PARTICIPATION AND PERFORMANCE OF FEMALE STUDENTS IN SCIENCE AND MATHEMATICS STREAMS: THE CASE OF AWASSA COLLEGE OF TEACHER EDUCATION

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A THESIS PRESENTED TO THE SCHOOL
OF GRADUATE STUDIES
ADDIS ABABA UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF ARTS IN CURRICULUM
AND INSTRUCTION

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JUNE 2004

ADDIS ABABA UNIVERSITY

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Abbreviations Used

ACTE - Awassa College of Teacher Education

GETT - Gender Equity Task Team

ICRW – International Center for Research on Women

IPPF – International planned Parenthood Federation

PAI – Population Action International

PRB- Population Reference Bureau

SNNPRG – Southern Nation Nationalities Peoples Regional Government

UNESCO – United Nation Education Science and Cultural Organization.

Acknowledgements

I would like to express my earnest thanks to my adviser, Dr Meseret Assefa whose advise and guidance were important for the realization of this thesis.

I would like to express my heartfelt gratitude to my friends Wondemagegnehu Tuji, Adamu Assfa, Solomon Araya, Birhanu Feleke, Abebe H/Mariam, and Awraris Belay for the encouragement and support they provided me during my study.

I thank my daughters Bezawit Getaneh and Biruktawit Getaneh whose eagerness to see my educational success was moral support to my endeavors.

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Abstract

This study attempted to examine the participation and performance of female students in science and mathematics streams in Awassa College of Teacher Education. Descriptive survey deign was employed for this study. To gather the required data, four sets of questionnaires were used. A total number of 190 subjects, that include, college instructors (N=23), high school teachers (N=42) and college students (N=125) participated in the study. In addition to this, data on the total student enrollment in the college during the last seven years and their cumulative GPAs were secured through document analysis.

Findings regarding participation revealed that very few females were found to be interested in science and mathematics, while the large majority (65%) was enrolled in language stream. As a result, a glaring gender imbalance was clearly observed in science and mathematics streams.

Results on achievement suggested that, female students in science and non-science streams achieved significantly lower than their respective male counter parts. A 0.05 significant level was used for comparison of means. However, the mean cumulative GPA of females in Science (μ= 2.44) is found to be slightly higher than the mean cumulative GPA of females in non-science streams (μ=2.39).

As to gender based factors, evidences indicate that home factors which include parental attitude and domestic labor seems to affect females' attitude and performance in the fields. Factors in the school environment that include gender stereotyped perceptions of subjects and the resulting gender specific views about talents in subject areas appear to be major factors that hinder females to participate in science and mathematics streams.

To increase females' participation in science and mathematics streams, changing the gendered environment of schools, offering counseling and guidance to female students so as to improve their attitude and perception toward science and mathematics subjects are among the recommendations forwarded.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Around the world females face multiple social and economic barriers to both enrolling and staying in school. As a general pattern, female's access to education lags behind males. Compared to males, females are not provided with equal opportunities at all level of schooling and hence do not enjoy the benefits of education that males do.

Gender based inequalities in the access of education hurt not only females but also the society (Green & Lori 1998). In order to make development sustainable and equitable it is necessary to ensure the participation of females, which comprise 50% of any society, to the development process (PAI, 2000). It is in recognizing this potential benefit of educating females that recent international conferences have called for the elimination of gender disparity at all level of education around the world (PRB, 2000). Accordingly governments have been taking policy measures to improve girls' education and significant progress has been made in almost all parts of the world (UNDP, 2000). Access to education improved worldwide and the gender gap is declining.

In developing countries, although remarkable progress have been made in expanding access to education and reducing the gender difference at lower levels of schooling, still females lack equal access at secondary and tertiary levels of education. Particularly at tertiary level, compared to males very few females enroll and a pronounced gender gap exists (PAI 1998).

To aggravate the situation the few females who enter institutions of higher education are observed to be concentrated in a limited area of studies. Generally, female students appear to be reluctant to enroll in natural science and related fields of studies. If they enter science stream, they tend to go to biological science. As a result, there is a glaring gender disparity particularly in the physical sciences. In this regard A. Karin (1993)

ascertained that in almost all developing countries, the few females who enroll in tertiary education tend to concentrate in narrow curriculum focusing on the traditional feminine courses. Extremely few females appear to be interested in physical sciences and mathematics, which are traditionally perceived as masculine subjects.

Evidence from every part of the world indicates that gender imbalance in basic and applied sciences are a problem of both developed and developing countries. Around the world, the majority of females appear to be disinterested in studying science and technology. As a result, gender disparity in science and technology fields of studies and occupations seems to be worldwide phenomena. To illustrate this situation the case of some countries is given below.

In USA, the extremely low participation of females in science and technology has been a serious problem (Betz 1997). Betz farther stated, "the problem is particularly serious in the physical sciences and engineering, less so in the biological and quantitative sciences, and not at all in the social sciences and psychology" (Ibid: 108). In almost all Asian countries, females do not choose science and engineering which are the primary fields of study for males (B. Jandhyale 1993). Instead they tend to study social sciences. In South Africa, females tend to avoid natural sciences; fields that have been traditionally considered as male-domains (GEET. 1997). So they tend to concentrate in areas that are considered as feminine. In Kenya, females' participation in science and technology is extremely low. (Ngau,1999). In technical colleges, the few females admitted are offered the traditional feminine courses, such as home economics, typing etc rather than pure science and technology courses that lead to the modern occupational opportunities.

In Ethiopia, Atsede (1991), after analyzing the 1986/87 enrollment data in AAU, demonstrated the low participation of females in science and technology faculties. She also showed that, particularly physical sciences were the areas in which very few

females were enrolled. Atsede's finding may indicate the prevalence of gender imbalance in science and technology fields at least in AAU

It is believed that, gender imbalance in science and related subject areas is a result of a combination of factors that hinder females from pursuing studies in these fields. These factors appear to be complex and multifaceted, which include, cultural factors, school factors, media etc.

The cultural factors emerge from the gender specific beliefs and biases that prevail in the society (presser 1997). Due to these gender-biased perceptions that prevail in the society, females do not aspire careers that are perceived as male-domains because of the fear of disapproval they many get from others (A. Karin & Hyde, 1993).

The school environment, that includes teachers, peers, learning materials etc, plays a crucial role in transmitting all forms of beliefs that reinforce gender inequities in science fields. For instance, the image of mathematics and science, as male domains reflected in the school environment highly affects females' choices of fields (GETT. 1997). Based on this masculine image of science, teacher, peers etc do not expect female students to perform well in science. This perception that prevails in the school environment is a form of psychological barrier for females to enroll in science and related subjects. Thus failure of females to study science and mathematics is related in some ways to perceptions that science and mathematics are male domains, that females are not good in these fields etc (Betz 1997).

Particularly, teachers are the major agents in the school environment that have powerful influence on the attitude, interest as well as achievement of students in a given subject. The gender stereotyping of subjects perpetuated by teachers at all level of schooling appears to be a major barrier for females to pursue their studies in sciences (Khale, 1993) Since biased sex role stereotyping has the effect of lowering

females' self-esteem (Hill, 2001), many female students could not have the confidence to come to the sciences.

Today, with the growing role and importance of science to our daily life we depend more and more in its application (Kumar, 1995). In order to take advantage and benefit from modern technology, it is necessary to be well prepared in science most importantly in its application. In spite of this however, the majority of females around the world are increasingly being reluctant to participate in the modern scientific and technological development. This tendency of females towards science and technology appear to have negative consequence to both females and the society. (Jacqueline,1970)

Gender differences in educational attainment are directly related to differences in occupational opportunities (Finn, Rois, & dulbers, 1982). From this point of view, females' lack of access to scientific knowledge and skill strictly limits their career possibilities, which in turn limits their life choice. That means, gender-inequality in science education hinders females from participating in the wide range of career opportunities that modern technology opens. This situation seriously affects females because it excludes them from professions that are better remunerated (ILO, 2000), and force them to be concentrated into low-paid, low-prestige occupation (Brydon & Sylvia 1989; population council, 2000). In short "technologically oriented provision privileges men because of the factors that prevent women from becoming technologically proficient "(GETT, 1997:45)

Moreover arguments, at present, the balanced development of society is possible only when females have the opportunity of equal participation in the scientific and technological development as their male counterparts (Snyder & Mary, 1995). That meansin the present rapid progress of science and technology, the future success of a country depends upon the presence of sufficient number of technologically skilled people in the country. This implies that, it is unlikely for a country to cope with the future

scientific and technological progress by leaving half of its citizens alienated from the contemporary fields of science and technology.

In short, the forgoing discussion leads to the conclusion that gender equality in the access of science and technology is highly significant at least for the following major reasons.

Access to any form of education is a fundamental human right (IPPF, 2000). Thus from the stand point of human right, females have equal right as their male counterparts to contribute to and benefit from the scientific and technological development. Respecting women's equal right to participate in all sectors of development creates healthy environment in the society and enhances development. Further more, in the present age of science, alienating half or the population from scientific and technological development means wasting half of the human resources and hence hindering the overall development of the society.

Consequently the participation of females in science and related fields in higher educational institutions appear to be an issue that needs investigation. In spite of this, however, in our country research on the tendency of females towards science is scant. Thus this research has been conducted to make a preliminary investigation on the magnitude of gender imbalance in science and mathematics streams in ACTE. It also attempted to find out whether or not gender related factors in the school and home environment influence female's participation in these fields. Furthermore the achievement patterns of female students in science and mathematics streams relative to their male counter parts has been examined.

1.2. Statement of the problem

The limited participation of female students in science and related fields of studies is part of the general gender inequality to the access of education.

The study was aimed at investigating the magnitude of the gender disparity in science and mathematics streams in ACTE. . It also attempted to find out some of gender related barriers to female's participation in science fields. More over the study was intended to find out whether there is a difference in science achievement between male and female students in the college. More specifically the study is intended to find answers to the following questions.

1. What is the magnitude of the gender gap in science and mathematics steams in ACTE since 1996?
2. What is the achievement of females in science and mathematics subjects as compared to their male counterparts?
3. What are the major gender-based constraints that hinder females to participate in science and mathematic fields of studies?

1.3. Significance of the study

"There is no question but that our present world is a creation of modern science in application" (Lai & Azim 1989:271).

This statement reminds us, the fact that the present society is one in which science in application is increasingly becoming important to both individuals and nations. It is during this time that the majority of females are being reluctant to participate in the

scientific and technological development. This situation seriously affects not only females as individual but also hinders the overall development of the society (PRB, 2000; Pietilia, 2001).

As a result, gender inequality in the access of science and technology seems to be a problem that the educational system should be concerned. Considering its potential effect to the overall societal development it is an issue that calls for immediate interventional measures. To do so, it is important to know that causes that hinder female students to pursue their studies in science and technology fields; because this is the first step in altering environments to eliminate the existing gender disparity in science and technology.

In Ethiopia, as long as the knowledge of the researcher is concerned not more than a couple of researches has been conducted in this area so far. Thus this research appears to be timely and important to identify some of the possible gender related constraints to female's' access to science and mathematics fields of studies. Therefore, the finding of this study is expected to have the following significance.

1. The finding of the study will contribute to the understanding of those gender related constraints that play major roles in hindering female students to enroll in science and mathematics streams in ACTE.
2. The result of the study will help all concerned bodies to realize the magnitude of the problem in ACTE and to attempt to tackle it.
3. The out come of the study may also stimulate the interests of other researchers and serve as a stepping stone for further study in this area.
4. Moreover, the recommendations and suggestions given may help the college and the regional government to know as to what type of interventions might be made to improve the situation.

1.4. Delimitation of the study

The main focus of this study is gender disparity in science streams at ACTE. Although the study considers the case at ACTE, the findings are believed to reflect the overall situation in the region for the following reason.

The subjects of this study include students and instructors from ACTE and teachers from the two government high schools at Awassa. The students in ACTE came to the college from all zones in the region; similarly, almost all instructors in the college and the high school teachers have served at least some years as high school teachers at different zones in the region before they came to Awassa. Therefore, all subjects in the study can be considered as a collection of individuals from all parts of the region.

Based on this argument the findings of the study are assumed to reflect the extent of the problem of gender inequality to the access of science education not only at ACTE but also in SNNPRG.

Although there are other variables that could affect females' participation in science technology the depth of this study is only confined to the gender related barriers in the home and school environments.

CHAPTER TWO

REVIEW OF LITERATURE

With the spread of education for all and the growing awareness of the role and importance of science, however, several evidences indicate that the majority of females students all over the world appear to avoid to participate in the broad variety of science disciplines of study. And this situation has negative impact on the individual lives of females as well as on the overall development of society.

In the following sections of the review of literature, the general state of females' participation in science education in both developed and developing countries is presented. Then the factors that affect females' participation in science education, the implications of the gender gap to the individuals and to the society at large and the value of gender equity in science education are described.

2.1Female's participation in science fields

The low participation of females in science and technology fields appears to be a problem of both developing and developed counties. This situation is stated by Finn et.al (1982:118) as: "In all parts of the world, boys are directed into mathematics and science curricula more actively, while girls when their education is encouraged are guided toward languages and the liberal arts". They also pointed out that, Eastern Europe and Soviet Union are countries where there is relatively smaller gender bias in carriers. But still, in these countries gender differences in science enrolment exists

In the United States, where universal primary and secondary education is achieved the level of participation of females students in natural science fields is very low. This situation has been addressed as serious problem that could have a negative impact in the future development of the country. Vetter(1989) as cited in Eccles(1997:67),pointed out that "the number of women entering engineering peaked in 1985 at 18%; currently it is back to 14%". So the problem is not only low participation of females in science fields but also their participation rate is declining with time. The issue needs serious attention because, according to Eccles, the source from which the country draws its scientists "Continues to shrink". In support to this, Betz (1997:106) indicated that the "Under representation" of females in science and technology has been a "chronic problem" in the United States. Betz also added that the situation is more serious because the issue is not only low participation but also there is a declining interest of females in science related subjects. . This shows that the low participation of females in science related courses is a serious concern even for the most developed countries like USA. The concern is clear from the fact that females, which comprise 50% of the population of any country, are being excluded from science and technology.

In developing countries, where the gender disparity at all levels of education is more pronounced, it is evident that the gender inequality in science fields is also more magnified. As Mensch Barbara et.al (1988) indicated, although many developing countries succeeded in widening the access of education, still females' access to education lags behind males. Moreover the inequality is reflected in academic stream choices made by the two sexes. Snyder & Mary (1995.83) ascertained that female's enrollment in the "contemporary fields" of science and technology is much less than that of males.

Similarly Anne (1993) pointed out that in almost all developing countries females' enrollment in higher education is very much concentrated in the humanities home economics and arts. She also added that in secondary schools females are highly concentrated in general education programs while they are underrepresented in

vocational and technical streams. B.Jandhydle (1993) also ascertained that, in almost all Asian countries the two main fields of study that female students choose are education and business administration while engineering is the primary field of study for males The problem of girls' limited access to vocational and technical education has been also problem in the Arab countries of the Middle East. The majority of girl enrolled in vocational education study domestic sciences (EL-Sanabary 1993).

Many studies showed that girls in African countries are less likely to go to science and engineering fields. For instance In South Africa, girls do not have the tendency to enroll in mathematics, pure or applied science fields. When they enroll in science subjects it is usually Biology or Zoology (Wolpe et.al 1997). Mathematics and science has been considered as "male domains" for many years. As the result women tend to concentrate in areas that traditionally considered as "feminine". A recent study conducted in Kenya, on the participation of females in institutions of technology also showed that females were "extremely underrepresented" in the institutes Ngau (1999). The enrollment of females in the traditionally male-dominated courses such as, Motor Vehicle Mechanics, Mechanical engineering, Water Technology etc. is extremely low. On the other hand, the enrollment figure for females in the traditionally "feminine" courses such as home economics secretariat studies food technology etc. is very high. These courses lead to occupations that are merely extensions of the traditional roles of women. This situation according to Hyde Karin(1993:54) is "one of the greatest disadvantages experienced by girls was a lack of access to science and mathematics fields often regarded as unfeminine".

In Ethiopia, the same situation prevails. In secondary schools, the two tracks from which students can choose are social and natural science. The majority of female students tend to go to social sciences while in natural science fields their rate of participation is very low as compared to their male counterparts. Thus under- representation of female students in science fields begins at the secondary school level. In the higher institutions when they enroll in science streams they appear to avoid the natural science fields.

Particularly physical sciences are two fields females are least likely to choose. In this regard Atsede (1991) pointed out that during the 1988/89 academic year, the percentage of females enrolled in science and technology faculties in AAU were 7% and 3% respectively, while the percentage of females enrolled in social sciences was 16%. In the same year the percentage of females students enrolled across the different disciplines of natural science were; 3% in physics, 4% in math, 6% in chemistry and 11% in Biology. The figures clearly show that, the enrollment ratio of females in science and technology is very low compared to their enrollment in social science faculty. More over, among the few females who joined science faculty, the majority went to Biology. Extremely few females appear to be interested in the physical sciences and mathematics. This evidence shows that there is a wide gender in balance particularly in science subjects that have traditionally long been considered as men's domains.

Similar high disparity exists in the field of studies chosen by female and male students in vocational and technical schools along traditionally set gender roles. The few females who enroll in these institutions tend to concentrate to a narrow curriculum focusing on the traditional feminine courses, such as home economics, typing nursing etc, rather than science and technical courses which open wide range of occupation opportunities. In support to this A.Karin (1993), citing UNESCO's statistical yearbook, 1987, showed the same patterns of enrollment. According to the data, the overall enrollment of females in higher education and their distribution in selected fields of study in Ethiopia is shown in table 2.1.

Table 2.1: Female Enrollment in Higher Education, Overall and in Selected Fields of Study in Ethiopia.(percentage of total enrollment)

Total	Education and teacher training	Commerce and business administration	Home economics	Natural science	Medicine and Health-related sciences	Engineering
17.9	19.1	34.4	37.5	7.5	14.3	3.3

Source: UNESCO Statistical Year Book, 1987.

As can be seen from the table, among the six selected fields of study, home economics and commerce and business administration are the most popular fields for females, while engineering and natural science are the least popular.

2.2 Factors that Determine Female's Participation in Science fields

The existing gender disparity in science education is the result of a combination of several social, cultural and institutional factors. The gender dynamics, which is deeply rooted in family systems, peer relationships and societal institutions, is believed to be the major source of the factors that hinder females' participation in science education. Thus in order to explain and modify the existing behavior of females toward science education, it needs to understand the variety of factors that shape this behavior. The following section is dedicated to the brief account of the factors that contribute for girl's exclusion from science education.

2.2.1. Social and cultural Factors

These factors emerge from the gender specific beliefs and biases that prevail in a given society, community or family. These socially constructed expectations (for male and female behaviors) prescribe a division of labor and responsibilities between men and women and different rights and obligations (Presser, 1997).

In developing countries, parents and societies expect boys and girls to act and behave within the socially/culturally accepted domains of males and females. Children, along the path of their development from their childhood homes into the society, are treated differently based on sex-distinction roles and behaviors that prevail in the society. This situation will have a great influence on their schooling and future aspiration as well. Confirming this point Mensch (1998) argues that the way children are treated during their childhood development – how they are expected to behave by their family and the society, have a great impact in their later livelihood. Yelfign (1998: 10) also stated that, the way children are brought up, " will have an impact on the schooling of boys and girls in the choice of subjects, and later in the choice of career".

Thus the social and cultural norms, in which girls are brought the expectations of their parents and the society at large, are highly influential on their attitude towards science subjects.

2.2.1.1. Domestic Factors.

Homes are places where gender roles begin at the early age of childhood. Children at the very young ages learn from their families, the way they should act, the type of work they are expected to do, and the role they are expected to play in their future family life. The differential treatment of boys and girls by parents in accordance to the culturally set gender rules begins at home. This fact is well illustrated by Mensch as:

> *Girl's homes are not just residential bases; they are also the loci of powerful forces that shape every aspect of girls' existence, including their time use, access to school, and paid work and social status. Many adolescent girls are virtually entrapped in the domestic sphere. This confinement serves two purposes; it keeps girls out of the public arena and it keeps them in the household, where they undergo their apprenticeship for adulthood-an intense training for a life long role as wife and mother (Mensch, 1998: 16).*

Parents generally, encourage their daughters to be "docile" and "compliant" so that they will be able to play the role they are expected to play as wife and mother in their future life, (Rubbo Anna, 1975:339) . The expected familial roles and responsibilities of girls are those duties that bind them to the domestic sphere, such as child care, food preparation, and other time-consuming activities, including, the fetching of water and fuel, cleaning, and agriculture work. Contrary to girls, boys are encouraged to develop some degree of autonomy and independence from the family (Jacqueline, 1970). The domestic roles expected from boys are out-door activities which are considered to be more productive tasks that generate income. (Finn, Reis & Dulburg, 1982)

Thus girls' familial roles and responsibilities bind them to the domestic sphere, even in the settings outside the home. Wolpe (1994) argued that girls and boys in their early

childhood are made to acquire the traditional gendered forms of behavior. The idea that women are better suited in nurturing and caring and males are better suited for intellectual matters and constructed in the minds of children by their domestic roles and responsibilities. As gendered home environment teaches girls to concentrate in domestic sphere they tend to aspire those occupations that are almost extension of their childhood roles. That is they tend to choose those occupations closely related to carings-like nursing, teaching etc. This situation is clearly stated by Yelfign (1998: 10). "The attitude that prevails that girls should be limited to the home and family activities and not to traditional male dominated development activities hinders their participation in science and technical-vocational areas". Thus based on their childhood experience at home girls are inclined more to those subject that are associated to traditionally approved domestic role of females.

Another aspect of domestic factor that contribute to the low participation of females in science and related fields is the fact that girls usually carry out much more domestic work than boys, which in effect limits their time for study. In this regard Mensch(1998:38) pointed out that, "girls carry a greater domestic work burden than boys in virtually every developing country." He also added "The pressure of domestic work would appear to constrain girl's access to schooling and their ability to concentrate on their studies". In similar vein Atsede (1991) and ICRW (2000) confirmed that home obligations, unequal labor in home as compared to boys, added responsibility to girls leave them with little or no spare time to study. Particularly, in those subjects like pure science and mathematics, which need more time to exercise, girls would be unable to compete with male students that enjoy more spare time to study.

Thus home environment also makes girls to develop what Betz (1997: 112) called "low science-related self-efficiency expectations". This psychological barrier to the pursuit of scientific and technical careers also account for large loses of women from these fields.

These ideas about the traditionally set appropriate roles and behavior for women besides making girls less participatory in schools than boys it also makes them psychologically unprepared to compete with their male counter parts in science and mathematics fields which are considered as male domains. So as Yelfign (1998) put it clearly, the expectations of parents as to how a girl should behave will have an impact in the choice of subject she makes in school. Similarly, El-Sanabary, 1993) argued that family has a great influence on decisions regarding education, career and marriage that their daughters make. In the same vein, Hyde Karin (1993: 108) stated that:

> *Ideas about the appropriate roles for women in the labor market or in society, about the biological unsuitability of women for science and about the gender-biased division of work in the household and on the farm influence decisions about schooling.*

Therefore, the educational and occupational aspirations of girls are highly influenced by the expectations and support they receive from their parents. The home environment in which girls grow, the perceptions, attitudes, experiences and expectations they develop during their childhood have contributed for their tendency to avoid science or mathematics fields in their later ages.

2.2.1.2. Society Influence

The domestic factors that hinder females to enroll in science and technology fields are part and parcel of the overall society perceptions about gender roles and responsibilities. When girls grow up, they become more and more influenced by culturally set gender rules. Regarding this Mensch states:

> *Girls and boys in cultures throughout the world are treated differentially from birth onward but at puberty this gender divide widens. During adolescence, the world expands for boys and contracts for girls. Boys enjoy new privileges reserved for men; girls endure new restrictions reserved for women. Boys gain autonomy, mobility, opportunity, and power... girls are systematically deprived of these assets. (Mensh, 1998: 2).*

As Mensch explicitly put it, adolescent girls are made to be restricted to less life choices and opportunities by culturally sanctioned gender rules imposed by society and sometimes perpetuated by girls themselves. This situation is reflected by their reluctance to participate in the fields of study that are traditionally considered as male-domains.

Society's perceptions and attitudes toward gender roles and responsibilities have great impact on the educational choice of girls. Children, when they grow to young people, become more and more aware of the traditionally expected roles and behaviors. Thus for boys success and achievement in the outside world becomes more important while girls tend to avoid such personal qualities as independence, competitive achievement, and self-confidence in male dominated areas (ICRW, 2000). Webster Paula (1975) also added that because of reproduction and associated child-care burdens social norms has always restricted woman to a maintaining, and nurturing roles, which man has appropriated the creative and transcendent role. Therefore, the reluctance of females to go to science fields arises partly from their response to society's perceptions about gender-appropriate vocations. (A.Karin & Hyde, 1993). Social norms regard scientific and technological fields as male-domains and female students all not encouraged to aspire for these fields (Atsede 1991).

In many developing countries, the socially approved role of females has been that of wife and mothers. Society encourages girls to develop interest towards the role they are expected to play in their future life. As a result of this female students tend to be interested in those subjects that are supposed to fit this role. Thus girl's choice of domestic sciences and biology and their low tendency toward physical sciences and Mathematics is a natural consequence of the influence form society.

Research evidence has shown that children's' subject and career choices are highly influenced by their exposure to the socially imposed gender norms through out their childhood. Because young children's lives are immersed in a society that promotes gender roles, that condition which activities, task and responsibilities are perceived as

male and female- they are expected to know and defined themselves in relations to gender staring from their early childhood. As young people, both sexes behave in accordance to the learned gender roles. Consequently girls do not tend to peruse mathematics, pure or applied sciences in schools.

> *Math, science and technical fields have always been perceived as male-dominated field. Psychological research has shown us that children as young as 2½ know which jobs are for women and that stereotyping increases with the age of the child. Furthermore, stereotypes are consistent with children's early choices for themselves. In several studies, the large majority of girls give nurse or teacher as their occupational choice, whereas boys give a much wider range of traditionally male occupation representing the sciences, trade, and professions. Some girls and young women may avoid careers they perceive as male-dominated because they fear disapproval from others (Betz, 1997: 112).*

2.2.2 Within School Factors

The school environment is also believed to play a crucial role for the prevalent of gender inequality in the access to science and mathematics related subjects and careers. Astede (1991) argued that the cultural and social factors that prevent girls to participate in science and technology related fields are maintained by the educational system through out the world, particularly in developing countries where the gender disparity at any level of schooling is more pronounced. Similarly Ngaw (1999: 56) ascertained that "apart from parents and members of the family, schools are the next most important socializing agents which shape the career aspirations of their children". The gender dynamics that prescribe different roles and responsibilities are also embedded in the educational system. That is, the traditionally gender specific beliefs and norms already established at home are redefined and reinforced at schools.

Schools are assumed to be neutral with respect to developing gendered experiences and identities in students (GETT, 1997: 76). However "they will still be responsible for assisting students to understand, in an informal way, the broader processes and

structures that contribute to gender based inequality." The team further elaborated that confirmed that even play- grounds in the school are "gendered environments" where students learn "socially endorsed patterns of relating". GEET farther explained that "right from the earliest years of schooling young girls and boys learn about narrow, gender appropriate ways of behaving and relating, gendered academic areas of learning and achievements." Thus the school environment is the central place where the social gender appropriate patterns are extended and applied to the choice of subject areas.

The major agents in the school environment that partly contribute for the lack of females' access to science and related subjects are teachers. Evidences from educational studies indicate that, student-teacher interaction is one of the factors that highly influence the "motivation", 'achievement" and "attainment" of students in different subject areas (El-Sandabary, 1993: 164). That is directly or indirectly, teachers transmit "sex-role stereotypes through what they teach and through their behavior". Knowingly or unknowingly, they transmit their assumptions about the gender appropriate skills and abilities. GETT (1997) also ascertained that, based on their perception of the unsuitability of studying particular courses, a teacher may discourage their students from perusing them.

Gender stereotyping of subjects is commonly exercised by teacher (Njambi, 1998). Boys are encouraged by their teachers to take up science and mathematics while girls are advised to stick to such subjects that are considered feminine domains. This is a result of the gender appropriate classification of subjects in accordance with the traditionally perceived male female behaviors. Thus, boys are perceived by their teachers to be hard workers and analytical and are able to deal with the most masculine subjects-physical sciences and mathematics. On the other hand female students are perceived as having feminine nature and incapable of dealing with the masculine subjects. Hegary (1984: 15) states "the masculine image of science as presented in schools made physics a particularly difficult choice for girls who were striving to achieve a feminine identify". Similarly, Kahel et. al (1993) argued that the fact that science is given as a masculine

image that it is considered to be hard, cold and an analytical discipline, make it difficult for girls to peruse science.

Teachers who sustain the feminine -masculine perceptions have low expectations of girl's performance in science subjects, which are considered as domains of male. Thus this gender stereotyping of subjects has inhibited girls to enroll and teachers to encourage their female students to join science stream. Moreover, based on their stereotypical notion of girls' inability in science, teachers may discourage girls from pursuing their study in science.

> *In their everyday classroom practices teachers may consciously or subconsciously denigrate girls' attainment levels. In suggesting that is more important for boys to answer questions, or participate actively in the classroom, teachers inadvertently send out to girls a message about what is expected from them. This expectation-and it is repeated in the boys' and girls' behavior-reflects ideological views about the lack of importance of girls being educated, their innate abilities and so on. (GETT, 1997: 89).*

Betz (1997: 174) also asserted that one of the "more subtle forms of discrimination that partly influence girls' attitude towards science is low expectations of teachers towards their intellectual capabilities.Therefore, the low involvement of females in science result in part from teachers' instructional practices in the science courses. That is the view that girls are unable to learn the masculine subjects reflected by teachers at all levels of grades have an impact on the attitude of girls toward science fields.

2.2.3. Low self-efficiency expectation in the part of females:

In the preceding part of this section, the major possible barriers to females to enroll in science and related subjects have been briefly illustrated. The question now is how do the above-mentioned barriers affect females and prevent them to participate in science fields? This is a fundamental question to be answered so as to explain the differential behavior of women and men toward science education.

There are several reasons for the low participation of females in science and math. Most of the reasons are associated in a certain way to perceptions that these subjects are "male domains", that females are less capable in those fields and that females don't need science and math (Betz, 1997: 110). These perceptions that reflect a gender bias toward science education exist among parents, teachers peers etc (Eccles, 1997) the attitude and expectations of these people towards females' science education is the result of their perception that females are incapable of performing science and math as male do. Self-perception of females about their capabilities in different subjects in turn is shaped by the attitude and expectations of other people around them.

What people expect from children highly influences their aspirations. These expectations can come from every where-the media, parents, peers or teachers. (Eccles, 1997: 93). Since every one is "primarily the product of expectations that others have of him/her, students' self-perception is highly affected by these expectations.

According to Scheefelben and Farrel (1982), the differential behavior of men and women within the educational system can be explained in terms of the self-perception they have about their ability. Slaughter and Defoe, 1997: 42) also argued "the long-term outcomes of schooling would be dependent on students' self-perception both as a learner and as a person". Moreover, students' self-perceptions about their academic abilities and potential are especially influenced by what teachers, parents, and the society at large expect from them.

Attitudes of women based on their "self-image" and the expectations of men about the "role and status of women" are seen as the "fundamental obstacles" to women equal participation in development (Synder Margaret and Mary Tadese, 1995: 144). They further indicated, "Those in grown attitudes continuously reinforced the conservative mentality that women and girls shared in common. The result was a passive acceptance of the limitations of their traditional roles and hesitancy to the new fields."

Kahel et.al (1993) state that, in general based on the masculine image of science, parents and teachers do not expect girls to perform well in sciences. These important persons, assuming science to be men's domain, do not also encourage them to pursue the study of sciences. Confirming this idea, Atsede (1991: 109) argued "it is highly unlikely for young girls to have the opportunity of encouragement to pursue studies in the fields of science and technology". Thus girls, throughout their schooling, are geared not to aspire for science and technological subjects that are apparently hard and sophisticated (Yelfign, 1998). Instead they are encouraged to go to the subjects that are traditionally perceived as feminine.

The pervasive gender stereotyping ultimately creates low self-efficacy in the minds of female students- that they are unable to compete with their male counterpart in those subjects that are perceived as male domains. "As a result girls do not anticipate higher performance in science fields and hence do not tend to pursue their studies in these fields (Khale et.al. 1993:56).Even if, girls are interested and perform well in science fields, they may not have the confidence to go out of the existing trend of women's choice of fields.

2.1 Significance of gender equity in science

Today science is progressing at such a rapid rate that every aspect of our life is being affected by the exceptional technological innovations. In order to take advantage and benefit from modern technology it is necessary to cope with its rapid progress. This in turn requires being well prepared in science and most importantly in the application of science to our day-to-day activities. Supporting this fact, Kumar (1995) pointed out that, with the growing role and importance of science in our daily life, it is clear that we depend on science discoveries to a very large extent. That is scientific principles and laws have numerous applications to our daily life and for proper utility of such applications some knowledge of science is required.

Knowledge of science and its application has manifold advantages for individuals. One of the importance of science education to individuals is reflected by its vocational value. In this regard Kumar (1995:40) stated, "In the present age we do not find any vocation

that does not need the knowledge of science". Here the importance of science education lies on the fact that it opens a vast field of opportunities for joining vocational courses and for choosing a wide range of career.

Science education also helps individuals to adjust themselves to modern life by changing their behavior. As Kumar puts exposure to science education helps us to have an open mind, a desire for accurate knowledge and a confidence to solve our problems in a scientific way. In the same vein Raj (1982:239) states that" prolonged exposure to science would generate a scientific out look and a rational appraisal of old knowledge in the context of the new". He also added that scientific out look or attitude would eliminate "Superstition, Prejudice and blind belief".

Recognizing the potential value of science education UNESCO'S International Education Commission in 1972 recommended science as an important component of the school curriculum. The recommendations made by the Commission about the teaching of science and technology as *cited* in Kumar states:

> *Science and technology must become essential Components in any educational enterprise, they must be incorporated into all educational activity intended for children, young people and adults, in order to help the individual to control social energies as well as natural and productive ones- thereby achieving mastery over himself, his choices and actions- and finally, they must help man to acquire a scientific turn of mind so that he becomes able to promote science without being enslaved by it. (Kumar 1995:20).*

What the commission emphasizes is that today it has, become necessary for every student to have basic understanding of science and its application so that he/she will be able to cope with the present era of science. The implication is, one cannot promote science without understanding it. Instead he will be a stranger from the past who lives in modern time.

It is in light of this that many countries give great emphasis to science education. For example the American Association for the Advancement of Science (AAAS) being concerned in the state of science education in the country has called for a radical reform in science and math education through out all levels of schooling. The statement of the association about the state of science education in the country is as :

> *Many US citizens, even those who are otherwise well educated, have little understanding of science or how it affects their standards of living nor do they possess the intellectual skills to act effectively on scientific matter that they encounter in their personal, professional, and civic experiences. (Eccles 1997:66)*

The association also pointed out that it is highly " critical" that more women should come into science related career and into the teaching of science. Great emphasis is given in the participation of females in science education, because, as Eccles put it, unless more females come to the natural sciences, jobs calling for specialized preparations may go unfilled in the near future. This will have a tremendous impact on the development of the country.

2.3.1. Significance in the part of females

The fact that females do not go to sciences and related fields implies that their career possibilities are narrowly restricted to limited areas .In this regard Wolpe et.al (1997) argued that, due to the factors that hinder women from becoming technologically proficient, they lack the opportunity of equal participation as their male counterparts in technologically oriented provisions. As the result, economic and technological development opens wide economic and occupational option for men but not for women (Remy Dorothy 1975).

The existing gender disparity in science & technology fields not only force females to concentrated in limited occupational areas but also excludes them from occupations that generate higher economic income; females' relative lack of skills and knowledge in

science and technology related fields is an important factor contributing to their subordinate position in the matter of wages, employment and development(Jacqueline 1970; Population Council 2002). ILO also stated that the restricted presence of women in the scientific and technological fields "Contributes to the creation of stereotypes of women and excludes them from professions that are better remunerated" (ILO, 2000:28). More over " once certain areas of employment have become dominated by women they tend to lose their status and are usually transformed into low-paid, low prestige occupations" (Boydon & SyLvia; 1989; 186.) This means the low participation of females in scientific & technological fields besides limiting their occupational options it also puts them at a lower social & political status than their male counterparts. Therefore, the eradication of sexual inequality in science & technological fields not only raises women' material standards of well being but also their status (Brydon & Sylvia 1989).

Another aspect of the impact of low participation of females in science is that in the long run, females will have hardly any chance to cope with the rapidly advancement of science & technology and hence cannot benefit from it. Jacqueline describes the seriousness of this situation as follows:

> *How In fact, can we fail to perceive this appalling prospect; generations of women who, tomorrow, will be cut off form progress and from the life of the world, just as the illiterate feminine masses are today? When a new scientific culture is born the key to understanding of the universe lies, in fact, in science and technologies how can we fail to be disturbed at seeing women barred from it and at finding the discriminatory process that operated at primary and other educational levels in action again? (Jacqueline, 1970:67)*

Therefore equal opportunities and participation in science technological fields has manifold importance in the part of females. First it allows them to have equal occupational opportunities as their male counter parts which in turn raise their social status. Besides that as Finn, Reis & Dulburg (1982:126) put it "not to expose both sexes within school to the fuller range of course contents and adult sex-role models, or to the

benefits associated with the highest expectations and support of their performance, is to deny them equal opportunity". They further argued that gender equity in educational results and life chances can exist only when individuals have equal chances to make their own "Positive choices" from available alternatives rather then "negative choices" from limited opportunities. As human beings females have equal right as their male counter parts to contribute to and benefit from the scientific and technological development. Hence not to effectively open all options to females is denying their human right.

2.3.2. Societal Significance

Equal access to scientific and technological professions for females is also highly significant for the development of the whole society. In this regard the existing literature clearly indicates that without the full participation of females in all development sectors the overall societal development is hardly possible.

Green Jennifer & Lori Ann (1998) ascertained that the gender-based constraints and inequalities in the access to education and technology hurt not only females but also the overall society. In order to make economic development sustainable and equitable it is required to ensure access to appropriate technology to females. "The most serious problems of development defy solution without the active participation of women" (Snyder & Mary 1995:42). Therefore, it is of highly importance to "break down the existing gender stereotypes" if any development planning is to be capable of precipitating fundamental change (Brydon &Sylvia; 1989:219)

To maintain the existing gender stereotypes in scientific and technological fields is to keep half of the human population out of the fields of the future. " This would certainly be an injustice, but worse still it would be an incalculable loss of human resources for both sexes, for society and for the cultural heritage" (Jacqueline, 1970:38).. That means the gender gap in the science & technology fields "Impedes the balanced development of society."

The importance of equal participation of women in scientific & technological sectors for the balanced development of society has been reflected in several international & regional conferences. The Rabat document, as cited in Snyder & Marry (1995:42) state s that: "If all the persons who are involved in the human tasks of survival and creation of a better life are allowed to share the opportunities available to apply scientific knowledge and technological advances, development will be achieved at the most rapid rate possible.' Similarly the fourth Abuja (1989), regional conference on the integration of women in development, categorically stated: " The participation of women in scientific and technical professions in Africa is critical to the future technological development of the continent" (Ibid: 183).

Furthermore to enhance gender equity in science and technology fields means to value diversity. Every type of diversity in a system has a contribution to the healthy survival and prosperity of the system. In this regard Anne et. al (1994:31) stated that:

> *Systems that value the contribution of diverse people not only have a greater chance of survival but also are healthier environments for the individuals involved. On the other hand systems that value only the contributions of one dominant group are wasting valuable resource and limiting the capacity of the systems to respond to the demands of changing world.*

Thus creating equal opportunities for females in the scientific and technological sectors means promoting social progress. Shortly as poetical (2001:85) put it "empowering women, and strengthening their abilities knowledge and competence to help themselves is ' the way of proceeding towards eradication of poverty. It is social policy from below building self-reliant and sustainable well-being for the whole nation".

CHAPTER THREE

METHODOLOGY

3.1. Research design

The aim of this study was to examine the participation and performance of female students in science and mathematics fields. To secure the required information both qualitative and quantitative approaches were used.

3.2. Subjects

Four groups of subjects, which include a total number of 190 instructors, teachers and students have been used in the study. Since the study is mainly concerned with gender disparity in science and mathematics streams in ACTE, most of the subjects (90%) were directly selected by the investigator for they are believed to be the most appropriate sources of information for the study.

The first two groups of subjects include all science and mathematics instructors (N=23) in ACTE and all science and mathematics teachers (N=41) presently teaching in the two governmental high schools (Addis Ketema and Tabor Senior Secondary Schools) in Awassa. The third group of subjects was all female first year students in mathematics and science streams (N=19) in ACTE and an equal number of first year male students (N=19) from the same stream and streams. The male students were picked randomly from their sections.The last group consists of all first year female students (N=87) in social science and language streams in ACTE. So, except for the male students in science and mathematics streams, who were randomly selected, in all other cases the whole populations of subjects were used in the study. Only 19 male students were taken for the purpose of making their numbers equal to that of female students in their streams.

The main reason for taking only science and mathematics teachers and students in the first three groups lies on the fact that the best sources of information for the case in the study are those actively participating in the teaching learning process of mathematics and science subject. On the other hand, the female students in social science and language stream were chosen for it is believed that they are the right sources of information us to why females do not study science and mathematic fields.

3.3 Instruments of Data Collection

The data collecting tools used for this study were questionnaires, and analysis of documents, which included students' enrollment and master sheet documents both from the registrar office in ACTE.

3.3.1. Questionnaire

Four sets of questionnaires were prepared to collect information from four groups of respondents. The members of the groups were all science and mathematics instructors in ACTE, all science mathematics teachers in the two government high schools in Awassa, all female and an equal number of male first year students enrolled in science and mathematics streams in ACTE, and all first year female students in social science and language streams at ACTE. All the four sets of questionnaires were constructed in three parts. The first parts of the four sets of questionnaires were used to obtain relevant personal information about respondents, the second parts of each set helped to secure information about the possible school related barriers to females' participation in science and mathematics streams, while the third parts of the questionnaires in each group were intended to obtain information regarding the influence of gender-stereotyping of subjects and occupations in hindering females from pursuing their studies in science and technology.

Before the administration of the questionnaires to the actual subjects in the study, a pilot study had been conducted to check the relevance of each item in the questionnaires. The subjects in the pilot study were 20 science and mathematics students (10 male and 10 female), 10 female social science students, a total of 30 students and 5 science and

mathematics teachers. All subjects in the pilot study were from Comboni high school, which is a private school in Awassa town. After the pilot study, modifications were made on few items and then questionnaires were administered to the actual subjects in the study.

As to the administration of the questionnaires, it was undertaken in two phases. The investigator did the distribution and collection of questionnaires for the instructors and teachers. On the part of student respondents, they were scattered in 20 different sections and it was found more convenient to assemble them in groups according to their respective streams. So the respondents from the four streams were made to gather with the collaboration of the respective stream heads. After this the researcher himself did the distribution and collection of the questionnaires.

3.3.2. Document Analysis.

Two types of documents, namely, student enrollment and grade master sheet documents have been used to gather relevant information for the study. Both documents were obtained from the registrar office in ACTE.

3.3.2.1. Student Enrollment Document

This document has been used to collect information about the enrollment of male and female regular students in ACTE since the college started training teachers. This was found to be necessary for the purpose of assessing the rate of participation of female students with respect to males in each department; particularly the data was required to identify the gender disparity in science and mathematics streams in the college. To this end, the enrollment of male and female students across eight departments for the last seven (i.e. since the college started training teachers) years has been obtained

3.3.2.2. Grade Master Sheet Document.

The master sheet document was used to collect the results of all regular students who have graduated from ACTE. This was done for the purpose of identifying the patterns of

achievements of male and female students in science and mathematics streams. To this end, the cumulative GPAs of male and female students who have graduated from the eight streams in the college during the last seven academic years have been secured. The GPA of science and mathematics students was used to investigate how female students achieve in their fields of study compared to their male counter parts. Although the study is not intended to investigate the achievements of non-science students their GPA were also collected. This was found to be necessary for the purpose of comparing achievements of female students in science and mathematics streams with those of females in non-science steams with respect to their corresponding male counter parts.

3.4. Methods of Data Analysis.

The data obtained during the study has been analyzed by applying statistical techniques such as percentages and statistical significant tests as well as descriptive statements. This was done in order to answer the basic research questions set at the beginning of the research.

Accordingly, for the purpose of answering the first research question, the data about students' enrollment across each department was used. The raw data collected from the registrar office in ACTE has been organized in such a way that the figures could be easily understandable. To this end the enrollment data was organized in different tables and graphs. In this regard, table of enrollment by sex, table of enrollment across departments, table of distribution of students by sex across departments has been used. In addition to this bar graphs showing students' enrollment by sex across each department is drawn.. Finally the data organized in tables and in graph were thoroughly discussed so as to give answer about the rate of participation of female students across departments. Here a particular emphasis has been given to the rate at which female students participated in the science and mathematics streams.

In order to give answer to the second basic question, which is aimed at identifying how female students in science and mathematics streams achieve compared to their male counter parts, it was required to obtain the over all students result from students' grade

master sheet. In due course, attention was also given to the achievement of female students in the non-science streams as compared to their male counter parts. This was done for the purpose of identifying which group of female students (i.e. those in science& mathematics streams or those in non-science streams) has better achievement relative to male students within their respective streams.

The t-distribution has been used to find out whether there is significant difference in achievement between male and female students in science and mathematics streams as well as between the two sexes in social science and language streams. The starting point of the statistical analysis was the hypothesis that "there in no difference in achievement between male and female students" within their respective streams. The .05 level of significance is used to reject the null hypothesis.

As to the third basic research question, it is mainly concerned with the key gender-related constraints in science and mathematics fields of study. To answer this basic question the data secured through questionnaires from four groups of respondents has been used. The information obtained from the second part of the questionnaires from all groups of respondents was analyzed to find out the possible barriers to females' participation in science fields. More over, the responses of all groups for the third part of the questionnaires were also analyzed in order to estimate the magnitude of the influence of gender stereotyping of subjects and occupations to affect female's participation in science and related subjects. The data analysis method applied to the information gained through questionnaires was percentages and descriptive statements.

3.5 Data organization and analysis

Both qualitative and quantitative approaches were used in the study. Raw data generated from enrolment and master sheets were processed through SPSS computer program and t-test was applied for comparison of means in relation to achievements. Regarding data generated through questionnaires descriptive statistics and narrative approaches were used.

CHAPTER FOUR

ANALYSIS AND INTERPRETATON OF DATA

This part of the study deals with the analysis of the data gathered from the different sources followed by discussion of the findings. Accordingly the main findings of the study are given below.

4.1. Results

The data gathered were analyzed by applying percentiles and other statistical tools such as mean, and t-test . Most of the data gathered are organized using tables and graphs and then descriptions of the results are given in statements.

4.1.1 Assessment of enrollment documents

As indicated in the forgoing part, the overall enrollment of students in ACTE since 1996 has been collected for the purpose of investigating gender disparity in science and mathematics fields. Besides that other aspects of gender related enrollment patterns such as, gender combination in the overall enrollment in the college, gender combinations in the non-science departments have been also given due attention. This has been done for the purpose of bringing the problems to the awareness of the college administration as well as to other interested researchers.

4.1.1.1. Total Enrollment

Since there are eight academic departments in the college students enrolled in the college are distributed across these departments. The total number of student enrolled in the college for the last seven years was 3105. The sex -combination of these

students and how they were distributed across each field of study are shown in table 4.1 and tale 4.2 below.

Table 4.1. Sex combination of Total Enrollment

Sex	No of Students	Percentage
Female	569	18.3%
Male	2536	81.7%
Total	3105	100%

Table 4.2. Distribution of Students Across Academic Departments

Department	No of students	Percentage
Amharic	406	13.1%
English	508	16.4%
Mathematics	495	15.9%
Biology	412	13.3%
Chemistry	379	12.2%
Physics	330	10.6%
Geography	320	10.3%
History	255	8.2%
Total	3105	100%

The data in table 4.1 clearly show that the sex, combination of the total students enrolled in the college during the last seven years was 81.7% male and 18.3% female students. This shows that compared to males extremely few females had the chance to enroll in the college. That is there is a highly pronounced gender disparity in the overall enrollment.

The distribution of total students across each department, i.e. the total number of students enrolled in each academic department during the last seven years is shown in table 4.2. Referring to this table the following main points can be drawn.

- Comparison of the percentage of students in science and mathematics streams shows that, physics is the subject in which the minimum enrollment (10.6%) occurs, whereas the maximum enrollment (15.9%) is observed in mathematics. On the other hand percentage enrollments in chemistry (12.2%) and in Biology (13.3%) are relatively moderate.
- Regarding the overall distribution of students, English (16.4%) and mathematics (15.7%) are the two fields that absorbed higher proportions of students enrolled in the college, while the subjects in which lower proportions of students enrolled are History (8.2%), Geography (10.3%) and Physics (10.6%). The percentages of enrollment in Biology (13.3%) and Amharic (13.1%) shows that these subjects had moderate enrollment of students.
- It is worth to emphasize her that, the percentage of students enrolled in science stream ranges from moderate in Biology (13.3%) and Chemistry (12.2%) to the smallest in physics (10.6%).
- It is also of interest to indicate that the social science stream (Geography and History) is the stream to which relatively smaller numbers of students are attracted whereas the language stream (Amharic and English) the leading stream in attracting larger proportion of students.

4.1.1.2 Distribution of total male and female students across departments

In order to identify the subject choice patterns of each sex it is required to look at how the total male and female students were distributed among the different fields of studies in the college during the last seven years. So the data organized for this purpose is shown in table 4.3. Moreover, additional bar graph, shown in Fig 4.1, is used so as to make the enrollment patterns of each sex easily visible.

It should be noted that percentages in table 4.3 represent percentage within sex of the student i.e. The percentage of female students for each department is calculated by dividing the number of females in the department by to total female students in each

department represents the percentage of the total female students enrolled in the college. Similarly the percentage for male students represents the percentage of the total male students enrolled in the college.

Table 4.3. Male and Female Distribution Across Departments

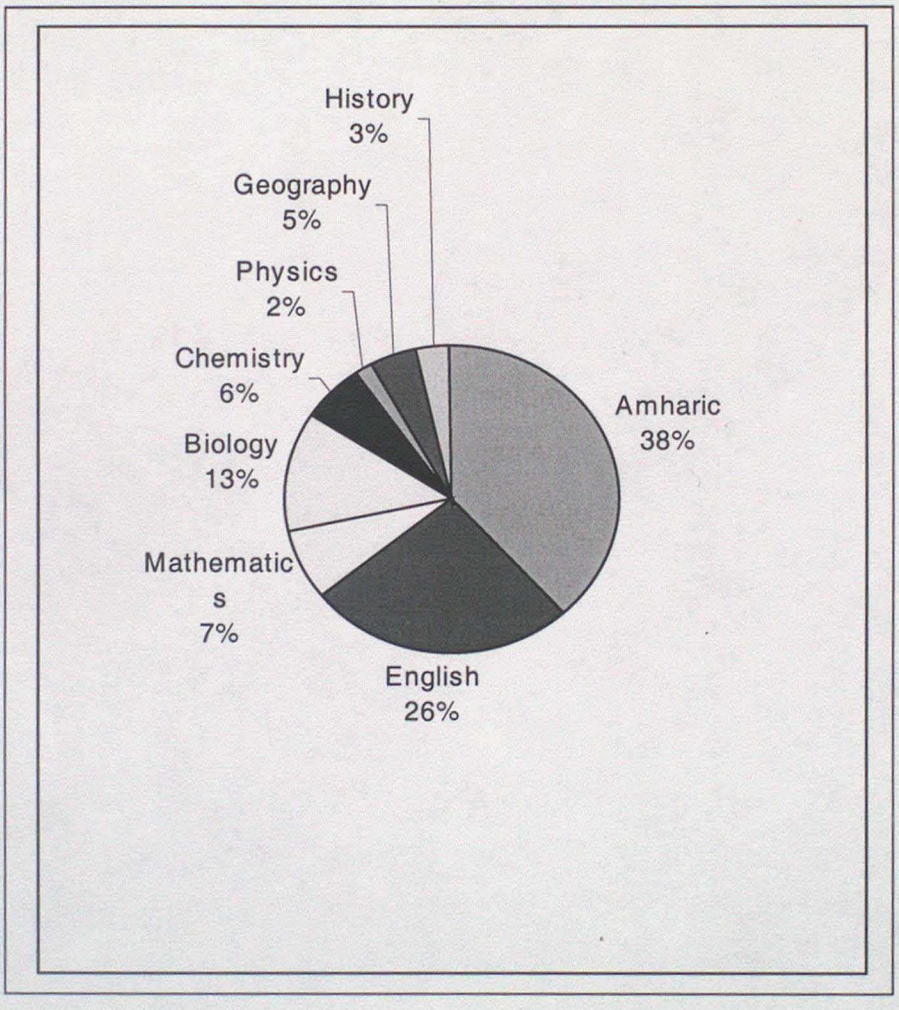
	Sex					
Department	Female		Male		Total	
Amharic	218	38.3%	188	7.4	406	13.1
English	146	26.7	362	14.3	508	16.4
Mathematics	42	7.4	453	17.9	495	15.9
Biology	73	12.8	339	13.4	412	13.3
Chemistry	34	6.0	345	13.5	379	12.2
Physics	11	1.9	319	12.6	330	10.6
Geography	26	4.6	294	11.6	320	10.3
History	19	3.3	236	9.3	255	8.2
Total	**569**	**100%**	**2536**	**100%**	**3105**	**100%**

Referring to table 4.3 reveals the following important points about the enrollment patterns of male and female students in the college.

- The percentage of female students enrolled in science and mathematics streams in only 28.1%, while the remaining 71.9% of females went to non-science streams. Science and Mathematics Streams, which include
- Comparison of the percentage of female enrollment within science and mathematics streams clearly shows that the majority of them were enrolled in Biology (12.8%), smaller percentages went to mathematics (7.4%) and Chemistry (6.0%) while in Physics the least percentage (1.9%) of females enrolled. Physics is also the subject that attracted the least number of female students as compared to all departments in the college. Only 11 female students have enrolled in physics department for the last seven years.

- Among the science subjects, though the participation of female students in Biology (12.8%) is moderate, their participation in the physical sciences (physics & Chemistry is very low. The physical sciences, which play major role in modern technological development, have attracted only 7.9% of female student

Fig. 4.1. Distribution of females across departments



Moreover, though it is not the main concern of this study the data shows additional enrollment pattern in the college that could be of interest. Table 4.3 and Fig 4.1 reveal the following points regarding the overall enrollment of students.

- Large majority of females were attracted to language stream, which showed 64% of the total population of female students. Amharic being the leading subject area in the college to attract the largest percentage (38.3%) of females while English is the subject which attracted the second largest percentage (26.7%) of females.
- Mathematics is the subject in which the largest number of male students enrolled while Amharic is the subject that attracted the largest number of female students in the college.
- The least number of females are enrolled in physics while it is in Amharic that the least number of males enrolled.
- Thus Amharic is the subject in which both the least number of males and the largest number of females were enrolled.
- Percentage of female students enrolled in social science stream is only 7.9% (4.6% in Geography and 3.3% in History). This shows that extremely few female students are interested in this field of study.

As to why these enrollment patterns of male and female students occurred in the non-science streams are left to other interested researchers, for this study is mainly concerned investigating the situation in science and mathematics streams.

4.1.1.3. Sex-Combinations of Students within departments

In order to clearly see the gender disparity within departments the total number of male and female students enrolled in each department had been collected. The gathered data is then organized as shown in table 4.4 below. In addition to this for the purpose of making gender-differences in the departments easily recognizable, a graphical illustration is given (Fig 2). It should be clear that the percentages in table 4.4 are percentages within the department. That is the percentage of females in a given department is calculated by dividing the number of females in the department by the total number of students in the department by the total number of students in the department. So the percentages show the percentages of the sex-combination of students in each department.

Table 4.4. Sex Combination within Departments

	Sex					
Department	Female		Male		Total	
	No	%	No	%	No	%
Amharic	218	53.7	188	46.3	406	100
English	146	28.7	362	71.3	508	100
Mathematics	42	8.5	453	91.5	495	100
Biology	73	17.7	339	82.3	412	100
Chemistry	34	9.0%	345	91.0	379	100
Physics	11	3.3	319	96.7	330	100%
Geography	26	8.1	294	91.9	320	100%
History	19	7.5	236	92.5	255	100%
Total	**569**	**18.3**	**2536**	**81.7**	**3105**	**100%**

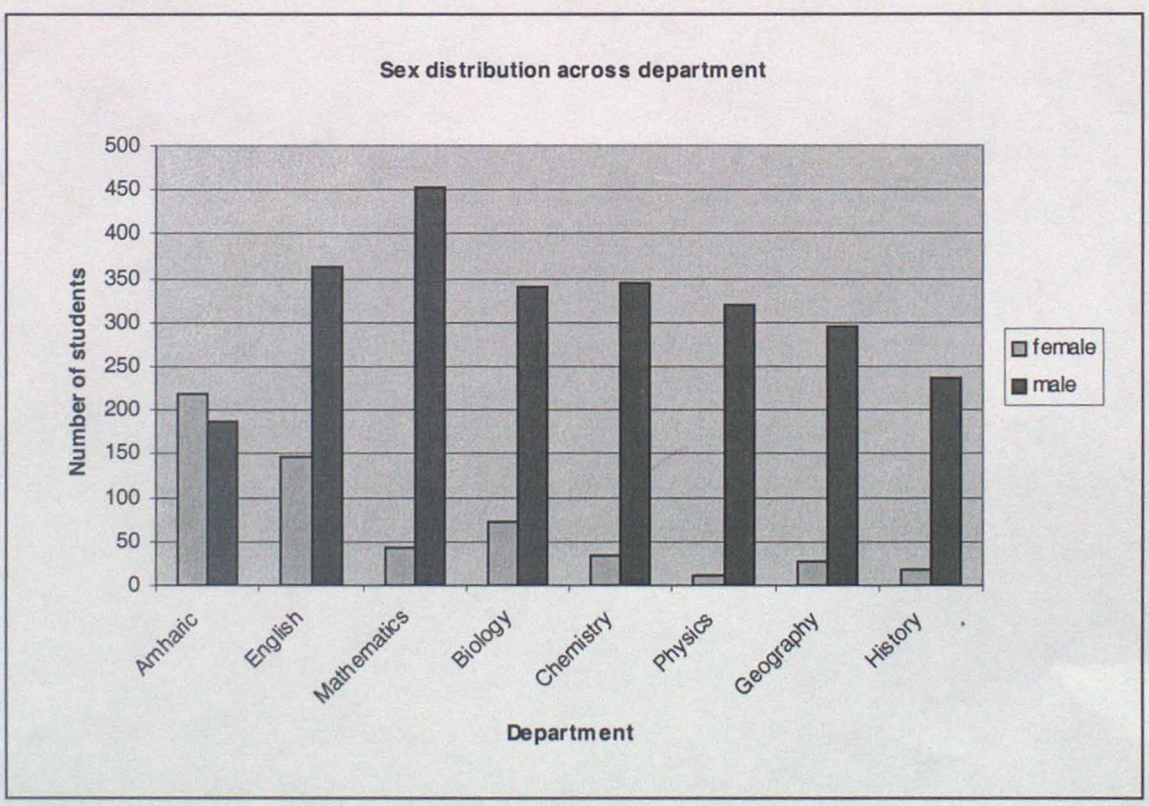


Table 4.4 and Fig 4.2

clearly illustrate the magnitude of gender in balance in each field of study. The following main point is drawn from these illustrations.

- The highest gender disparity is observed in physics in which 96.7% of the total students enrolled in this field were males while females were only 3.3%.
- The gender imbalance in science and mathematics streams is also very high. The percentages of females in Chemistry was 9%, in Mathematics 8.5% , which shows in both subjects the male enrollment was more than 90%. The percentage of females in Biology is also still much low as compared to 82.3% male participation in the field.

Additional points that need mentioning concerning gender disparity in the college are:

- Except Amharic in which more females (53.7%) enrolled than males (46.3%) pronounced gender gap is observed in all fields of studies.
- The social science stream is also exhibits very high gender imbalance.
- Arranged in the order of increasing gender disparity the list of subjects looks like; Amharic, English, Biology, Chemistry, Mathematics, History, Geography and Physics.

Generally, the findings clearly indicate the prevalence of an extreme gender disparity in the science and mathematics field of studies particularly the physical sciences are in which the problem is most magnified. Besides this, female students in the college showed a better participation in the language stream.

4.1.2. Analysis of females' achievement

The data gathered from students master sheet is used to compare the achievements of male and female students in ACTE. While studying gender disparity in science and mathematics streams it appears reasonable to investigate how those female students enrolled in these fields achieve as compared to their male counterparts.

For this purpose, the cumulative GPA of all male and female students so far graduated from science and mathematics streams in the college has been collected. The gathered data was then tested by applying appropriate statistical methods so as to find out whether there is a significant difference between male and female students in science and mathematics achievement.

Similarly, the cumulative GPA of all students graduated from departments other than science and mathematics has been gathered. Then the same procedure used for science and mathematics students was applied in order to check the performance of females in the non-science fields, compared to their male counter parts. This has been done first in order to check if female students were good achievers in the subject areas to which the majority of them were attracted. Secondly, and more importantly the achievement of non-science female students as compared to male students in their streams was required in order to investigate, which group of female students (those in science stream or those in non-science stream) achieved better relative to male students in their respective streams.

Comparison of the achievements of the two groups of female students was found important for the purpose of checking whether one of the reasons for female students' reluctance to study the sciences is their relatively better achievement in the non-science fields. To this end, comparisons of the mean GPA of the two group of female students with reference to the mean GPA of their respective male students was made. Against this background, the statistical tests applied and the major findings are given here-under.

4.1.2.1. Comparison of male and female students achievement in science and mathematics

As mentioned before, the t-test has been applied in order to check the existence of significant difference between male and female students in science and mathematics

fields. The hypothesis used for the statistical analysis was "there is no difference in achievement between the two sexes and the level of significance used to neglect the null hypothesis was 0.05. The outcome of the statistical analysis is shown in table 4.5(a) and table 4.5(b) below.

Table 4.5 (a) Group statistics

Sex	N	Mean	Std. Deviation	Std. Error mean
Male	788	2.6777	0.4520	0.0161
Female	58	2.4391	0.3995	0.0525

Table 4.5(b) Independent Samples Test

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std.Error Difference	95%confidence interval of the difference	
						Lower	Upper
Equal variance assumed	3.9085	844	0.000	0.2386	0.0610	0.1188	0.3584

Table 4.5 (a) shows the group statistics of male and female students in science and mathematics fields. As indicated before the mean values in the table represent the means of the cumulative GPA of all male and female students so far graduated from ACTE. Accordingly the mean GPA for males is 2.6777 while that of females is 2.4391.

Table 4.5 (b) shows the results of the independent samples t-test for equality of means. As can be seen the mean grade point averages of males and females students were found to be significantly different at t ($\alpha_{1/2}$, 844) =3.9085, p<0.000, showing that male students have higher achievement in science and mathematics fields than female students.

4.1.2.2. Comparison of male and female students achievement in non-science fields of studies

It may be useful to mention here again as to why the treatment of achievements of social science students required while it is not the main concern of the study. It was included for the purpose of checking the assumption that the attraction of the majority of female students towards non-science fields might be due to their achievements in these fields. To this end the mean grade point averages of male and female non-science students so far graduated from the college was calculated. Then in order to examine whether there is difference in the achievements of male and females non-science students the t-test for equality of means was applied. The starting point of the statistical analysis is the hypothesis that "there is no difference between the mean grade point averages of male and female students". The.05 level of significance was used to reject the null hypothesis. The results of the statistical analysis are organized in table 4.6 (a) and 4.6 (b).

Table 4.6(a) Group statistics

Sex	N	Mean	Std.Dev	St.Error Mean
Female	149	2.3854	0.4330	0.0355
Male	627	2.9105	0.4922	0.0197

4.6(b) Independent Sample Test

	t-test for Equality of Means						
	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference	95%confidence interval of the difference	
						Lower	Upper
Equal variance assumed	11.967	774	0.000	-0.5251	0.439	-0.6112	-0.4390

As can be seen from table 4.6 (a) the mean grade point average of male students who have been graduated from social science and language streams in ACTE since 1996 was 2.9105 while that of their female counterparts was 2.3854.The finding from t-test analysis for equality of means shown in table 4.6% (b) indicate that the mean grade averages of male and female non-science students were significantly different at $t(\alpha_{1/2}, 774) = -11.967$, $P < 0.000$. This shows that male students have higher achievement in non-science subjects than female students.

4.1.2.3. Comparison of achievements of female students in science fields and in non-Science fields.

The same statistical procedures and methods used in comparing male and female student achievements in science and non-science streams above, is used to compare the achievements of females in science streams with those in non-science streams. The outcomes of the statistical analysis are given tables 4.7 (a) and 4.7 (b) below.

Table 4.7(a) Group statistics

Sex	N	Mean	Std.Dev	St.Error Mean
Female in science	58	2.4391	0.3995	0.05245
Female in non-science	149	2.3854	0.4330	0.03547

Table 4.7(b) Independent Samples Test

All Females Equal Variance Assumed	t-test for Equality of Means				
	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference
	0.820	205	0.413	0.05377	0.06561

Referring to the group statistics in table 4.7 (a), the mean grade point average of female students in science was 2.4391 and that of females in non-science stream was 2.3854. This shows that the mean grade point average of females in science streams is higher than that of the mean grade point average of females in non-science streams by 0.5377.

Moreover, as can be seen from table 4.7 (b), the t-test applied for the equality of means between the two groups of female students yields that there were no significant difference between the two means ($t=0.829$, $df = 205$, $p < 0.413$) showing that female students in both science and non-science streams achieved the same.

4.1.3. Analysis of questionnaire Responses

As mentioned earlier the questions in the questionnaire were designed in such a way that the responses would elucidate some of the major gender related factors that may affect females' participation in science and mathematics fields in ACTE. The main findings are stated below.

4.1.3.1. Female students in the home environment

Since the learning process takes place both at school and a home, the home environment can affect the education of children. I light of this, two possible home factors that could influence the attitude and performance of female students were given attention in this study.

The first one is parental attitude towards the education of their children. In this regard student respondents were asked as to whether their parents give equal importance to the education of their sons and daughters. The responses indicate that, 44.7% of parents give more importance to the education of their sons than their daughters, 8.8% of parents give more importance to the daughters education and the education of both sexes.

The other home factor about which attempt was made to investigate is the amount of domestic work that female students carryout in their homes. Regarding this, student respondents were asked to indicate the sex that has been exposed to intensive domestic work during their primary and secondary schooling. Moreover, students and high school teachers were also asked to indicate the sex that has been enjoying the advantage of more free time for studying at home.

On the other hand, to see whether lack of sufficient study time has influence on the learning of science and mathematics, the instructor and teacher respondents were asked whether science and mathematics subjects require much effort and time from students for their understanding. The responses obtained from the all groups are the following.

As to which sex carries more domestic work, 89.4% of the respondents claimed that female students were responsible for much of the domestic work than their brothers. The remaining 1.8% and 8.8% respondents, respectively, claimed that males had more domestic work than females and both sexes were exposed to equal amount of work at home.

Regarding the sex that has more time for study at home, 92.3% teachers and 77.5% of students stated that male students have more extra time for study than their sisters. And those who claimed that both sexes have equal study time are 5.1% of teachers and

20.0% of students. On the other hand the percentages of responses to females enjoy more study time than males are 2.6% of teachers' and 2.7% of students.

As to the whether science and mathematics subjects demand students more effort and time. 90.5% of instructors and 95.7% of teachers conceded that these fields require more effort and time for their understanding. Those who do not believe so are 9.5% of instructors and 4.3% of teachers.

In addition for another question, the responses form 42.2% of female students indicated that during their pre-college schooling, one of the main difficulties the faced in learning science and mathematics was lack of sufficient time to do home works and exercise.

4.1.3.2. Female students in science and mathematics classes.

Certain aspects of females' behavior during classroom interaction may indicate their attitudes towards subjects. In this regard, the rate at which female students interact during science and mathematics classes, their self-confidence in doing these fields, their self perception abut their ability etc appear to be important behaviors that need investigation for the knowledge of such behavior could give us some clues about the effect of gender biased perception on females' performance in science and mathematics. For this purpose two types of questionnaire questions were prepared. The first question contains a list of seven items regarding female students' behavior activity in science and mathematics class. Respondent instructors, teachers and students form science and mathematics streams were asked to rate the level at which each of the behavior/activity is reflected by female students as compared to male students. The rating scale used was a five rank scale between very low and very high. The results obtained for this are shown in table 4.8.

The other question regarding students' classroom behavior / activity/ was prepared for respondent students in social science and language streams. In this question, there

were five items about students' classroom behaviors/activities and respondents were asked to indicate to which sex belongs more of the activity stated in each item. These respondents were asked give their answers based on their highs school experience. The results obtained form this group is shown in table 4.9.

Table 4.8. Views about females' behavior /activity science and mathematics Classes.

No	Females Behavior/Activity	Very low	Low	Average	High	Very High
1	Interest in learning science and Mathematics	5.0%	26.7%	32.7%	26.7%	8.9%
2	Performance in science and mathematics subjects	4.9%	36.9%	47.6%	6.8%	3.9%
3	Habit of doing homework and exercises regularly	6.7%	41.3%	33.7%	16.3%	2.9%
4	Effort to understand and succeed in science and mathematics field of studies	4.8%	36.6%	34.6%	18.3%	6.7%
5	Participation in the teaching learning process	12.5%	54.8%	26.9%	2.9%	2.9
6	Self-confidence in science and mathematics	6.8%	57.3%	28.1%	4.6%	2.9%
7	Self-efficacy perception in mathematics and science	6.8%	50.5%	30.1%	8.7%	3.9%

Table 4.9 male and female students in classrooms

No	Items	Male Students	Female Students	Equal for both
1	Ask questions more frequently in the class	77%	4.6%	18.4%
2	Receive more attention from teachers	24.7%	32.9%	42.4%
3	Do exercises on the blackboard more frequently	86.2%	0%	13.8%
4	Receive appreciations more frequently from teachers	22.1%	53.3%	24.4%
5	Have more confidence in their abilities	71.8%	0%	28.2%

Considering the self-confidence and self-efficacy perception of female students in science and mathematics subjects, 64.3% and 57.3% of responses in table 4.8 show that females have low self - confidence and low self efficacy perception in science and mathematics subjects. The result in table 4.9 (item 5) shows that the percentage of respondents who claimed male students have more confidence in science and mathematics subjects 71.8%, which is in agreement with the result from the other group.

4.1.3.3. Perceptions about female's ability in science

In order to have information on what perceptions male students promote about female students' ability in science and mathematics a question was given to social science and language streams students (all of which are females) in their questionnaire. The question has four alternatives about the possible perceptions of male students and the respondents were asked to indicate those perceptions that male students reflect during their high schooling. The alternatives of the question and the percentage of female students who chose the alterative are given in table 4.10.

Table 4.10 Male students' perceptions

No	Item	Percentage of Respondents
1	Male students think that they are more capable of doing science and mathematic than female students	55.2%
2	Male students think that females are better in science and mathematics than male students	2.3%
3	Male students believe that both sexes are equally able in doing science and mathematics	37.9%
4	I don't know	3.4%

As can be seen in table 4.10, 55.2% of female student respondents claimed that male students think that they are more capable in doing science and mathematics than female students. On the other hand 37.9% of female respondents conceded that male students have a perception that both sexes are equally able in doing science and mathematics.

Moreover in order to find out how science and mathematics teachers perceive the ability of their females students, respondent students from science and mathematics streams were asked to indicate whether they agree, partially agree or disagree, with the ideas stated in five statements. That is students were to indicate whether the behaviors stated in their teachers reflect each statement in the class. The organized data of their response is shown in table 4.11.

Table 4.11. Student's perceptions of Teachers' attitude towards female students

No	Classroom behavior reflected by science and mathematics teachers	Agree %	Partially agree%	Disagree %
1	Give equal attention to both sexes	60.5%	18.4%	21.1%
2	Give more emphasis to male students by encouraging them to participate in the classroom	21.1%	34.2%	44.7%
3	Have lower expectation to females ability in science and mathematics	34..2%	28.9%	36.8%
4	Offer encouragement and support to female students to enable them improve their performance	34.2	44.7	21.1
5	Perceive female students as less able in science and mathematics than male students	23.7	28.9	47.7

Table 4.11 reveals the following points.

- 63.1% students agree and partially agree that teachers have low expectation to females ability is science and mathematics
- 52.6% of respondents agree and partially agree that teachers believe that female students as less able in science and mathematics than their male counterparts.
- The total percentage of students who agree and partially agree to teachers' more encouragement toward male students is 5.3%

4.1.3.4 Image of subjects as male and female domains

The image of subjects as male and female domains that is reflected in the school environment is thought to be another factor that can be partly responsible for the reluctance of females to enroll in science and mathematics fields. This study has attempted to find out whether such image of subject areas exist among students and teachers.

In this respect, all participants in the study were asked if they think there are subject areas in the college that are difficult particularly for females to pursue their studies to the highest level of education in the fields. If they think so, they were also asked to list down the names of those subject areas that are difficult and those that are easy for them to reach the highest level of education.

From the responses, it is found out that 4.3% of Instructors, 45% of high school teachers and 48.7% of student respondents believe that certain subjects in higher educational institutions are difficult for female students.

Those subjectareas that are claimed to be difficult and those that are believed to be simple for females with the corresponding number of respondents are organized in table 4.12 below.

Table 4.12 Gender stereotyping of subjects

		Respondents			
	Subject	Instructors	High School Teachers	Students	Total
Subjects considered to be difficult for females	Physics	4.3%	50%	53.6%	47.3%
	Mathematics	4.3%	52%	50.4%	45.2%
	Chemistry	4.3%	50%	46.4%	42.6%
	Biology	4.3%	4.8%	20%	14.9%
Subjects considered to be simple for females	Amharic	4.3%	47.6%	48.8%	43.6%
	English	4.3%	45.2%	42.4%	38.8%
	Geography	4.3%	42.9%	24%	31.4%
	Biology	4.3%	26.2%	35.2%	29.6%
	History	0	31.2%	20%	20.7%

As can be seen from table 4.13, the three major subjects that are considered to be difficult particularly for females are physics (47.3%), mathematics (45.2%) and Chemistry (42.6%). The percentage of respondents who believe that Biology is difficult

for females is 14.9%, which is much smaller than the percentages for physical sciences and mathematics fields.

On the other hand, Amharic (43.6%), English (38.8%) Geography (31.5%) Biology (29.6%) and History (20.7%) are subjects perceived to be simpler for females. An Biology appears in both groups, and it can be seen that the percentage of respondents (29.6%) who claimed Biology is simple for females is almost twice of the percentage of respondents (14.9%) who voted fore its being difficult.

Generally the findings show that a large number of teachers and students promote the perception that classifies subject areas according to gender.

4.1.3.5. Perceptions about the relationships between gender and scientific and technological knowledge and skill

In order to find out the prevalence of gender based perceptions about science talent different types of questions were given to all respondents in the study.

The first questionnaire question consists of five items that reflect views about relationship between science and gender. This question was to be answered by all respondents of the study by indicating whether they agree, disagree, or partially agree with each item in the question. The results of the response are organized in table 4.13.

In another similar questionnaire question instructors and teachers were asked to rate the level of capability and interest of females in science the impact of gender disparity in science and the effect of barriers on females etc. The rating scale range between very low and very high and the result is tabulated in table 4.14 below.

Table 4.13. Perceptions about relationship between science talent and sex

No	Item	Agree	Partially agree	Disagree
1	Females can achieve equally as males in science and mathematics	71.5%	20.5%	7.9%
2	Engineering is a profession which is inconvenient and difficult for females	13.7%	28.9%	57.4%
3	Females are more gifted in language than in science	39.5%	25.8%	34.7%
4	Males are more talented to be scientist and to discover new things in science than females	5.3%	7.4%	87.3%
5	Nursing is a better and condiment profession for females than electrician	46.6%	29.1%	24.3%

Table 4.14 Responses from instructors and teachers about females in science and technology

No	Item	Very Low	Low	Moderate	High	Very High
1	Capability of females to pursue their studies in science and math's to the highest level education	3.1%	25.0%	29.7%	37.5%	1.6%
2	Support and encouragement females receive from parents, teachers & friends to enroll and succeed in science and mathematics fields of studies	28.1%	59.4%	6.3%	3.1%	3.1%
3	Females' interest in science and mathematics and the effort they show to succeed in these fields.	10.9%	48.4%	28.1%	6.3%	3.1%
4	Direct and indirect psychological barriers that hinder females to participate in scientific and technological sectors	3.1%	9.4%	12.5%	54.7%	18.8%
5	The impact of gender disparity in science and technology to the development of society.	0	1.6%	1.6%	56.3%	40.6%

The result in table 4.13 reveals that the majority of respondent (71.5%) promote the view that females and males have equal ability is science and mathematics while 20.5% of

respondents partially agree and 7.9% of respondents do not agree with equal ability of females with that of males in science and mathematics.

On the other hand a significant number of respondents think that engineering is an inconvenient profession for females and nursing is a better profession for them than electrician. Moreover though 87.3% of respondents claimed that females are equally talented as males to be a scientist, 39.5% and 25.8% respondents respectively agree and disagree to the idea that females are more gifted in language than in science.

Moreover, in order to countercheck the forgoing responses of instructors and teachers they were asked to indicate to which sex belongs more of the behavior reflected in each of the five items in table. The corresponding responses are also shown in the table 4.15

Table 4.15 Teachers and instructors view about relationship between science and sex.

No	Item	Male	Female	Both Sexes are equal
1	More talented to learn scientific and technological knowledge	27.4%	1.6%	71.0%
2	More interest and tendency toward science and mathematics subjects	80.3%	3.0%	16.7%
3	Capable of being a scientist and finding new discoveries in science	29.7%	0	70.3%
4	High self-confidence to learn mathematics and science	78.8%	1.5%	19.7%
5	The sex for which knowledge in math and science is more important		4.7%	95.3%

Referring to table 4.15 reveals the following major points.

- Though 71.0% of respondents believe that both sexes are equally talented to learn scientific and technological knowledge, still a significant number, 27.4% of respondents believe that males are more able than females.

- 80.3% respondents indicated that males have more interest and tendency toward science and mathematics subjects than females,
- 78.8% of respondents claimed that males have high confidence in science than females.
- Though 29.7% of respondents believed that males are more capable to be scientist, 70.3% conceded that both sexes are equally able. More over 95.3% response say the knowledge of science is important for both sexes.

Gender stereotyping of occupations is another factor that is believed to contribute to the problem of gender disparity in scientific and technological fields of studies. Hence, it appears appropriate for this study to investigate whether there are such perceptions among students and teachers or not. For this purpose a list of seven occupations were given to all subjects in the study and were asked to classify each occupation to the sex to which it is more appropriate and convenient. The list of occupations with their corresponding percentage of responses is shown in table 4.1

Table 4.16. Gender stereo typing of occupations

No	Occupation	For Males	For Females	For Both
1	Office secretary	1.6%	62%	36.4%
2	Physics teacher	33.2%	1.6%	65.2%
3	Car mechanic	76.5%	0%	23.5%
4	Rocket scientist	46.3%	3.2%	50.5%
5	Biology teacher	1.6%	16.5%	81.9%
6	Language teacher	1.1%	32.1%	66.8%
7	Kindergarten teacher	3.3%	59.2%	37.5%

The data in table 4.16 reveals the prevalence of gender stereotyping of occupations. The major points of the findings are:

- All occupations in the list are stereotyped. That is, though the stereotyping rate varies each occupation is classified as male or female domain.

- Car mechanic, office secretary, kindergarten teacher and rocket scientist are the most stereotyped occupations. 76.5% and 46.3% responses claimed that car mechanic Rocket Scientist are a male domain respectively on the other hand office secretary (by 62.0%), and kindergarten teacher (by 59.2%) are considered to be female domains.
- Biology teaching is the least stereotyped occupation for 81.9% responses claimed it as appropriate for both sexes.

4.1.3.6 Views of respondents about the factors that hinder females from science and mathematics

As to why the majority of female students do not enroll in science and mathematics fields of studies in higher educational institutions, instructors and teachers were asked to indicate those items they believe are reasons among five possible alternative items.

Table 4.17: Reasons for females' reluctance to join science

No	Item	% of Respondent
1	Lower Self-efficacy perception of females	37.5%
2	Females' perception about science as a difficult field	96.9%
3	Their belief that males are more talented naturally for science fields	15.6%
4	Lack of role models in the subject	78. %

The result in table 4.17 shows that teachers and instructors believe that the two factors that highly affect females' enrollment in science are the image a science as a difficult subject and lack of role models in science fields. Low self-efficacy perception of females is also believed to have a significant effect, while the effect of the belief that males are naturally talented than females is believed to be smallest.

Further more students' respondents were asked the problems that female students face to be as successful as males in science and mathematics fields. Among the given

alternatives the major problems that student respondents indicated with the corresponding percentages of responses are.

- Low expectation of teachers and peers to females' performance in science (59.2%)
- Lack of sufficient time for study due to much work load at home (52.%)
- Following the traditional trend of avoiding science and mathematics fields by females (44.8)
- Lack of interest in science subjects

To find out the possible reasons for females reluctance to come to science and mathematics fields of studies one of the reasonable step is to ask those female students who do not enroll in science and mathematics as to why they didn't choose these fields. To this end the female students in language and social science streams were asked to choose, among seven possible reasons, and indicate that/those reasons that prevent them to join science & mathematics streams in the college. They were also told that they can give more than one answer. The reasons of the students with their corresponding percentage responses are the following.

- 33.3% of respondents didn't choose science or mathematics streams because they thought that they might not be successful for the subjects are difficult.
- 32.2.% of respondents conceded that they do have sufficient ability and interest in science or mathematic, but they lack confidence to enroll in these streams being afraid of dismissal.
- 23.0% and 21.8% of the respondents confessed that they are not interested and they do not have the ability in the fields respectively.
- 8.0% of the respondents though there had interest they were advised not to enroll in those fields.

- The reasons given by 6.9% of the respondents are that many females don not go to the fields and the fields are more convenient to males than to females.

4.1.3.7 Guidance, advice and Encouragement given to female Students

The type of advice, guidance, and encouragement that females receive from friends, parents, teachers etc. can influence their participation in science and mathematics. For this purpose, data has been collected from all subjects in the study.

On the part of instructors they were asked to choose from among alternatives, the type of advice they would give to female students if they were asked for their advice as to which stream to choose. According to their responses 82.6% of the instructors would advice them to choose based on their own interest and tendency, 17.4% of the instructors would encourage them to choose science and mathematics while 4.3% would advice them not to choose the science or mathematics streams for they are difficult for them.

In the part of high school teachers, their responses to a similar but a little bit modified questionnaire question indicate that 57.5% of them have been asked for their advice by females students in choosing their streams. Accordingly, 56.5% of the advice given to them was they could choose according to their interest, 30.4% of the advice was encouragement to females to choose science streams while 4.3% advised females not to choose science for it is difficult for females.

In their response to another question in their questionnaire, 31% instructor and teacher respondents claimed that effort has been made to increase female's enrollment in science while 69% responses indicate no effort has been made. More over 56.5% instructors indicate that female students enrolled in their departments are encouraged and are given support so they could be successful in their studies. As the type of

support and encouragement provided to females it is indicated that besides counseling advice they are provided with additional tutorial classes.

On the part of students, as to whether others in which stream to enroll in the college, 36.8% Social science students responded that they were advised not to join natural science and mathematics stream . The most frequently mentioned reasons given for the advices were that:

- Science and mathematics are difficult that they could no succeed;
- Science and mathematics are not as simple as they appear in high schools, they become more and more difficult in college;
- Those who enroll in science finally become crazy;
- The fields are difficult for females and they would be dismissed.
- Though they may understand the subjects the laboratories are very difficult that they could not achieve good grade etc.

4.2. Discussion

In the preceding parts of this chapter, a detail description of the findings about the enrollment and achievement patterns of male and female students in ACTE since the college started training teachers in 1996 and on the prevalence of gender-related perception in the school environment has been presented. The following and the last part of this chapter deals with a brief discussion of the main findings of the study.

4.2.1. Overall enrollment patterns of students in ACTE

The findings on the enrollment patterns of students during the last seven years in the college revealed the prevalence of a high gender disparity both at the collage and department levels.

The percentages of male (81.78%) and female (18.3%) students so far enrolled in the collage clearly show the prevalence of a highly pronounced gender disparity in the overall enrollment in the collage. The gender imbalance in ACTE revealed in this study together with Atedes' (1991) finding that showed the existence of the same problem at AAU, are indication the prevalence of gender imbalance in the higher educational institutions in the country.

A look at table 4.2 shows that the overall distribution of students across departments was unbalanced. If students, were distributed equally to all departments the average percentage of students enrolled in each department would have been 12.5%. Comparing this average percentage with the percentage enrollment in each department shows that the physical sciences are among the subject areas in which few students are enrolled. This indicates that the problem associated with physical sciences (physics and chemistry) is not only very few females are interested in this fields but also the tendency that only few males are interested is. If similar tendency occurs in other higher education institutions it should be troubling to us because as Belz (1997) pointed out the tendency of students avoiding the physical sciences is a concerning issue because it is happening when a country needs more and more scientific and technological proficient citizens.

4.2.2. Distribution of female students across Departments.

It is seen that very few females (18.3%) enrolled in the college. The logical question that follows is as to how these few female students are distributed across different departments in the college. This is important because it could tell us the existing tendency of female students towards different field of studies. In this regard the study has unraveled important patterns of female students' departmental enrollment in ACTE.

Referring to table 4.3, one can easily see that among the total female enrollment in the college very few (28.1%) were channeled to science and mathematics streams. (It should be noted that if female students were distributed equally to each department, the percentage share of science, and mathematics streams would have been 50%). This is

an indication that very few female students are interested in science and mathematics subjects. What is interesting is that large majority of female students (65%) were concentrated only in to two subject areas: Amharic and English. This tendency of female students' reluctance to study science and mathematics and their concentration in to language streams in not a case limited to ACTE. The existing literature shows that the under-presentation of females in science and mathematics fields is a world wide phenomenon (Ngau, 1999; Betz, 1997; GETT, 1997; A.Karin, 1993). For instance A. Karin (1993) ascertained that throughout the world, male students actively enrolled in science and mathematics curricula, while female students are channeled into language and the liberal arts. What is different for ACTE is that, females are disinterested not only in science and mathematics but surprisingly they appear to be disinterested in social sciences even more than the sciences and mathematics streams. As to why they are least interested in the social sciences is left for interested researchers for it is not the territory of this study.

What is more, a look at table 4.3 and fig 4.1 reveal other interesting patterns of female and male student enrollment across departments. One of these is the enrollment pattern observed in Amharic and English fields. These subjects not only absorbed the highest percentages of female students, but also they are the only two subjects for which the percentage female enrollments are much higher than their percentage male enrollments i.e. the respective male and female enrollments in Amharic are, 7.4% and 38.3% and for English are 14.3% and 26.7%). For all other six subject areas, the percentage male enrollment is greater than the percentage female enrollment. These shows that language stream is more attractive to females and less attractive to males. In addition to this, the fact that Amharic is the subject in which both the highest female (38.3%) and lowest male (7.4%) enrollment occurred; and that mathematics is the subject where the highest number of males (17.9 %) enrolled, where as in physics the minimum number of females (1.9%) enrollment occurs-all these lead as to the conclusion that females are least attracted to science and mathematics while males are least attracted towards languages. These patterns of male-female enrollment patterns

appears to be in accordance to the perception that considers science and mathematics as male domains and language subjects as female domains.

Another important enrollment pattern of female students that needs mentioning is the distribution of those few (28.1%) female students across the fours subjects in science and mathematics streams. As can be seen in table 4.3 or Fig 4.1 the subjects from the highest to the least enrollment are Biology (12.8%) Mathematics (7.4%), Chemistry (6.0%) and physics (1.9%). So, among the female students who came to science and mathematics the majority (almost half of them) studied Biology, while, the remaining were distributed among the physical sciences and mathematics. Particularly, physics appears to be the subject to which extremely few females are interested. The fact that only 11 females have enrolled in physics during the last seven years seems to be a highly concerning situation, for physics is the subject that plays the major role in the modern technological progress (Kumar, 1995: Endawork, 1999).

The fact that the majority of those females, who enrolled in science, are particularly joining into Biology in ACTE, is in agreement with existing literature (GETT, 1997; Betz, 1997; Ngau 1999). For instance Wolpe et al., (1997) pointed out that Female students tend to avoid science and when they enroll in science subjects it is usually in Biology.

In a word, large majority of female students in ACTE are observed to be highly concentrated in the two subject areas; Amharic and English, while they have other six possible choices. Their reluctance to enroll particularly in the physical sciences and mathematics appears to be due to the influence of gender stereotyped perceptions about subject areas, the detailed discussion of which is given in the following sections. As to why they also tend to avoid the social, sciences appear to be a situation that needs immediate investigation.

4.2.3. Gender disparity within departments.

As shown in table 4.4, and Fig 4.2, except in Amharic, in which females' enrollment is slightly more than males, wide gender gaps are observed in all academic subjects.

More importantly, considering the sex combinations in science and mathematics fields, which is the main concern of the study, except For Biology, the percentages of female enrollments are less than 10%, while those of male enrollments are more than 90%. This is an indication of the seriousness of the problem particularly in the physical science and mathematics (Kumar 1995: Endewok, 1999).

It should be also noted that though the percentage of females enrolled in Biology (17.7%) is better than that of the physical sciences, the gender disparity is still very high. The extremely wide gender gap in science and mathematics fields is a consequence of the large majority of females being channeled into the two language subject. The maximum gender gap is observed in physics where the minimum number of female students enrolled. This appears to result from the perception that physics being considered as the most difficult subject for females- that is the view that claims physics as the most masculine subject area. Contrary to this Amharic appears to be the most feminine subject for gender difference stands on the side of females. Regarding physics Hegary (1984) stated that the masculine image if physics perpetuated in schools appears to be the major factor that hinder females to study the subject.

To sum up, the extreme gender gap in science and mathematics in the college appears to be highly concerning that needs immediate interventional measures. Otherwise, if the trend continues, even in the limited case of the college, females appear to be in a most disadvantageous position. This is because since the objective of the college is in producing teachers for second cycle primary schools, after their collage education students are assigned to teach the subject which they have studied in the college. In this regard, it appears that teachers particularly in the physical sciences and mathematics subjects are most advantageous for most of the time they are assigned in town schools. On the other hand students who graduated, particularly form language stream are

usually assigned in rural areas, since the graduates, of language stream are large in number.

4.2.4. Achievement patterns of students

In studying gender disparity in science and mathematics field of studies it appears reasonable to look at how those female students enrolled in these fields achieve as compared to their male counterparts. This is found to be necessary because first it gives an idea as to how female students perform in the fields that are perceived as male domains. Secondly the achievement of female students in science and mathematics could be used as reference to make decision as to how that majority of females who enrolled in language and social sciences achieve in the fields perceived as female domains. In other words whether or not those females who avoid sciences achieve better than those in science and mathematics could be determined by comparing the mean CGPA of the two groups of female students. For this purpose, the mean CGPA of all students enrolled in the college during the last seven years was used.

By applying the statistical t-test, three different achievement comparisons has been mad. The first one involved comparison of male and female students' achievements in science and mathematic streams. As can be seen in table 4.5(a) and 4.5(b) the out come of the t-test for equality of means indicates male students achieve significantly higher than female students in science and mathematics subjects. This is in agreement in most case of the existing literature (Akarin 1993) It is also in agreement with the perception of a significant number of questionnaire respondents which claimed that females are not as talented us males in science and mathematics.

However, it should be noted that, such perceptions that specify subject talents into male-female domains believed to be factors that affect females' attitude, self-confidence and performance (Dweck carlos, 2001); Hill, 2000, khale, 1993; Slaughter & Defoe, 1997). For instance, study shows that "students idea about their intelligence, can be influenced by the messages they receive and when these ideas charge, changes in performance

can follow" (Dweck Carlos 2001:36). This shows that low expectation of teachers and peers about females' ability can influence their performance in the subject areas.

Moreover, the existing perception about females' lower capability in doing science and mathematics in the school environment can affect females' self esteem and self-confidence which in turn affect their performance. As Hill (2000; 24) indicated "biased sex-role stereotyping has the effect of lowering women's self esteem".

The fact that female students in science and mathematics classes lack confidence in their ability, that they perceive themselves less efficient in the fields than males were indicated by large majority of respondents (table 4.8 and table 4.9). This downscaling of their ability may be caused by the gender stereotyping perceptions sustained and transmitted in the school environment. However; as large majority of respondents indicated female students do not participate in the classroom interaction during science and mathematic classes rather they prefer to be silent listeners. This behavior might be the result of their lower self-efficacy perception in the subjects which in turn affects their confidence. All these situations may contribute for female students' lower performance the field of studies concerned.

As indicated earlier, the achievements of female students in social science and language streams as compared to their male counterparts has been investigated mainly for the purpose of checking their achievement in the fields they are supposed to be good and hence to check whether their good performance in the non-science fields is one of the factors that forced them to be reluctant to study the science and mathematics fields. To this end, the result of the t-test for equality of means showed that male students in the non-science fields achieved significantly higher than female students in the same fields. This shows that female students are still lower achievers than male students in fields other than science and mathematics.

Moreover, the comparison of achievements of female students in science and mathematics with those female students in social science and language streams has

been made by using the t-test analysis for equality of means. The out come of the test, as shown in table 4.6 (b), indicate that there is no significant deference between the achievement of the two groups of female students. This result tells us several important points. First, though females students concentrate particularly in the language streams they didn't achieve better than those, females enrolled in science and mathematics. Thus, females' better achievements could not be the reason for their avoidance of science and mathematics and for their concentration in language streams.

Secondly, the perception that females are good in language subjects than science and mathematics subjects, which prevails in the school environment is a mere assumption for neither they achieved equal to their male counterparts nor better than those females in science and mathematics.

Moreover, the mean difference between male and female students in science and mathematics streams is 0.2386 (tables 4.5 (a) and 4.5 (b)) while the mean difference between male and female students in the non-science fields is 0.5251 (tables 4.6 (a) and 4.5 (b). The mean difference between male and female students in the social science and language streams is much higher than that of the difference in science and mathematics streams. Besides that as can be seen in table 4.7 (a) the means cumulative GPA of females in science and mathematics (2.4391) is greater than those of females in non -science fields (2.3854) by 0.05377. these comparisons show that the performance of females in science and mathematics is relatively better than those females in language and social science streams.

In short the findings here indicate that both groups of females in science and mathematics as well as those in social science and language streams achieve lower than their corresponding male counterparts. In addition females in science and mathematics streams, not only scored a higher mean GPA than those females in non-science streams, but also are relatively better in competing with their male counter parts. Thus the majority of female students are interested in languages not because they achieve better in these fields than those in science and mathematics. The evidences

also disprove the existing perception among teachers and students that considers languages as female domains.

4.2.5. Gender based factors that hinder females' participation in science and mathematics fields.

As indicated previously one of the focus of this study was to investigate some of the gender based barriers to females' participation in science and mathematics fields. To this end, an attempt was made to investigate certain aspects of the home and the school environments that may partly contribute to the reluctance of female students to enroll in science and mathematics field of studies. These include parental attitude and domestic labor in the home environment, and gender based participations about subjects and females' ability in the school environment.

In this regard, the findings of the study appear to indicate that all the factors investigated to be partly responsible to the present tendency of female students towards science and mathematics subject areas. A brief account of how these home and school factors could contribute to the low participation of female students in science and mathematics areas is presented here-under,

4.2.5.1. Factors in the home environment.

The possible factors in the home environment that were dealt with in this study were parental attitude toward their daughter education and the amounts of domestic labor female students are responsible in their homes.

Parental attitude towards girls' education and the unequal labor in home as compared to boys is believed to contribute to girls' reluctance to study science and mathematics at higher level of education (ICRW 2000; Mensch 1998; Atsede 1991; Rubbo Anna, 1975).

The findings of this study are also in agreement with the existing literature. Based on their experience at home large majority (90%) of student respondents ascertained that

girls were responsible for much more domestic labor at their homes than their brothers and hence girls didn't have sufficient time for study, which their brothers did have. This is also confirmed by majority of instructors (77.5%) and high school teacher (92.3%). These respondents claimed that during their primary and secondary education boys have more free time to study than girls.

It is true that girls' less free time for study than boys influences their performance in all subject areas. But evidence indicates that lack of sufficient free time for study highly influences the interest and performance of students particularly in science and mathematics. This is because as a large majority of respondent instructors (90.5%) and high school teachers (95.7%) conceded science and mathematics subject areas require relatively more effort and time from students than other subject areas. In this regard ICRW (2000) and Atsede (1991) also indicated that, particularly in science and mathematics subjects which require more time to exercise, female students would be unable to compete with male counter parts, who have more spare time to study.

The above assertion is confirmed by majority of student respondents (52%), who, claimed that one of the obstacles female students face to effectively learn science and mathematics subjects in high schools is lack of sufficient spare time to study and exercise the subject, for domestic work burden consumes much of their spare time at home.

On the other hand a significant number of student respondents (44.7%) conceded that their parents give more value and importance to the education of their boys than their girls. The implication is that parents could not be ready to do for their daughters what they ought to do in fulfilling the requirements for their schooling. This includes allowing more spare time for doing exercises, handworks, and study. Such argument leads to the conclusion that science and mathematics are subjects that require sufficient background knowledge in lower classes so as to effectively perform the subjects at a higher level of schooling. In this regard the findings show that, due to barriers in the home environment, females are not in a position to acquire the necessary background knowledge in the

fields as their male counterparts do. As a result they would tend to avoid these fields of studies at higher education levels for they feel that they would not be able to compete with male students.

Thus the factors in the home environment, namely domestic work burden and parental attitude to their education, appear to partly contribute to the reluctance of the majority of females to participate in science and mathematics fields of studies.

4.2.5.2. Gender stereotyping of subjects in the school environment

Gender stereotyped perception that classifies subject areas into male domains and female domains are major factors that hinder female students from enrolling in science and mathematics streams (Hill, 2001; GETT, 1997; Betz, 1997; Presser, 1997; A. Karin & Hyde, 1993; Khale, 1993). These gender stereotyped views about talents in subject areas are commonly exercised in school environments. Such gender specific perceptions transmitted in the school environment are believed to be major barriers to females to pursue their studies in science and mathematics fields.

In this regard, the data provides strong evidence that indicate gender stereotyping of subjects is a widely promoted perception among teachers and students.

As can be seen in table 4.12 a significant proportion of respondents (instructors, high school teachers and students) indicated physics, chemistry and mathematics subjects to be the most difficult areas for females to pursue their studies at higher levels while Amharic and English are subjects assumed to be simpler for females. This is an indication that gender stereotyping perception which classifies the physical sciences and mathematics as male domains and the language subjects as female domains exist among instructor teachers as well as students. The fact that such perception exist among all groups of respondents with significant percentage, and that the students came from all high schools in the region, are strong evidences that indicate perception about subjects as male-female domains is a widely promoted view in many schools.

Other evidences obtained from gender specific talent in subject areas also confirms the prevalence of gender stereotyped perception in the school environment. One piece of evidence is that 39.5% of respondents agree and 25.8% of them partially agree to the idea that females are more talented in language areas than in science and mathematics subjects. This means a large majority (65.3%) of total respondents perceive language subjects as female domains and science and mathematics as male domains. In addition to this, though, 71.5% of the total respondents show their agreement to the capability of female students to achieve equally as male student science and mathematics, still 7.9% of the respondents do not believe so, and other 20.5% are not sure of females' capability in the fields for they partially agree in the view. This shows that 28.4% of respondents (which is a significant proportion) are suspicious of females' capability of doing science and mathematics as males do. Further more, 32.1% of respondents perceive language teaching to be a female domain while 33.2% of them perceive physics teaching as male domain occupation. Surprisingly, 29.0% of instructors and teachers, which are the most influential persons in the school environment, promote a view that males are naturally talented in acquiring scientific and technological knowledge than females.

All these evidences lead us to the same conclusion, that, the physical sciences (physics and chemistry) and mathematics subjects are perceived as male domains, that females are not expected to compete with males in these fields. Rather it is in language areas that females are expected to perform well. The evidence from every direction conform that, perceptions about male -female domains of subjects are widely transmitted views in the school environment.

The importance of these findings lies on the fact that the prevailing patterns of students enrollments in ACTE could be explained in terms of these findings about gender specifics talents in subjects areas.

The view that females are more talented in languages, which are considered as female domains, appears to be the major factor that caused the concentration of females'

students into Amharic and English fields, while they have other six alternative choices. Similarly, the perception that considers science and mathematics as male domains, that females are incapable of competing in these fields with males appears to be nor of the main reasons for females' reluctance to study these fields.

More interestingly, every detail of the male female enrollment patterns observed in ACTE could be explained in terms of these gender appropriate subject perceptions. One of this is that the enrollment patterns observed in Amharc and English subjects. These subjects areas besides absorbing the majority of female students (65% enrolled in the college, they are also the only two subject areas in which the percentage male share less than the percentage female share. Table 4.3 and fig 4-1 show that, for all other subjects the percentage male share is greater than their percentage female share. More over, considering the sex combinations within departments (table 4.4. and fig 4.2) the minimum gender disparity is observed in English and Amharic. For that matter, the percentage of females (53.7%) enrolled in Amharic is greater than the percentage of males (46.3%) in this field. These entire enrollment patterns show that compared to other subject areas, Amharic and English are the two subject areas that attracted highest numbers of female students and least numbers of male students. This is in accordance with perception that considers the languages as female domains.

Similar observation in table 4.3, table 4.4, Fig 4.1 and 4.2 reveals that physical sciences and mathematics are those areas, which attracted very few female students, and as a result of which, the subjects in which the highest gender disparities are observed. Moreover, it is worth to mention that, compared to physical sciences and mathematics, biology is the science subject in which better enrollment of females is observed. This may be due to the fact that biology is perceived as the science subject which is manageable by females. Although some respondents (14.9%) view Biology as a difficult subject for females, almost twice of the respondents (29.65) also classified it as one of the simple subjects.

In short the physical sciences and mathematics are the subject areas that are perceived as male-domains, and these same subjects are in which extremely few females enrolled and the highest gender disparity is observed. Country to this, Amharic and English are subjects perceived as female domains and where the highest number of females enrolled and lowest gender disparity is observed.

To sum up, the above discussion can be summarized into the following points. Ample evidence show that gender specific perceptions that consider physical sciences and mathematics as males' domains and the language subjects as female domain exist among teacher and students in the school environment. Consequently, the glaring gender disparity in physical sciences and mathematics subjects; the reluctance of the large majority of females to enroll into these fields and their concentration into the language streams appears to be partly caused by these perception.

4.2.5.3. Down Scaling of Females' Ability

Based on their gender based perceptions about subject areas teachers and peers may reflect their low expectation attitudes towards female's performance in science and mathematics which are perceived as male domains. Such attitudes of teachers and peers towards females' ability in science and mathematics highly influence their interest and performance in these fields (El-Sanbadary, 1993; GETT, 1997).

In this regard evidence in the study indicate that teachers and peers have low expectation towards females ability in science and mathematics fields. On the part of teachers, in their responses shown in table 4.14, 28.1% believe that the capability of females to pursue their education at higher levels in science and mathematics is low, and 59.3 indicated that females, interest and effort in these fields are low. This implies teachers do not expect females to be interested and make effort in the fields. Low expectation of teachers towards female students ability in science and mathematics is also confirmed by science and mathematics student respondents. Among these 63.1% students agree that their teachers have lower expectation of females and 52.3% them conceded that teachers perceive female students as less able than males in science

and mathematics. These are some of the piece of evidence that indicate teachers attitude towards females performance in this fields.

As to peers attitude, 52.2% of student respondents form social science and language streams (all of which are females) conceded that male students perceive themselves as more talented in science and mathematics than females. Moreover, a large majority of student respondents (59.2%) claimed that the low expectations of teachers and peers towards females performance in science is one of the factors that causes females' low participation in science.

In general, the gender stereotyping of subjects discussed before added to this down-scaling of female's ability in the fields concerned are believed to be psychological barriers to female students to enroll in these fields. In this regard Kahel et al. (1993) asserted that the widely propagated gender stereotyping ultimately creates low-efficacy in the minds of females. As result females do not anticipate higher performance in science fields and hence do not tend to pursue their studies in these fields. It is enough to mention what a female student respondent wrote in answering an item in a questionnaire question about peers' attitude towards female students' ability in mathematics. She said that down scaling of females' ability in science and mathematics is a common occurrence in schools. The example she gave is what a male student said which reads "females' knowledge in mathematics can not go beyond polynomials". She added that "how can female students be confident in this fields in this demoralizing circumstances?"

The above argument lead us to the conclusion that even if females are interested and perform well in science and mathematics the gendered messages form teachers and peers could be psychological barriers to then and they may not have the confidence to choose these fields. Regarding this slaughter and Defoe (1997) ascertained that students' self perceptions about their academic abilities and potential are especially influenced by what teachers and peers expect form them. Eccles (1997) added that self- perception of female students about their ability in science could be shaped in

accordance with the expectations of teachers and peers. The fact that female students' low self-efficacy perception; their low confidence in their ability; their lower participation in classrooms, etc, all these behaviors of female students in science and mathematics classes, which are indicated by a large majority of respondents, appear to be caused by partly from the above described attitudes of teachers and peers.

The impact of such attitude of teachers and peers towards females' ability in science and mathematics is reflected form the response of female social science and language students to a questionnaire question. As to why they didn't choose science and mathematics field 32.2% of respondent female students concede that they do have sufficient ability and interest in the fields, but they lack confidence to enroll in these streams being afraid of dismissal. Moreover other 33.3% of the respondents didn't choose the fields because they thought that they might not be successful for the subjects are perceived as difficult.

To come to the point teachers' and peers' low expectancy of female's ability in science and mathematics also appears to contribute to the alienation of females fromm science and mathematics fields.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. summary

The main focus of the study was to investigate the participation of female students in science and mathematics streams in Awassa College of teacher Education; their achievement in science and mathematics as compared to male students and the influence of gender biased perception on female students' choice of subject areas. To this end a descriptive approach was employed and the instruments of data collection used were questionnaire and document analysis.

For the purpose of investigating gender inequality in science and mathematics fields in ACTE as well as to examine other aspects of gender related enrollment patterns, the overall enrolment data since 1996 has been collected and analyzed.

Moreover, since gender biased perceptions are believed to be factors that would influence females' choice of subjects the influence of certain aspects of such perceptions was also given attention in the study. In this regard questionnaires were used to asses the prevalence of gender biased perceptions in the school environment that influence females' participation in science and mathematics fields. In addition to this the influence of home environment to females' attitude and performance in science and mathematics fields was also dealt with. In this respect the gender related factors that were examined include, parents' attitude towards females' education and domestic work load in the home environment and the factors in the school environment namely, gender stereotyping of subjects; perceptions about females' talents in science related subjects, gender stereotyping of occupations and some other related perceptions. The main outcomes of the study are as stated briefly belw.

- The majority of females (65%) who enrolled in the college for the last seven years were channeled into the language streams. Very few of them were enrolled in science and mathematics streams. Particularly the physical sciences (physics and chemistry) and mathematics were among the fields in which the lowest number of female students enrolled. Physics was found to be the field in which the lowest percentage (1.9%) of females enrolled while Amharic was the highest percentage (38.3%) of female enrollment observed.
- As a result of females' avoidance of science and mathematics streams and their concentration to the language streams, the gender disparity in science and mathematics fields is observed to be extremely high. The percentage of females enrolled in physics, chemistry and mathematics fields was less than 10% while the percentage of males in these fields was more than 90% which indicates the prevalence of extreme gender disparity particularly in the physical sciences and mathematics fields. Though the percentage of females enrolled in Biology is better than that of the physical sciences and mathematics, still the gender in balance in Biology is very high

  These findings about the tendency of the majority of females being interested in the languages and the prevalence of high gender inequality particularly in physical science and mathematics streams in agreement with the existing literature (Wolpe 1997; snyder and Mary 1995; Ngau 1999; Atsede 1991).
- As to the achievement of females' students, it is found out that both groups of females in science and mathematics fields as well as those in language and social science fields under achieved as compared to their corresponding male counterparts. Moreover, the mean cumulative GPA of female students in science and mathematics streams is found to be greater than that of females in language and social science streams, showing that females in science and mathematics achieved better than those females in non-science fields. Additionally it is also seen that, though both groups of females under-achieved as compared to their

respective male counterparts, comparison of means showed that females in science and mathematics to be relatively better competent with their respective males than females in non-science fields

- Regarding the influence of gender biased perceptions, all the factors dealt in the study appear to contribute to the reluctance of females to enroll in science and mathematics fields of studies.

Factors in the home environment appear to influence females attitude and performance in science and mathematics subjects during their high schooling. The evidences indicate that parents give more importance to the education of their sons than their daughters. In addition, compared to boys, girls are commonly carrying much more domestic work load in their homes. As a result of these female students were not able to study and do more exercises in science and mathematics which are believed to be subjects that need relatively more time and effort from students

- As to the prevalence of gender biased perception related to subject talents, the evidences indicate that such perceptions are sustained within the school environment. One of these perceptions that exist among teachers and students is the classification of subjects in accordance to gender. Thus physics, mathematics and chemistry are perceived as male domains while, Amharic, English, Geography are subjects perceived as female domain. Accordingly the "male-domain" subjects are considered as subject in which females are unable to succeed at higher levels of education while the subjects in the "female domain" are viewed as areas in which females could be successful.
- Based on gender stereotyped perceptions a significant number of teachers and male students appear to have low expectations about females' ability and performance in science and mathematics fields on the other hand the view that females are talented in languages than in science appears to be sustained in the school environment.
- As to the behavior of females in science and mathematics classes the questionnaire evidences showed that female students are low interactive

in the class and have low self – confidence and low self-efficacy perception in science and mathematics subjects.

- Finally other reasons indicated by respondents as to why females do not interested in science were given by respondents, among which most frequently stated were:
  - Low expectation of teachers and peers to females' performance is since and mathematics
  - Lack of sufficient time to study the subjects due to much work load at home
  - The image of science and mathematics as difficult subjects
  - Lack of confidence in spite of the fact that they have interest and ability in the areas
  - Guidance and advice from others and
  - Lack of interest

5.2. Conclusion

The extremely high gender disparity in science and mathematics field of studies in ACTE appears to be caused by multiple factors that influence females' attitude, interest and performance in these fields. Among the investigated factors in this study, the gender stereotyping of subjects as male female domains, the perception that considers females incapable of doing science and mathematics as males do, as a consequence of which, low expectation of teachers and peers to females' performance in science and mathematics appear to be the major factor that contribute to females' low participation in these fields. Ample evidences show such perceptions are wildly being transmitted in the school environment. Since teachers are the most influential persons in the school environment, particularly the existence of such perceptions among teachers appear to be highly influential to females' attitude and performance to science and mathematics fields for they may directly or indirectly transmit messages that hinder females to enroll in these areas of studies. The classroom behavior reflected by female students such as low-confidence and low-efficacy perceptions in science and mathematics seem to be resulted from such influences.

In addition to this the home environment in which female students live during their schooling seems to contribute to their existing tendency towards science and mathematics fields. The fact that parents give less importance to their daughters' education, and that they are responsible to a much more domestic labor seem to put female students in a disadvantages position than male students. This is because the unequal domestic work load leaves them with no or little time to study their subjects at home. This situation particularly affects their atitude and performance towards science and mathematics because these subjects are believed to require relatively more time to exercise them. As a result, female students could not acquire the necessary background knowledge at lower classes to pursue the studies at higher levels. So these factors in the home environment may partly affect females enrollment in science and mathematics fields.

Further more, the widely prevalent perception that females are more talented in the languages and hence they would be more successful in language subjects than in science and mathematics appears, at least, in the case of ACTE a mere assumption, for it is those females in science and mathematics streams that achieved better than those in language and social science streams.

Finally, gender disparity in science and mathematics fields, despite its high magnitude and the serious consequence it entails, it appears that little or no attention has been given. Considering the impact it can cause in the long run, gender disparity, in science and mathematics should be given the attention it deserves

5.3. Recommendations

Gender disparity in science and related subject areas in higher educational institutions is part of the overall gender imbalance in the access to education, particularly today, when the knowledge and skill in science is more required female students appear to be more and more disinterested in the fields. This atitude of female students towards science and

mathematics hurts both females concerned as well the over all society. Thus it is a problem that calls for immediate interventional measures at least to reduce the prevailing extreme gap between female and male enrollment is these fields. Besides that despite the seriousness of the problem it appears that, it has attracted little or no attention even in the research area. Thus based upon the outcome of this study the following main recommendations are given.

- In order to solve the problem of gender disparity in science and mathematics fields, the root causes to the problem must be known. Thus more research studies should be initiated and conducted in the area.
- Appropriate measures have to be taken in order to reduce the highly prevailing gender biased perception in relation to science and technology, among teachers and students
- Counseling and advising services need to be provided to female students' so as to build up their self confidence and self-efficacy perception in science and mathematics
- Appropriate guidance and encouragement should be given to female students during their subject choices so as to bring to science at least those females who have interest in the fields
- Particularly teacher training institutes and teacher education colleges could play an important role in reducing the gender biased perceptions in the school environment by producing teachers who are free of such biases.

PARTICIPATION AND PERFORMANCE OF FEMALE STUDENTS IN SCIENCE AND MATHEMATICS STREAMS: THE CASE OF AWASSA COLLEGE OF TEACHER EDUCATION

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CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. summary

The main focus of the study was to investigate the participation of female students in science and mathematics streams in Awassa College of teacher Education; their achievement in science and mathematics as compared to male students and the influence of gender biased perception on female students' choice of subject areas. To this end a descriptive approach was employed and the instruments of data collection used were questionnaire and document analysis.

For the purpose of investigating gender inequality in science and mathematics fields in ACTE as well as to examine other aspects of gender related enrollment patterns, the overall enrolment data since 1996 has been collected and analyzed.

Moreover, since gender biased perceptions are believed to be factors that would influence females' choice of subjects the influence of certain aspects of such perceptions was also given attention in the study. In this regard questionnaires were used to asses the prevalence of gender biased perceptions in the school environment that influence females' participation in science and mathematics fields. In addition to this the influence of home environment to females' attitude and performance in science and mathematics fields was also dealt with. In this respect the gender related factors that were examined include, parents' attitude towards females' education and domestic work load in the home environment and the factors in the school environment namely, gender stereotyping of subjects; perceptions about females' talents in science related subjects, gender stereotyping of occupations and some other related perceptions. The main outcomes of the study are as stated briefly belw.

- The majority of females (65%) who enrolled in the college for the last seven years were channeled into the language streams. Very few of them were enrolled in science and mathematics streams. Particularly the physical sciences (physics and chemistry) and mathematics were among the fields in which the lowest number of female students enrolled. Physics was found to be the field in which the lowest percentage (1.9%) of females enrolled while Amharic was the highest percentage (38.3%) of female enrollment observed.
- As a result of females' avoidance of science and mathematics streams and their concentration to the language streams, the gender disparity in science and mathematics fields is observed to be extremely high. The percentage of females enrolled in physics, chemistry and mathematics fields was less than 10% while the percentage of males in these fields was more than 90% which indicates the prevalence of extreme gender disparity particularly in the physical sciences and mathematics fields. Though the percentage of females enrolled in Biology is better than that of the physical sciences and mathematics, still the gender in balance in Biology is very high

  These findings about the tendency of the majority of females being interested in the languages and the prevalence of high gender inequality particularly in physical science and mathematics streams in agreement with the existing literature (Wolpe 1997; snyder and Mary 1995; Ngau 1999; Atsede 1991).
- As to the achievement of females' students, it is found out that both groups of females in science and mathematics fields as well as those in language and social science fields under achieved as compared to their corresponding male counterparts. Moreover, the mean cumulative GPA of female students in science and mathematics streams is found to be greater than that of females in language and social science streams, showing that females in science and mathematics achieved better than those females in non-science fields. Additionally it is also seen that, though both groups of females under-achieved as compared to their

respective male counterparts, comparison of means showed that females in science and mathematics to be relatively better competent with their respective males than females in non-science fields

- Regarding the influence of gender biased perceptions, all the factors dealt in the study appear to contribute to the reluctance of females to enroll in science and mathematics fields of studies.

Factors in the home environment appear to influence females attitude and performance in science and mathematics subjects during their high schooling. The evidences indicate that parents give more importance to the education of their sons than their daughters. In addition, compared to boys, girls are commonly carrying much more domestic work load in their homes. As a result of these female students were not able to study and do more exercises in science and mathematics which are believed to be subjects that need relatively more time and effort from students

- As to the prevalence of gender biased perception related to subject talents, the evidences indicate that such perceptions are sustained within the school environment. One of these perceptions that exist among teachers and students is the classification of subjects in accordance to gender. Thus physics, mathematics and chemistry are perceived as male domains while, Amharic, English, Geography are subjects perceived as female domain. Accordingly the "male-domain" subjects are considered as subject in which females are unable to succeed at higher levels of education while the subjects in the "female domain" are viewed as areas in which females could be successful.
- Based on gender stereotyped perceptions a significant number of teachers and male students appear to have low expectations about females' ability and performance in science and mathematics fields on the other hand the view that females are talented in languages than in science appears to be sustained in the school environment.
- As to the behavior of females in science and mathematics classes the questionnaire evidences showed that female students are low interactive

in the class and have low self – confidence and low self-efficacy perception in science and mathematics subjects.

- Finally other reasons indicated by respondents as to why females do not interested in science were given by respondents, among which most frequently stated were:
  - Low expectation of teachers and peers to females' performance is since and mathematics
  - Lack of sufficient time to study the subjects due to much work load at home
  - The image of science and mathematics as difficult subjects
  - Lack of confidence in spite of the fact that they have interest and ability in the areas
  - Guidance and advice from others and
  - Lack of interest

5.2. Conclusion

The extremely high gender disparity in science and mathematics field of studies in ACTE appears to be caused by multiple factors that influence females' attitude, interest and performance in these fields. Among the investigated factors in this study, the gender stereotyping of subjects as male female domains, the perception that considers females incapable of doing science and mathematics as males do, as a consequence of which, low expectation of teachers and peers to females' performance in science and mathematics appear to be the major factor that contribute to females' low participation in these fields. Ample evidences show such perceptions are wildly being transmitted in the school environment. Since teachers are the most influential persons in the school environment, particularly the existence of such perceptions among teachers appear to be highly influential to females' attitude and performance to science and mathematics fields for they may directly or indirectly transmit messages that hinder females to enroll in these areas of studies. The classroom behavior reflected by female students such as low-confidence and low-efficacy perceptions in science and mathematics seem to be resulted from such influences.

In addition to this the home environment in which female students live during their schooling seems to contribute to their existing tendency towards science and mathematics fields. The fact that parents give less importance to their daughters' education, and that they are responsible to a much more domestic labor seem to put female students in a disadvantages position than male students. This is because the unequal domestic work load leaves them with no or little time to study their subjects at home. This situation particularly affects their atitude and performance towards science and mathematics because these subjects are believed to require relatively more time to exercise them. As a result, female students could not acquire the necessary background knowledge at lower classes to pursue the studies at higher levels. So these factors in the home environment may partly affect females enrollment in science and mathematics fields.

Further more, the widely prevalent perception that females are more talented in the languages and hence they would be more successful in language subjects than in science and mathematics appears, at least, in the case of ACTE a mere assumption, for it is those females in science and mathematics streams that achieved better than those in language and social science streams.

Finally, gender disparity in science and mathematics fields, despite its high magnitude and the serious consequence it entails, it appears that little or no attention has been given. Considering the impact it can cause in the long run, gender disparity, in science and mathematics should be given the attention it deserves

5.3. Recommendations

Gender disparity in science and related subject areas in higher educational institutions is part of the overall gender imbalance in the access to education, particularly today, when the knowledge and skill in science is more required female students appear to be more and more disinterested in the fields. This atitude of female students towards science and

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በአዲስ አበባ ዩኒቨርሲቲ የትምህርት ፋኩልቲ

የካሪኩለምና ኢንስትራክሽን ትምህርት ክፍል

በአዋሣ መ/ት/ኮሌጅ የሶሻል ሣይንስና የቋንቋ ሴት ተማሪዎች የሚሞላ መጠይቅ

የዚህ መጠይቅ ዋና አላማ በአዋሣ መምህራን ት/ት ኮሌጅ ሴት ተማሪዎች በሣይንስ የትምህርት መስኮች ያላቸውን ተሣትፎና ብቃት አንዲሁም ሴት ተማሪዎች የሣይንስ ትምህርቶችን ለመማር አንቅፋት የሚሆኑባቸውን ምክንያቶች ለማወቅ ለሚደረገው ጥናት አጋዥ መረጃ ለማግኘት ነው። በመሆኑም ከናንተ የሚገኘው ትክክለኛ መረጃ ለጥናቱ ከፍተኛ አስተዋጽኦ አንደሚኖረው በመገንዘብ ከዚህ በታች ለተሰጡት ጥያቄዎች የራሣችሁን የግል አምነት የሚያንፀባርቁ መልስ በመስጠት አንድትተባበሩኝ አየጠየቅሁ ውድ ጊዜያችሁን ሰውታችሁ ለምትሰጡኝ መረጃ በቅድሚያ ምስጋናዬን ለማቅረብ አወዳለሁ።

ስም መጻፍ አያስፈልገም።

1. **አጠቃላይ የግል ሁኔታ መረጃ በባዶ ቦታዎቹ በመሙላት ያመልክቱ**

   1.1 ዕድ _____

   1.2 ዲፓርትመንት _____

   1.3 የመጣሽበት ወረዳ_____

   1.4 ወላጆችሽ የሚተዳደሩበት የሥራ መስክ _____

   1.5 በቤተሰብሽ ውስጥ ትምህርት በመማር ላይ የሚገኙ ወንድምና እህት ካለሽ ብዛታቸው ምን ያህል ነው=

   1.5.1 ወንድም _____

   1.5.2 እህት _____

2. ከመማር ማስተማር ጋር የተያየዙ መረጃ በተሰጡት ባዶ ቦታዎች በመሙላት ወይም በተሰጡት ሣጥኖች ውስጥ ✓ መልክት በማድርግ ይመለሱ

   2.1 አሁን የምትማሪበት የትምህርት ክፍል /ዲፓርትመንት/ የተመደብሽው እንዴት ነው?

☐ በምርጫዬ

☐ ምርጫዬ ሌላ ሆኖ በመገደድ

☐ ያለምርጫዬ ተመድቤ በመቀየር

ሌላ መልስ ካለ_____

2.2 በመጀመሪያ ከተመደብሽበት ቀይረሽ ከሆነ መጀመሪያ የተመደብሽበት የትምህርት ክፍል ምን ነበር ? _____

2.3 ከ7ኛ እስከ 10ኛ ክፍል በነበርሽበት ጊዜ በጣም የምትወጂውና በፍላጐት የምትከታተይው ትምህርት ምን ነበር ? _____

2.4 ወደ ሣይንስና (ፊዚክስ፣ኬሚስትሪ፣ባዮሎጂ) የሂሣብ ትምህርቶችን ለማጥናት ያልመረጥሺው ለምንድነው? ከአንድ በላይ መልስ ካለ መስጠት ይቻላል::

☐ ችሎታ ስለሌለኝ

☐ ፍላጐት ስለሌለኝ

☐ በቂ ችሎታና ፍላጐት እያለኝ በመፍራት

☐ ሴቶች በብዛት ስለማይገቡ

☐ ሣይንስና ሂሣብ ከሴቶች ይልቅ ለወንዶች የበለጠ አመቺ ስለሆኑ

☐ ከባድ ስለሆኑ ላይሣካለኝ ይችላል ብዬ በማሰብ

☐ ፍላጐት ቢኖረኝም በሰዎች(ቤተሰብ፣ጓደኛ መምህር) ምክር

ሌሎች ምክንያቶች ካሉ ቢገለፁ _____

_____

2.5 ከ 7ኛ እስከ 10ኛ ክፍል በነበርሽበት ጊዜ በአብዛኛው ከሌሎች የተሻለ ውጤት የምታገኚባቸው የነበሩ ሦስት የትምህርት ዓይነቶች ምን ምን ነበሩ?

1. _____

2. _____

3. _____

2.6 ሁለተኛ ደረጃ ት/ቤት በነበርሽበት ጊዜ ከፊዚክስ፣ኬሚስትሪ፣ባዮሎጂና ሂሣብ ትምህርቶች መካከል የሚሰብሽና በፍላጐት ትከታተለሽ አጥጋቢ ውጠት የምታመጪበት ትምህርት ነበረ ወይ?

☐ ነበረ ☐ አልነበረም

2.7 በጥያቄ 2.6 መልስ ''ነበር'' ከሆነ፣

2.7.1 ትምህርቱ ምን ነበር _____

2.7.2 ይህን የትምህርት መስክ ለምን አሁን አልመረጥሽውም

_____

_____

2.8 በሁለተኛ ደረጃ ት/ቤት በነበርሽበት ጊዜ በአብዛኛው አነስተኛ ውጤት ታገኚባቸው የነበሩት ሦስት የትምህርት ዓይነቶች ምን ምን ነበሩ?

1. _____

2. _____

3. _____

2.9 በሁለተኛ ደረጃ ት/ቤት ውስጥ በተለይ የሳይንስና ሂሣብ ትምህርቶችን በጥሩ ሁኔታ ለመከታተል ያጋጠሙሽ ችግሮች ምንድናቸው /ከአንድ በላይ መመልስ ይቻላል/

☐ ከሌሎች የትምህርት ዓይነቶች የተለየ ችግር አልገጠመኝም

☐ ከባድ ስለሆኑ አይገቡኝም ነበር

☐ ፍላጐቱ ስላልነበረኝ በደንብ አልከታተላቸውም ነበር

☐ ከት/ቤት ውጪ ወላጆቼን በሥራ ስለምረዳ፣ በት/መስኩቹ በየጊዜው የሚሰጡትን የቤት ሥራዎችን ለመሥሪያና የማጥኚያ በቂ ጊዜ አለመኖር

ሌሎች ካሉ ቢዘረዘሩ _____

_____

2.10 ከ7 እስከ 10ኛ ክፍል በተማርሽበት ት/ቤት ሴት የሣይንስ ወይም የሂሣብ መምህራን ነበሩ ወይ?

☐ አዎ ☐ የለም

2.11 ለጥያቄ 2.9 መልሱ '' አዎ '' ከሆነ

2.10.1 ቁጥራቸው ስንት ነበር? _____

2.10.2 የሚያስተምሯቸው የት/ዓይነቶች መን ምን ነበሩ?

_____

2.12 ወደ ኮሌጁ ስትገቢ የሣይንስ ወይም የሂሣብ ትምህርቶችን እንዳትመርጪ ምክር የሰጡሽ ነበሩ?

☐ አዎ ☐ የለም

ለጥያቄ 2.12 መልስሽ አዎ ከሆነ፣

ሀ. የመከሩሽ ማናቸው / ዘመድ፣ጓደኛ፣ ወላጅ መምህር ወዘተ/

_____

ለ. የሰጡሽ ምክንያት ምንድ ነው? _____

_____

2.13 እስካሁን ባለሽ የኮሌጅ ቆይታሽ ባገኘሽው ኢንፎርሜሽን መሠረት:

ሀ. በርካታ ተማሪዎች የሚባረሩባቸው ሦስት ዲፓርትመንቶች በቅደም ተከተል እነማናቸው?

1. _____ 2. _____ 3. _____

ለ. ብዙ ተማሪ የማይባረርባቸው ሦስት ዲፓርትሜንቶችስ

1. _____ 2. _____ 3. _____

2.14 ከሣይንስ ትምህርቶች በአንዱ በከፍተኛ ትምህርት ተቋማት ተምረው የጨረሱና በጥሩ የሥራ ምስክ ላይ የሚሠሩ ሴቶች ታውቂያለሽ?

☐ አውቃለሁ ☐ አላውቅም

2.15 በጥያቄ 2.14 መልስሽ አውቃለሁ ከሆነ እነሱ በተማሩበት የትምህርት ዓይነት ተምረሽ የደረሱበት ደረጃ ለመድረስ ምኞት ነበረሽ

☐ አዎ ☐ አልነበረኝም

2.16 እስካሁን ካለሽ ለምድ በአብዛኛው ሴቶች ተምረው የተሻለና ጥሩ የሥራ እድል ያገኙባቸው ሦስት የትምህርት ዓይነቶች በቅደም ተከተል እነማናቸው?

1. _____ 2. _____ 3. _____

2.17 እስካሁን በነበረሽ የት/ቤት ቆይታ ወንድ ተማሪዎች ስለሴት ተማሪዎች የሣይንስና ሂሣብ ትምህርቶች ችሎታ ያላቸው አመለካከት ምንድ ነው?

☐ ወንዶች ከሴቶች የበለጠ ችሎታ እንዳላቸው

☐ ሴቶች ከወንዶች የበለጠ ችሎታ እንዳላቸው

☐ ሁለቱም ፆታዎች እኩል ችሎታ እንዳላቸው

☐ አላውቅም

2.18 ወደ ከፍተኛ ትምህርት ተቋም የሚገቡ አብዛኛዎቹ ሴት ተማሪዎች ሣይንስና ሂሣብ ነክ የሆኑ የትምህርት መስኮችን አይመርጡም ለምን ይመስለሻል? (ከአንድ በላይ መልስ ካለ መመለስ ይቻላል)

- ☐ በሣይንስና ሂሣብ ትምህርቶች ሴቶች ከወንዶች እኩል መሥራትና ውጤት ማምጣት ስለማይችሉ
- ☐ በተለምዶ ወደ ሣይንስና ሂሣብ ትምህርቶች ብዙ ሴቶች ስለማይገቡ
- ☐ ሴቶች በሣይንስና ሂሣብ ትምህርቶች ከወንዶች እኩል የመሥራት ችሎታ የላቸውም የሚል እምነት በብዙ ሰዎች ስለሚንፀባረቅ
- ☐ ትምህርቶቹ ከሴቶች ይልቅ ለወንዶች ጠቃሚ ስለሆኑ

ሌላ ካለ _____

_____

_____

2.19 ከዚህ በታች የተዘረዘሩትን ሀሣቦች '' እስማማለሁ '' ወይም '' በመጠኑ እስማማለሁ '' ወይም አልስማማም'' በሚለው ሥር ባሉት ቦታዎች ውስጥ የ ✓ መልክት በማስቀመጥ መልሱ

ተ.ቁ	ክንውን	ሙሉ ለሙሉ እስማማለሁ	በመጠኑ እስማማለሁ	አልስማማም
1	በሣይንስና ሂሣብ ትምህርቶች ሴቶች ከወንዶች እኩል ውጤት ማምጣት ይችላሉ			
2	የምህንድስና /ኢንጂነሪንግ/ የሥራ መስክ ለሴቶች ተስማሚ ወይም አመቺ አይደለም			

3	ሴቶች ከሣይንስ ይልቅ በቋንቋ ትምህርት የተሻለ ተሰጥኦ አላቸው			
4	ሣይንቲስት ለመሆንና በሣይንስ ምርምር አዲስ ነገር ማግኘት ከሴቶች ይልቅ ወንዶች ከተፈጥሮ ያገኙት ተሰጥኦ ነው::			
5	ሴቶች ኤሌክትሪሽያን ከመሆን ነርስ ወይም ሀኪም መሆን ይቀላቸዋል ይመረጣልም			

2.20. በፊዚክስ፣ኬሚስትሪ፣ባዮሎጂና ሂሣብ ክፍል ጊዜ በሚከተሉት ክንውኖች ጉልህ /የበለጠ/ተሣትፎ ያለው ማነው?

ተ.ቁ	ክንውን	ወንዶች	ሴቶች	ሁለቱም እኩል
1	ክፍል ውስጥ ያልገባቸውን በብዛት የሚጠይቁ			
2	በመምህራን የበለጠ ትኩረት የሚሰጣቸው			
3	መልመጃዎችን በተማሪ ፊት በብዛት ወጥተው የሚሠሩ			
4	በሥራቸው ከመምህራን የበለጠ አድናቆትና ማበረታት የሚሰጣቸው			
5	በክፍል ውስጥ በችሎቻው የበለጠ የሚተማመኑ			

2.21 የሚከተሉትን የሥራ መስኮች ለየትኛው ፆታ የበለጠ ተስማሚ ወይም ተመራጭ ናቸው?

ተ.ቁ	የሥራ መስክ	ለወንዶች	ለሴቶች	ለሁለቱም
1	የቢሮ ፀሐፊ/ሴክሬታሪ/			
2	ፊዚክስ ማስተማር			
3	የመኪና ሜካኒክ			
4	ቋንቋ ማስተማር			
5	የሮኬት ሣይንቲስት			
6	ባዮለጂ ማስተማር			

2.22 የሁለተኛ ደረጃ ተማሪ በነበርሽበት ጊዜ ተማሪ የሆነ ወንድም ወይም ወንድሞች ነበሩሽ? ☐ አዎ ☐ የለም

2.23 ለጥያቄ 2.22 መልሱ ''አዎ'' ከሆነ፣

ሀ. ለጥናት የሚሆን የተሻለ ትርፍ ጊዜ የነበረው ማነው?

☐ እኔ ☐ ወንድሜ/ወንድሞቼ/ ☐ እኩል ጊዜ ነበረን

ለ. በቤት ውስጥ ከቤተሰብ የበለጠ የሥራ ድርሻ የሚሰጠው ማነው?

☐ ለእኔ ☐ ለወንድሜ/ወንድሞቼ/ ☐ ለሁላችንም እኩል

ሐ. ቤተሰብ ለማንኛው ትምህርት የበለጠ ትኩረት ይሰጥ ነበር

☐ ለእኔ ☐ ለወንድሜ/ለወንድሞቼ/ ☐ ለሁለታችንም

መ. ቤተሰብ በትምህርት ከፍተኛ ደረጃ ይደረስልኛል በሚል የበለጠ ተስፋ የነበረው ☐ ለእኔ ☐ ለወንድሜ ☐ ለሁለታችንም እኩል

በሰዲስ አበባ ዩኒቨርሲቲ የትምህርት ፋኩልቲ

የካሪኩለምና ኢንስትራክሽን ትምህርት ክፍል

በአዋሣ ከተማ ሁለተኛ ደረጃ ት/ቤቶች የሣይንስና ሂሣብ መምህራን የሚሞላ መጠይቅ

የዚህ መጠይቅ አላማ በአዋሣ መምህራን ት/ት ኮሌጅ ሴት ተማሪዎች በተፈጥሮ ሣይንስ የትምህርት መስኮች ያሳቸውን ተሣትፎና ብቃት አንዲሁም ሴት ተማሪዎች ወደ ሣይንስ የትምህርት መስኮች በብዛት የማይገቡበትን ዐቢይ ምክንያቶች ለማወቅ ለሚደረገው ጥናት አጋዥ መረጃ ለማግኘት ነው:: በመሆኑም ከእርስዎ የማገኘው መረጃ ለጥናቱ ከፍተኛ አስተዋጽኦ አንደሚኖረው በመገንዘብ በእውነት ላይ የተመሠረተ መረጃ ይሰጡኝ ዘንድ በአክብሮት አየጠየቅሁ ውድ ጊዜዎን መስዋእት በማድረግ ለምትሰጡኝ መረጃ በቅድማያ አመሰግናለሁ::

ስም መጻፍ አያስፈልግም::

መረጃዎችን የሚሰጠት በባዶ ቦታዎች በመሙላት ወይም በሣጥኖቹ ውስጥ የ ✓ ምልክት በማድረግ ነው::

1. ዕድ ☐ ወንድ ☐ ሴት

2. የሚያስተምሩበት ት/ቤት ስም _____

3. የትምህርት ደረጃዎ _____

4. የአገልግሎት ዘመን /በመምህርነት/_____

5. የሚያስተምሩት የትምህርት ዓይነት _____

6. የሚያስተምሩበት የክፍል ደረጃ/ዎች/ _____

9. እስከዛሬ ካለዎት ልምድ ሴት ተማሪዎች በይበልጥ የሚመርጡት የትኛውን የትምህርት መስክ ነው? ☐ ተፈጥሮ ሣይንስ ☐ ሶሻል ሣይንስ

☐ ሁለቱንም በተመጣጣኝ

10. እርስዎ በሚያስተምሩት የትምህርት ዓይነት ከሀ እስከ ረ በተዘረዘሩት የትምህርት ክንዋኔ የሴት ተማሪዎች ድርሻ ከወንድ ተማሪዎች ጋር ሲነጻጸር ምን ይመስላል?

ተ.ቁ	ክንውን	በጣም ዝቅተኛ	ዝቅተኛ	ተመጣጣኝ	ከፍተኛ	በጣም ከፍተኛ
ሀ	ትምህርቱን ለመማር ያላቸው ፍላጐት					
ለ	በትምህርቱ ያላቸው ብቃት (Performance)					
ሐ	ለትምህርቱ ያላቸው ዝንባሌ					
መ	የቤት ሥራዎችን፣መልምጃዎችን አዘውትሮ የመሥራት ልምድ					
ሠ	ትምህርቱን በትጋት ተከታትሎ ውጤታማ ለመሆን የሚያደርጉት ጥረት					
ረ	በመማር ማስተማሩ ሂደት/ጥያቄ በመጠየቅና በመመለስና በመሳሰሉት/ ንቁ ተሣትፎ ማድረግ					
ሰ	በሥራቸው ያላቸው የራስ መተማመን (Self confidence)					
ሸ	ለግል ብቃታቸው ያላቸው ግምት (Self Efficacy perception)					

11. እስከዛሬ ካለዎት ተሞክሮ 10ኛን ክፍል ከጨረሱ በኋላ ወደ ተፈጥሮ ሣይንስ ስትሪም የሚገቡ የሴት ተማሪዎችን ብዛት ከወንድ ተማሪዎች ብዛት ጋር ሲነጻፀር ምን ይመስላል?

☐ በጣም ዝቅተኛ ☐ ዝቅተኛ ☐ ተመጣጣኝ ☐ ከፍተኛ ☐ በጣም ከፍተኛ

12. በከፍተኛ ትምህርት ተቋማት ውስጥ የተፈጥሮ ሣይንስን፣ በተለይም ፊዚክስ፣ኬሚስትሪና ሂሣብን ለመማር የሚገቡ ሴት ተማሪዎች ቁጥር እጅግ አናሣ መሆኑን መረጃዎች ይጠቁማሉ:: ይህን የሚያደርጉት በምን ምክንያት ይመስልዎታል? /ከአንድ መልስ በላይ መስጠት ይቻላል::

- ☐ ከወንዶች እኩል ውጤታማ አንሆንም ብለው ስለሚገምቱ
- ☐ ትምህርቶቹ ከባድ ናቸው ብለው ስለሚያስቡ
- ☐ በትምህርት መስኮቹ ሴቶች ከወንዶች እኩል የተፈጥሮ ችሎታና ተሰጥኦ የላቸውም ብለው ስለሚያምኑ
- ☐ በትምህርት መስኮቹ እንደአርአያ (Roll model) የሚሆኗቸው ሴቶች በብዛት አለመኖር
- ☐ ሴቶች ወደሣይንስ መስኮች መግባት ያልተለመደ በመሆኑ
- ☐ ወላጅ፣ ጓደኞች፣መምህራን ወዘተ እንዳይገቡ ስለሚመክሯቸው

ሌሎች ወይም ተጨማሪ ምክንያቶች ካሉ ቢዘረዘሩ _____

_____

_____

13. ሴት ተማሪዎች የትኛውን ስትሪም ቢመርጡ እንደሚሻል አማክረዎት ያውቃሉ?

☐ አዎን ☐ የለም

14. ለጥያቄ 14 መልስዎ አዎ ከሆነ በአብዛኛው የእርስዎ ምክር ምንድ ነው?

- ☐ በራሣቸው ውሣኔና ፍላጐት እንዲገቡ
- ☐ ሣይንስ ለሴቶች ከባድ ስለሆነ ባይገቡ እንደሚሻላቸው
- ☐ ወደሣይንስ እንዲገቡ ማበረታታት

ሌሎች _____

17. ቀጥሎ ከ – ሠ ለተዘረዘሩት ባህሪያት አንጻር በሁለቱ ፆታዎች መካከል አለ ብለው የሚያምኑትን ልዩነት ያመልክቱ

ተ.ቁ		ወንድ	ሴት	ሁለቱም
ሀ	የሣይንስና ቴክኖሎጂ ዕውቀት ይበልጥ ተሰጥኦ ያለው			
ለ	ለሣይንስና ለሂሣብ ት/ቶች የበለጠ ፍላጐትና ዝንባሌ ያለው			
ሐ	ሣይንቲስት ለመሆን ብቃት ያለው			
መ	ሣይንስና ሂሣብን ለመማር የበለጠ በራስ መተማመን ያለው			
ሠ	ሣይንስንና ሂሣብን ለመማር የበለጠ አስፈላጊ የሚሆነው			

18. የተፈጥሮ ሣይንስና የሂሣብ ትምህርቶች ከለሎች ትምህርቶች ይልቅ ከተማሪው የበለጠ ጊዜና ጥረት የሚጠይቁ ይመስልዎታል

☐ አዎ ☐ አይመስለኝም

19. የጥያቄ 18 መልስዎ '' አዎ '' ከሆነ

ሀ. ይህን በተሻለ ሁኔታ የሚያሟላው የትኛው ፆታ ይመስልዎታል?

☐ ወንድ ☐ ሴት ☐ ሁለቱም እኩል

ለ. ምክንያትዎን ቢገልፁ _____

_____

_____

20. በት/ቤትዎ ውስጥ ተማሪዎች ስትሪም በሚመርጡበት ጊዜ ሴት ተማሪዎች ወደሣይንስ እንዲገቡ ጥረት ይደረጋል ወይ? ☐ አዎ ☐ የለም

21. ለጥያቄ 20 መልስዎ ''አዎ '' ከሆነ ምን ምን ጥረቶች እንደሚደረጉ ቢያብራሩት? _____

_____

_____

22. ከዚህ በታች በተዘረዘሩት ሀሣቦች አንጻር የራስዎን እምነት ያመልክቱ

ተ.ቁ		እስማማለሁ	በከፊል እስማማለሁ	አልስማማም
1	በሣይንስና ሂሣብ የትምህርት ዘርፎች ሴቶች ከወንዶች እኩል ውጤታማ መሆን ይችላሉ			
2	ምህንድስና /እንጂነሪንግ/ ለሴቶች ተስማሚ ያልሆነ አስቸጋሪ የሥራ ምስክ ነው			
3	ሴቶች ከሣይንስ ይልቅ ለቋንቋ ትምህርት የተሻለ ተሰጥኦ አላቸው			
4	ሣይንቲስት መሆንና በሣይንስ ምርምር አዲስ ነገር ማግኘት ከሴቶች ይልቅ ወንዶች ከተፈጥሮ ያገኙት ተሰጥኦ ነው::			
5	ሴቶች ኤሌክትሪሽያን ከመሆን ነርስ ወይም ሀኪም መሆን ይቀላቸዋል ይመረጣልም			

23. ሴት ተማሪዎች የተፈጥሮ ሣይንስንና የሂሣብ ትምህርቶችን ከወንዶች እኩል ተምረው ውጤታማ እንዳይሆኑ እንቅፋት የሚሆኑባቸው ነገሮች አሉ ብለው ያምናሉ? ☐ አዎ ☐ የለም

24. ለጥያቄ 23 መልስዎ ''አዎ '' ከሆነ ምን ምን እንደሆነ ቢዘረዝሯቸው?

_____

_____

25. ከሚከተሉት የሥራ መስኮች ለየትኛው ያታ የበለጠ ተገቢ፣ተስማሚ፣ወይም አመቺ እንደሆነ ያመልክቱ

ተ.ቁ	የሥራ መስክ	ለወንድ	ለሴት	ለሁለቱም
1	የቢሮ ፀሐፊ /ሴክሬታሪ/			
2	የፊዚክስ መምህርነት			
3	የመኪና ጥገና ሥራ(Mechanic)			
4	የሮኬት ሣይንቲስት			
5	የባዮሎጂ መምህርነት			
6	የቋንቋ መምህርነት			

26. ከ ሀ – ሠ ለተዘረዘሩት የራስዎን ግምት ከተሠጠት አማራጮች ሥር ያስቀምጡ

ተ.ቁ		በጣም ዝቅተኛ	ዝቅተኛ	መካከለኛ	ከፍተኛ	በጣም ከፍተኛ
ሀ	ሴቶች በሣይንስና ሂሣብ የዕውቀት ዘርፎች ከፍተኛ ደረጃ ለመድረስ ያላቸው ብቃት					
ለ	ሴቶች በሣይንሱ ዘርፍ ውጤታማ እንዲሆኑ ከቤተሰብ፣ጓደኛ፣መምህራንና ከህብረተሰቡ የሚያገኙት ማበረታቻና እገዛ					
ሐ	በሣይንስና ሂሣብ ውጤታማ ለመሆን ሴቶች ያላቸው ፍላጐትና የሚያደርጉት ጥረት					
መ	ሴቶች ወደ ሣይንስና ቴክኖሎጂ የዕውቀት ዘርፎች በብዛት እንዳይሣተፉ በቀጥታ ወይም በተዘዋዋሪ የሚደርስባቸው የሥነ ልቦና ተዕእኖ					
ሠ	የሴቶች በሣይንስና ቴክኖሎጂ ያላቸው ተሣትፎ እጅግ አናሣ መሆን በህብረተሰቡ አጠቃላይ እድገት ላይ ያለው ተዕእኖ					

27. በእርስዎ እምነት በሣይንስና ቴክኖሎጂ ዘርፎች የሴቶች ተሣትፎ መጨመር አስፈላጊ ነው ይላሉ? ☐ አዎ ☐ አይደለም

በአዲስ አበባ ዩኒቨርስቲ የትምህርት ፋኩልቲ

የካሪኩለምና ኢንስትራክሽን ትምህርት ክፍል

በአዋሣ መ/ት/ኮሌጅ የሣይንስና ሂሣብ ስትሪም ተማሪዎች የሚሞሳ መጠይቅ

የዚህ መጠይቅ ዋና አላማ በአዋሣ መምህራን ት/ት ኮሌጅ ሴት ተማሪዎች በሣይንስ የትምህርት መስኮች ያሳቸውን ተሣትፎና ብቃት እንዲሁም ሴት ተማሪዎች የሣይንስ ትምህርቶችን ስመማር አንቅፋት የሚሆኑባቸውን ምክንያቶች ስማወቅ ስሚደረገው ጥናት አጋዥ መረጃ ስማግኘት ነው። በመሆኑም ከናንተ የሚገኘው ትክክለኛ መረጃ ስጥናቱ ከፍተኛ አስተዋጽኦ አንደሚኖረው በመገንዘብ ከዚህ በታች ስተሰጡት ጥያቄዎች የራሣችሁን የግል አምነት የሚያንፀባርቁ መልስ በመስጠት አንድትተባበሩኝ አየጠየቅሁ ውድ ጊዜያችሁን ሰውታችሁ ስምትሰጡኝ መረጃ በቅድሚያ ምስጋናዬን ስማቅረብ አወዳለሁ።

ስም መሳፍ አያስፈልግም።

1. የግል ሁኔታ መረጃ

1.1 ዕታ _____ ዲፓርትመንት _____

1.2 የመጣህበት/ሽበት ወረዳ _____

1.3 ወላጆችህ/ሽ የሚተዳደሩበት የሥራ መስክ _____

1.4 በቤተሰብህ/ሽ ውስጥ እህት/ወንድም አለህ/ሽ ☐ አዎ ☐ የለም

1.5 ለጥያቄ 1.2 መልሱ '' አዎ '' ከሆነ

ሀ. ለጥናት የሚሆን የተሻለ ሰፊ ጊዜ ያለው ወንድ ልጅ ነው ወይስ ሴት ልጅ?

☐ ወንድ ልጅ ☐ ሴት ልጅ ☐ ሁለቱም እኩል ጊዜ

አላቸው

ለ. በቤት ውስጥ የበለጠ የሥራ ድርሻ ያለው ማነው?

☐ ወንድ ልጅ ☐ ሴት ልጅ ☐ ሁለቱም እኩል

ሐ. ቤተሰብ ለማንኛቸው ትምህርት የበለጠ ትኩረትና ተስፋ አለው?

☐ ለወንድ ☐ ለሴት ☐ ለሁለቱም እኩል

2. **በሁለተኛ ደረጃ /ከ7ኛ እስከ 10ኛ/ ትምህርት ሂደት ጋር የተያያዘ መረጃ**

2.1 በተማርክበት/ሽበት ሁለተኛ ደረጃ ት/ቤት ሴት የሣይንስ ወይም የሂሣብ መምህራን ነበሩ ወይ? ☐ አዎ ☐ የለም

2.2ለተኛ ደረጃ ት/ቤት ውስጥ በተለይ የሣይንስ ትምህርቶችንና ሂሣብን ለመማር ያጋጠመህ /ያጋጠመሽ ችግሮች ምን ምን ናቸው? / ካንድ መልስ በላይ መመለስ ይቻላል/

☐ የትምህርቶቹ ከባድ መሆን

☐ ከትምህርት ቤት ውጭ ቤተሰቦቼን በሥራ ስለምረዳ በቂ መልመጃዎችን ለመሥራትና ለማጥናት በቂ ጊዜ አለመኖር

☐ ለትምህርቶቹ ፍላጐት አለመኖር

☐ በቂ የመምህራን እገዛ ና ማበረታታት አለመኖር

ሌላ ካለ_____

_____

2.4 3በሁለተኛ ደረጃ የሣይንስና/ፊዚክስ፣ ኬሚስትሪ፣ባዮሎጂ/ ሂሣብ መምህራን የሚያሣዩትን ባህሪ በተመለከተ '' አስማማለሁ '' ወይም ''በመጠኑ አስማማለሁ '' ወይም '' አልስማማም '' በሚለው ሥር የ ✓ ምልክት በማድረግ መልሱ ለወንዶች

ተ.ቁ	የሣይንስና ሂሣብ መምህራን ባህርይ	አስማማለሁ	በከፊል አስማማለሁ	አልስማማም
1	የሣይንስና ሂሣብ መምህራን ለሁለቱም ፆታዎች እኩል ትኩረት ይሰጣሉ			
2	ከሴቶች ይልቅ ለወንዶች/ጥያቄ በመጠየቅ፣በማበረታታት መልምጃዎችን እንዲሠሩ በማድረግና በመሣሉት/የበለጠ ትኩረት ይሰጣሉ			
3	ለሴቶች የመማር ችሎታ አነስተኛ ግምት አላቸው			
4	ሴቶች በሣይንስና ሂሣብ ውጤታማ እንዲሆኑ ያግዛሉ ያበረታታሉ			
5	ሴቶች በሣይንስና ሂሣብ ትምህርቶች ከወንዶች እኩል ውጤታማ አይደሉም የሚል እምነት አላቸው			

3. በኮሌጅ ውስጥ የትምህርት ክንዋኔ ጋር የተያያዘ መረጃ

3.3 እስካሁን ባለው የኮሌጁ ቆይታህ/ሽ ባገኘኸው/ሽው መረጃ መሠረት

ሀ. በርካታ ተማሪዎች ይወድቁባቸዋል የሚባሉት ሦስት ዲፓርትመንቶች በቅደም ተከተል እነማናቸው?

1_____ 2 _____ 3 _____

ለ. ብዙ ተማሪ የማይባረርባቸው ሦስት ዲፓርትመንቶችስ?

1 _____ 2_____ 3_____

ሐ. በጣም ከባድ ናቸው የሚባለት ሦስት የት/ዓይነቶችስ

1_____ 2_____ 3_____

መ. ከሌሎቹ ቀላል ናቸው የሚባሉት ሦስት የትምህርት ዓይነቶችስ

1 _____ 2_____ 3_____

ሠ. በተለይ ሴት ተማሪዎች ሊማሯቸው አይችሉም የሚባሉ የት/ዓይነቶች ካሉ

1 _____ 2 _____ 3 _____

3.4 በኮሌጁ ውስጥ ቆይታህ/ሽ በመማር ማስተማር ሂደት ውስጥ የሴት ተማሪዎችን ተሣትፎ ከወንዶች ጋር ሲነጻጸር ምን ያህል እንደሆነ አመልክቱ

ተ.ቁ	ክንውን	በጣም ዝቅተኛ	ዝቅተኛ	ተመጣጣኝ	ከፍተኛ	በጣም ከፍተኛ
ሀ	ትምህርቱን ለመማር ያላቸው ፍላጐት					
ለ	በትምህርቱ ያላቸው ብቃት (Performance)					
ሐ	ለትምህርቱ ያላቸው ዝንባሌ					
መ	የቤትሥራዎችን፣መልመጃዎችን አዘውትሮ የመስራት ልምድ					
ሠ	ትምህርቱን በትጋት ተከታትሎ ውጤታማ ለመሆን የሚያደርጉት ጥረት					
ረ	በመማር ማስተማሩ ሂደት/ጥያቄ በመጠየቅና በመመለስና በመሳሰሉት/ ንቁ ተሣትፎ ማድረግ					
ሰ	በሥራቸው ያላቸው የራስ መተማመን (Self confidence)					
ሸ	ለግል ብቃታቸው ያላቸው ግምት (Self Efficacy perception)					

4. የሣይንስና ቴክኖሎጂ ክህሎትና የዕታ ግንኙነትን በተመለከተ መረጃ

4.1 በሣይንስና ሂሣብ የትምህርት መስኮች በከፍተኛ ትምህርት ተቋማት ትምህርታቸውን ጨርሰው በጥሩ የሥራ መስክ ላይ የተሰማሩ ሴቶች ታውቃለህ/ሽ? ☐ አውቃለሁ ☐ አላውቅም

4.2 የጥያቄ 5.1 መልስ '' አውቃለሁ'' ከሆነ

ሀ. የትምህርት ዓይነቱ ምንድነው

ለ. በዚህ ትምህርት እነሱ የደረሱበት ደረጃ ለመድረስ ምኞት አድሮብህ/ሽ ያውቃል? ☐ አዎ ☐ የለም

4.3 እስካሁን ካለህ/ሽ ልምድ በአብዛኛው ሴቶች ተምረው ጥሩ የሥራ መስክ የሚያገኙባቸው ሦስት የትምህርት ዓይነቶች በቅደም ተከተል እነማናቸው?

1_____ 2_____ 3_____

4.4 ከዚህ በታች ለተዘረዘሩት ሀሣቦች በተሰጠት አማራጮች አንጻር የ ✓ ምልክት በማድረግ መልስ/ሺ

ተ.ቁ	የሣይንስና ሂሣብ መምህራን ባህርይ	እስማማለሁ	በከፊል እስማማለሁ	አልስማማም
1	የሣይንስና ሂሣብ ትምህርቶች ሴቶች ከንዶች እኩል ውጤታማ አይደሉም			
2	የምህንድስና/ኢንጂኒሪንግ/ የሥራ መስክ ለሴቶች ተስማሚ ወይም አመቺ አይደሉም			
3	ሴቶች ከሣይንስ ይልቅ ለቋንቋ ትምህርት የተሻለ ተሰጥኦ አላቸው			
4	ሳይንቲስት መሆንና በሳይንስ ምርምር እሚስ ነባር ማግኘት ከሴቶች ይልቅ ወንዶች ከተፈጥሮ ያገኙት ተሰጥኦ ነው			
	ሴቶች ኤሌክትሪሽያን ከመሆን ነርስ ወይም ሀኪም መሆን ይቀላቸዋል ይመረጣልም			

4.5 ሴቶች በሣይንስና ሂሣብ ትምህርቶችን ከወንዶች እኩል ውጤታማ እንዳይሆኑ እንቅፋት የሚሆኑባቸው ነገሮች ምንድናቸው?

- ☐ ለሴቶች በተለይ እንቅፋቶች የሉም
- ☐ ከወንዶች እኩል ችሎታ አለመኖር
- ☐ ለሣይንስ ትምህርቶች ፍላጐት አለመኖር
- ☐ መምህራን፣ወንድ ተማሪዎች ወዘተ ለሴቶች ችሎታ ዝቅተኛ ግምት መስጠት
- ☐ ወላጆችን ሥራ በመረዳት ከወንዶች እኩል የማጥኛ ጊዜ አለመኖር
- ☐ በተለምዶ ብዙ ሴቶች ሣይንስና ሂሣብ አለመምረጥ

ሌሎች ካሉ _____

4.6 ሴቶች ሁኔታዎች ቢመቻቹላቸው በሣይንስና ሂሣብ ትምህርቶች ከወንዶች እኩል ችሎታና ውጤት ይኖራቸዋል

☐ አዎ ☐ አይኖራቸውም ☐ አላውቅም

4.7 የሚከተሉትን የሥራ መስኮች ለየትኛው ፆታ የበለጠ ተገቢና አመቺ መሆናቸውን አመልክት/አመለክቺ

	የሥራ መስክ	ለወንዶች	ለሴቶች	ለሁለቱም
1	የቢሮ ፀሐፊ/ሴክሬታሪ/			
2	ፊዚክስ ማስተማር			
3	የመኪና ሜካኒክ			
4	ቋንቋ ማስተማር			
5	የሮኬት ሣይንቲስት			
6	ባዮለጂ ማስተማር			