not willing to facilitate their daughters' to attend and study mathematics, it could be resulted in decreasing their daughters' mathematics achievement test grade by 0.12 in Bole Sub-City Government First Cycle Secondary Schools.

Table 8: Summary of Analysis of Variance (ANOVA)

Variables	Source of Variance	Sum of Squares	dF	Mean Square	F	P
Personal factors,	Regression	14515.68	3	4838.5	212.10	0.00
Home related factors	Residual	7026.27	309	22.81		
School related factors	Total	22541.95	312			

Moreover, the summary of Analysis of Variance (ANOVA) in the above Table indicated that at least one of the variables entered into the regression model significantly predicts female students' mathematics achievement ($F_{(3,309)}=212.10, p<0.01$).

Chapter 5: Discussions of Findings

This section deals with discussions of the results of the study and focuses on the possible explanations for the data analysis in chapter four. The discussion was elaborated the results obtained from simple descriptive statistics and multiple regressions result for major socio economic status (education, occupation and income) of parents and personal factors, home related (out school) factors and school related factors on female students mathematics achievement test.

5.1 The Major Socio Economic Status

One of the basic questions of this study was to examine the effect of out of school factors on female students' mathematics achievement test. The result of data analysis revealed that the major socio economic status (education, occupation and monthly income) of parents' was the most dominant out of school variable to affect female students' mathematics achievement test in Bole Sub-City Government First Cycle Secondary Schools. More specifically it could be seen that female students those have well educated mothers scored better than females of illiterate mothers.

Socio economic status (estimated by family annual income and level of education) was intricately related with parenting style and had paramount potential in influencing child's school achievement Girsburg & Bronstein (1993) as cited in Yonas (2007). The result of this study also consistent with their findings.

Another possible explanation was that female students those, who had literate mothers, score better than those with illiterate mothers. More specifically, mothers' education was slightly affecting female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools than fathers' education. It was seen from Table 4 in chapter four females those who have literate mothers scored more than those who have literate fathers. Table 4 in chapter four clearly indicated that, female students' whose fathers were diploma and above scored an average of 47.15 on mathematics achievement test. Whereas, females those whose mothers were diploma and above scored

49.47 grades in mathematics achievement test. Therefore mothers education is slightly affect female students' mathematics achievement at Bole Sub-City Government First Cycle Secondary Schools.

5.2 The Relationship between Major Socio Economic Status and Mathematics Achievement.

Except for parents' occupation, the analysis of Major Socio Economic Status variables, such as father's education, mother's education, and parents' monthly income on female students' mathematics achievement from multiple regressions result in chapter four Table 6 indicated that, it was significantly affect female students mathematics achievement at Bole Sub-City Government First Cycle Secondary Schools. Moreover, as observed in table 6 in chapter four for the mothers who improve their educational level by one cycle causes to increase their daughters' mathematics achievement test score by 3.96 grades. Similarly, fathers those who improve their educational level by one cycle resulted in 1.53 grade increment in their daughters' mathematics achievement test score.

Finally, parents who promote their income rate by one professional science level increased their daughters' mathematics achievement test by 1.85 grades. It was also indicated by coefficient of multiple determination ($R^2=0.412$),41.2% of the variation in female students mathematics achievement test at Bole Sub-City Government First Cycle Secondary Schools was accounted by variability in the major socio economic status of parents' as a group.

Similarly, Sanabary (1993) as cited in Alemayehu (2006) indicated that, family's socio economic status influences their daughters' education through financial and moral support for own schooling and indirectly through a set of variables that include the daughter's physical, cognitive, and psychological development as well as her motivation, aspiration, and expectations.

5.3 The Relationship between Personal Factors, Home Related Factors and School Related Factors on Achievement Test

The multiple regressions analysis of dependent variable (mathematics achievement test) on independent variables such as, personal factors, home related factors and school related factors was indicated that personal factors was positively related to female students mathematics achievement whereas, home related factors and school related factors was related negatively to female students mathematics achievement at Bole Sub-City Government First Cycle Secondary Schools. Moreover, if female students show a positive self-esteem, positive attitude or motivations to study or learn mathematics subject their achievement test score would increase by 0.11 grades. Whereas For every increments of home related factors the female students' mathematics achievement tests score would decrease by 0.12 grades. That is if the parents of female students were not willing to facilitate their daughters' to attend and study mathematics in home, it resulted in decreasing their daughters' mathematics achievement test grade by 0.12 and also the increment of school related factors such as shortage of school library, pedagogical center, unsafe school environment like unavailability of water latrines ,latrines, well-qualified and experienced teachers and unorganized instructional leadership and unavailability of guidance and counseling would result in declining female students mathematics achievement by 0.21 grades at Bole Sub-City Government First Cycle Secondary Schools.

Furthermore, it was observed from coefficient of multiple determination that ($R^2=0.674$), 67.4% of the variation in female students mathematics achievement test at Bole Sub-City Government First Cycle Secondary Schools was accounted by variability in three of the predictors personal factors, home related (out school) factor and in school factors as a group.

More over one of my informants who was a councilor at Dr. Haddis Alamayehu First Cycle Secondary School mentioned that:

About 75% of female students those I have council currently emphasized on recreation and they have no motivation and courage to attend their class. In general in as I observed on them, they do not set goal for their further educational attainment. (C₁, 22nd March 2013)

Similarly, one of my informant principal of Lem First Cycle Secondary School mentioned that:

In our school the teachers take initiative to offer tutorial class for female students even including Saturday. But in one or another reason most of female students were not willing to attend tutorial class. Even we tried to intervene the problem along with our school counselor most of them are negligees in science subjects including mathematics. (P₂, 24th March 2013)

Therefore, from multiple regressions result for personal factor above and from the above interview response one can deduced that personal factors was one of paramount variable that can influence female students' mathematics achievement at Bole Sub-City Government First Cycle Secondary Schools.

Similarly, Burstein (1992) in a comparative study of factors influencing mathematics achievement found out that there is a direct link between students' attitudes towards mathematics and students outcomes. He also found that 25% in England and 26% in Norway accounted for variation in students' attitude towards mathematics. The findings of this study for personal factors were consistent with the pervious findings.

The other dominant out school factor was home related factor as indicated in analysis part it was one of the out school factor which influences female students mathematics achievement negatively. This includes unattractive home environment like, parents unpleasant approach towards their daughters and quarrelsome and unwillingness to facilitate school materials, which were negatively influence their daughters' school performance in general and mathematics performance in particular.

In addition to this one of my informant student from Bole Community First Cycle Secondary School explained that:

I am living with my mother and she produces and sells local bran “arake” from 12.00PM to 6.00PM (Mid night) per day and she needs my support to her work unless she beats me so, I have to support her, after all of our customers going I start to study but I cannot. That is because I fill tired. (S₃, 26th March 2013).

In addition to this one of my informant a teacher from Dr. Haddis Alemayehu stated that:

In our school most of female students live with their relatives and their relatives emphasize on domestic works than their education, that is why most of my female students come to class without doing their homework and when I asked the reason, they replay that I live with my relatives and I work domestic chores exhaustively then I fill tired to do my homework.

(T₁, 20th March 2013)

From multiple regressions analysis in chapter four and from qualitative data through interview home environment is one of the out school influential factor that affects negatively female students' mathematics achievement at Bole Sub-City Government First Cycle Secondary Schools. This was consistent with the findings of previous study. Similarly, Tilaye (1999) indicated that the quarrelsomeness of the home environment (for instance, between father and mother, between father and child etc) could also create a serious emotional disturbance among students in the form of tension, anxiety, fear or instability in their lives which in turn are hindrances to their concentration in classes or school work in general. Mekasha (2000) also indicated that factors that affect female students could be lack of study time both at home and school. Which is highly influences mathematics achievement since it consumes much time to study and master concepts.

The other factor on female students' mathematics achievement was in-school factors. Which included the unavailability of well equipped library, qualification and experience of teachers and teacher-pupils' interaction, shortage of latrines, school guidance and counseling. To bring better school performance these things should be facilitated within the school environment. The absence of these things could negatively influence female students' mathematics achievement as indicated above.

In addition to this one of my informant student from LEM First Cycle Secondary School explained that:

As you see, our school has a lot of students but only one library which cannot accommodate the students. So, we are keeping a turn to study. Not only this, but also it has no appropriate reference books and there is no time to use it. This is because it works at tea break, lunch time and after school. But my parents are not allowed me to use after school. These things discourage me to stay at library and to use it. (S₂, 22nd March 2013)

More over one of my informant principal of Dr. Haddis Alamayehu First Cycle Secondary School at Bolc sub-city described the interconnection and impact of these factors on female students' mathematics achievement. As follows:

In our school two third of our staff members are with experience less than five years. They have no enough skill and experience how to handle class room management. Most of the times, we have meeting on conflict management between teachers and pupils. This is the result of poor interaction between teachers and students. Consequently it affects students' achievement. (P₁, 19th March 2013)

Therefore, school related factors like, unavailability of library, qualification and experience of teachers and the school environment in general were some of school related factors that were affect female students' mathematics achievement.

In line with this, UNESCO (2000) stated that teacher characteristics are of paramount interest because the qualification, experience and competence of the teachers play a critical role in the shaping the process of teaching and learning and because the interactions between pupil and teacher are the primary way of transmitting knowledge and skills.

Chapter 6: Summary Conclusion and Recommendation

6.1 Summary

The primary objective of this study was to investigate the main factors that affect female students' mathematics achievement both in school and out of school in Bole Sub-City Government First Cycle Secondary Schools. To achieve this objective the following basic research questions were formulated for investigation.

1. What are the out of school factors that are significantly affect female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary schools?
2. Is there a significant relation between in school factors and female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools?
3. Is there a significant relation between personal factors and female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools?

Among total of 1431 target population, 312 participants were taken using random sampling techniques. 56 participants from Bole Community First Cycle Secondary School, 130 participants from Lem First Cycle Secondary School and 126 participants from Dr. Haddis Alamayehu First Cycle Secondary School were selected randomly. In order to collect valid and reliable data an instrument namely questionnaires, achievement tests, and interview were employed. The results of descriptive statistics, multiple regressions and Analysis of variance (ANOVA) summarized as follows:

The finding of this study indicated that the major Socio Economic Status (educational background, and monthly income) of parents' and unpleasant home environment were out of school factors that causes female students' mathematics achievement test variation. In addition to this, females those who had well educated parents and high income family scored a good grade in mathematics achievement test. It was also indicated by coefficient

of multiple determination ($R^2=0.412$), 41.2% of the variation in female students mathematics achievement test at Bole Sub-City Government First Cycle Secondary Schools was accounted by variability in the major socio economic status of parents' as a group.

Personal factors, home related factors and school related factors were also found to be significantly predictors of female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools. Moreover, the data analysis in chapter four indicated that female students with positive self-esteem, positive attitude or motivation to study or learn mathematics subject would increase their mathematics achievement test score by 0.11 grades. Whereas For every increments of home related factor the female students' mathematics achievement tests score would decrease by 0.12 grades. That is if the parents of female students were not willing to facilitate their daughters' to attend and study mathematics in home, it resulted in decreasing their daughters' mathematics achievement test grade by 0.12 and also the increment of school related factors such as shortage of school library, pedagogical center, unsafe school environment like unavailability of water latrines ,latrines, shortage of well qualified and experienced teachers and unorganized instructional leadership and unavailability of guidance and counseling would result in declining female students mathematics achievement by 0.21 grades at Bole Sub-City Government First Cycle Secondary Schools.

Furthermore, it was observed from coefficient of multiple determination that ($R^2=0.674$), 67.4% of the variation in female students mathematics achievement test at Bole Sub-City Government First Cycle Secondary Schools was accounted by variability in three of the predictors personal factor, home related (out school) factor and in school factors as a group.

6.2 Conclusions

The major focus of this study was to see both in school and out of school factors those affect female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools. Accordingly, the findings of this study indicated that the major socio economic status (education, and income) of parents' and unpleasant home environment were out of school factors that significantly affect female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools.

Similarly, shortage of school library, pedagogical center, unsafe school environment like unavailability of water latrines, latrines, shortage of well-qualified and experienced teachers and unorganized instructional leadership and unavailability of guidance and counseling were in school factors that significantly affect female students' mathematics achievement in Bole Sub-City Government First Cycle Secondary Schools. Furthermore, female students' positive self-esteem, positive attitude or motivation to study or learn mathematics subject were personal factors that significantly affect their mathematics achievement in Bole Sub-city Government First Cycle Secondary Schools.

6.3. Recommendations

Based on the findings of this study, suggestions about the practical implications and further investigations were forwarded for concerned bodies.

1. School principals have a potential to strengthen the relation between Schools and families therefore school principals should aware the parents about the importance of mathematics to other science and technology fields. Consequently they might smooth the relation with their daughters' and facilitate attractive environment to study and solve mathematical problems at home.
2. Sub-City education offices have a potential to increase mothers education through inclusive adult education. Hence they must focus on mothers in addressing adult education. Since mothers educational background was dominantly affect female students' mathematics achievement at Bole Sub-City Government First Cycle Secondary Schools as indicated in the discussion section.

3. Schools should encourage students to participate in co-curricular activities such as mathematics club, natural science club. It might attract and motivate female students toward the subject and to solve the problems.
4. The biased believe and attitudes of parents, school communities and female themselves were also contributing factor for female students low achievement in mathematics.

Therefore, panel discussions both in school and at Sub-City level held to awaking female students' competence in general and mathematics in particular.

Finally, this study focuses on factors that affect female students' mathematics achievement at Bole Sub-City Government First Cycle Secondary Schools. It is the area of research to conduct the same study in elementary schools and preparatory schools to see its effect.

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Appendices

Appendix- A

Addis Ababa University

School of Graduate Studies

Institute of Educational Research

Department of Educational Research and Development

Mathematics Achievement Test For Grade 9

General Directions

This exam contains 60 items and time allowed to attempt all equations is 2hrs. There is only one best answer for each question chooses the best answer and write your answer on the space provided.

_____ 1. Which of the following is the simplified form of $\sqrt{27} - \sqrt{12} + \sqrt{3}$?

- A. $2\sqrt{3}$ B. $4\sqrt{3}$ C. $5\sqrt{3}$ D. $\sqrt{3}$

_____ 2. The value of x for $(2x-1)^3 = 27$ is

- A. 3 B. 2 C. 1 D. 0

_____ 3. Which of the following is not a rational number?

- A. $\sqrt[3]{24}$ B. $\sqrt[3]{27}$ C. $(1 + \sqrt{3})^2$ D. $(\sqrt{2} + 1)(\sqrt{2} - 1)$

_____ 4. If $x = 0.212112 \dots$ and $y = 0.12122122\dots$ then x / y is equal to

- A. $\frac{3}{100}$ B. $\frac{7}{10}$ C. $\frac{1}{3}$ D. 0.333

- _____ 5. When the denominator of $\frac{4}{\sqrt{5} + 1}$ is rationalized it gives
- A. $\sqrt{5} - 1$ B. $\sqrt{5} + 1$ C. $\frac{\sqrt{5} - 1}{6}$ D. $\frac{\sqrt{5} - 1}{4}$
- _____ 6. If $A = 0.0017$ then its standard notation is equal to
- A. 1.7×10^{-3} B. 17×10^{-3} C. 1.7×10^{-2} d. 1.7×10^{-5}
- _____ 7. Which of the following is a solution set of $2x^2 - 5x + 3 = 0$?
- A. $\{1, -3/2\}$ B. $\{1, -1\}$ C. $\{3, 2\}$ D. none
- _____ 8. The sum of roots of equation $2x^2 + 14x + 24 = 0$ is
- A. -12 B. 12 C. 16 D. 10 E. 7
- _____ 9. If $12^{x+3} = 12 - 5$, then the value of x is
- A. -2 B. 8 C. -8 D. 2
- _____ 10. The solution set of $\sqrt[3]{36}^{x-8} = 6x$ is equal to
- A. $\{10\}$ B. $\{8\}$ C. $\{-8\}$ D. $\{-16\}$
- _____ 11. Which of the following is true about the properties of absolute value for all real number x and y ?
- A. $\sqrt{x^2} = |x|$ B. $|x| < 0$ C. $\frac{x}{y} < \frac{x}{y}$, for $y \neq 0$ D. None
- _____ 12. If $x = z$ and $y = 4$, then the value of $|3x - 2y| + |x + y|$ is equal to
- A. 4 B. 5 C. 10 D. 8
- _____ 13. Which of the following is the solution set for $\begin{cases} 2x - 3y = 5 \\ 5x + 3y = 9 \end{cases}$
- A. $\{1, 2\}$ B. $\{5\}$ C. $\{1/2\}$ D. All

_____ 14. IF $\begin{cases} y = x + a \\ y = x \end{cases}$ has no solution, then the value of a is?

- A. 10 B. 5 C. $\frac{1}{2}$ D. 7

15. if the sum of the roots of equation $3x^2+kx+0=0$ is 7, then the value of k is:-

- A. 7 B. 21 C. -21 D. 7

_____ 16. If the sum of two numbers is 6 and their product is eight. What are the two numbers?

- A. -2 and -4 B. -2 3 C. 2 and 4 D. none

_____ 17. If $64^{2x-3} = 4^{x+6}$, then the value of x is equal to

- A. 3 B. -3 C. 9 D. 5

_____ 18. The solution set not $(3x-5)^2 = (2x+1)^2$ is equal to

- A. $(\frac{4}{5})$ B. $\{-6\}$ C. $\{6\}$ D. $\{0\}$

_____ 19. The solution set of $\begin{cases} X - 2Y = 4 \\ X + Y = 1 \end{cases}$ is

- A. $\{(2,1)\}$ B. $\{(-2,-1)\}$ C. $\{(2,-2)\}$ D. None

_____ 20. The simplest form of $(\frac{16}{48})$ is

- A. $\frac{16}{81}$ B. $\frac{2}{3}$ C. $\frac{1}{3}$ D. $\frac{27}{8}$

_____ 21. The solution set of $125^{x-1} = (5)^{x+1}$ is

- A. $\{\frac{2}{5}\}$ B. $\{1\}$ C. $\{\frac{1}{5}\}$ D. $\{\frac{4}{5}\}$

_____ 22. Which of the following is finite set?

- A. The set of whole number
- B. The set of natural number b/n land 10
- C. The set of rational number
- D. The set of natural number

_____ 23. If the GCF (60,x) and LCM (60,X) = 180, then x is equal to:-

- A. 90
- B. 36
- C. 144
- D. 48

_____ 24. The value of x for $\sqrt{3x} = 32x+1$

- A. $-\frac{2}{3}$
- B. $\frac{2}{3}$
- C. $\frac{1}{3}$
- D. $\frac{3}{2}$

_____ 25. The solution of $\begin{cases} x + y = 3 \\ 2x + 2y = 6 \end{cases}$ is

- A. $\{(-1,1)\}$
- B. $\{(2,-2)\}$
- C. 1K
- D. none

_____ 26. The value of x in $\sqrt{3x-2} = \sqrt{3x-7}$ is

- A. \emptyset
- B. $\{-1,1\}$
- C. $\{2,-2\}$
- D. all

_____ 27. Which of the following is perfect square?

- A. $X^2+2ax+a^2$
- B. X^2-4x-5
- C. X^2-x+1
- D. $2x^2+4x+2$

_____ 28. The factors of $x^2 + 5x + 6$ are

- A. $(x+2)(x+1)$
- B. $(x+3)(x+2)$
- C. $(x-2)(x+3)$
- D. $(x-3)(x-2)$

_____ 29. The solution of quadratic equation of $x^2-2x-12=7x-12$

- A. 2 and 1
- B. 0 and 9
- c. 2 and 7
- D. 3 and 2

- _____ 30. If $x^2 - 8x + 16 = 0$ then the solutions are
 A. $\{1, 4\}$ B. 4 C. $\{4\}$ D. $\{-5\}$
- _____ 31. If $3x^2 - 5x + 2 = 0$, then find the sum of the roots
 A. $\frac{2}{3}$ B. $\frac{5}{3}$ C. 1 D. $\frac{2}{5}$
- _____ 32. From question 31 find the product of the roots
 A. $\frac{10}{6}$ B. $\frac{2}{3}$ C. $\frac{1}{4}$ D. 1
- _____ 33. If the product of roots of the equation $kx^2 + 8x + 3 = 0$ is 1 then what is the value of k
 A. $\frac{8}{3}$ B. $\frac{1}{3}$ C. 2 D. 3
- _____ 34. If the sum of the roots of equation $8x^2 + kx + 1 = 0$ is 7, then, the value of k is
 A. -56 B. -7 C. 12 D. none
- _____ 35. The sum of the squares of two consecutive natural number is 313 find the number
 A. -1 and 13 B. -13 and 12 C. 16 and -16 D. a and c
- _____ 36. The sum of the numbers is 11 and their product is 28, find the numbers
 A. 7 and 2 B. 11 and 6 C. 4 and 7 D. 1 and 4
- _____ 37. Suppose the sum of the number of subsets and subset is 15 then what are the number of elements, proper subsets and subsets respectively?
 A. $\{7, 3, 8\}$ B. $\{8, 3, 7\}$ C. $\{3, 8, 7\}$ D. $\{3, 8, 7\}$
- _____ 38. If $n(A \times B) = 24$ and $n(A) = 4$, then $n(B)$ is
 A. 20 B. 5 C. 6 D. 8
- _____ 39. Given $U = \{1, 2, 3, \dots, 8\}$ and $A = \{1, 3, 5, 7\}$, then A is equal to
 A. $\{1, 2, 6, 8\}$ B. $\{1, 3, 7, 5\}$ C. $\{4, 6, 7, 8\}$ (2) D. $\{2, 4, 6, 8\}$

- _____ 40. Let $A = \{0, \{1,2\}, 3\}$ $B = \{0, \{3\}, \{1,2\}\}$ then which of the following is true
 A. $B \subset A$ B. $A \cap B = B$ C. $A \cup B = A$ D. $\{1,2\} \in A \cap B$
- _____ 41. Given two sets A and B such that $A = \{\{a,b\}, c\}$ and $B = \{a, \{b\}\}$ then what is $A \cap B$?
 A. $\{1\}$ B. $\{a, \{b\}\}$ C. $\{a\}$ D. $\{a,b\}$
- _____ 42. If $A = \{-3,5\}$, and $B = \{6,7\}$, then $A \times B$ is
 A. $\{-3,6\}, \{-3,7\}, \{5,6\}, \{5,7\}$, B. $\{-3,6\}, \{-3,7\}, \{6,7\}, \{6,5\}$
 C. $\{6,-3\}, \{7,-3\}, \{7,5\}, \{5,7\}$ D. All
- _____ 43. The solution set of $3x^2 + 12x + 15 = 0$ is
 A. -1 B. 2 and 5 C. 1 D. no real solution
- _____ 44. The simplify form of $\sqrt[3]{-27x^6}$ is
 A. $-3X$ B. $-3X^2$ C. $3X$ D. $3X^3$
- _____ 45. The simple form of $\frac{\sqrt{x+1}-1}{\sqrt{x+1}+1}$
 A. B. $X+1$ C. 1 D. 2
- _____ 46. What is the scientific notation of (1.0000475)
 A. 4.75×10^{-2} B. 4.75×10^{-5} C. 47.5×10^{-7} D. 4.75×10^{-4}
- _____ 47. The product of $(5 + 3\sqrt{2})(5 - 3\sqrt{2})$ is
 A. 16 B. -11 C. 7 D. 6
- _____ 48. The simplify form of $\frac{\sqrt{18}}{\sqrt{5-3}}$
 A. $\frac{\sqrt{3}}{2}$ B. $\frac{\sqrt{5}}{3}$ C. $\frac{\sqrt{18}}{4}$ D. none

_____ 49. If $\sqrt{16x + 4} = 2^{3x}$ the value of x is

- A. 8 B. 2 C. -4 D. -8

_____ 50. The solution of linear equation is $\begin{cases} 4x + 3y = 8 \\ -2x - \frac{3}{y} = -6 \end{cases}$

- A. (6,5) B. (1,1) C. (0,4) D. no solution

_____ 51. The solution of $\frac{1}{2x+2} = \frac{1}{2x-1}$ is

- A. $-\frac{1}{4}$ B. $-3 - \frac{1}{4}$ C. $\frac{3}{4}$ D. -1

_____ 52. The solution set of $(x-2)^2=1$ is

- A. 1 and 3 B. 2 C. 2 and -2 D. b and c

_____ 53. Which of the following is true about quadratic equation ax^2+bx+c

- A. If $a = 0$ it's quadratic B. If $c=0$ it's also possible to be quadratic
C. If $a=c$ it's also quadratic D. A and B

_____ 54. The simplest form of $\frac{\sqrt{x+a}}{\sqrt{x-a}} + 1$ is

- A. $\frac{\sqrt{2ax\sqrt{x}}}{x}$ B. $\sqrt{x+a}$ C. $\sqrt{x-a}$ D. $\sqrt[3]{x+a}$

_____ 55. If $12x^3 = 12^{-5}$ the value x is

- A. -8 B. -3 C. -4 D. -1

_____ 56. For non-negative number a where m,n, are E/R. which of the following is false.

- A. $a^m \times a^n = a^{mn}$ B. $(a^m)^n = a^{m+n}$
C. $a^m = a^{m-n}$ D. $a^m = a^n$ if $m=n$

_____ 57. Let $x = \frac{\sqrt{a}}{b}$ and $y = \frac{\sqrt{b}}{a}$ then what is the value of $x^2 y^2$?

- A. $\frac{a}{b}$ B. $\frac{1}{a \cdot b}$ C. $\frac{\sqrt{ab}}{ab}$ D. \sqrt{ab}

_____ 58. Which of the following has one real root?

- A. $X^2 - 4X + 4$ B. $X^2 - 4X + 3$ C. $2X^2 + 8X + 6$ D. None

_____ 59. The zero of $f(x) = x^2 - x - 30$ are

- A. 6 and -5 B. -6 and 5 C. -6 and -5 D. -3 and 2

_____ 60. The solution set of $|2x - 1| > 2$ is equal to

- A. $\{1/2, 3/2\}$ B. $\{-1/2, 3/2\}$ C. $\{-3/2, -1/2\}$ D. none

Mathematics Achievement Test For Grade 10

General Directions

This exam contains 60 items and time allowed to attempt all equations is 2hrs. There is only one best answer for each question chose the best answer and write your answer on the space provided.

- _____ 1. Which of the following is not a polynomial?
- A. $3^X + X^2 + 1$ B. $\sqrt{x^2}$ C. $x^y 3 + x^{-1}$ D. all
- _____ 2. Let $f(x) = 3x^2 + 5$ and $g(x) = x^7 - 2x + 3$ then what is the degree of $(f \circ g)(x) =$
- A. 7 B. 9 C. 14 D. 12
- _____ 3. Find the remainder when $f(x) = x^3 - 4x + 3$ is divided by $x - 1$
- A. 6 B. 0 C. 4 D. 3
- _____ 4. Which of the following is true about graph of polynomial function?
- A. It's dissentingly function
- B. A function of degree n has at most n x -intercept
- C. For $n > 0$ degree has $n + 1$ turning point
- D. None
- _____ 5. Let $f(x) = 3x^2 + (x + 1)(2 - 3x) + x$ then which of the following is not true?
- A. f is a polynomial function of degree 2 B. $f(x) > 0$ for every real number x
- C. $f(-x) = f(x)$ for all $x \in \mathbb{R}$ D. None of the above

_____ 6. If $f(X)$ and $g(X)$ be any two polynomial, then which of the following is false?

- A. $F(x) + g(X)$ is polynomial
- B. $F(g(x))$ is 2 polynomial
- C. $F(X) - g(x)$ is 2 polynomial
- D. $f(X)/g(X)$ is polynomial

_____ 7. Let $f(X) = 2x^2 - x + 1$ and $g(X) = x^3 + x + 3$, Find $\sqrt{f(g(0))}$

- A. 1
- B. $\sqrt{3}$
- C. 4
- D. 16

_____ 8. What is the quotient of divide $x^3 - 2x^2 + 7x - 11$ by $x^2 - x + 3$

- A. $X^2 - X + 3$
- B. $X - 1$
- C. $3X + 14$
- D. $X + 5$

_____ 9. Determine the value of "a" and "b" if $x - 3$ is a common factor of the polynomials

$$f(X) = x^3 + ax^2 + bx - 5 \text{ and } g(X) = 2ax^3 - bx^2 - 2x - 3$$

- A. $a = -\frac{2}{3}, b = -5$
- B. $a = -1, b = -2$
- C. $a = 0, b = 2$
- D. $a = \frac{1}{2}, b = 3$

_____ 10. When $f(X) = 4x^4 - 3x^2 + ax + 1$ divided by $x - 1$, the remainder is 19, find the value of a.

- A. 12
- B. 18
- C. 17
- D. none

_____ 11. Which of the following is not true about a polynomial function of degree n?

- A. Every vertical line crosses its graph of exactly one point.
- B. Its graph has at most $n - 1$ turning point
- C. The line crosses it's graph at most n-times when $n > 1$
- D. None

_____ 12. If $(x+2)^n (X-2) = (x+2) (x^2-4)$ for all value of x , what is the value of n

- A. 1 B. 2 C. 3 D. 4

_____ 13. What is the value of c , if $x-c$ is a factor of $x^3+2x^2-c^2x-8$

- A. (0,-1) B. (-2,2) C. (4,6) D. (1,3)

_____ 14. Which of the following is true about $f(X) = (x^2-5)^2 (x-5)$?

- A. $\sqrt{5}$ is a root of multiplicity 2
B. $\sqrt{5}$ is a root of multiplicity 4
C. *5 is a root of multiplicity 2*
D. $\sqrt{5}$ is a root of multiplicity 1

_____ 15. Which of the following is not a factor of $p(x) = x^4 - x^3 - 4x^2 + 4x$?

- A. $X-1$ B. $X+1$ C. $X-2$ D. $X+2$

_____ 16. If $f(X) = 2(x^4 - 5x^2 + 3x - (x^2, x^2) + 2)$, then which of the following is false?

- A. $f(x)$ has degree 2
B. the leading coefficient is -10
C. The coefficient of x^3 is 0
D. the constant term is -4

_____ 17. What is the solution set of $x^4 - 10x^2 + 9 = 0$

- A. (1, ± 3) B. (1,4,5) C. (3,1) D. none

_____ 18. IF $\sqrt{9X^2 - 1} = 1$ then, the value of x is

- A. $X = \pm 1$ B. $X = \pm 2$ C. $X = 0$ D. $X = \pm 3$

_____ 19. If $\sqrt{9^{x^2-1}} = 1$ then the value of x is

A. $\log^x / \log^2 = \log^x - \log^2$

B. $-\log^x = \log 1/x$

C. $\sqrt{\log x} = 1/2$

D. $\log_2 1/x = \log_{a.5}^x$

_____ 20. What is the value of x if $\log_2^{x^2} - \log_2^{x+2} = 0$

A. $\{-1, 2\}$

B. $\{2\}$

C. $\{-1\}$

D. $\{1, -2\}$

_____ 21. If $\log_7^2 = x$ and $\log_2^{13} = y/2$ the \log_2^{91} is

A. $X - Y/2$

B. $\frac{2X + Y}{2}$

C. $Y/2 + X^2$

D. None

_____ 22. The solution set of $3 - \log_3^x = \log_3^y$ is

A. $\{9\}$

B. $\{-9, 9\}$

C. $\{3\}$

D. $\{7\}$

_____ 23. Which of the following is true about $f(x) = e^x$ and $g(x) = e^{-x}$

A. They have some range

B. The domain is $x > 0$

C. Are increasing function

D. All

_____ 24. The universe of the $\log_3 \frac{1}{x+1}$ is

A. $(-2, \infty)$

B. $(\infty, -1)$

C. $(-\infty, -1) \cup (1, \infty)$

D. None

_____ 25. The solution set of $9^x - 10(3^x) + 9 = 0$

- A. $\{3,4\}$ B. $\{0,2\}$ C. $\{1,-1\}$ D. $\{3,1\}$

_____ 26. The domain of $f(x) = \log(x^2 - 1)$ is

- A. $(-2, \infty)$ B. $(\infty, -1)$ C. $(-\infty, -1) \cup (1, \infty)$ D. None

_____ 27. Which of the following is true about if $x > 0$ and $y > 0$

- A. $\log^x y = 0$ B. $\log_a^x + \log_a^y = \log_a^{\frac{x}{y}}$
C. $\text{Log } y^x = \text{Log } y^x$ D. $c \log y = x$

_____ 28. If $\log^y x = a$ and $\log^x y = b$, then $\log^{\frac{x^2 y^3}{\sqrt{xy}}}$ is equal to

- A. $\frac{2b+a}{a+b}$ B. $\frac{4b+6a}{a+b}$ C. $\frac{a+b}{2a+b}$ D. $\frac{6a+4b}{a-b}$

_____ 29. $\ln \frac{x}{y}$ for $x, y > 0$ is equal to

- A. $\ln - \frac{x}{y}$ B. $-\ln \frac{x}{y}$ C. $\frac{\ln X}{\ln Y}$ D. $\ln \frac{-x}{y}$

_____ 30. If $\text{Log}^2 = \sin \theta$ and $\log^5 = \cos \theta$ then \log^{100} is

- A. $\sin \theta$ B. $\cos \theta$ C. $2 \sin \theta$ D. $2 \cos \theta$

_____ 31. If $\log^x = \sin \theta$ and $\log^y = \cos \theta$ then $(\log^{xy})^{2-25 \sin \theta \cos \theta}$ is

- A. $(\sin \theta \cos \theta)^2$ B. 1 C. $-\sin \theta \cos \theta$ D. $\sin \theta \cos \theta$

_____ 32. What is the solution set of equation $\log^{\frac{(x-2)(x-3)}{}} = 1$

- A. $\{0\}$ B. $\{5\}$ C. $\{0,5\}$ D. \emptyset

— 33. Which one of the following is equal to the solution set of in equality

$$\log_2^x + \log_4^x \leq 3/2?$$

- A. $\{0,2\}$ B. $(-\infty, 1]$ C. $(0, 3/2]$ D. $(2, 3/2]$

— 34. The domain of $f(X) = \sqrt{\log(3 - 2x)}$ is

- A. $(-\infty, 1]$ B. $(-\infty, 3/2)$ C. $[1, 3/2]$ D. NONE

— 35. If $f(X) = ax$ then which of the following is true ?

- A. It's increasing function of $a > 1$
B. It's decreasing function $0 < a < 1$
C. It's increasing and decreasing at $a = 1$
D. A and B

— 36. A sample of radioactive is otores decrease from 5mg to 4mg in 24 in year. Find the amount of material left after 30 years?

- A. 2mg B. 3.78mg C. 4.27 mg D. 2.41mg

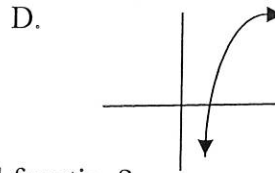
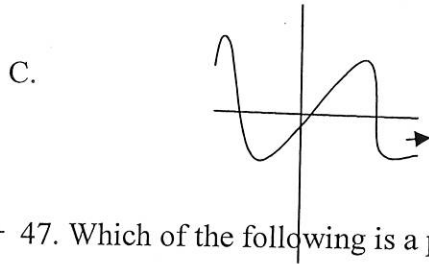
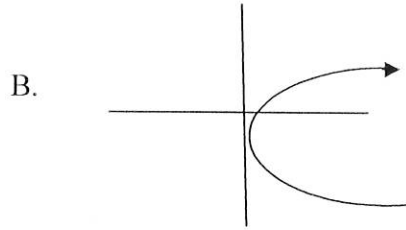
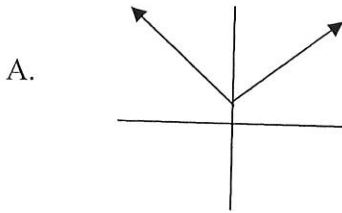
— 37. Suppose Birr 3000 is invested at 5% compounded continuously how long will it takes the amount to grow to birr 7000?

- A. $30/4$ years B. $1/7$ year C. 21 year D. 7 year

— 38. Let $g(X) = 3^x$, then which of the following is not true?

- A. $g(-3) = (1/3)^3$ C. $-g(-X) = g(x)$
B. $g(x+y) = g(x)g(y)$ D. $g(X+1) = 3g(X)$

46. Which of the following graph could possibly be the graph of a polynomial function?



47. Which of the following is a polynomial function?

- A. $f(X) = \frac{x+1}{x+1}$ B. $f(X) = X$ C. x^2+2 D. e^x+1

48. If $\log 2 = 0.310$ and $\log 3 = 0.477$ then $\log 24$ is equal to

- A. 0.77 B. 1 C. 1.381 D. A and B

49. If $x=2$ and $y=4$, then the value of $\frac{x-2y}{x+y}$

- A. 12 B. 6 C. 10 D. 7

50. The solution set of $\frac{x+2}{x} = 4$ is equal to

- A. $\{-6, 2\}$ B. $\{-2, 4\}$ C. $\{2\}$ D. $\{-1, 2\}$

51. If $\sqrt{16x+4} = 2^{3x}$ then the value of x

- A. 8 B. 2 C. -4 D. -8

_____ 52. The sum of the squares of two consecutive natural number is 313 find the number of x and y.

- A. -12 and 13 B. -13 and 12 C. 16 and -16 D. A and C

_____ 53. Which of the following are true about the properties of absolute value for all numbers of x and y

- A. $\sqrt{X^2} = |X|$ B. $\{X\} < 0$ C. $\left|\frac{X}{Y}\right| < X/Y$, for $y \neq 0$ D. all

_____ 54. Which of the following are solution set of $2^{x^2} - 5x + 3 = 0$?

- A. $\{1, -3/2\}$ B. $\{1, -1\}$ C. $\{3, 2\}$ D. None

_____ 55. If the product of roots of the equation $kx^2 + 8x + 3 = 0$ is 1, what is the value of k?

- A. $8/3$ B. $1/3$ C. 2 D. 3

_____ 56. The solution set of $\begin{cases} x - 2y = 4 \\ x + y = 1 \end{cases}$ is

- A. $\{(2, -1)\}$ B. $\{(-2, -1)\}$ C. $\{(2, -1)\}$ D. none

_____ 57. If $x=4$ and $y=4$, then the value of $|x-y| + \left|\frac{y}{x}\right|$ is equal to:-

- A. 7 B. -1 C. $13/4$ D. 4

_____ 58. The simplest form of $\sqrt[4]{+16x^8}$ is

- A. $4X$ B. $2X^2$ C. $4X^2$ D. $2X^4$

_____ 59. If $n(A \times B) = 24$ and $n(A) = 4$ then $n(B)$ is

- A. 20 B. 5 C. 6 D. 8

_____ 60. The value of x for $3^x = 27$ is

- A. 2 B. 3 C. 1 D. 0

Appendix B

በአዲስ አበባ የኒቫርስቲ

የድንረ ምረቃ ትምህርት ቤት

የትምህርት ጥናትና ምርምር ተቋም

በ9ኛ እና በ10ኛ ክፍል ሴት ተማሪዎች የሚሞላ የጽሑፍ መጠይቅ ውድ ተማሪዎች

የዚህ መጠይቅ አላማው በቦሌ ክ/ከተማ ባሉት 9ኛ እና 10ኛ ክፍል ሴት ተማሪዎች በሂሳብ ትምህርታቸው ውጤታማ እንዳይሆኑ የሚያደርጉ በቤት፣ በት/ቤት አካባቢ እና ከራሳቸው የሚመነጨ ችግሮችን የሚያሳይ መረጃ መሠብሰብ ነው።

የመረጃው ሚስጥራዊነት በጣም የተጠበቀ ነው። ለማንኛውም አካለ ተላልፎ አይሠጥም። ስለሆነም ተማሪዎች የምታዩዎቸውንና የምታውቁትን በቤታችሁ እና በት/ቤታችሁ አካባቢ የሚንፀባረቀውን እንዲሁም የራሴ ችግር ነው ብላችሁ የምታስቡትን ነገር ሁሉ በግልፅኝነትና ያለምንም ፍርሃት ከዚህ በታች በቀረበው መሠረት እንድትመልሱ በትህትና እጠይቃችኋለሁ።

1. ስም መጻፍ አያስፈልገውም።
2. በጥያቄው ስር በቀረበው ሣጥን ውስጥ የራይት (✓) ምልክት ብቻ ይጠቀሙ።
3. እባካችሁ ጽሑፍ ለሚያስፈልገው ጥያቄ በጽሑፍ መልሱ።

ስለትብብራችሁ በቅድሚያ አመሠግናለሁ።

ክፍል አንድ የግል ሁኔታ የሚያሳይ መረጃ

1. የት/ቤቱ ስም _____

2. ክፍል 9 10

3. ዕድሜ _____

4. ከማን ጋር ነው የምትኖረው?

ከእናቴ እና ከአባቴ ጋር

ከአባቴ ጋር ብቻ

ከእናቴ ጋር ብቻ

ከባለቤቴ ጋር

ከሌላ ቤተዘመድ ወይም አሳዳጊ ጋር

ሌላ ካለ -----

5. የቤተሰቦችሽ የትምህርት ሁኔታ ምን ይመስላል?

	አባት	እናት
ያልተመራ/ች	<input type="checkbox"/>	<input type="checkbox"/>
የመጀመሪያ ደረጃ ያጠናቀቀ/ች (1-8)	<input type="checkbox"/>	<input type="checkbox"/>
የሁለተኛ ደረጃ (9-12) ክፍል ያጠናቀቀ/ች	<input type="checkbox"/>	<input type="checkbox"/>
ዲፕሎማ እና ከዚያ በላይ	<input type="checkbox"/>	<input type="checkbox"/>

6. የቤተሰቦችህ የስራ ሁኔታ ምን ይመስላል?

የመንግስት ሠራተኛ

ነጋዴ

የቀን ሠራተኛ

ሌላ ካለ ይግለፁ -----

7. በቤታችሁ የሚኖረው የሰው ብዛት ምን ያህል ነው?

ከ 4 በታች

ከ 5-8

ከ 9-12

ከ 12 በላይ

8. ከትምህርት ቤት መልስ ወላጆችሽን በቤት ስራ ታግጥረዋለሽ?

አዎ አይደለም

9. ለጥያቄ «8» መልስሽ አዎ ከሆነ በቀን ምን ያህል ሰዓት ታግጥረዋለሽ?

በየቀኑ ለ4 ሰዓት

በየቀኑ ለ3 ሰዓት

በየቀኑ ለ2 ሰዓት

በየቀኑ ለ1 ሰዓት

10. ለጥያቄ «8» መልስሽ አዎ ከሆነ በየትኛው ስራ ነው የምታግጥረው?

ህፃናትን በመንከባከብ

የቤት ውስጥ ስራ በማገዝ

ሱቅ በመስራት

ሌላ ካለ ይግለፁ _____

11. በየወሩ የቤተሰቦችሽ ገቢ ምን ያህል ነው ብለሽ ታስቢያለሽ?

ከ 200-500 ብር ከ 1233-2249

ከ 500-1233 ብር ከ 2249 ብር

ክፍል ሁለት ሴት ተማሪዎች በሂሳብ ት/ት ውጤታማ እንዳይሆኑ ከራሳቸው

የሚመነጨ ችግሮችን የሚያሳይ መረጃ

እባክሽን ከዚህ በታች ባሉ ዓረፍተ ነገሮች ላይ ያለሽን የመስማማትሽን ወይም ያለመስማማትሽን ደረጃ ይህን ምልክት «√» በመጠቀም ግለጭ::

በጣም እስማማለሁ	እስማማለሁ	አልወሰንኩም	አልስማማም	በጣም አልስማማም
በእስ	እስ	አልወ	አል	በአል

ተ.ቁ	መጠይቅ	በእስ	እስ	አልወ	አል	በአል
2.1	የሒሳብ ት/ትን እንደ አንድ ሸክም አየዋለሁ ስለዚህ ከት/ቤት ወጪ ልሠራው አልፈልግም					
2.2	የሂሳብ ት/ት ይከብደኛል					
2.3	ከት/ቤት ከወጣሁ ሂሳብ የሚጠቅመኝ አይመስለኝም					
2.4	የሂሳብ ት/ትን ክፍለ ጊዜ ሁልጊዜ እከታተላለሁ					
2.5	የሂሳብ ት/ትን በክፍለ ጊዜ በፍጹም አልከታተልም					
2.6	ብዙ ውስብስብ የሆኑ የሂሳብ ጥያቄዎች የምሠራ ይመስለኛል					
2.7	ከሂሳብ በስተቀር ብዙ ትምህርቶችን እችላለሁ					
2.8	የሂሳብ ት/ትን መስራት ለወደፊት ህይወቴ አይጠቅመኝም					
2.9	ለወደፊት ስራዬ ጥሩ የሂሳብ ዕውቀት እንዲኖረኝ አልገባለሁ					

2.10	ሂሳብን ሁልጊዜ አጠናልሁ					
2.11	ጓደኞቼ ሂሳብ ስለማይመቻቸው ከእነሱ ጋር መዞሩን እመርጣለሁ					
2.12	ሂሳብን ፈጽሞ አላጠናውም					
2.13	በሂሳብ ጥሩ አይደለሁም					
2.14	ሂሳብ መስማት አልፈልግም					
2.15	ሒሳብ እንዳጠና የሚመክሩኝን ሰዎች እጠላለሁ					
2.16	ውስብስብ የሂሳብ ጥያቄዎችን ወንዶች እንደሚሰሩ የምተማመነውን ያህል ሴቶች እንደሚሰሩ እተማመናለሁ					
2.17	በሒሳብ ጥሩ መስራት ያን ያህል አስደሳች አይደለም					
2.18	ሒሳብ እንዳጠና የሚመክሩኝን ሰዎች እወዳቸዋለሁ					
2.19	የማጠናከሪያ ትምህርት የሒሳብ ትምህርትን እንዳሻሽል ምንም ፋይዳ የለውም					
2.20	የሶሻል ትምህርት ለማጥናት ስለወሰንኩ የሒሳብ ትምህርት አይጠቅመኝም።					

ክፍል ሦስት ከትምህርት ቤት ወጪ በቤት አካባቢ የሚታዩ ሴት ተማሪዎች በሂሳብ ትምህርት ውጤታማ እንዳይሆኑ የሚያደርጉ ችግሮችን የሚያሳይ መረጃ

እባክሽን ከዚህ በታች ባሉ ዓረፍተ ነገሮች ላይ ያለሽን የመስማማትሽን ወይም ያለመስማማትሽን ደረጃ ይህን ምልክት «√» በመጠቀም ግለጭ።

በጣም እስማማለሁ	እስማማለሁ	አልወሰንኩም	አልስማማም	በጣም አልስማማም
በእስ	እስ	አልወ	አል	በአል

ተ.ቁ	መጠይቅ	በእስ	በእ	አልወ	አል	በአል
3.1	የወላጆች የትምህርት ደረጃ በሴት ተማሪዎች የሒሳብ ትምህርት ውጤታማነት ላይ ተጽዕኖ የሚፈጥር ይመስለኛል።					
3.2	ወላጆቹ ሴቶች የሂሳብ ት/ት በደንብ እንደሚይችሉ ያምናሉ።					
3.3	ወላጆቹ በሌላ ት/ት እንደሚያበረታቱኝ በሂሳብ ት/ት ጥሩ ውጤት እንዲያመጡ አያበረታቱም።					
3.4	ወላጆቹ በሂሳብ ት/ት ጥሩ እንደሚሠሩ ሰው አድርገው ይገምታሉ።					
3.5	ወላጆቹ ለትምህርቱ የሚያስፈልጉኝን ቁሳቁሶች ሁሉ ያሟላሉ በተለይ ለሂሳብ ት/ት					
3.6	እናቱ የሒሳብ ትምህርት በማጠናበት ፋንታ በቤት ውስጥ ስራ ባግዛት ትመርጣለች።					
3.7	አባቴ ስለ ሂሳብ ውጤት ግድ የለውም።					
3.8	ወላጆቹ የማጠናከሪያ ትምህርት እንድከታተል ፍላጎት የላቸውም ይልቁንስቤት ውስጥ እንድቆይ ያስገድዱኛል።					

3.9	ወላጆቹ የሒሳብ ትምህርት ውጤታማነትን እንደ ደግሞ እንደሚደግፉኝ ግንባቤ የላቸውም።					
3.10	ለወላጆቹ በሂሳብ ጥሩ መስራት ምንም ማለት አይደለም።					
3.11	የሒሳብ ትምህርት በህይወት ውስጥ ምንም እንደማይጠቅመኝ ወላጆቹ ነግረውኛል።					
3.12	ወላጆቹ የሒሳብ ትምህርት ለወደፊት እንደማይጠቅመኝ ስለሚያስቡ ሌሎች የትምህርት ዓይነቶችን ብቻ እንዳጠና ያበረታቱኛል።					
3.13	ወላጆቹ የሂሳብ ትምህርት እንደማጠና በመናገር ፋንታ ሁሉ የሂሳብን ትምህርት አስቸጋሪነት ይነግሩኛል።					
3.14	እናቱ ሴቶች ውስብስብ የሂሳብጥያቄ እንደማይሠሩ ታስባለች					
3.15	ወላጆቹ በተደጋጋሚ ወደ ትምህርትቤት እየመጡስለ ሂሳብ ትምህርት መረጃ ያገኛሉ።					
3.16	ወላጆቹ በአመቱ መጨረሻ ወደ ትምህርት ቤቱ መጥተው ውጤቱን ይሠራሉ።					
3.17	ስለ ሂሳብ ውጤታማነት እናቱ ከአባቱ ይልቅ ቸልተኛ ናት።					
3.18	ለሂሳብ ትምህርት ውጤታማነት እናቱ ከአባቱ ይልቅ ተጥራለች።					
3.19	ወላጆቹ በቤተ-መጻሕፍት ወይም የማጠናከሪያ ክፍል ከሚቆይ በቤት ውስጥ ስራ ባግዛቸው ይመርጣሉ።					
3.20	በሒሳብ ጥሩ ውጤት የሚያመጡ ሴቶች ከወላጆቻቸው በቂ ድጋፍ የሚደረግላቸው ይመስለኛል።					

ክፍል አራት በትምህርት ቤት አካባቢ የሚታዩ የሴት ተማሪዎች በሂሳብ ትምህርት ውጤታማ እንዳይሆኑ የሚያደርጉ ችግሮችን የሚያሳይ መረጃ

እባክሽን ከዚህ በታች ባሉ ዓረፍተ ነገሮች ላይ ያሉትን የመስማማትሽን ወይም ያለመስማማትሽን ደረጃ ይህን ምልክት «√» በመጠቀምግለጭ።

በጣም እስማማለሁ በእስ	እስማማለሁ እስ	አልወሰንኩም አልወ	አልስማማም አል	በጣም አልስማማም በአል
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ተ.ቁ	መጠይቅ	በእስ	እስ	አልወ	አል	በአል
4.1	የት/ቤታችን ቤተ መጻሕፍት በቂ የሆነ የሂሳብ ት/ት ማጣቀሻ ያለው አይመስለኝም።					
4.2	ት/ቤታችን በቂ የሂሳብ መ/ራን አሉት።					
4.3	የሂሳብ አስተማሪዬ ሁልጊዜ የቤት ስራና የክፍል ሥራ ይሰጣል።					
4.4	የሂሳብ አስተማሪዬ ሁልጊዜ የሠጣቸውን የቤት ስራም ሆነ የክፍል ስራ ያርማል።					
4.5	የሂሳብ አስተማሪዬ የሠጣቸውን የቤት ስራም ሆነ የክፍል ስራ በፍጹም አያርምም።					
4.6	የት/ቤቱ አስተዳደር በሂሳብ ት/ት ያለኝን መሻሻል ይከታተላል።					
4.7	የት/ቤታችን ርዕሰ መምህራን መምህራን ለሴት ተማሪዎች የማጠናከሪያ ት/ት እንዲሰጡ ያስተባብራሉ።					
4.8	የት/ቤቱ መማክርት ለሴት ተማሪዎች በሂሳብ ት/ት ምክር ይሰጣል።					
4.9	መምህራኖቼ የማጠናከሪያ ትምህርት የመስጠት ፍላጎት አላቸው።					

4.10	የሂሳብ መምህራን የማጠናከሪያ ትምህርት መስጠት ጊዜ እንደሚባከን ይገምታሉ።					
4.11	የትምህርት ቤታችን ርዕሰ መምህራን የተማሪዎችና የመምህራኖችን ግንኙነት ብዙም አይከታተሉም።					
4.12	የትምህርት ቤታችን ቤተ-መጻሕፍት ብዙ ልብ- ወለዶች እና ከሂሳብ ጋር ተዛማጅ ያልሆኑ የማጣቀሻ መጻሕፍት አሉት የሒሳብማጣቀሻ ግን የሉትም።					
4.13	የትምህርት ቤታችን ቤተ-መጻሕፍት ቆይታ ሁኔታ ሰፊ አይደለም ለዚያ ነው ቤተ-መጻሕፍት መቆየት የምጠላው።					
4.14	የሂሳብ ትምህርትን በተግባር ለመማር የትምህርት ቤታችን ማበልፀጊያ ማዕከል በቂ የሆኑ የሂሳብ ሞዴሎችና መርጃ መሣሪያዎች የሉትም።					
4.15	የሂሳብ መምህራን የሂሳብ ትምህርት በሞዴል እና በመርጃ መሣሪያ አስደግፈው የማስተማር ፍላጎት የላቸውም።					
4.16	የትምህርት ቤታችን የሂሳብ መምህራን ለተወሰኑ ወንዶች ብቻ የክፍል ስራ ያርማሉ።					
4.17	የሂሳብ መምህራን ከሴቶች ጥሩ ውጤት አይጠብቁም።					
4.18	የት/ት ቤታችን አስተዳደር የውጭውን ነገር ብቻ መሟላት ነው እንጂ ስለ ውጤታችን ግድ የለውም።					
4.19	የሂሳብ መምህራን የሚያስጨንቃቸው መጽሐፉን መጨርስ እንጂ የኛ ውጤት አያስጨንቃቸውም።					
4.20	የት/ት ቤታችን አስተዳደር የስራ ሰዓት መቆጣጠር እንጂ የሴት ተማሪዎች ውጤታማነት ብዙም አያስጨንቀውም።					

ክፍል አምስት በቦሌ ክ/ከተማ በ2ኛ ደ/ት/ት/ቤቶች ሴት ተማሪዎች በሂሳብ ት/ት ውጤታማ እንዳይሆኑ የሚያደርጉ አንዳንድ ተጨማሪ ችግሮችን የሚያሳይ መረጃ

ከዚህ በታች ለቀረቡት ጥያቄዎች እባክሽን የሚሰማሽን ፍላጎት በባዶ ቦታው በመጻፍ መልሹ::

1. በትምህርት ቤት እና በቤት አካባቢ ያሉ ተጨማሪ ችግሮች ካሉ

2. በሂሳብ ትምህርት ጥሩ እሴት ለሁ ብለሽ ታስቢያለሽ? አዎ/አይደለም?

በሂሳብ ትምህርት ጥሩ አልሠራሁም ካልሽ ከቤት እና ከትምህርት ቤት ውጪ በሂሳብ ትምህርት ውጤታማ እንዳልሆን ያደረገው የራሴ ችግርነው የምትይው ካለ

3. ሌላ አስተያየት ወይም ሃሳብ ለዚህ ጥናት ይጠቅማል ብለሽ የምታስቢው ካለ እባክሽን ከዚህ በታች ባለው ባዶ ቦታ በመዘርዘር ግለጭ

Appendix C

Addis Ababa University

School of Graduate Studies

Institute of Educational Research

Department of Educational Research and development

Interview Guideline questions for school principals, councilors, mathematics teachers and some selected female students.

Interview for School principals

1. Is the interaction between mathematics teachers and female students can influence their achievement? How?
2. Do you think your school library has available and have relevant materials to your students?
3. Are there enough well qualified mathematics teachers in your school?
4. Does your school have facilities to respond to girls need? (for example, separate toilet, providing instructional material, etc)
5. Does your school have any especial program that contributes for female students' mathematics achievement?

Interview for Guidance and Counselor

1. Do female students get guidance and counseling service for their academic achievement difficulties in mathematics?
2. From your counseling experience how do you explain female students' attitude towards mathematics?

4. If female students' attitude to mathematics is negative do you think that it is emanating from home and school environment only?
5. How can you explain female students' interaction with their mathematics teaches? Is there any relation with teacher experience and his student interaction?
6. From your experience what portion of your school female students set the goal for their future? If not what is the reason behind?

Interview for Mathematics Teachers

1. Do you think that female students in your school are motivated to learn and study mathematics? If not can you mention some of the reasons?
2. How can you explain the female students' participation both in class room learning activity and doing their project or assignment in their home or library?
3. What proportion of your female students doing home work and class work properly? If not what are the barriers?
4. Can you mention or suggest possible solutions to alleviate the problem that female students face in your school?

Interview for Students

1. How often your mathematics teacher provides homework and class work?
2. How often your teachers check your homework?
3. Have you done your home work properly?
4. Is there any problem that influences your study and doing home work in your home?
5. How often you study in your school library? If no why?
6. Do you think your school facilities such as (library, laboratory, pedagogical center, toilet, etc) seem well coming nature for female students?

Codes of interview Participant

P₁-Principal of Dr. Haddis Alamayehu First Cycle Secondary School

P₂-Principal of Lem First Cycle Secondary School

P₃-Principal of Bole Community First Cycle Secondary School

C₁-Guidance and councilor of Dr. Haddis Alamayehu First Cycle Secondary School

C₂-Guidance and councilor of Lem First Cycle Secondary School

C₃-Guidance and councilor of Bole Community First Cycle Secondary School

T₁- Mathematics Teacher from Dr. Haddis Alamayehu First Cycle Secondary School

T₂- Mathematics Teacher from LEM First Cycle Secondary School

T₃- Mathematics Teacher from Bole Community First Cycle Secondary School

S₁-Student from Dr. Haddis Alamayehu First Cycle Secondary School

S₂-Student from LEM First Cycle Secondary School

S₃-Student from Bole Community First Cycle Secondary School

Appendix- D

Pilot Test Result

Item-Total Statistics

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
item2.1	294.7692	715.359	.478	.824
item2.2	295.3846	705.090	.620	.822
item2.3	294.0000	738.167	.413	.828
item2.4	294.2308	754.526	-.147	.833
item2.5	294.6923	761.231	-.203	.836
item2.6	294.6154	701.923	.569	.822
item2.7	294.7692	675.026	.860	.814
item2.8	295.5385	736.436	.164	.829
item2.9	295.9231	722.244	.303	.827
item2.10	294.4615	732.603	.195	.829
item2.11	294.1538	735.141	.194	.829
item2.12	294.6154	756.423	-.160	.834
item2.13	295.5385	740.769	.075	.831
item2.14	294.3077	710.231	.572	.823

item2.15	294.7692	704.026	.620	.821
item2.16	294.6154	728.756	.294	.827
item2.17	294.7692	727.359	.235	.828
item2.18	294.0769	742.244	.218	.829
item2.19	293.9231	746.744	.064	.830
item2.20	293.9231	745.577	.121	.830
item2.21	294.4615	754.436	-.149	.833
item2.22	294.2308	717.859	.450	.825
item2.23	294.2308	735.192	.192	.829
item2.24	293.9231	731.244	.555	.827
item2.25	294.0000	736.167	.359	.828
item3.1	295.5385	729.269	.176	.830
item3.2	295.0769	741.744	.061	.832
item3.3	295.0769	769.910	-.298	.838
item3.4	294.9231	746.244	-.009	.834
item3.5	294.0000	735.000	.547	.828
item3.6	294.3077	740.731	.092	.831
item3.7	295.9231	762.577	-.186	.838
item3.8	295.1538	729.808	.199	.829
item3.9	295.0000	690.000	.692	.819

item3.10	295.4615	766.603	-.207	.840
item3.11	294.8462	744.308	.023	.832
item3.12	294.4615	711.936	.427	.824
item3.13	294.1538	740.141	.216	.829
item3.14	294.2308	744.526	.061	.831
item3.15	294.4615	714.603	.546	.824
item3.16	294.3846	714.256	.545	.824
item3.17	293.8462	744.974	.207	.830
item3.18	293.9231	738.577	.464	.828
item3.19	293.9231	745.244	.137	.830
item3.20	294.3846	737.756	.129	.830
item3.21	296.3077	721.897	.343	.826
item3.22	296.0000	735.000	.113	.831
item3.23	295.3846	733.756	.130	.831
item3.24	296.0000	748.333	-.033	.835
item3.25	294.3077	719.064	.461	.825
item3.26	294.5385	738.936	.107	.831
item3.27	295.6923	747.731	-.025	.834
item4.1	295.2308	697.526	.608	.821
item4.2	296.0000	718.167	.300	.827

item4.3	295.1538	725.308	.244	.828
item4.4	294.9231	741.410	.044	.833
item4.5	294.6923	700.564	.693	.820
item4.6	294.1538	718.308	.625	.824
item4.7	295.3846	745.756	-.002	.833
item4.8	295.9231	768.077	-.256	.839
item4.9	294.6154	792.756	-.641	.843
item4.10	296.7692	731.026	.254	.828
item4.11	296.8462	739.808	.118	.830
item4.12	296.5385	729.269	.209	.829
item4.13	295.4615	712.603	.372	.825
item4.14	294.6923	741.064	.069	.831
item4.15	295.8462	752.141	-.075	.835
item4.16	296.0769	693.077	.647	.820
item4.17	295.7692	757.859	-.137	.836
item4.18	294.8462	715.474	.438	.825
item4.19	295.7692	692.359	.532	.821
item4.20	296.3846	708.256	.453	.824
item4.21	295.3846	721.756	.287	.827
item4.22	294.3077	724.231	.374	.826

item4.23	294.6923	684.731	.814	.817
item4.24	294.4615	722.603	.381	.826
item4.25	294.6923	724.731	.370	.826
item4.26	295.3846	690.923	.605	.820

Reliability Statistics for personal factor items category

Cronbach's Alpha	N of Items
.766	25

Reliability Statistics for home related/out school/ factors item category

Cronbach's Alpha	N of Items
.705	27

Reliability Statistics for school related factors items category

Cronbach's Alpha	N of Items
.737	26

Reliability Statistics for total item within three categories

Cronbach's Alpha	N of Items
.830	78

Appendix – E

Formula to calculate sample size

Krejice and Morgan (1970) published a formula for an efficient method of determining representative sample size of a given population by using the formula:

$$S = \frac{X^2 NP(1-P)}{D^2(N-1)+X^2 P(1-P)}$$

Where, S= required sample size

X²= The table value of 95% confidence interval

P= The population proportion assumed to be 0.5

for it provides the maximum sample size.

D= The degree of accuracy expressed as a

Proportion (0.05)

N= The population size

Hence, in this study X²= (1.998)², N= 1431, P= 0.5, D= 0.05

$$\begin{aligned} S &= \frac{(1.998)^2 (1431) (0.5) (1-0.5)}{(0.05)^2 (2431-1) + (1.998)^2 0.5(1-0.5)} \\ &= \underline{312} \end{aligned}$$

Declaration

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Name: Meles Samuel

Signature:  _____

Date of Submission: 15/07/2013

This thesis has been submitted for examination with my approval as university advisor.

Name: Deselegn Chalichisa (PhD)

Signature: _____

Date: _____

