

**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**PARTICIPATION AND PERFORMANCE OF FEMALE
STUDENTS IN ENGINEERING FIELDS: THE CASE OF
ARBA MINCH UNIVERSITY (AMU)**

**BY
CHOMBE ANAGAW DESSIE**



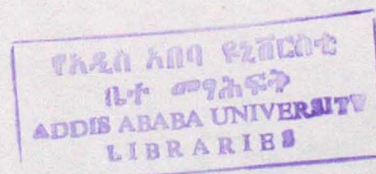
**COLLEGE OF EDUCATION
DEPARTMENT OF CURRICULUM AND INSTRUCTION**

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Engineering Fields: The Case of
Arba Minch University (AMU)**

**A Thesis Presented to the School of Graduate Studies
Addis Ababa University**

**In Partial Fulfillment of the Requirement for The Degree of
Mater of Arts in Curriculum and Instruction**



**By
Chombe Anagaw Dessie**

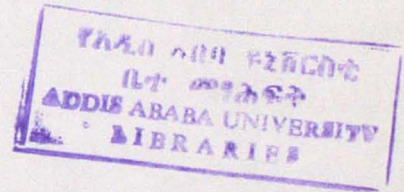
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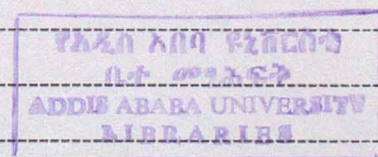
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ACRONYMS

AA	-	Affirmative Action
AMU	-	Arba Minch University
EFA	-	Education for All
HE	-	Higher Education
IEM	-	International Association of the Evaluation of Academic Achievement
MOE	-	Ministry of Education
MOLSA	-	Ministry of Labour and Social Affairs
UNDP	-	United Nation Development Programe
UNESCO	-	United Nation Economic, Social and Cultural Organization

ABSTRACT

The purpose of this study was to examine the participation (enrollment) and performance (achievement) of female students in engineering fields of Arba Minch University (AMU).

To achieve this objective, 125 engineering female students, 98 instructors, department heads, faculty deans, president, vice presidents, and women representative of the university were involved as research participants. The required data was secured using different research instruments such as; document analysis, guided interviews, focus group discussions and questionnaires. Accordingly, different methods of data analyses like: statistical approach, including percentage, for quantitative data and narrative approach for qualitative data were used.

Findings regarding female participation (enrollment) revealed encouraging trends.

The university under study is found to lack important teaching-learning facilities, like library, reading room, clinic, textbooks and reference materials. Despite these problems female students do better achievement pattern than their male counterparts.

Regarding drop out in the university education system, female students are high drop out than their male counterparts. Environmental problem and health problem are indicated as the major reason that lead females students to drop out the university.

Regarding gender based factors, results indicate that cultural stereotyped subject or field perception and psychological barriers choose the field appear to be major factors that hinder females to participate in the engineering fields. Accordingly, family encouragement and good family educational background are also found to be the other major reason why few female students are choosing this field. It was further identified that, institutional effort to sensitize the campus climate and effort to support academic problems were for to be totally poor.

To increase females participation in engineering fields in terms of intervention strategies include: providing academic support service, like tutorials, textbooks, reference books, and arranging or providing guidance and counseling service (academic or personal), promoting gender sensitalizaiton program in the form of seminar, conference, workshop, to improve the attitude and perception towards engineering fields. In order to alleviate or minimize the environmental and health problem within the university, provide recreational facilities and campus health care sufficiently.

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Education is identified as a fundamental means of improving the social, cultural and economic development of a country. It is also believed to be a primary prerequisite for an individual's participation in the advanced sectors of the society. Higher skills and knowledge are essential for access to employment opportunities and to be in a decision making position.

Moreover education is the main means to bring changes in values and attitudes conducive to progress (Krishna M. R. 1982: 249). That is, education not only enables an individual to adjust to changes already taking place, but it is also an instrument that enables the individual to contribute towards the acceleration of such developments.

These impacts of education can be fully realized only when all citizens of a country have equal opportunity and access to education. The overall cultural, social, and economic development of a country depend upon the degree to which it ensures the access and opportunity of education to all social groups without disparity.

In Ethiopia females' access to education is behind that of males. Females have less chances to enter schools, are not provided with equal opportunities at all levels of education, do not enjoy equal benefits of education as compared with males.

Females constitute about fifty per cent of the human race. Besides, the role they play in the social sectors is exceedingly high, for they are not only producers but procreators of producers as well. Yet, female are considered in some degree inferior to men, in all societies, despite differences in family form, kinship structures, marital arrangements, and political and economic structures, and are treated by the society accordingly (Charlton, 1984: 49).

The social perception that regards female as inferior to male in many aspects of social activities has made them not to deserve education. Despite the fact that the citizens benefit from schooling, the advantages that can be gained from educating females are likely to be much broader in scope than those gained from educating males. (Ibid) However, this seems to be ill understood, in most Third World Countries including Ethiopia.

Hence, Barbara (1998: 30) indicates that, access to education is a fundamental human right and therefore, females' lesser access for education basically implies their deprivation of females.

It is in light of this, that gender equity in education has increasingly become a major issue of concern throughout the world and several international, regional and national measures have been taken to improve the situation.

Consequently an encouraging sign of progress is being observed. Females enrollment in many countries has increased and the inequality gap is declining (UNDP, 2000: 94). At the secondary level many countries showed great increase in female enrollment. The participation of females at tertiary level education is also growing in many countries. Yet, a lot remains to be done to achieve gender equality in general and to do under with disparity in access to education in particular.

Ethiopia is one of the least developing countries where gender imbalance is more pronounced at all levels in general and at higher education levels in particular.

The educational statistics of the Government for Higher Education indicate that proportion of female students admitted in higher education institution was the highest in 2000/01 and constantly declined to reach 20.5% in 2002.03. The table below shows the percentage of admitted students by gender in government higher institutions for the years 1998/99 to 2002/03.

Table Proportion of male and female students admitted

Year	1998/99	1999/00	2000/01	2001/02	2002/03
M	78.5	82.3	71.8	75.9	79.5
F	21.5	17.7	28.2	24.1	20.5
Total	100.00	100.0	100.00	100.0	100.0

Source: Ministry of Education Addis Ababa, December 2003

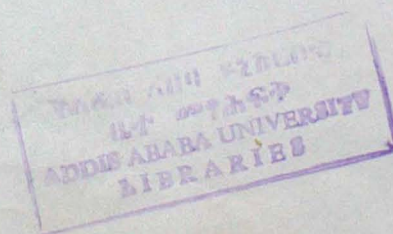
Moreover, females' distribution among different streams in higher education institutions, particularly in streams traditionally taken as men's domain, is limited which in turn limits their career opportunity. As a general pattern females appear to avoid fields of the "hard sciences" in general, and the problem is particularly serious in engineering fields.

For example, Atsede (1991) noted that in 1988/89 academic year the percentage of women enrolled in the natural sciences and technology faculties was 4% and 3% respectively, while the percentage enrolled in social sciences was 16% in the same academic year. The percentage of females enrolled in physics math, and chemistry, was also 6%, 7%, 8% respectively, while in biology which is seldom considered as one among the "hard sciences" the proportion stands at 11%.

As can be seen from the above data the percentage of enrollment of females in science fields is much less than that of social science streams. No significant change has been observed during the subsequent ten years of Atsede's research. This was shown in a relatively recent study by Yelfign (1998), which also depicted that the same pattern of most girls preferring to join the social science fields at the end of secondary general education is still observed.

The World Bank (1995) revealed that female participation in education when compared to male in most countries at all levels is low. Besides, the number of female students in higher education institutions is proportionally smaller in fields like technical fields, engineering etc in the developing countries of Latin America, Asia and Africa.

In our context Ethiopia, Gennet (1988) indicate that many females are concentrated in fields such as, home economics, secretarial, nursing, and teaching elementary schools. In addition, Almaz (2001) pointed out that, in most African countries there is an equality



in female's access and participation of higher education due to low enrollment, high attrition, poor performance, and under representation of females as compared to males.

Almaz also says that, the distribution of academic specialization in predominant numbers, pursue academic study in traditionally "female" disciplines such as social sciences, humanities and arts and under represented in the traditionally "male" disciplines of math, science, and engineering.

Snyder and Mary (1995) discussed that, at present the balance development of society is possible only when females have the opportunity of equal participation in the scientific and technological development. Hence, developing sufficient technology by skilled people in the country can succeed only if participation in scientific and technological fields.

Thus, despite the fact that measures have been taken to encourage females to go to science streams specially engineering fields, as part of the national effort to increase the participation of females at all level of education, the problems still persist. When it comes to engineering it appears as if this field is meant to be exclusively the domain of male students.

1.2 Statement of the Problem

The under representation of female students in engineering is part of the general problems of gender inequality in education, which is the predominant issue in our country. As mentioned above, female students shows less interest to participate in engineering fields in general and their preference has remained limited to social sciences and humanities.

The underrepresentation of females in engineering fields is a major setback in women's representation in such areas of professionalism and decision-making, reflecting the prevalent gender inequality and the negative impact on the individuals as well as the society as a whole.

Indeed a recent study by the Ministry of Labor and Social Affairs (MoLSA) on the Recruitment, Working Conditions and Decision Making Roles of Women Working in Establishments Administered Under Labor Proclamation 42/93 (now replaced by 377/04), showed that the field of study women commonly prefer to specialize in determines their involvement in establishments' decision-making processes.

According to this study, establishments assessed were "Predominantly manufacturing and production enterprises where the requisite qualifications are often within the realm of technical, engineering, agricultural, and other hard sciences. Women, even when they got the opportunity of joining higher learning institutes, rarely choose to join such faculties or departments. Most areas of specialization women tend to study, with the exception of accounting, are often irrelevant to such institutions and women workers with the required qualifications for managerial posts are often rare. Accordingly the number of women in decision-making position is close to nil". (MoLSA, 2004: 172). On the other hand, the proportion of female workers working as secretary, cashiers, and etc, is five-fold compared to male workers.

The root cause of the situation, the study, depicted, boils down to cultural. "The gender roles that we play in every day life including our choice of area of study, kind of job and the like are determined by the culture we are born to" (Ibid).

As one anthropologist put it "human beings do not invent new paths for males and females to follow from one generation to the next. Rather, young people are inexorably bound by sexual (gender-based) life styles of their parents. No matter how hard they try to be different, young males and females eventually experience the tidal pulls of their culture" (Reeves, 1981: 76).

The present study therefore, will try to see the extent to which different factors contributed to the possible underrepresentation of women in the engineering fields including the ones set forth as presumed causes by different studies.

1.3 Aims and Objectives of the Study

Aims of the Study

The aim of the study was to investigate the different factors contributed to the participation and performance of female students in engineering streams of Arba Minch University (AMU).

Specifically the objectives of the study are the following:

- To analyze the participation of female students in engineering fields of AMU.
- To assess the performance of female students in engineering fields in comparison with their opposite sexes in AMU.
- To explore the main demand and supply side factors that facilitate or hinder the participation and performance of female students in engineering streams of AMU.
- To recommend possible solutions that might contribute to change the situation.

1.4 Research Questions

In order to carry out these objectives, an attempt is made to seek reliable answers to the following research questions.

1. What is the enrolment of female students in Engineering streams at Arba Minch University (AMU) like in the last ten years?
2. What is the achievement pattern of female students in engineering fields vis-à-vis that of their male counterparts?
3. Why do female students choose Engineering fields instead of non-engineering fields?
4. What factors, cultural and other constraints, facilitate or hinder female students' join in engineering?
5. Is there any institutional support (academic or personal) that can encourage female students to succeed in the university?
6. What are the lessons learnt from this?

1.5 Significance of the Study

As indicated above the purpose of the study was to obtain information about female participation and performance in engineering education at Arba Minch University.

The disadvantaged position of females in education has frequently been a point of discussion throughout the world. There is a general view that women are not interested in science fields. As a result, there is a general trend of avoiding science education by the majority of female students. This inequality of access to science education implies unequal opportunities for occupations.

The possibility of equal life chances for both sexes is highly important because first it is a basic human right, and secondly it is assumed to be a major prerequisite to ensure the overall development of a country.

A recent report made by Yelfign (1988) indicates, there is a general tendency of female students preferring to join the social science fields. It also emphasizes that it is highly important that we recruit more students in to science related and into the teaching of science. From this it is clear that we will not be able to meet our human resource needs if we continue to rely primarily on the male population for science related careers. It therefore calls for the need to improve the situation so that more females come to science and engineering fields.

Given these situations, it is highly essential to know what causes so many girls to behave in the way that severely limits the choices they will have in life.

The first and absolutely essential step in devising mechanisms to alter the social environment and ensure the equal participation of female students in engineering stream, is thus to have understanding of the root causes of the problem.

It follows then the significance of the present undertaking lies in the fact that it is an important step to break down the low participation of females from science education particularly engendering stream, which has serious consequences on the future of both females and society as a whole.

Secondly, it is believed that the recommendations and suggestions that will be given at the end of the study will have the significance of helping the university, other Higher Learning Institutions, the government as well as other stakeholders (of which the society is the most important), to make an informed decision so as to determine what type of interventions might be made to improve the situation.

Thirdly, the study would initiate other researchers to conduct further study on the issue and come up with results that would enhance the understanding of policy makers and the society at large on the need to address the problem.

1.6 Scope of the Study

The scope of the study is limited to AMU particularly to six engineering fields of the university. The study was delimited to examine the participation (enrolment) and performance (achievement) of female students in engineering field in the year 1988 E.C. – 1997 E.C. in AMU.

1.7 Limitation of the Study

The study focused on Engineering fields of AMU. There was a scarcity of reference books relation to engineering fields in conducting the study.

1.8 Operational Definition of Terms

Participation: In this study to mean females evolvment and indicates the persistence of female students in university level (Kane, 1995: 8).

Performance: The academic achievement of students in successfully completion of the study (graduation) class attendance, homework study time are used as indicate correlating with performance (MOE, 2003: 23).

Drop out rate: is the percentage of students who discontinue their learning from a given grade out of previous year total enrolment in the same grade (MOE, 2003).

Gender gap: Differences between male and female students enrolment ratio in a given year (MOE, 2001/02: 26).



Engineering: the application of science to the solution of a problem of society at a point, based on knowledge of mathematical and natural science (Geoge E, Dietor, 1991).

1.9 Organization of the Study

The paper consists of five chapters. The first chapter is introduction, which encompasses; background of the study, statement of the problem, objective of the study, significance of the study, scope of the study, limitation of the study, and operational definition of terms. The second chapter deals with the review of related literature and other related research work. The third chapter contains the methodology used to collect and the data analyzed. The fourth chapter presents the findings interpretation and analysis of the data (discussion), and the last chapter, chapter five includes, summary of the findings, conclusions and recommendations.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 General Background

Education is increasingly being perceived not only as an essential tool for achieving the goals of equality and development, but also as a basic human right. Nondiscriminatory education benefits both girls and boys and thus ultimately contributes to more equal relationship between women and men (United Nations, 1996:47). Though schools in principle usually plan to take in and educate all children in the same way regardless of sex differences, in practice female enrolment is still low in Ethiopia as is the case in other developing countries. Kelly supports this assertion when he states:

Women remain underrepresented at all levels of education relative to men. Fewer females than males enter educational programs in formal or non formal fewer receive technical and vocational training and women account for a very small proportion of enrollment in secondary education (1982:1).

The Beijing Declaration of human right also pointed out that despite the fact that more than half a decade has elapsed since the UN Declaration of "Education for All" (1990) "approximately 100 million people among which 60 million are girls are without access to primary schooling, and more than two third of the world's 960 million illiterate adults are women" (1996:47).

King (1991) describing the situation of illiteracy in general and that of the disparity between males and females in particular, wrote "In some countries with wide differences between male and female schooling, only one out of five adult females can read.

Even though females right to education is generally recognized they are far from exercising this right. It is thus clear that females have less opportunity than males to get schools in most developing countries and the problem of female participation in education is a global issue calling for practical measures to narrow the gap between female and male participation in developing countries.

There is a considerable variation even among developing countries in the rate of female participation in education and the problem is more pronounced in African countries especially in sub Saharan Africa. According to Etta, the fact that girls and women are educationally underrepresented and disadvantaged, in all but less than a handful of countries in Africa, is no longer news (1996:10). Since Ethiopia is part of the sub Saharan countries the pattern of enrollment and participation of females is likewise similar to most of sub Saharan African countries.

2.2 The Benefits of Educating Female

Increasing female participation in education has become a policy objective in developing countries for the past three decades with considerable emphasis on females' access to education. Because it is believed that:

A) Female Education Enhances Women Ability to Exercise their Rights

Education enhances the achievement of the goal of equality, development, and peace governments have the responsibility to guarantee. And non-discriminatory education benefits both girls and boys and thus ultimately contributes to more equal relationship between women and men. Equal access to and attainment of educational qualification are necessary if more women are to become agents of changes (Beijing Declaration 1996:47).

Finally education enables women to have the right to own land, the right to vote, gives them consciousness to protect themselves against violations in homes or streets and to protect themselves through due process of law.

B) Educating Females Enables them to Give Better Care to their Family

Education of women encourages them to make use of health inputs in better and more effective ways, to practice hygiene, improve nutrition, and greater effectiveness in caring for the well being of their family (King and Hill 19993:28). In general education equips mothers with the knowledge needed to be more effective in their roles at home.

Education of mothers also makes women aware of the fact that the smaller the family the greater the share of resources, and the higher the chance of proper upbringing of their children, hence the advantage of contraceptive use to limit and/or space births (MOE 1998:9).

C) Mother Education Increases the Educational Attainment of Children Especially of Daughters

The extent to which the mother indicated is very important in determining her daughter's opportunities to education. Educated mothers often push their children to acquire much education as they have done themselves. Educated mothers are also more likely to have access to resources and information on different issues. (King and Hill 1993: 15858-158).

King and Hill (1993:29) depicted that the self-confidence of female students built in the public education system in Cairo is found out to be associated with their mother's education. The more formal schooling a mother had the better she could give praise and confidence to her daughters. The standards and expectations of daughters from educated family are different from those of less educated family.

D) Females Education Will Enable Females to Participate in Socio Economic Development programs

For the development of the society females have equal responsibility with males, and education of females has more benefits for social development. In support of this reality King and Hill stated that:

Educating girls is the hope of breaking the cycle of famine and deprivation. Increased schooling has similar effects on the income of females and males but educating girls generates much larger social benefits. Because of what women do with the extra income they earn, because of the extra leverage it affords them with in the family, and because of the direct effects of greater knowledge and awareness, female education has an enormous social impact (1993: Vii).

Social benefit of female education include reduced fertility, reduced infant and maternal mortality, enhanced family health and welfare, improved children's education, and increased agricultural productivity, and over all economic productivity for women, and the larger economy. Moreover educated women are better prepared to enter the paid

labor force, which is critical to the welfare of the many female headed households in developing countries (Odaga and Heneveld 1993:2)

Conway and Bourque (1993) also argue that it is good to expand educational opportunity for girls by identifying the obstacles to women's advancement. In order to improve their living condition and to expand their role in social leadership it is invaluable to widen the educational opportunities of women. From this point of views one can see that educating women yields durable benefits to individual women, to their families, and to the society at large.

According to Pasacharapoulous (1985) whose research encompassed sixty-one countries all over the world, the rate of return to the educational investment on women exceeds that of men, particularly in developing countries (Cited in Teshome, 2003:4). According to this study the average return for all levels of education combined was 15% for women as compared to 11% for men. (2003:4).

2.3 Factors Affecting females Participation in Education

There are many factors that affect enrolment rate of students in education. These factors are more likely reflected on females' education, which include socio economic conditions, cultural barriers, as well as political, institutional, and school environment situations.

2.3.1 Socio Economic Factors

Regarding socio-economic conditions, particularly at household level, school fees, cost of learning materials and transportation, absence of boarding and other expenses are the major hindrance for parents not to educate children particularly girls. King and Hill (1993:24) pointed out that unless the expected returns to sending daughters to school do not exceed the cost of doing so, female education as an investment becomes unattractive to parents. According to them daughters will then be educated only to the extent that parents are willing to accept low economic returns.

Odaga and Heneveld also confirm this argument by raising the example of Mozambique where it is said that the cost of schooling is considerably high and are

beyond the capacity of many rural and per urban families. According to this study, most of the rural families interviewed could not imagine sending their children to schools in town to complete primary or attend secondary schools (1995:15)

Similarly in Cameroon many secondary schools charge fees. This conditions reportedly affects mainly girls than boys (Cammish and Brock 1994 in Odaga and Heneveld 1995:15) It is noted that when parents decide to hold back their children from going to school because of financial constraints it is the girls that are to be withdrawn from school. Those girls from better off families and who are familiar to urban area have a chance to remain in school longer than the poor and rural families.

The importance of girls' labor for agricultural, domestic, and marketing tasks, has been well documented. When it comes to childcare, girls are more likely to be involved than boys, and children in the rural areas spend more time doing physical works than those of urban areas. Bowman and Anderson (1982:22) noted that:

The time spend by girls working in the garden or field, fetching water and fire wood, carrying or helping in marketing activities, or doing home-processing of products for sale, can be especially important in poorer families, where perception of benefit from the schooling of girls are dimmer.

From this it is possible to conclude that girls are the main sources of income for their family especially for the poorest one and the need for their physical labor and income generating activities, is often given priority over their education.

On the other hand some parents are provided with some gifts both in cash and in kind when their daughter are getting married. In conformity to this view a World Bank publication (1988:15) pointed out that "bride price paid by the bridegroom's family to the bride's parents in South Omo in SNNPR may go up to Birr 2000, four goats, bullets, a gun, two pots of honey, clothes and Jewelry". Accordingly, the full opportunity cost of educating girls may be higher than for boys.

If at all parents send their daughters to school they loose that benefit and the above mentioned evidence may help to explain why poor parents often invest less in their daughters schooling than in their son's.

2.3.2 Socio Cultural Factors

Parental and family attitudes have strong influence on the decision to invest in female education. Parents worry about wasting money on the education of girls who are likely to get pregnant or married before completing their schooling. There is strong belief that once girls are married and become part of another family and parental investment in female education is low (Davison, in Odage and Heneveled 1995:20).

In addition, Bouya (1996:107) stated that as voluntary or involuntary victims of stereotypes inherited from previous generations certain parents in both rural areas and sub urban centers think girls need not be provided with schooling because women's ultimate natural duty and goal consists of getting married and producing children.

Further more other study finding indicated that the only socially acceptable role for females is to be wives and mothers. As a result they are trained for these purpose from their easily stage instead of attending school (Assefa 1991:13). The assumption is that formal schooling does not prepare daughters adequately for their traditional role as mothers and wives.

Thus customs, traditions and beliefs influence decision to enroll girls in school. From this point of view Barbvara Hert etal, (1991:29) wrote:

Girls are expected to have special physical protection traditionally they often demand special concern for privacy and social reputation. In some societies there is a cultural belief that females must be secluded from direct confrontation of other members of the society during their puberty stage. Because of this girls enrollment rate to schooling is low.

In addition to this in some places especially among Muslim societies women's formal education is not encouraged and those from the elite families receive much or all their schooling at home (Bowman and Anderson 1982:11). This shows that parents' obligation is to keep their daughters at home and prepare them for maternal responsibility rather than sending them to school.

In Ethiopia too the previous education system was predominantly religion- oriented to train the masculine to serve at the religious and state (government) organizations where women were not allowed to involve. (Befekadu 1992:129).

This shows that religion is one of the factors that affect adversely female school entrance. Hyde (1993:113) shares his observation in northern Nigeria where education of girls was hampered due to screening of Muslim women from strangers both in rural and urban areas. The main cause for this screening seems owing to their fear that Western education may promote values and behavior which are contrary to their cultural and religious norms.

2.3.3 Factors Related to the school environment

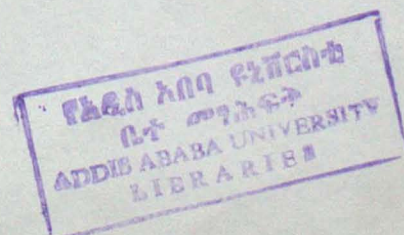
In relation to factors related to school environment teachers' attitudes, and practices distance of schools, role model of female teacher and gender bias in textbooks and teaching material, affect female performance, attainment and participation in education. Regarding this topic Hyde (1993: 119) writes

School- related factors could be important determinants of whether girls enter and remain in school. The quality of schools, especially the course offered and the messages about set roles conveyed by educational materials, and by the teacher, influence how parents as well as students themselves make schooling decisions.

From the above point one can conclude that, the school environment has a great impact on participation of female education. The most important implication for girls' enrollment and academic effectiveness is teachers' attitude, behavior and teaching practice. Teachers' attitudes towards their students are reflections of the broader societal biases about the role of women in society. Raynal (1999:9) stated that:

Teachers often ask boys more questions, give them more time, more encouragement and more advice, than girls. So that boys learn to express themselves better and to assert themselves and to question authority and the girls to be inhibited in their interaction with teacher to take up less space physically and intellectually to be less highly valued.

Because of the difficulties discussed above, therefore, girls lack self-confidence and morale to continue their education and have less chance to be effective.



Other factor discouraging girls from both rural and urban areas is the distance of the school from their residences. This long distance may make parents think about their daughters' security on travel.

Another scholar Bowman and Anderson (1982:23) forwarded the points that the closer the school is to their homes parents are less likely worried about girls. Security for girls can be kept under close watch. Further more location of secondary schools (especially for girls) was more inconsistent than location of primary schools, and the catchment areas for girls of secondary schools (especially if boarding) were larger for boys than that of girls attending from the remote areas.

In our situation most secondary schools especially in the rural areas have long distance from girls' homes. Hence, this results in the decrease of participation of girls in the teaching –learning process.

Moreover, as Bowman and Anderson (1982:20) stated, in order to encourage female in education particularly in rural areas the promotion and the increasing number of role model teachers is one of the strategies.

However, the availability of role model teachers especially in secondary schools is minimal. Hence, the presence of female teachers can motivate girl students and guarantee parents

To support the above idea Barbara Herz K. Subbarao, Massom, Habib and Laura Rancy (1991:30) referring to their study in India, stated that:

In Kerala for example which has the highest female literacy and enrollment rates of all states in India over 60 percent of teachers are women compared with fewer than 20 percent in the state of Bihar and Uttar Pradesh which have the lowest female enrollment rates.

2.3.4 Political and Institutional Factors

According to (Odogo and Hanerled, 1995:40) several political and institutional factors also constrain female participation in education. The political will to tackle the problems of non-participation and non-enrollment of girls is a key factor in improving educational outcomes of all children.

Conway and Bourgue supports this assertion and argues that improvement in women's status is at least dependent upon their ability to mobilize political activities as well as educational achievements since political consciousness or its lack is closely linked to educational content. Policy makers can interpret and analyze the political and economic consequences of women's access to education Odaga and Heneveld (1995:45) also depicted that, in several sub-Saharan African countries the capacity to finance and manage the education sector is increasingly under threat. The fiscal crisis and the inadequate public support are the two major issues in the education sector.

When it comes to the Ethiopian context most schools are suffering from financial management problem. In many cases the budget allocated by the government does not reach the schools on time.

Since the role of education is an investment in development it has to be considered as the only instrument of peaceful social change. It must be recognized in that the need for a serious concerted commitment to increase and spread education in the population in general and among women in particular.

The concerned bodies of the government must urge to review the overall investment in education sector and provide more funds for school so that most girls can be enrolled and efficiency and quality of education can be improved.

The problem is not only due to the meagerness of allocated funds or the proper utilization of the same, but also the issuing and implementation of policies. As Conway and Bourgue (1993:24) stated "to state the policy goals is easy but the problem on how to exercise the actual implementation and how to understand in connection the country context".

Regarding this point the recent review of education reforms and policies across the sub-Saharan African countries indicates their limited effectiveness because of shortcomings in implementation. (Craig 1991, Fuller and Hante 1992 Psacharopoulos 1990 in Odaga and Heneveld 1995:46).

Consequently Conway and Bourgue (1993:25) confirmed that enhancing female education has no value if there is no implementation.

In light of the above point when it comes to the Ethiopian context the Ethiopia Education and Training Policy (MOE, 1994:7) on the overall strategy of education and finance policy stresses that "the government will provide support to raise the participation of women in education".

But till now the enrollment rate of females is lower than that of males. The potential contribution of women to development is well known. The constitution of the Federal Democratic Republic of Ethiopia Article 35 "rights of women" Sub-article 6 (1995:93) states that "women have the right to full consultation in the formulation of national development policies the designing and execution of projects and particularly in case of project affecting the interest of women".

According to the constitution women ministers were assigned, regional bureaus zonal department, and woreda offices of women's Affairs were established in almost all regions of Ethiopia. But their contribution to reduce factors adversely affecting females participation in education is low.

2.4 Promising Approaches for Increasing Females Education

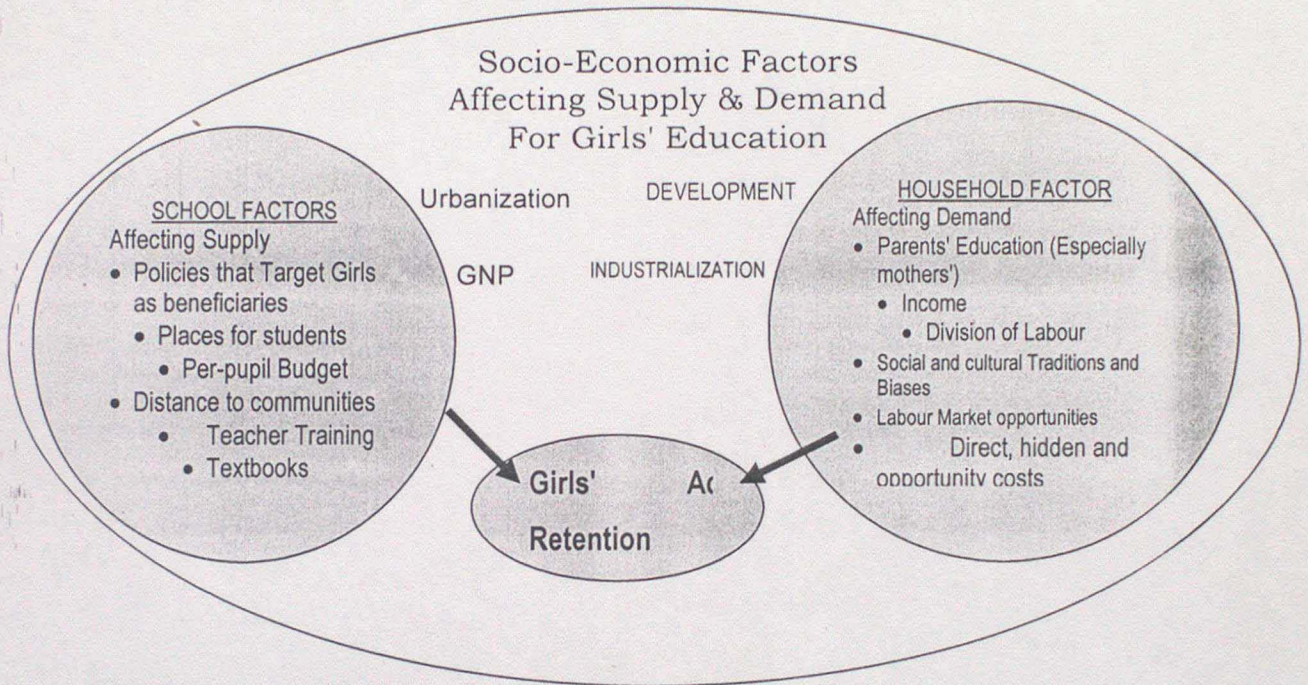
In order to improve and expand female education King and Bellew (1993:294) indicate that, if schools are closer to children's homes it seems to be more promising because of parental concern about their daughters' physical and moral safety. They emphasize that schools with closer ties to the community are more effective for males as well as females enrollment. It is also undeniable that the presence of female teachers can draw the attention of more girls to join schools so that recruiting female teachers is better to increase females' participation in education.

Furthermore, introducing parents with educational information can help to increase parental and community awareness about the benefits of female education is imperative.

- In order to promote females education findings are provided as framework solution by Wainiama (1998: 122). The solutions are summarized below.
- Reduction of repetition and drop-out rates by gender
- Reduction of direct cost schooling and abolishing uniform regulation

- Improving school infrastructure such as separate latrine for girls and boys and expansion of multi grade classroom
- Regulation of school – issuing legislation that out laws forced marriage before finishing schools
- Increase in parent /community demand for girls education
- Increase in the percentage of female school administrators and/ or supervisors.

In UNESCO World in Education report 1991 describes the supply/demand paradigm socio economic factors affecting female education as presented in the following figure.



Source UNISCO, 1991 report

2.5 Social theories of Gender Inequalities

One of the characteristics of the modern world is the better understanding of the relative importance of biological and social factors in explaining variations in gender roles and the disparities in participation and attainments in various sectors of society.

No one denies that there are fundamental biological differences between women and men. Clearly women's biological role in the reproduction of children places constraints on their ability to participate fully in other activities at certain stages of their lives.

However, whether these biological differences are related to metabolic differences which influence other behaviors and abilities is more controversial.

Confirming this point Acker (1984) indicated that if women are perceived to be weaker more passive and more emotionally oriented than men it is due to cultural rather than biological differences. . Ultimately it is the way that women and men are defined and the attitudes values and beliefs about the biological differences that determine variations in their roles in societies.

He further divides the major social theories of gender inequality into two categories: the *fundamental* and the *implementary*. The first is concerned with explaining why women are subordinate to men, while the second focuses on the processes and practices, which maintain this subordination. Fundamental approaches include the functionalist argument that gender roles are consequences and the needs of an increasingly differentiated society. Thus, the implementary approach concentrate on the social processes which explain how women come to attain their subordinated position.

Rather than structures, implementary approaches focus on the socialization processes where by women acquire attributes which make them unsuitable or inappropriate for certain social positions and economic activities in society.

Thus, these approaches are concerned with the way that masculinity and femininity are constructed and reconstructed throughout a person's lifetime. Girls are socialized into traditional personality traits of their societies, which in turn restrict their choices and options. With this framework the way girls and boys are raised in the home, taught in the school and encounter wider society become important for explaining gender inequalities throughout the life course. (Ibid: 170)

2.5.1 Educational Inequalities

There are a number of levels at which one can approach the question of educational inequality between women and men. According to (Stromqvist, 1987). The most basic concerns access or what some call equality of educational opportunity. This refers to both the opportunity to participate in education and the availability of facilities which in

many countries are not distributed equally (for example in the different facilities available in rural and urban areas).

The second level of inequality is in participation or the effect to which individuals and groups enroll in and attend formal educational activities. The distinction is important because enrolment and retention figures which already reveal group variation in most countries are not necessarily good indicators of actual attendance and attainments in schools or classes. For example in many parts of the world attendance is affected during the planting and harvesting of crops.

According to Stromqvist, the third level of educational inequality is in treatment and academic performance. We know that not all students, or groups of students, are treated equally by teachers and administrators. Streaming curriculum tracks attention giving and stereotyping are all forms of differential treatment received by students. The treatments are thus factors, which lead to variations in academic performance.

She further indicates that inequalities occur with respect to the effects of education on adult life. It can happen that the value of education for the attainment of jobs, income, political power, and social networks, may be different for women and men, even though the type of education may be the same (Stromqvist, *ibid*: 172).

Studies prior to the turn century had projected that in the year 2000 in some countries of the world girls enrollment in schools would be the same in extent or even more than boys, at least at the lower levels. However this did not come true in most less developed countries where boys dominate in school classes. When it comes to the tertiary level education women participate much less than men in all regions of the world.

2.5.2 Inequalities in Academic Performance

In most developed countries the data suggest that at primary school girls perform at the same level as boys but at the secondary level they begin to do more poorly. This variation appears to be partly related to subjects, for girls continue to do as well as boys, sometimes even better in reading ability and language learning. However they

invariably fall behind in mathematics and science, which in most countries are more highly valued and lead to more prestigious and better paying jobs (Kelly, 1978).

The reasons usually given for gender related differences in academic achievement include opportunity to learn, support systems for learning, and the absence of appropriate role models (Finn et al, 1979). For example in the first International Association of the Evaluation of Academic Achievement (IEA) of mathematics (Husen, 1967), it was found that even where interest levels were identical boys still outperformed girls leading to the conclusion that "exposure" to mathematics might be one of the explanations for gender differences.

This is not necessarily attributable to differences in science and mathematics enrolments, but more importantly the different emphasis on learning and the degree of interest in and encouragement given to girls by teachers in science and mathematics classes. It thus demonstrates that social support in the form of encouragement and actual assistance seems as important, particularly where cultural factors mediate against the education of girls in non-traditional subjects.

Finally, it has been argued that the absence of female role models directly inhibits girls achievement in non traditional subjects.

Overall, the social factors related to the inequalities of female education in many developing countries are more complex and difficult to overcome simply by the introduction of government policies to encourage the education of girls.

2.6.The Trend of Female education in Higher Education in Developing Countries

Higher education for women is important not only for equal education opportunities between the sexes, but also because of the substantial economic returns achieved by raising women's productivity and the health, educational and income levels of families. Investments in higher education, particularly in developing countries, have high private rates of return measured by associated wage increases. The prevailing high rates of return are also indicative of the existence of productive opportunities for women.

Over the last four decades, tertiary enrollments have expanded manifold throughout the developing world. New institutions have mushroomed, and more places have been added to old institutions. A forthcoming World Bank discussion paper¹ addresses the issue of women in higher education by examining: (i) how women have fared in the wake of this general expansion of tertiary enrollments; and (ii) what programs and policies instituted through World Bank projects have contributed to enhancing women's enrollment.

Despite this general situations and the potential of women's higher education to economic growth, a "gender gap" in enrollments at the tertiary level is pervasive, especially in Sub-Saharan Africa, the Middle East, and South Asia. This gender disparity implies that a large number of potential candidates are denied the opportunity to participate actively in productive activities or contribute to faster economic development.

A World Bank publication (Johanna Coenen, 1994) shows that while general expansion accounted for about 70 percent of the change in female enrollments over the 1970s, a change (improvement) in gender parity contributed only about 20-25 percent. And the general expansion of tertiary enrollments has relatively benefited.

Yet the gains in female enrollments since the 1970s need to be interpreted with caution since few women were able to enter science and engineering fields. Indeed, gender streaming appeared pervasive in all countries, including the developed countries, with women being over represented in humanities and vocational schools. Pro-active (incentive) policies are needed both at the secondary school level (to induce girls to opt for sciences and mathematics), and at the university level.

According to this paper, of the many factors influencing female tertiary enrollments, two are important: (i) female secondary enrollments and dropout rates, which together set the limits for female tertiary enrollments; and (ii) structural changes such as the expansion of the service sector, which may trigger the demand for higher-educated female labor. Owing to the absence of a reliable database, the paper could not address the issue of dropout rates across countries. Therefore, causality could not be established on what determines the level of female tertiary enrollments. However,

simple correlations do suggest that lagged female secondary enrollments and the extent of service sector activity are positively correlated to female enrollments.

The paper examines the policies that have been explicitly tried in order to increase women's access with reference to World Bank projects. Over 253 education projects with higher education components are reviewed. Some promising approaches to reduce the gender gap in higher education are outlined.

The Bank's early projects focused on building infrastructures and developing educational planning capacity. Since the early 1980s, the Bank-assisted projects have introduced policy reforms affecting the expansion, financing and internal efficiency of higher education systems. Thus, despite the persistence of gender disparity in most developing countries, the Bank-assisted projects during 1970-85 rarely mentioned gender disparity as an issue, nor introduced significant policies to overcome it. Since the mid-1980s, however, the situation has changed, and many Bank-assisted projects have begun to pay attention to gender disparity.

The severity and extent of constraints have varied across regions and countries. Economic constraints, such as an unfavorable labor market situation for women, have been the most limiting factors in some countries. In others, constraints such as lack of single sex institutions, inadequate supply of female teachers or insufficient dorm facilities, have proved to be the strongest barriers to female participation. Identification of constraints for female participation in higher education varies a great deal across the regions. In South and East Asia, such identification preceded project formulation, whereas identification of constraints appeared with less frequency in Sub-Saharan Africa and many regions.

Numerous interventions have been introduced in Bank-assisted projects including: general expansion of student places; reservation of student places for women (e.g. Nepal); expansion of places in traditional fields of study (e.g. countries in the MENA region); expansion of places in non-traditional (e.g. India); setting up single-sex institutions (e.g. Oman); curriculum reform and modification of admission criteria for women (e.g. the Gambia); provision of scholarships and financial assistance (e.g. Papua New Guinea); expansion of boarding facilities (e.g. India and Yemen);

recruitment of female faculty (e.g. Yemen); community awareness campaigns (e.g. Korea); and counseling and guidance (e.g. Korea). Regionally, a wider variety of specific interventions to reduce gender disparity have been introduced in East Asia than in other regions.

However, it should be noted that until very recently, development agencies such as the World Bank and the American foundations – Ford, Rockefeller - held the view that basic education was sufficient for the development needs of developing nations of Africa and elsewhere. This followed the economic analysis that had shown that investment in primary education yielded higher returns to society while investment in higher education (HE) yielded higher returns to the individual (Psacharopoulos 1993 cited in Subbarao et al., 1994).

Consequently, policies followed by donor agencies had its contributions to the sustenance of gender disparity in enrollment in HE institutions in Kenya, like others in Africa received little financial support from these agencies at a time when they were experiencing considerable expansion in student populations. With little resources, managers of HE institutions did not give much thought to gender issues (Ibid). At the same time, United Nations' championed development goals such as Education for All (EFA) by 2020 lay emphasis on basic education and even articulated gender equity goals.

Consequently, while primary and to some extent even secondary education gender equity issues have received considerable analytical, research and programming attention in Kenya. The same cannot be said about HE gender issues. Yet, educational statistics in Kenya indicate that the higher up the educational ladder you go, the wider the gender disparities in favor of males become.

Because a good proportion of women in Africa have not had and still do not have access to even primary education, higher education for a few women is often seen as too much of a luxury and as such little attention is paid to gender disparities in higher education. However there is a formidable rationale for getting concerned about gender inequities in HE.

On the other hand, increased women's participation in HE is particularly important in the era of globalization that we live in. According to the International Labour Office (1998) in McGrath (2000:9), globalisation seems to offer positive opportunities for those with higher levels of 'useful' knowledge and skill, but to threaten the livelihoods of those who have the lowest skill and knowledge levels and those in traditional areas of skill that are devalued by technological changes.

It is only through higher education that women can be sure to acquire the knowledge and skills that they need to earn competitive incomes and thus lead meaningful lives in a globalized world.

A further rationale for concern about gender issues in HE has to do with women's contribution to social, economic and political development. Basic education for women has been shown to have unequalled social and economic benefits at the family and community levels. He, on the other hand, enables women to participate in the social, political and economic lives of their communities and countries as leaders in business, in the professions and in politics.

There are two main forms of gender disparities in HE in Kenya: those that have to do with women representation and those that have to do with women's experiences in HE institutions. Women in Kenya are underrepresented in HE institutions as students and as workers. While gender disparities in students' enrollment exist at all levels of HE, they are particularly wide at higher degree levels and in science, mathematics and technology (SMT) oriented subjects.

Bunyi demonstrates the gender disparity in Kenya's Institutions of Higher learning in general and the more pronounced situation in science, mathematics and technology departments in the following table.

Table 1: Enrollment in Technical Training Institutions by Course and Gender, 1998

Course	Male	Female	Total	% Female
Mechanical Engineering	632	9	641	1.4
Electrical & Electronic Engineering	625	29	654	4.4
Building & Civil Engineering	515	27	542	5.0
Applied Science	575	380	955	39.8
Business Studies	263	370	633	58.5
Graphic Arts	329	148	477	31.0
Institutional Management	61	331	392	84.4
Survey & Mapping	278	61	339	18.0
Information & Liberal Studies	125	82	207	39.6
Computer Studies	118	56	174	32.2
Total	3,521	1,493	5014	29.8

Source: Ministry of Education Science and Technology (Kenya) 2003

The Table shows that in 1998 only 29.8% of the students enrolled in public technical institutions were women. It also illustrates that women in these institutions were concentrated in traditionally 'female' disciplines such as institutional management – 84.4%; business studies, which incorporates secretarial studies, a traditionally 'female' discipline.

On the other hand, women registered dismal enrollment rates in traditionally male disciplines such as engineering—mechanical engineering 1.4%, electrical and electronic engineering – 4.4% and building and civil engineering 5.0%.

The gender disparities at TVET level are of great concern since the implications are that an overwhelming majority of women who complete secondary school do not go on to acquire useful skills needed in the world of work. As such their secondary education is unlikely to have increased their chances of raising their incomes. Poverty and dependency are therefore likely to be the lot of these women throughout their lives.

Thus, as Namuddu (1995) among others have succinctly posited it for increasing female participation in education in general and in HEs in particular, education institutions and especially African universities have a critical role to play in the social and economic transformation of African societies. Moreover, for HE institutions to play this role effectively, they must provide a model of excellence to the rest of society as regards gender equity by embracing the principle of gender equity in their make up and in their practices.

2.7 Females in Higher Education in Ethiopia

Various researches on development indicated that women have been victims of inequality since long due to different gender biases and behavior influenced by social, economical, cultural, historical and religious factors. Consequently, inequality is highly prevalent in the fields of social, political educational and economic life of women in Ethiopia.

However, inequality in education is the most hazardous since education is the pipeline to improve the economic social and political life of individual women. As Neave, in Seyoum (1991) stressed " There is no inequality more intolerable than inequality of educational opportunity".

Thus, the prevalent general social inequality, has affected the education and training of women in all the three dimensions of educational process, namely access, success, and outcomes at all levels of schooling (Lindsay 1991). Besides to this, it is indicated that the degree of severity of gender disparity increases along levels from primary to tertiary and cross- sectional among countries from the highly developed ones to the least developed others (Bowman and Anderson, 1982, Lindsay and Njuma, 1993).

In light of the above statements, it becomes obvious that the education of women has hardly been in progress to promote their status in institutes of higher learning of developing countries that is particularly important to the national development.

In other words, equal access of educational opportunity is highly limited for women right from the initial phase of schooling, rendering the enrollment rate of women very low

compared to their male counter parts at all level of schooling. Regarding female population in institutes of higher learning, the status of the third world countries, like Ethiopia, is highly acute (Bowman and Anderson, 1982; Njuma, 1993). Research findings of Seyoum (1991) and Abebayehu (1998) on the situation of female participation in higher education of Ethiopia have confirmed this fact.

Female educational inequity is also manifest in school environment due to lack of equal quality of educational setting Inadequate, or lack of learning support system, hostile learning environment, and other related problems in school system, impede the participation and performance of female students. Thus, high attrition and low retention rate characterize female education at large, and this gets worse at institutions of higher learning (Njuma 1993).

Moreover, Tsige (1991) pointed out that the academic participation and performance of females students in higher education institutes of Ethiopia is negatively affected by the severity and hostility of the learning environment to female students. Additionally, educational inequity is perpetuated under owing to the emphasis given to the "traditional pathway" of allotting fields of study such as language, home sciences etc, to females and deliberately separating them from other fields designated as "non traditional path way" areas of subjects, like mathematics, natural science and technology (Kenway, 1993).

This trend has further sustained the inequity of educational outcomes for females entailing uneven distribution of educational benefits among society. Confirming this fact, Tsige (1991) indicated that a closer look of the trend of department enrollment process in institution of higher learning of Ethiopia reveals females' under representation in crucial field of study, especially in science and technology areas. These areas are however, very critical for females not only to assume full participation in development process but also to become in a opposition of getting the benefits of the educational outcomes equally with their male counterpart (Jacqueline 1970's Nijuma, 1993).

The above-mentioned persistent way of educational inequity in Ethiopia institute of higher learning is conceived to adversely influence the development of the country. It is

argued that that national development is almost impossible through isolating a pool of female populace from joining higher learning institution.

Therefore in order to mitigate the situation it is recommended that policies designed to promoter national development and educational equity must clearly incorporate plans to include systematically the participation of females (Lidnsday, 1990).

2.7.1 Affirmative Action Programs at the Level of Higher Education

It is in institutes of higher learning, that affirmative action (AA) programs aimed at enhancing female participation become operational.

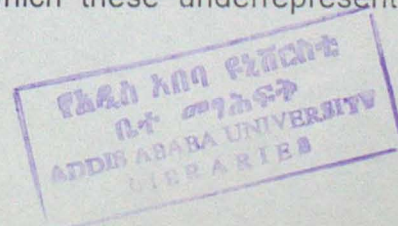
According to Menges and Exum (1993), no matter how complete the design of affirmative action programs are what strongly decide the implementation of the program is the willingness and the capacity of the personnel in the institutions. Hence, to effectively implement and institutionalize affirmative action programs, it is necessary to take intervention in the form of corrective and redistributive measures on those aspects believed to sustain educational inequity, both in the areas of academic performance and participation of female students.

In this respect, intervention strategies have to be arranged in order to make the learning environment girls- friendly, and more specifically to provide equal quality of educational setting that nurture talent and help girls equally compete with their male counterparts. According to Subbarow (1994), to effect this, the interventions need to focus, on:

- a) Institutional policy and program
- b) Curriculum and Instruction
- c) Gender Relation in the institute

2.8 What Stops Women from Majoring in and Completing Engineering Fields?

It is a fact that women groups enter fields of engineering with far less frequency than do their male counterparts. The frequency with which these underrepresented groups



enter these highly skilled professions is good indicators their general enablement. Green (1989) indicated that, when women groups begin to enter these fields in numbers that represent their proportion in the general population, then we can begin to feel comfortable that efforts to enable them have succeeded.

Of course the impediments presented in the elementary and secondary- years, the short- comings of poorly implemented desegregation, the home environment that do not prepare children to with- stand harsh educational environments, and the educational environment themselves that sometimes do more to limit than to guarantee opportunity, are sufficient to make college attendance only a remote possibility for many.

Moreover, Colleges themselves present obstacles that are considerable and that are not limited to the challenge presented by the academic material. Thus, only the tiniest fractions of girl students who enter the educational pipeline in kindergarten remain in the pipeline at the end of graduate school (Green 1989:106)

Consequently under representation of women group in engineering has been a chronic problem in most parts of the world including our country.

2.9 Choice and Implementation in the Careers of Women in Science and Engineering Fields

Lucy Sells (1982) indicates that, choice and implementation are two major phases of career development. Choice is what you choose, implementation is how you get the educational training to implement your choice. According to Sells in terms of career choices too few people are choosing the science and engineering fields in the first place. But the problem is especially serious among women.

In terms of implementation of a career choice, which in the present case is done via undergraduate and ideally graduate degree retention, is a serious problem. For women problems in retention arise especially at the graduate degree level, where their degree attainment rate is lower than that of men (Sells 1982:109). In addition, to this academic problem, financial problems as well as problems related to the institutional environment seriously affect retention at both baccalaureate and graduate levels.

2.10 The Place of Engineering in Girls' Choice of Disciplines

There are two major barriers to a given choice: lack of preparation and lack of motivation or interest. As far as preparation is concerned Lubinski and Humphrey (1990) suggested that science and engineering requires that:

That one has a strong high school record especially in math and science courses. In fact college science- majors are academically stronger students in high school than are majors in other fields.

They further indicated that failure to obtain adequate pre-college preparation has been one of the major barriers for women students to join engineering and other science fields. Although women get better grades than men in the arts and humanities in both high school and college, they more often lack the math prerequisites for getting started in a science/ engineering major in college. Math has been called the critical filter in career development; it filters out options in dramatic fashion (Ibid: 111).

Benbow (1988), noted that participation in physics in high school may be particularly important because this is where interests in engineering careers are often born. High school women often report being tracked away from both physics and computer science courses. Even males who fall into the lower half of the achievement distribution are more likely to continue the study of math and science than are female.

There are many postulated reasons for the failure of females to continue taking math in high school and college. Most relate in some way to the perceptions that math is "a male domain", that females aren't good at math, and that females don't need math. Also lacking are role models and encouragement toward science achievement and careers. (Benbow, 1988:200)

Be it as it may, inadequate math and science course work and inadequate high school preparation in general, limits the choices of students seriously making surviving college level course work difficult. In sum, it suffices to say that continuing efforts to encourage

(or motivate) female students to overcome the said challenges is essential to keep open their option to pursue science and engineering careers.

2.10.1 Psychological Barriers to choice

Psychological barriers to the pursuit of science and engineering careers also account for large losses of women to these fields. According to Mead and Metraux (1957) choice of science careers can be viewed as maladaptive cognitions or beliefs about themselves in relationship to science math and engineering careers.

He classified the maladaptive cognitions in to three general classes namely: gender or racial stereotypes, low science- related self- efficacy expectations, and beliefs that they wouldn't enjoy science. Research concerning these maladaptive cognitions suggests serious negative effects on women choices of science and engineering careers (ibid).

Math science, and engineering fields have always been perceived as male dominated fields. Psychological researches have shown 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 choice of career for themselves. In several studies the majority of girls give nurse or teacher as their occupational choice, where as boys give a much wider range of traditionally male occupations representing trades and professions related to science and engineering. (Metraux, 1957:112) Some girls and young women may also avoid career they perceive as male dominated because they fear disapproval from others.

2.10.2 Stereotypical Roles

One study illustrating the power of occupational stereotypes was that of Drabman et. al (1981), which indicated that science itself elicits a particular kind of stereotype from people of all ages. He held several studies showed that about 90% of interviewed individuals perceive scientists as old and white usually with glasses and at least half of

the time bearded. The study further illustrated the views of scientists of about 35,000 high school students:

A scientist is a brain that spends his days endlessly sitting in a laboratory processing things from one test tube into another. His work is uninteresting, dull, monotonous, tedious, and time consuming. He may be hurt by radiation, bring home disease, may use himself as a guinea, or may even accidentally kill someone... He has no social life, no other intellectual interests, buddies or relations, he bores his wife, he brings homework and also bugs and creepy things (Drabman, 1981:387).

According to these studies children of the 1980 hold images of science and scientists that are essentially unchanged from those of the 1950. In 1986 researches at Harvard University Educational Technology Center applied Mead and Metracit's methodology to another generation of potential scientists. They found that most responses sounded familiar depicting scientists as

Nerds and science is important but boring. The students had little inkling of the day-to-day intellectual activities of scientists of what experiments are for or of the social nature of the scientific enterprise

Stereotype of this kind can have several types of detrimental effects and that any one who believes this will want to avoid science (Harvard Education Letter 1988:6)

Minority students may avoid career areas that they perceive as essentially closed to them affirmative action notwithstanding, female students may avoid career areas where they perceive they will be one of the few or the only members of their gender or race (or both). And because occupational stereotypes reflect the realities of gender and racial segregation in the occupational world there are many fewer female role models for girls to emulate.

2.10.3 The Role of Guidance Counselors

Research has shown that the advice given by guidance- counselors to clients often tends to encourage young women to stay in traditional roles (e.g. those of wife and

mother) or to pursue traditionally female dominated careers rather than a broader range of career options.

In one study by Pietrofessa and Schlossberg (1970) counselor trainees were asked to advise a female "Client" (actually a research subject) wanting advice in choosing between her top career preferences engineering and education. Of preferential statement made by the counselors over 80% were in favor of education and against engineering.

Counselors said things such as "Engineering is normally thought of as a man's field" "if you were a teacher you could have your afternoons and summers off to be with your kids", and "Engineering is awfully technical and doesn't give you a chance to help people" (Pietrofessa and Schlossberg, 1970:115).

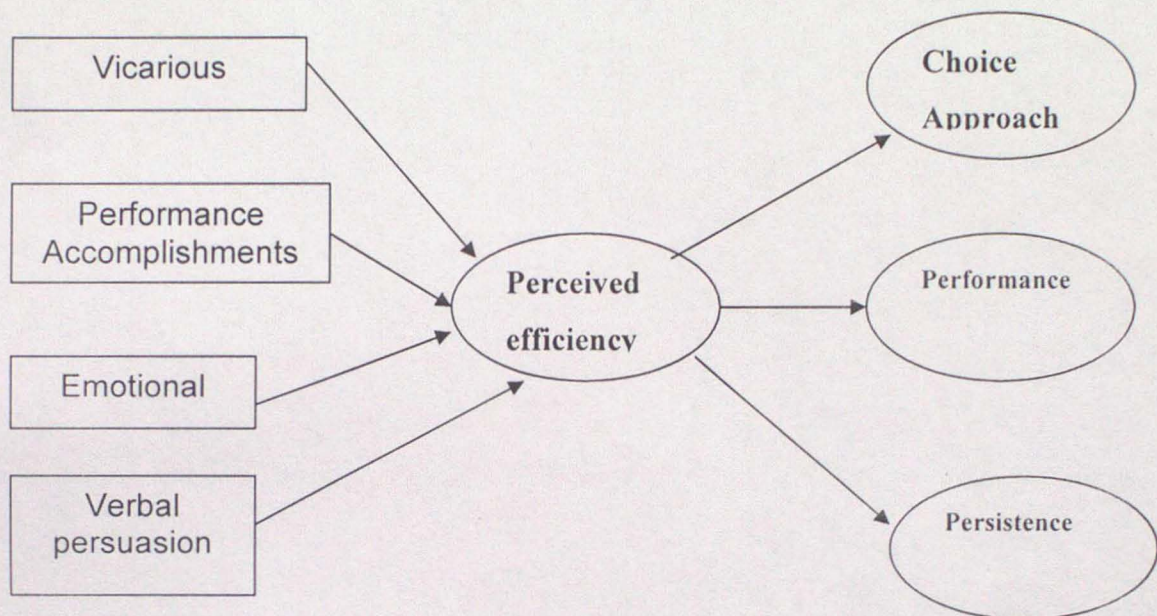
In light of the above point we can say that women students considering science and engineering career are probably in need of what has been called decision support. The more non stereotypical the choice the riskier it is for most women members. Thus, they need relatively more reassurance and support.

2.10.4 A Self Efficacy Approach to the Aspiration of Girl Students

Bandura, in his study of gender differences in educational and career decisions (1977) stated that self-efficacy is our beliefs about our competence to engage in a certain domain of behaviour. According to him, self-efficacy determines whether we engage in a behavior in the first place, how well we perform, and whether we persist when we come to obstacle.

He propose that self efficacy expectations or our beliefs about our own competence with respect to specific domains of behaviors are the major mediator of approach versus avoidance (or choice) behavior, and of the persistence of behavior when obstacles are confronted (Bandura, 1977:15)

Bandura's model of perceived self-efficacy is presented in the following figure.



Source: Adopted from Bandura (1977) Sources of efficacy information

On the above point Bandura's self-efficacy theory does not say ability is irrelevant. The theory however, is especially useful in understanding the under use of real abilities on the part of such groups of women.

In their self-efficacy model, Gil and Bandura further suggested that women's socialization led to insufficient exposure to sources of information that would lead to the development of strong expectations of efficacy with respect to many traditionally male dominated career fields particularly those in science and engineering (Gil and Bandura, 1977:117).

2.11 Ways to make Changes

The above-cited research findings conclude by underlining that, programs of intervention designed to increase students' expectations of self-efficacy are potentially valuable. What this particular series of studies suggests is that the strengthening of individual self-confidence concerning the pursuit of a science and engineering degree may be an important buffer to the lack of support or worse even discrimination. Thus our intervention regarding retention should be directed at both helping individuals and improving the institutional climate (Hackett et. al, 1992:165).

Points provided as a framework solution for enhancing females' education in science and engineering are summarized as follows:

- Improved Guidance counseling, more outreach program in science and engineering among students in high school and university. Counter stereotypical role models: (other programs could focus on bringing women scientists and engineers into the secondary schools to provide role modeling and information functions but also to challenge stereotype of scientists).
- Better understating of the formation of interest is needed: (we also need to know more about the development of interest in science and Engineering. The more competent you feel in a domain of behavior the more likely you are to express and pursue interests in it).
- Don't give up on interest formation just because the student is in college:(Another important point of focus for intervention involves students just beginning college work. We need to make the assumption that it is not too late to encourage students to consider science and engineering majors even in their freshman and sophomore years of college and develop research and intervention programs that could assist in this process).
- Once the student is committed see that the commitment is supported: (Once we get young people to choose science and engineering major we need to ensure that more of the academically able interested ones able to complete their degrees).
- A high expectation of efficacy is crucial factor in retention and success

(Given an environment characterized by discrimination whether overt or subtle and a relative lack of support other environmental and personal factors may become crucial determinants to survival and persistence in demanding educational programs).

CHAPTER THREE

3. METHODOLOGY

3.1 Research Design

The aim of this study was to examine the participation (enrolment) and performance (achievement) of female students in Engineering fields. To secure the required information both quantitative and qualitative approach were used.

3.2 Methodology

3.2.1 Design

As mentioned earlier the aim of this research was to survey and explain the participation and performance of females students in Engineering fields. To secure this, multi-methods (quantitative and qualitative) were employed. That is, a survey with a case study was adopted. Yin (1989) indicated that, it is possible to use multiple strategies in a given study. That is a case study within a survey or a survey within a case study. Bales, R. F and S. P. Cohs (1979), have indicate, case studies use almost all the research techniques in the social scientist's tool kit, one factor is unlikely to be the cause, this is what a case study is good for: showing how factors and circumstances come together over time.

3.3 Data Collection

3.3.1 Instruments of Data Collection

To obtain adequate information for the study, four types of data collection tools were employed. These were; questionnaires, guided interview, document analysis, and focus group discussion

a. Questionnaire

The questionnaires were set for four types of respondents; university instructors, department heads, female students and women groups in engineering fields. The questionnaire for university instructor and department heads included instructors background, attitude and belief towards female's education, items concerning university facilities, university student enrollment, achievement, dropout.

The female students questionnaire included items on age, parental education, occupation of parents, and perceived self-esteem of girls and university related information.

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 on instructors and students similar to those to be included in the study of the engineering fields of Arba Minch University. After the necessary rearrangement and modification regarding omissions and difficulties made, items which were found to be not related to the issue were canceled from the questionnaires.

The women group questionnaire included, items on institutional support for females to sensitize the campus climate, institutional support for females, sufficiency of academic support service to succeed and other institutional facility that facilitates the teaching-learning process in the university was administered by the investigator to the actual respondents directly.

B. Focus Group Discussion

Focus group discussion was held with female students selected purposively from the six Engineering fields, Kreuger, Richard A. (1988) indicated that, focus groups discussion consists of people you have specially selected for their experience in relation to whatever your are studying. Usually, the group consists of six to twelve

people of similar background in terms of age, sex, class and so on who are brought to discuss as a small number of question or issues. He, further point out that, this, type of discussion approach may help you to complement information you obtained by interviewing people on their own, by observing, or by looking at records and documents.

Besides, guided interview was also held with university president, vice presents, and faculty deans of Arba Minch University. The focus group discussion and the interview focused on parents attitude toward girls education, major societal problems or factors that facilitate or hinder the participation and performance of females students in engineering education, and measure that should be taken to improve females in the engineering fields in the university.

The interview and the focus group discussion enabled the researcher to cross check information obtained from different sources and information not revealed by one or the other instrument.

C. Document Analysis

Two types of document analyses were used, namely student enrollment and students graduation year documents were used to generate information about participation (enrollment) and performance (achievement) pattern of female students with their male counter parts in the field of engineering.

D. Student Enrollment Document

This document has been used to collect information about the participation (enrolment) trend of male and female students in Arba Minch University (AMU) during the last ten years in the engineering fields. The student enrollment document analysis was important to identify the gender gap and the trend in the engineering field in the university.

E. Student Graduation Year Document

The graduation year document was used to collect students who have graduated in the field of engineering in Arba Minch University during the last four years. This was done

for to identify the achievement pattern of female students with their male counter parts in the engineering fields.

To this end the graduation years of female and male students who have graduated from the different engineering streams during the last four consecutive graduation years have been secured. This was found to be useful for the purpose of comparing the achievement pattern of female students in engineering fields with their male counterparts.

3.4 Selection of Samples

The selection of research settings included six engineering fields of Arba Minch University (AMU). The research population included female students, university, instructors, president, vice presidents, faculty deans, department heads in the engineering fields, and women groups of the university. A total of 102 (male and female) instructors and department heads in the engineering field were selected availability to fill in the questionnaire. As far as female students in the field of engineering is concerned, a total of 125 female students were availability selected from (year two, three, four and five) regular degree students in the engineering fields by the investigator to fill in the questionnaire. An in-depth interview was also conducted with 9 purposively selected university president, vice presidents, and faculty deans in the engineering fields. Women groups were also selected to fill the questionnaire in regarding institutional support to (both academic and personnel) to female students in the institution.

The table below shows the details of the participants of the study.

Table 3.1 Research Setting and Participants of the study

Types of participant in the study	Research instrument used	Research setting and number of participants						Total
		Hydraulic s Engin.	Irrigation Eingin	Civil Engin	Electrical Engin	Mechanic al Engin	Computer .Eingl	
	Questionnaire	18	22	24	16	10	25	115

Female students	Questionnaire	18	22	24	16	10	25	115
	F. G. discussion	2	2	2	2	1	1	10
Instructors	Questionnaire	16	19	132	11	14	7	99
Dept. heads	Questionnaire	1	1	1	1	1	1	6
President	Interview			1				1
Vice presidents	Interview			1		1		2
Faculty deans	Interview	1	3			1		5
Women groups	Questionnaire	-	-	-	-	--	-	5
Grand total		38	47	61	30	28	34	243

3.5 Data Organization and Analysis

The study was approached both quantitatively and qualitatively. Information was obtained by using different instruments from different sources. The raw data was organized into different document files.

Accordingly, the information obtained from sources were coded and entered into the SPSS computer program. The information obtained from document analysis and questionnaires were analyzed by using averages and percentages as the main tool of summarizing the data. Regarding information about the difference in achievement pattern between male and female students, four consecutive graduation year documents were used to identify how they were successful. Similarly, narrative approach was used for data from interviews and focus group discussions from the female student respondents.

CHAPTER FOUR

FINDINGS AND ANALYSIS OF THE STUDY

4.1. University Profile and Respondents' Background

4.1.1. University Profile

Arbaminch University is situated in Southern Nationalities and Peoples Region in Gamo Gofa Zone, Arbaminch town. It is found at about 500 kms south of Addis Ababa. It is bordered to south by Kenya, southwest by Gambella, and northeast by Oromia regions.

The town, the capital of the zone, is rich in natural resources. It is especially known for its beautiful lakes, Abaya and Chamo, delicious fish. The Nech Sar National Park, Crocodile breeding center and the new international air port are only a few of the tourist images that the town can be proved of.

The University was established in 1978 E.C. with the aim of fostering the country's effort in producing qualified water engineers. The weather climate of the region is based on semi arid area in the country with an average temperature of 30 -42 degree centigrade.

The study targeted six Engineering Departments from Arba Minch University. (The ten years university enrollment, dropouts and number of instructors by sex is presented in table 4.1) (See appendix – I).

As presented in the table, out of the total number of students from year 1988 – 1997 E.C. (12559) in the six departments, 11273 (89.8%) were boys as compared to 1286 (10.2%) girls. The table also presents that there are 101 (96.8%) male instructors and 4 (3.2%) female instructors in the university.

Regarding the qualification of instructors 15 (14.7%) were advanced diploma holders, (technical assistant) and 40(39.2%) were, B.Sc Degree graduates, and 43(42.2%) were MSc. holders out of whom 4 were female instructors and the rest 4(3.9%) were PhD holders.

The gender gap, that is the ratio of female to male students, is 1:26. This figure shows that there is an extreme imbalance in enrollment in favor of males. This finding is inline with the finding of Tsige (1991) who indicated that a closer look at the trend of department enrollment process in institution of higher learning of Ethiopia reveals females under representation in crucial fields of study, especially in science and technology areas. Yet, these areas are very critical for females not only in assuming full participation in the development process but also to in a position of getting the benefits of educational outcomes equally with their male counter part (Jaqueline 1970's Nijuma, 1993).

4.1.2 Respondent Students Background

All female students from (2nd, 3rd, 4th and 5th year) engineering departments from the surveyed six engineering fields were targeted to respond to the study questionnaires and interviews. Although the intended number of student respondents was 125, 115 filled in the questionnaire and duly returned the papers. Given the inevitability of non-response in any research undertaking the number of students who were cooperative in this regard was quite satisfactory. The number of female student respondents, categorized in age, is presented in Table 4.2 below.

Table 4.2: Sex and Age of Female Student Respondents

	Age		Total
	16 - 20	20 – 25	

	No	%	No	%	No	%
Intended No.	95	82.6	20	17.4	115	92

The female students who participated as respondents to the questionnaire were 115(92%). All of them responded to all the items in the questionnaire.

4.1.3 Teacher Respondent's Background

Table 4.3: Service Year of Instructor respondents

Sex	Service Year								Total	
	1 - 5		6 - 10		11 - 15		16 - 20			
	N	%	N	%	N	%	N	%	N	%
M	39	38.2	21	20.6	22	21.7	16	15.7	98	96.1
F	2	1.10	2	1.10	-	-	-	-	4	3.9
T	41	40.2	23	22.5	22	21.7	16	15.7	102	100

The total number of targeted instructor respondents was 102. However, only 99 (97.05%) completed and returned the questionnaire. Out of the total number of instructors, the overwhelming majority 95 (93.1%) of them were men only. It is thus self-evident that females extremely are under represented in the university, and particularly in the studied departments, as far as engagement in teaching is concerned.

Regarding the qualification of interviewed instructors, department heads, and Faculty Deans 15(14.7%), have advanced diploma with a technical assistant II and III academic title and 40 (39.2%) instructors have a five year BSc degree with graduate assistant I, II and assistant lecturer, 43 (42.2%) instructors was MSc graduate with a lecturer title, of 43 instructors 4 instructors were female, while 4 (3.9%) instructors were PhD degree holders.

4.1.4 Socio-Economic Background of Parents of Female Student Respondents

The research included questions intended to obtain information regarding the socio-economic background of the parents of female students. The rationale behind was to see whether the educational, occupation or economic situation of parents had some influence in encouraging or discouraging students' preference in selecting certain field of study while the latter are preparing for college. As shall be further elucidated below the assumption was found true. The analysis of the responses of students to the question demonstrated that there is an intrinsic relation between the educational status of parents and their daughters' selection of fields of study. The response of female students regarding this is shown in Table 4.4 below.

Table 4.4: Student's response about parent's socio economic characteristics

Occupation	Sex				Total	
	Male		Female		N	%
	N	%	N	%		
Government employee	53	51.9	31	26.10	84	78.00
Farmer	3	2.9	--	--	---	2.9
Trader	7	6.9	8	6.9	15	13.8
House wife	--	--	5	4.3	5	4.3
Other	4	3.9	4	3.5	8	7.4
Partners education						
no school of any kind	7	6.9	5	4.3	12	11.2
Read and write	12	11.7	9	7.8	21	19.5
Primary(1-8)	17	16.7	15	13.0	32	29.7
Secondary(9-12)	15	14.7	17	14.9	32	29.6
College or university	35	34.3	20	17.4	55	51.7

As could be seen from the table above, 84(78%) of at least one of the student's parents were found to be government employees with a certain level of education 51.7% of whom are College or University graduates. In terms of sex the proportion was that male parents working in various government and non-government organizations accounted for 51% while female parents were 26% of the total. On the whole, the educational status of parents greatly varies ranging from those who only read and write, completed primary or secondary schools to college or university graduates. Only a very small proportion 4.3% were non-literate.

This finding appears to be in line with that of Slaughter and Schneider, (1986), Who wrote that, literate parents are important influence on the educational career and/or performance of their children

Bloom and others also asserted that family educational background and home environment are strongly implicated in educational outcomes of their children (Bloom, 1982). Likewise, King and Hill (193.29) depicted that, the self- confidence of female students built in the public education system in Cairo is associated with their mothers' educational status. The more formal schooling a mother had the better she would give praise and confidence to her daughters. The standards and expectations of daughters from educated family are basically different from those of uneducated family.

This was exactly what was being reflected in female students focus group discussion sessions. Almost all discussants stressed that they owe much to their parents' advice and encouragement for their enrollment in the engineering field. The finding also confirms that female education would have far reaching repercussions in the educational future of a society as a whole.

4.2 Enrollment

The major areas of the investigation under this topic were participation /enrollment/, academic achievement pattern and drop out rates. Efforts was made to acquire relevant information and analyze the trend of enrollment and dropout for the last ten years from (1988 – 1997 E.C) in the University and particularly in engineering streams. The information is summarized and presented in Table 4.5 below.

Table 4.5: Enrollment in university by sex (1988-1997E.C)

Year	Enrollment				
	M	F	T	%F	%M
1988	365	3	368	0.8	99.2
1989	409	11	420	2.6	97.4
1990	555	22	577	3.8	96.2
1991	764	33	797	4.1	95.9
1992	968	32	1000	3.2	96.8
1993	1260	55	1315	4.2	95.8
1994	1521	35	1556	2.2	97.8

1995	1923	157	2080	7.5	92.5
1996	1487	422	1909	22.1	77.9
1997	1939	598	2537	24.0	76.4

Note: The years are given in Ethiopian calendar

As shown in the table the total enrollment data of students in the engineering field as registered during in the last ten years indicates that the enrollment of students of both sexes reveals fluctuating trend in general. The total number of students enrolled in the regular degree program in the engineering field in the last ten years has increased from 368 in 1988 to 2537 in 1997. However, the number of male students was growing faster than female students. With regard to female students at the beginning there was a fluctuating trend, and started increasing from 1996 to 1997 except a decreasing trend in the year 1992 and 1994. Comparatively female student's enrollment has shown a meaningful increment particularly from the year 1995 up to 1997.

Regarding total enrollment rate, in each year male students' enrolment by far exceeds that of females and the gap is alarming.

The ratio for each year, was found to be 1:21, 1:37, 1:25, 1:23, 1:30, 1:23, 1:43, 1:20, 1:19, 1:18, for the years 1988, 89, 90, 91, 92, 93, 94, 95, 96 and 97, respectively. This finding is in line with those of Bowman and Anderson (1982), Njuma (1993) which showed that enrolment rate of female students is very low compared to their male counterparts at all levels of schooling. The problem is, however even more pronounced when it comes to Institutes of Higher Learning. Seyoum (1991) and Ababayehu (1998) also demonstrated this when they depicted that the status of female population in Higher Learning Institutions in the third world countries like Ethiopia, is highly acute, especially in the "non traditional path way" areas of subjects, like mathematics, natural sciences and technology.

4.3 Dropout

Data on the number of dropouts was also collected and analyzed from the six engineering departments (hydraulics, Irrigation, Electrical, Mechanical, Civil and Computer science). The available data aggregated by sex is given in Table 4.6 below.

Table 4.6: Dropout in the six engineering departments by sex (1993 – 1996E.C)

Year	Dropout				Total	
	M		F		N	%
	N	%	N	%		
1993	324	6.8	25	16.0	349	11.4
1994	345	5.5	7	14.3	352	9.9
1995	325	2.2	7	28.6	332	15.4
1996	315	6.6	118	29.7	434	18.2
Total	1310	21.1	157	88.6	1467	54.9

Percentage calculation is based on the enrollment figures of the same year.

As it is mirrored in table, the proportion of students who dropout of the University for different academic and non-academic reasons has a great variation between male and female students. The percentage of dropout males in the years 1993-1996 was 21.10% and that of female dropouts is 88.6%. From the above finding female dropout rate is extremely higher than that of males. In order to know what the contributing factors for this reality female students and Heads of the relevant Departments were asked to indicate major factors that enforce females to drop out.

Table 4.7: Female's Perception of Major Factors for Dropping-out

Deterring factors	Girls ratings		
	High	Medium	Low
Environmental problems	63.1	24.7	10.2
Economic problems	1.1	2.1	40.3
Dislike of the curriculum	2.3	4.3	25.5
Difficulty in the subject area	2.6	4.5	37.1
Discouragement from teachers frequently	3.5	18.1	42.3
Health problem	46.2	33.4	11.2
Lack of separate facilities in the university	3.1	21.2	25.3

The table shows that girls rated environmental problems as the main deterring factor that led girls to dropout of the university, while health problem is rated as the second.

The two most deterrent factors are assumed to have their own repercussion in that one factor leads to the other and affect each other reciprocally. But in contrast, Economic problem, difficulty in the subject area, and dislike of the curriculum were rated low as factors entailing female students' dropout.

Table 4.8: Instructors' perception of reasons for high girls' dropout rate



Deterring factors	Instructors' Ratings		
	High	Medium	Low
Dislike of the curriculum	3.5	9.2	30.7
Economic problem	2.2	3.2	44.3
Environmental problem	40.2	21.5	4.1
Difficulty in the subject area	2.1	5.6	32.5
Discouragement by instructors	-	1.2	40.5
Health problem	39.5	8.3	4.2
Lack of separate facilities in the university	3.1	10.5	34.6

Instructors' ratings of factors that influence female students to dropout are almost similar with that of the ratings of girls themselves. The proportion was that environmental problems accounted for (40.2%) and health problem (39.5%). From this we can say that environmental and health problems are the two main deterring factors that force girls to dropout more than any other factor.

Table 4.9: Department Heads ratings of factors that force females to drop out in percent.

Deterring factors	Department Heads rating		
	High	Medium	Low
Dislike of the curriculum	10.5	12.3	35.2
Economic problem	1.2	9.7	39.2
Environmental problem	47.7	13.7	4.3
Difficulty in the subject area	8.7	17.6	31.2
Discouragement by instructors		3.2	49.3
Health problem	34.2	13.3	9.7
Lack of separate facilities in the university	11.5	15.0	31.0

It is interesting to see that the information obtained from female students about the major factors that aggravate the dropout rate of female students was found similar to what was set forth by instructors, department heads and other officials of the University.

As it is indicated in table 9, Environmental factors (47.7%), and Health problem (34.2%) Department heads rated as the main hindering factors that lead to females to drop out. This finding is also more closely related to females' and instructors' response shown earlier. In general there seems a general consensus that these two factors take the

loin's share in making life difficult that often become the main cause of dropping out of female students.

This phenomenon is peculiar to Arbaminch University and probably other Institutions of Higher Learning located in similar geographical and climatic conditions. As indicated in the introductory section, Arbaminch is one of the semi-arid areas in the country with an average temperature of 30degree centigrade arising to 42 and above degree during the hottest season. It is also one of the areas prone to very serious malaria infestation. Students coming from highland areas would often find it difficult to stand the weather, while most, if not all would fall sick of malaria usually repeatedly (2-6times over on the average) within a given semester. It is therefore not surprising to know that these two factors are the predominant factors entailing high dropout rate.

4.4. Academic Achievement

An effort was made to know whether or not there is a significant difference in academic achievement between boys and girls starting from their freshman enrollment year up to their years of graduation (see Table 4.10).

Table 4.10: Academic achievement of regular degree students in engineering streams during the last four consecutive graduation years (1989-1996)

Year	Enrollment					Year	Graduate				
	T	M	F	%M	%F		T	M	F	%M	%F
1989	229	224	5	97.8	2.2	1993	65	60	5	26.8	100.0
1990	394	379	15	96.2	3.8	1994	157	152	5	40.1	33.3
1991	653	628	25	96.2	3.8	1995	215	206	9	32.8	36.0
1992	828	801	27	96.7	3.3	1996	311	298	13	37.2	48.1
							Total			34.3	72.5

It is clear from the table that there is a significant difference between male and female enrollment the proportion being 89.8% and 10.2% respectively. However, unlike the commonplace attitude that engineering field is a "male's domain", the achievement pattern of female students was found to be much better than that of their male counterparts. The percentage of female achievement pattern in the Years 1993 – 1996EC was 72.5% while that of male was 34.3%.

It should be noted here that by achievement it is meant successful completion of the program and obtaining degree or diploma. The above statistics therefore shows that out of all male students enrolled those who succeeded to graduate during the last four batches were only 34.3% while more than three quarters of girls of the same batch could complete their studies. This finding discredits the common stereotype that girls/women are fit only for the social sciences and humanities whereas only males are fit to engineering and natural sciences. It could therefore be concluded that girls could do equally or even better than boys in the engineering fields had they equal opportunity to enroll.

This finding is in line with the finding of Namuddu (1995) who among others have succinctly posited that, female students who complete secondary school do not go on to acquire useful skills needed in the world of work. As such their secondary education is unlikely to have increased their chance of raising their incomes. She further confirmed that, many factors influence female secondary enrollment and dropout rates, which together set the limits for female tertiary enrollments. It follows then in order to promote females both in their participation and achievement, pro-active (incentive) policies are needed both at the secondary school level and at the University level that would induce females to opt for science and engineering.

4.5 Instructors' Attitude

Instructor respondents were asked in the questionnaire related to the teaching-learning process. The first question focused on whether they prefer teaching girls or boys. Table 14:11 summarizes the results.

Table 4.11: Instructor's preferences of teaching in both sexes

Teacher's preferences	No	%
Male	6	5.9
Female	1	0.9
Makes no difference	84	82.4

Majority of teacher respondents, 84(82.5%) claimed that they see no difference between males and females. This is also confirmed from the interview with faculty Deans. One of the interviewed faculty Dean, said that:

Teaching both female and male students in class by itself is not as such a problematic matter in the teaching – learning process.

4.5.1 Instructors' Understanding of Gender Issues in Education

One of the items in the questionnaire was about the level of understanding of instructors regarding gender issues in education. Table 4:12 summarizes the result.

Table 4.12: Instructors' Gender Awareness

Instructors awareness of gender issue	No	%
Sufficient	65	65.7
Average	21	20.6
Insufficient	4	3.9

As it is depicted in table 13, 65 (65.7%) of instructors indicated that they had sufficient awareness about gender issue in relation with education. Nevertheless, 21(20.6%) had average understanding and 4(3.9%) had insufficient understanding about gender in relation to education. The above findings indicate that majority of instructors have sufficient understanding about gender issue education. This implies that, being aware of gender issue in education by the instructor is vital for improving females social and psychological problems in teaching learning process. Hence, a lot is required on the part of concerned body of the institution by creating gender related issues awareness on the part of instructors.

4.5.2 Instructors' Perception of Girls' Classroom Activities

There was an item in the instructor's questionnaire, which requires the response of instructors towards the activities of girls and boys in class, in order to draw out information about the behavior of female students in class. The information obtained is given below.

Table 4.13: Instructors opinion of boys and girls class activity

Activities	Instructors opinion
------------	---------------------

	M		F		Both	
	N	%	N	%	N	%
Asking and answering questions in class	53	51.9	20	19.6	16	15.7
Doing homework and assignment	47	46.1	31	30.0	15	14.7
Paying more attention during class	42	41.2	38	37.3	11	10.9
Feeling more independent in class	67	65.7	19	18.6	5	4.9
Attending class regularly	52	50.9	40	39.2	4	3.9
Self-confidence	61	59.8	20	20.2	9	8.8
Self-efficacy	64	62.7	20	19.6	12	11.8

As it is mirrored in the above table, 40(39.2%) of instructors indicated that female students pay more attention during class, attend class regularly do homework and assignments and have self-confidence in their studies. 67(65.7%) instructors indicated that male students feel more independent in class, attend class regularly and feel more self-confident in asking and answering question in class. 20 (19.6%) instructors pointed out female students have low self-efficacy, while 64(62.7 %) instructors indicated that male students have high self-efficacy

This finding, in line with Bandura et al's self-efficacy approach that, indicates that self-efficacy is useful in understanding the under use of real abilities on the part of female groups. He and his associates formulated a self-efficacy model to explain females under representation in male dominated career areas, in that the socialization women lead to insufficient exposure to sources of information that would lead to the development of strong expectations of efficacy with respect to many traditionally male-dominated career fields, particularly those of the engineering fields. (Gaill Hae Kett and Bandura 1977). Hence, the concerned bodies, are required to encourage female students understanding of the field. Academic institution should also provide guidance and counseling service to help girls develop self-confidence and a belief that they can achieve as equal as their peer opposite sexes.

In order to know whether or not parents support their daughters in the latter's education, an item in the questionnaire was added and the answer given by respondents is discussed below.

Table 4.14: Female Student's response about the attitude of parents towards their education

Statement of attitudes	Mothers		Fathers		Total	
	N	%	N	%	N	%
Support my education	55	47.8	49	42.6	104	90.4
Does not support my education	4	3.5	3	2.6	7	6.1
Is indifferent	-	-	-	-	-	-

As it is shown in the table 55(47.8%) male students and 49(42.6%) female students clearly described that, the attitudes of parents towards their education is unquestionable. This finding confirm the finding of Anderson 1990 who indicates that parents attitude towards their education are important, because of their children's affective ties to them, because they are the children's most enduring teachers, and because our democracy recognize parents as that person legally responsible for the child's welfare.

This finding indicates that, positive educational attitude from parents to their daughters is of great importance to girls' academic success.

Female Students Reason for Subject Preference

Educational inequality is perpetuated owing to the emphasis given to the "traditional path way" of allotting fields of study such as language, social science, economics, etc., to females and deliberately separating them from other fields designated as "non traditional path way" areas of subjects, like mathematics, natural science and technology. Consequently, few female students incline to choose the 'non traditional pathway' areas of subjects like engineering. In the female students questionnaire there was an item that rate why few female students choose engineering than non-engineering fields. The information obtained is given below.

Table 4.15: Female ranking towards why choosing engineering fields than non-engineering fields

Preferences	Girls ratings							
	1st		2nd		3rd		4 th	
	N	%	N	%	N	%	N	%
Interest in the field	18	15.6	12	10.4	17	14.8	25	21.7
Job opportunity	54	46.9	36	31.3	5	4.3	3	2.6
Job applicability	38	33.0	25	21.7	15	13.0	3	2.6
Based on technological application	3	2.6	6	5.2	24	20.9	34.0	20.0

Table 15 shows that the majority 54(46.9%) and 38(33%) female students rank job opportunity and job applicability 1st and 2nd choice as the reasons for choosing engineering, where as 25(21.7%), females rank interest in the field and technological application was put in the fourth place. This finding appears to be in line with the response to the interview made with Presidents and Faculty Deans of the University. One of the interviewed faculty Deans said:

There is a tendency to listen to the senior friends or family members in choosing field of study rather than to seek one self. What subject interest them is not what matters in the choice but, sometimes which field of study is prestigious also matters (like medicine, law)

One of the interviewed Vice-Presidents also supported the above assertion and said:

The reason, way few female students had some knowledge of the engineering fields is because most of them came from big cities and educated families.

This finding appears to be in line with information obtained in focus group discussions made with female students. It was stressed that:

Girls tend to decide on their first choice usually due to the positive enforcement of the family and the society, though, there are few students who choose this field because of their good background in physics and mathematics.

4.5.3 Instructors' Opinion as to why Females Choose Engineering Fields

Table 4.16: Instructors ranking as to why female choose engineering fields

Opinion	Instructors ratings							
	1st		2nd		3rd		4 th	
	N	%	N	%	N	%	N	%
Interest in the field	13	12.7	10	9.8	29	28.4	39	38.2
Job opportunity	53	52.1	30	29.4	10	9.8	2	1.9
Job applicability	49	48.0	33	32.4	15	14.7	3	2.9
Based on technological application	13	12.7	11	10.9	38	37.3	27	26.5

As could be seen in table 4:16, Instructors', ranking of reasons that compel female students to choosing engineering are similar with that of girls. Accordingly job

opportunity 53(52.1%) and job applicability 49(48%) are ranked as first and second main reasons for preference to choose engineering, while, in relation to technological application 38(37.3%) and interest in the field 39(38.2%) were ranked third and fourth respectively.

4.6 Female Opinion of Encouraging Factors for Choosing Engineering Fields.

In order to know whether or not there is any motivational factor that lead or enforce girls to choose engineering, there were items in girl's questionnaire that to rate which motivational factors influenced their choice The information obtained is given below.

Table 4.17: Females response towards motivational or encouraging factors that lead to choose engineering in percent.

Encouraging factors	Girls rating	
	N	%
Family encouragement	49	42.6
Environmental exposure	16	13.9
Teachers' and friends' awareness	18	15.7
Good educational background of families	32	27.8

As it is depicted in table 49(42.6%), female students rate that, family encouragement is the most important motivational or encouragement factor that led them to choose engineering and 32 (27.8%) students rated that families good educational background was also the second most important encouraging factor. In conformity with the previous finding concerning educational background of female students' parents, it was found that the literacy status of parents could have a strong influence on their children's career choice as more educated parents would very likely give clear directions.

This was also further confirmed during a focus group discussions with female students. They underscored:

Most of us came from families with good educational background and good environmental exposure that can create awareness from the

society. Definitely, beside our interest, family encouragement was a tremendous factor for choosing the field.

Table 4.18: Instructors ratings towards academic achievement /performance/ of female and male in different subjects in percent

Subjects	Female rating					
	Females			Males		
	High	Medium	Low	High	Medium	Low
Mathematics	28.5	30.3	29.7	45.3	30.1	15.3
Social science	48.2	30.3	11.5	40.2	28.7	13.2
Language	46.3	38.2	9.2	32.5	35.8	28.1
Engineering	30.5	25.7	33.3	47.7	30.9	12.7

As it is disclosed in table 19 46.3%) instructors seemed to harbor the idea that female students have high academic performance in subjects like language and social science and (33.3%) and low academic achievement in subjects like engineering and mathematics while (47.7%) as opposed to their male counterparts.

This perception is not uncommon. For example Bett and Hackett (1983) argued that females might perform better in the social sciences and humanities than they do in the standard male-dominated fields. In this connection, Kelly (1978), argued that, in most developed countries the data suggest that at primary school girls perform at the same level as boys, at the secondary level they begin to do more poorly. This variation appears to be partly related to subjects, for girls continue to do as well as boys, sometimes even better in reading ability and language learning. However, they invariably fall behind in mathematics and technologies, which in most countries are more highly valued and lead to prestigious and better paying jobs. However, it would be non-rational to deduce that girls are totally poor in engineering fields. Indeed they

could perform better in the so-called male domain fields as could be seen from the findings concerning achievement patterns in section 4.4 above.

Table 4.19: Responses of female towards factors deter not to complete their assignment out of class

Deterring factors	Female rating	
	N	%
Lack of textbook	55	47.8
Lack of library	47	40.8
I do not have time for assignment	7	6.0
I do not usually understand lesson given	12	10.4

As it is indicated in table 20, 55(47.8%) lack of textbooks, and 47(40.8%) reported that lack of well-organized library are the main factors that deter female students from properly doing their assignments out of class.

Insignificant number 12 (10.4%) of boys and 7(5%) girls indicated that lack of time and problem of understanding the lesson given in class are also among the deterring factors.

4.7 Females View Regarding Availability of Institutional Support to their Academic Life

In the student's questionnaire, there was an item that was intended to know whether or not there is an institutional support specifically meant to support female students in their studies. The response obtained from female students is given below.

Table 4. 20: Female Student's response towards instructional support in percent

Supporters	Student's Response		
	High	Medium	Low
	%	%	%
Teachers	22.1	14.2	49.8
Student friends	33.5	25.6	39.8
Counselor	4.1	15.3	59.8
Women representative of the University	53.2	16.4	57.1

The result in table 4.20 portrays that the vast majority of the respondents indicated that the support they got is insufficient. Only 21.12% and 33.5% asserted that they get

support from their teachers and friends respectively to overcome what ever problem they happen to encounter, while 59.8% and 57.1% of them stressed that that they had low support and counseling. This is despite the fact that there are important offices of the University which are meant to help female students (i.e., women groups and guidance and counseling office). In this connection Cases and Rocha (1992) suggest that, female should be encouraged and be provided with appropriate support both in their academic and non-academic problems. They further elaborated that:

The strengthening of female individual's self-confidence concerning the pursuit of a science and engineering degree may be an important buffer to the lack of support or worse overt discrimination. Thus, our intervention regarding retention should be directed at both helping individuals and improving the institutional climate (1992: 48).

Table 4.21: Instructor's Perception of the factors that facilitate or hinder to join the engineering fields before joining the University fields

Perception	Instructor's Rating							
	Very High		High		Moderately low		Low	
	N	%	N	%	N	%	N	%
The effort and ability to gain knowledge of engineering	40	34.9	14	12.2	25	21.7	5	4.3
Encouragement obtained from family, friends, teachers and the society to be effective in engineering field	33	28.7	19	16.5	14	12.2	26	22.6
Psychological barriers that hinder females in joining the engineering fields	48	49.5	26	26.8	14	12.2	3	2.6
Societies stereotypes and cultural hinders the participation of females in the fields	49	51.0	30	31.0	6	5.2	5	4.3

Perception is an important factor in facilitating or hindering an individual's performance. In this study it is attempted to find out how instructors perceive the performance of girls in engineering fields and how female students feel about their instructors' attitudes towards girls education in engineering fields is conceived to be useful for the concerned

issues in general and the students as well as instructors in particular to address the problem of female students in their study.

As depicted in table 4.22, instructors strongly claimed that social stereotypes and cultural beliefs hinder the participation of female students in engineering field. This factor has been rated as very high, high, moderately low and low by 51% (49), 31.0%(30), 5.2%(6) and 4.3%(5) respectively by instructors who participated in the study. The second important factor that negatively affects female participation in engineering field as perceived by instructors is psychological barriers which is rated as very high, high, moderately low and low by 49.5%(48), 26.8%(26), 12.2%(14) and 2.6%(3) respectively.

The effort and ability of girls to gain knowledge of engineering as affecting girls education in engineering field is rated very high, high, moderately low and low by 34.9% (40), 12.2%(14), 21.7(25) and 4.3%(5) respectively by instructors.

On the other hand, encouragement obtained from family, friends and teachers from society in general, as considered to be the factors that facilitate to join engineering is also rated as very high, high, moderately low and low by 28.7%(33), 16.5%(19), 12.2%(14) and 22.6%(26) respectively.

This shows that, instructors perceive social stereotype, cultural and psychological barriers to affect girls education in engineering fields.

This finding appears to be inline with the finding of Draman et. al.(1981) who pointed out that, psychological barriers to the pursuit of scientific and engineering careers can be viewed as male adoptive cognitions or beliefs about themselves in relationship to science, math, and technological careers. He further elaborated in relation to stereotypical roles that, female students may avoid career areas where they perceive they will be one of the few or only members of their gender and because occupational stereotypes reflect the realities of gender segregation in the occupational world, there are fewer female role models for girls to emulate.

Table 4.22: Girls' Perception of Their Instructors' Behavior

Engineering Instructor's Behavior	Females Rating					
	Agree		Moderately agree		Disagree	
	N	%	N	%	N	%
Females can be effective equally as boys in the engineering field	42	36.5	31	32.0	16	13.9
Engineering is not comfortable and difficult to females	18	15.7	24	20.9	50	52.0
Females are gifted in social science and language instead of engineering field	41	42.3	26	28.9	25	25.8
Naturally males are more scientifically creators and researchers	20	20.6	28	28.9	44	45.4

Female students were asked to rate the perception of instructors towards girls education in engineering field. As shown in table 4.22 female students of the University believe that instructor's perceive females to be effective in engineering field as boys. In response to the idea that engineering is not comfortable and difficult to females 15.7 % (18), 20.9 % (24) and 52.0% (50) agree, moderately agree and disagree respectively. They believe that instructors do not perceive as if engineering field is discomfortable and difficult to female students.

Regarding sex related difference in ability on different subjects 42.3% (41) of the respondents agree with 28.9% (31) moderately agree and 25.8% (25) of the respondents disagree. In line this, 20.6% (20) of the instructors said males are naturally scientifically creators and researchers, 28.9% (28) responded moderately agree and 45.4% (44) said disagree.

Hence, from the respondents view females are gifted in social science and language instead of engineering fields.

Table 4.23: Female's attitude towards the field of engineering

Perception	Girls Rating					
	Agree		Moderately agree		Disagree	
	N	%	N	%	N	%
Females can be effective equally as boys in the engineering field	40	41.2	38	39.2	19	19.6
Engineering is not comfortable and difficult to females	20	20.6	26	26.8	51	52.6
Females are gifted in social science	22	22.7	31	31.9	44	45.4

and language instead of engineering field						
Naturally males are more scientifically creators and researchers	28	28.9	30	30.9	39	40.2

In order to relate the information or the perception of female students with their engineering instructors' behavior, female students were asked to express their attitudes towards the field of engineering.

As depicted in table 4.23, 41.2% (40), 39.2% (38), 19.6% (19) of female students agree, moderately agree and disagree respectively with the idea that females can be equally effective as boys in the engineering field.

In response to the statement engineering is difficult to females', 20.6% (20), 26.8% (26) and 52.6% (51) mentioned agree, moderately agree and disagree respectively. They have also indicated that they disagree to the concept that naturally boys are more scientifically creators and researchers'. In relation to sex difference inability in different subjects, 22.7% (22), 31.9% (31) and 45.4% (44) of female students in the study responded agree, moderately agree and disagree respectively to the concept which is stated as females are gifted in social science and language than engineering fields.

Table 4.24: Instructors perception of females in the field of engineering

Perception	Females Rating					
	Agree		Moderately agree		Disagree	
	N	%	N	%	N	%
Females can be effective equally as boys in the engineering field	39	40.2	37	38.1	19	19.6
Engineering is not comfortable and difficult to females	17	17.5	27	27.8	45	47.4
Females are gifted in social science and language instead of engineering field	40	41.2	25	25.8	23	23.7
Naturally males are more scientifically creators and researchers	15	15.5	30	31.0	49	51.0

Instructors were asked to rate their own perception of female students in engineering fields.

As shown in table 25 University instructors believe that, females can be effective in engineering field equally as boys. In response to the idea that engineering is not comfortable and difficult to females, 17(17.5%), 27(27.8%), and 45 (47.4%) are rated agree, moderately agree and disagree respectively. Instructor's strongly conceived that engineering field is as such not difficult for female students. Regarding sex related differences in ability on different subjects, 40(41.2%), 25 (25.8%) and 23(23.7%) instructors responded agree, moderately agree and disagree respectively. Instructors claimed that comparatively females are gifted in social science and language instead of engineering fields.

In response to the idea that naturally males are more scientifically creators and researchers, 15(15.5%), 30 (31.0%) and 49(51.0%) respectively agree, moderately agree and disagree. Thus, from above table instructors strongly claimed that males are naturally not researchers and scientifically creators.

From the above finding, there is a positive relationship between the perception of instructors and female students towards the effectiveness of females in engineering fields and to the statement which reads as engineering is discomfort able and difficult to female students. Both groups agree that females could be equally effective as boys in engineering fields and disagree that engineering is discomfort able and difficult to female students.

But there is a difference of perception regarding subject related difference in ability. Most instructors agree that females are gifted in social sciences and languages. Female students disagree in this statement.

In general, the findings indicates, that there is a positive perception on the instructors side on the females effectiveness in engineering fields, reciprocally females have also positive perception of their engineering instructors behaviors towards their academic effectiveness in engineering fields. Having such good perception of female is considered to be vital for developing confidence in their filed of specialization.

4.8 Women's Response Towards Institutional Effort to Sensitization in the Campus Climate and, Sufficiency of Academic Support Service in the University

In the women's questionnaire, there was an item that requests whether or not there is an institutional effort to sensitize the campus climate and sufficient academic support service for female students to succeed.

As it is portrayed in appendix 3 in relation to items that institutional effort to sensitize the campus climate, almost all respondents of female groups indicated that, nothing has been done regarding the issue by the University.

4.9 Women's response towards sufficiency of academic support service

Academic support service is an important factor in facilitating or retarding female students in institution of higher learning. In this study it is tried to find out how the institution had provided academic support to female students in order to alleviate their academic other problems during their study. As shown in appendix 4, women groups strongly claimed that, provision of consultation service, tutorials, academic counseling, counseling, mentoring, and compensatory education has been rated as adequate (20%), indifferent (20%) and not at all (80%) respectively, while other services, borrowing service of reference books and texts, supply of stationary, financial package and entertainment, has been rated as, adequate (60%), and not at all (40%) respectively. Those achievement improving strategies like (tutorials, guidance and counseling, i.e. academic or personal, mentoring, borrowing service of reference, text, compensatory education are mentioned not provided by the institution at all.

For cross checking purpose, the representative of the women group in the university were inquired. The response of the respondents correspond with the officials' the absence of such special achievement improving strategies like tutorials, guidance and counseling (academic or personal) mentoring, and financial package. Thus the above finding confirmed that, little has been done regarding an academic support for female students by the University to promote their education.

4.10 University Related Factors

University facilities and the University environment can enhance or hinder female students' performance and participation. University facilities encompass teaching materials and infrastructures related to facilitate teaching learning process. In the department heads questionnaire, there was an item that requested department heads to views regarding University facilities. The information obtained from item is summarized in a table (see appendix II)

It was found that the University under study was not well facilitated. Important University teaching facilities, library, reading room, a textbooks and clinic are not sufficiently available. Lack of teaching facilities in the University generally affects the performance of the students.

This finding appears to be in line with the findings of Seyoum (1991) and Njama (1993) who confirmed that female educational inequity regarding performance and participation (sustainability) prevail in University environment due to lack of learning support system, hostile learning environment, and other related problems. The University system, impedes the participation and performance of female students. Thus, high attrition and low retention rate characterize female education at large and this gets worse at institution of higher learning.

Institutional and Political Factors

Different efforts were made in the country, in order to mitigate the problems and to enhance girls at various levels of education. The government has been positive regarding open policy environment and undertaking the promotion of girl's education. From an interview made with the President, Vice-presidents, and Faculty Deans, regarding the intervention efforts of girls in engineering subjects at school or preparatory levels the following points were suggested.

- Make proper awareness rising that engineering is not meant for males only and raise girls' interest.

- More money for the evaluation of model programs for recruitment and retention of girl members is needed. And more money for basic research on the psychological factors related to choosing and persisting in science and engineering major is necessary, especially because such research can help design effective interventions.
- Offer more courses in mathematics and physics at high school level with competent teachers.
- As more female members pursue the sciences and engineering, more teachers from these groups should be visible at the secondary school, college and University levels.

In addition to this:

Regarding the intervention efforts to promote girls in engineering subjects at school and preparatory level, the following points were suggested from female students at a focus group discussion:

- Keeping their interest together with their GPA.
- Doing something about making student ready for engineering at high school /at preparatory level. That is to say, instead of relying on the physics and mathematics background of the students to join engineering, they put as a quotation:

There should be a separate syllabus which is directly relevant to the various field of engineering just like what is true of other subjects eg. mathematics, physics, etc., during high school studies.

- The society in general and the family in particularly should not bias the students by feeding misinformation, such as engineering is the best or medicine is the best. Instead they should encourage student's /children/ to go their own way.

Among the intervention at University level to promote girls in engineering fields are:

- Offering supplementary classes on courses where there is deficit.
- The University can offer alternative mechanism of tutorials.
- The teacher should spend more time with his/her students after normal classes.

It is possible to deduce from the above findings that political situation is convenient for female education. However, at practical level, there is clearly a need to give special attention to programs in the physical science and engineering, and intervention efforts should focus on both choice and retention issues in higher education by the concerned governmental institutions so as to enhance the participation of female students in this particular field of study.

CHAPTER FIVE

5. SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The main focus of the study was to assess the participation (enrolments) and performance (achievement) of female students in engineering fields of AMU. The study was also intended to investigate the main cultural and other constraints that contribute to facilitate or hinder the participation and performance of female students in the engineering fields.

In order to achieve the objective, different topics related to the females participation and performance in education, primary, secondary and tertiary level globally and locally, constraints to female education, benefits of female education and approaches to overcome constraints were discussed in the review of related literature. In order to understand the explanatory conditions, issues related to the socio-cultural, socio-economic, Political factors and Institutional factors possible investigation was discussed.

In order to carry out the study, multiple of qualitative and quantitative methods was adopted. To collect the required information, different data collection instruments were used. These were, document analysis, questionnaire, guided interviews, and focus group discussion were used. In order to secure the data from document analysis and questionnaire, statistics such as percentage were used. Data secured from focus group

discussion and guided interviews were approached using narratives including provided by respondents. Finally the study noted up with the following findings.

Main Findings of the Study

University Profile

The gender gap, that is the ratio of female to male students enrollment for the year 1988-1997 E.C is 1.26 which indicated male enrollment exceeds extremely female enrollment.

Regarding instructors qualifications 15 (14.7%) of them are diploma and advanced diploma holders (as a technical assistant), 40(39.2%) are B.Sc degree holders, and 43 (42.2%) were MSC degree holders out of whom 4 were female. Instructors, 4 (3.9%) are PHD degree holders. In the observed university the overwhelming majority of instructors were men and, it is thus self- evident that, females were extremely under represented in the university.

Background of Respondents (Students and Instructors)

The majority of the students respondents aged from 16-20 years and the rest 20(17.4%) respondents were between 20-25 years old. Regarding the instructors respondents service years, most responding instructors 39 (8.2%) have a service of 1-5 years and the rest are ranging from 21 (20.6%) 6-10, 22(21.7%) 11-15 and 16 (15.7%) 16.20 service years. Relatively when we compare the service year the instructors they have sufficient year of experience. In regard to the socio-economic characteristics of parents, 84 (78%) of the respondents responded that, most of them were found to be government employees with a certain level of education graduated from colleges and universities very small proportion 4.3% were non-literate. This indicates that, the

educational status greatly various ranging from those who only read and write, completed primary, or secondary schools to college and university graduates.

Enrollment

The trend of enrollment in the university from 1988-1997e,c during the last ten years indicates the enrollment of both sexes reveals fluctuating trend in general. Regarding the total enrollment rate of female students at the beginning, there was a fluctuating trend, and it started increasing from 1996 to 1997 and decreasing trend from 1992 to 1994. Comparatively female students enrollment had shown a meaningful increment particularly from the year 1995 up to 1997.

The gender gap, which female- to male enrollment ratio, is a perfect indicators that male enrollments was alarming.

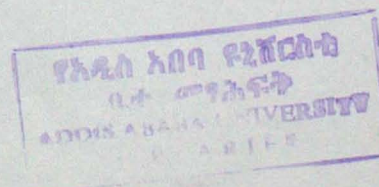
Attitudes of parents towards their children's education is one of the main indicators of socio cultural characteristics. Female students and instructors indicated that, educational background of parents is most important to educate children.

Dropout

The percentage of dropout for males in the year 1993-1996 was (21.10%) and that of female was (88.6%), which indicates female dropout rate was extremely higher than that of males. Environmental problems is indicated as the main factors that led to students to drop out. Health problem is also rated as the second deterring factor by students, instructors and department heads. This indicates that the information obtained from female students about the major factors that aggravates the dropout rate of female students was found exactly similar to what set by instructors, and department heads of the university.

Academic Achievement

Unlike the common place attitude held by that engineering field is a "male domain", the achievement pattern of female students was found to be much better than that of their



male counter parts. The percentage of female achievement pattern in the years 1993-1996 E.C was 72.5% while that of male was 34.3%.

- Regarding academic achievement of girls and boys in different subjects instructors seemed to harbor the idea that female student have high academic performance in subjects like language and social science 46.3% and low academic achievement in subject like engineering 33.3% while 47.7% as opposed to their male counterparts. However from the above statistical data, it would be non- rational to deduce that girls are totally poor in engineering fields. Indeed they could perform better in the so called "male domain" fields as could be seen from the above data relatively and from the findings concerning achievement pattern in section 44 above.

Why female choose engineering fields

- Most of the students' and respondents' ranking of reason that female students to choosing engineering are similar with that of the instructors. Job opportunity 53(52.1%) and job applicability 49(48%) are ranked as first and second main reasons for choosing engineering while interest in the field was ranked fourth in the information obtained from female students about the main reason that choosing engineering field was found similar to what set instructors of the university.

Factors that Facilitate Choosing Engineering Field

Regarding motivational factor that led to choose engineering fields, the majority of female student respondents and female students in the focus group discussion indicates that, family encouragement 49(42.6%) and families good educational background 32(27.8%) are indicated as the main factors that facilitate female students to choose engineering fields.

Factors that hinder females students to join the engineering fields.

Majority of the instructor respondents strongly claimed that, social stereo types and cultural beliefs 49(51.0%) psychological barriers 48(49.5) and the effort and ability of

girls to gain knowledge of engineering rated as the factor that hinder the participation of female students in engineering field.

Institutional effort to sensitization, the campus climate and sufficiency of academic support service in the university

Regarding institutional effort to sensitization the campus climate, the majority of female respondents from the focus group discussion and women representative of the university indicate that, nothing had been done regarding on the issue by the university.

Institutional Effort Towards Sufficiency of Academic Support Service

Women groups strongly claimed that, those achievement improving strategies like, tutorials, guidance and counseling (academic or personal,) mentoring, borrowing service of reference, text, compensatory education are indicated as not provided by the institution at all.

University Related Factors

Regarding university facilities, it was found that, important university teaching faculties like library, reading room, textbook and clinic are not sufficiently available. In relation to understanding about gender issues majority of 65 (65.7%) of instructor respondents have sufficient awareness about gender issue in education.

Most respondent instructors indicated that, male students develop self –confidence, feel more independent in asking question, and females show low self-efficacy approach in class.

5.2 Conclusions

- Based on the findings of the study it can be concluded that, female participation (enrollment) in Arba Minch University is encouraging. The gender gap that is the ration of female to male students is 1: 26. This figure shows there is an extreme imbalance in favor of males. However, female enrollment rate has shown a meaningful trend in the recent years.

- Regarding female students drop out in the university education, compared with their male counter parts is extremely higher. Environmental and health problem are rated as the main problems that compel females to drop out for the university.
- From the achievement pattern of both sexes, it has been rational to deduce that unlike the common place attitude that engineering field is a "male domain", the achievement pattern of female students was much better than the males achievement.
- The majority of women reported that, institutional efforts to sensitization the campus climate and sufficiency of academic support service in the university are not provided to the students. From this we can conclude that, the university did not make them aware through orientation, campaign and conference so far.
- A significant number of instructors and department heads reported that there are shortage of university facilities like library, reading room and clinic materials.

5.3 Recommendations

1. The enrollment rate from 1995 – 1997 had shown a significant increment of female students. Hence, the university has to work more on awareness raising process to encourage the enrollment of female students in engineering fields.
2. There are many factors that affect enrollment rate of girls in the university, which includes stereotypes such as cultural barriers, institutional and environmental situation. Hence, the university has to be expected special physical protection traditionally they often demand special concern for privacy and social reputation and built self- confidence and morale to continue their education.
3. Since the role of education is an investment in development, it has to be considered as the only instrument of peaceful social change. It must be recognize in that the need for a serious concerted commitment academic support service for

girls. In light of this, providing tutorial services is one critical and effective measure for enhancing the academic performance of female students and consequently reducing their attrition rate resulting from academic dismissal. However, the academic support service was not provided by the institution. Therefore, concerned bodies of the institution must organize tutorial services, offering supplementary classes where there is a deficit and sufficient orientation to female students on a regular basis.

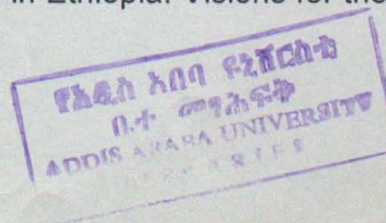
4. The learning environment of higher education is comprised of various elements that collectively influence the overall atmosphere and seriously affect the well-being of female students and adversely influence their ability to survive. It is an environment that respects differences, in gender abilities, in kind and degree in culture. As the finding indicated, the dropout out rate of female students is higher than male students in the institution due to many factors such as health and environmental problems. Thus, to minimize these problems the institution should concern more with females physical and morale safety effectively by providing sufficient health care and other recreational facilities.
5. Guidance and counseling (academic or personal) to female students is vital for their success. So, counselors must encourage and give enough information to female students to avoid female psychological and social problems.
6. Job opportunity and job applicability are the reasons for female students choosing of engineering fields. However, as the finding indicated, the interest of female students towards choosing the field was neglected. So, concerned bodies must work hand in hand by providing awareness raising programs to female students to choose based on their full interest.
7. Engaging in activities aimed at increasing female students participation in engineering fields is really a tansformatory undertaken since it involves trying to change people's beliefs and attitudes towards females. Such field can referred as

gender sensitization which must be conducted through seminars, conferences, work shop, and other forums.

8. Educational facilities enhances the teaching- learning process in a proper manner. Classrooms, workshops, laboratories, reference materials are used by instructors to provide educational support to facilitate learning. But, the research indicated that facilities were not sufficiently available. Therefore, to achieve better performance and participation of female students in engineering field the university should fulfill the necessary instructional facilities in each department.
9. Teacher attitude, behavior and teaching practice are the most important implication of female students enrollment and academic achievement. Hence, teachers should encourage female students to increase the enrollment and to bring sufficient gender awareness in education practically.
10. Parental attitudes has strong influence on the decision to educate female students. The finding indicated, that the background of parents towards education was high. Thus, the university should involve parents to encourage the participation of female students using different types of information discrimination mechanisms to aware the community and parents about educational information the benefits of female education.
11. The gender gap expectation was the most problem of female students in the institution. The educational inequality affects the education of female students in their access, success and out comes at all levels. Hence, the institution should promote progress of their status and give equal access of educational opportunity to female students.

REFERENCE

- Abebayehu Aemeour. (1998). "**Problem of Gender Equity in Institute of Higher Learning in Ethiopia.**" *Quality Education in Ethiopia: Vision for the 21st Century.* Addis Ababa: IER, AAU.
- Acker, S. (1984). "**Sociology, Gender and Education**", in Sandra Acker et. al (eds). *World Yearbook of Education*, New York: Nicholas Publishing Co.
- Almaz Eshetie (2001). **Achieving Gender Equity in African Universities:** Issues of Concern, Recommendations and Good Examples of Good Practice. *IICBA News Letter*, Vol. 3, No 3, pp 6-10.
- Assefa Beyene. (1991). **Female Participation and Performance in Rural Primary Schools in Ethiopia:** Addis Ababa, UNICEF/SIDA.
- Atsede Wondimagegn (1988/89). "**Women in Science and Technology in Ethiopia.**" In Tsehai Berhane-Sellassie. (Edr.). *Gender Issue in Ethiopia.* Institute of Ethiopian Studies; AAU.
- Bales, R. F., and S. P. Cohne, (1979). **A System for the Multiple Level Observation of Groups.** New York: Free Press.
- Balcknore, J. and Ja Kenway. (1993). **Gender Mater in Education Administration and Policy a Feminist Introduction.** Washington D.C the Falmen Press.
- Bandura, A. (1977). **Self-efficacy Toward a Unifying Theory of Behavioral Change.** *Psychological Review* 84, 191-215.
- Barbara Jange and Mekelich Gidey (1998). "**Gender role Models**". In Amare Asegedom et al (Eds). *Quality Education in Ethiopia. Visions for the 21st Century*



Proceeding of National Conference Held in Awassa college of Teacher Education 12-18 July, 1998 IER: AAU.

Barbara, Herz K.Subbarao, Massoma, Habib and Laura Raney. (1991). **Letting Girls Learn Promising Approaches in Primary and Secondary Education**, World Bank, Washington D.C

Bastian, A et. al. (1986). **Choosing Equality the Case for Democratic Schooling**. Philadelphia Temple University Press.

Befekadu Zeleke. (1998). **Promoting Girls Basic Education in Rural Areas of Oromia**; Quality of Education in Ethiopia; Visions for the 21st Century, Institute of Educational Research: Addis Ababa University.

Bellew, Rosemary T. and King Elizabeth M. (1993). **Educating Women: Lessons from Experience, women's Education in Developing Countries: Barriers, Benefits and Policies**, World Bank, Washington D.C.

Bellow, R, And E, Kind, (1991). **Promoting Girls and Women's Education Lesson for the Past**. PRE Working Papers No 715 Washington D.C The World Bank.

Benbow, C.P. (1988). **Sex Differences in Mathematical Reasoning Ability in Intellectually Talented Preadolescents: Their Natures Effects and Possible Causes**. Behavioral and Brain Sciences, 11, 169-183, 217-232.

Bouga, Alphonsine. (1996). **Obstacles to Women's Intellectual Development: Stereotypes of Sexual Discrimination**, UNESCO-Africa Six Monthly Journal No.13 Dakar Regional Office.

Bowman, M.J. and Anderson, C.A. (1982). **The Participation of Women in Education in the Third World**; Women's Education in the Third World: Comparative Perspectives, State University of New York.

Charlton, S.E.M (1984). **Women in Third World Development**, Boulder and London: West View Press.

Conway, Jill Ker and Bonrque, Susan C. (1993). **The Politics of Women's Education**; Perspectives from Asia, Africa and Latin America, University of Michigan.

David, Miriame. (1993). **Parents, Gender and Educational Reform**, Cambridge

Drabman etal. (1981). **Children's Perception of Media Portrayed Sex Roles**. Sex Roles

- Etta, F. Ebam. (1996), **Women in Education: It Call to Action** UNESCO- Africa Six Monthly Journal, No. 13 Dakar Regional Office 1993.
- Federal Negaret Gazeta. (1995). **The constitution of the Federal Democratic Republic of Ethiopia**: Addis Ababa.
- Finn et al., (1979). "**Sex Differences in Educational Attainment: a Cross National Perspective**", Harvard Educational Review, 49: 477-503.
- Gennet Zewide (1998). **Women in Education: A Study of Academic Performance and Participation of female Students in High Schools of Addis Ababa** Reign. IER FLAMBEAU Institute of Educational Research (IER), Addis Ababa University, 6, 26-53.
- Green, K.C. (1989). **A Profile of Undergraduates in the Sciences**. American Scientist, 7, 475-480.
- George E., Dieter (1991). **Engineering Design**. A Materials and Processing Approach. Second Edition, McGraw-Hill, inc.
- Hackett, and Bandura, (1981). **The Relationship of Career- Related Self- Efficacy Expectations and Perceived Career Options in College Women and Men**. Journal of Counseling Psychology 28,339-410.
- Hackett, G., Betz, N., Cases, J. M., and Rocha-Singh, I.A (1992). **Gender, Ethnicity, and Social Cognitive Factors Predicting the Academic Achievement of Students in Engineering**. Journal of Counseling Psychology, 39, 527-538.
- Horn, R (1991). "**Qualitative Indicator Development for Education Sector Performance in Sub-Saharan Africa**". Concept Paper. UNESCO.
- Hyde, Karin A.L. (1993). Sub-Saharan Africa; **Women's Education in Developing Countries: Barriers, Benefits and Policies**. World Bank, Washington D.C.
- Joequeline, C. (1970). **The Education and Advancement of Women**. Paris: UNESCO.
- Johnna Coenen (1994). "**Women in Higher Education: Progress, Constraints and Promising Approaches**", Mimeo, Esp Department, Gender Analysis and Policy Group, World Bank. Disc. Paper # \$ 244
- Kelly, Alison (1978). **Girls and Science**, Stockholm: Almqvist and Wiksell International.
- Kelly, P. Gail and ELLIOTT, M Carolyn. (1982). **Orientations Towards the Study of and Women's Education in the Third World Comparative Perspectives**, State University of New York.

- King, Elizabeth M. (1991). **Educating Girls and Women Investing in Development**, World Bank Washington D.C.
- King, Elizabeth M. and Anne, Hill. (1993), **Women's Education in Developing Countries: An Overview**, Women Education in Developing Countries: Barriers Benefits and Policies. World Bank, Washington D.C.
- Kreuger, Richard A. (1988). **Focus Group Interview in Developing Countries**. Washington, D.C.: U.S. Agency for International Development.
- Krishan Rajmalhreye (1982). "**Women Work and Science in India**". In Kelly Gail and Carolyn M. Ellisth (Eds), *Women's' Education in the Third World: Comparative Perspectives*. New York: State University of New York Press.
- Levine, A. (1994). **Higher Learning in America: 1980-2000** Maryland the Johns Hopekin University press.
- Lindsay, B (1991). "**Educational Equity in Cross-Sectional Setting**." *International Comparative Education*. London: Macmillan.
- Lubinsky, D., and Humphreys, L.G. (1990). **A Broadly Based Analysis of Mathematical Giftedness Intelligence**, 14,327-356.
- Mc Grath, S. (2000). **What Does Globalisation Mean for Education in African Countries?** *Southern African Review of Education With Education with Production*, 6, 5-18.
- Mead, M., and Metraut, R. (1957). **Images of the Scientists Among High School Students**. *Science*, 126, 384-390.
- Menger, J and Willian Exum (1993). **Barriers to the Progress of Women & Minority Faculty**, *Journal of Higher Education @hio state uni pan* 54 (2).
- MOE (2003). **Strategies for the Promotion of the Participation and Performance of Girls in Science, Mathematics and Technology (SMT) Subjects: Some Lesson From FEMSA Paper Presented at WERK Seminar, Nairobi**.
- _____ (2003). **Indicators of Ethiopian Education System**. Addis Ababa.
- MOE. (1994). **Transitional, Government of Ethiopia Education and Training Policy of Ethiopia**, Addis Ababa, EMPDA.
- _____. (1998). **Promoting Girls Education**, Addis Ababa.
- MOLSA (2004). **Employment, Working Condition, Decision Role and Exposure to HIV AIDS of Women; Working in Establishment Administrated Under Proclamation 42/93**.

- Namuddu, K. (1995). **Gender Perspectives in the Transformation of African: Challenges to the African University**. In Women in Higher Education in Africa. (pp 58-88). Dakar: UNESCO.
- National Science Board. (1996). **Science and Engineering Indicators**. Washington, D.C: Government Printing Office.
- Njuma, D. (1993). **"An Overview of Women's Education in Africa."** The Politics of Women Education. Michigan: Michigan Uni. Press.
- Odaga, Adhiambo and Henveld, Ward, (1995). **Girls and Schools in Sub Saharan Africa: from Analysis to Action**, World Bank, Washington D.C
- Pasachropoulos in Teshome (2003). **Low Participation of Female Students in Primary Education: A Case Study of Dropouts form the Amhara and Oromia Region Ethiopia: II** CBAA.A.
- Pietrofessa, J. J. and Scholosberg, N.K (1970). **Counselor Bias and the Female Occupational Role** (ERIC Document No. CG 006 056).
- Prediger, D.P., and Hanson, G.R. (1976). **Holland's History of Careers Applied to Men and Women: An Analysis of Implicit Assumptions**. Journal of Vocational Behavior, 8, 157-645.
- Psacharopoulos G. and Maureen Woodhall (1985). **Education for Development: An Analysis of Investment Choices**, Baltimore: John Hopkins University Press.
- Raynal, Florence. (1999). **Women the Champion in Education**, LABEL France Information Magazine of the French Ministry for Foreign Affairs No. 37.
- Sells, L. (1982). **Leverage for Equal Opportunity through mastery of Mathematics**. In S, M. Humphereys (Ed.) Women in Science, Boulder, co: West View.
- Seyoum Teffera. (1991). **"The Participation of Girls in Higher Education in Ethiopia"**. Gender issues in Ethiopia. IES.AAU.
- Stromquist, Nell P. (1987). **"The State and the Education of Women: Toward a Theoretical Understanding"**. Paper Presented to the CIES Annual Meeting, Washington D.C.
- Subbarao et. al (1994). **"Women in Higher Education: Progress, Constraints and Promising Approaches"**, Mimeo, Esp Department, Gender Analysis and Policy Group, World Bank. Disc. Paper # \$ 244.
- Subbarow, D, (1994). **Women in Higher Education Progress, Constraints and Promises Initiates** Washington D.C World Bank Discussing Paper.

- Taking Liberties Collective. (1989). **Learning the Hard Way: Women's Oppression In Men's Education.** London: Macmillan Press.
- Tsige, H. (1991). **An Assessment of the Academic Performance of Female Students in Higher Education Institution in Ethiopia.** A.A.
- UNDP (2000). **Women's Issues Five Years After Beijing Progress and Drawbacks.** New York: UNDP.
- UNESCO (1986). **Education of Girls in Asian and Pacific.** Bangkok: UNESCO Regional Office.
- United Nations. (1996). **The Beijing Declaration and the Plat form for Action,** New York.
- Wagner. Daniel, A (1985). "Islamic Education: Traditional Pedagogy and Contemporary Aspects", in TORSTEN HUSEN and NEVILLE Postlethwaite (eds), *International Encyclopedia of Education* Oxford: Pergoamon Press.
- Wanjama, G.Leah. (1998). **The Role of Research in Promoting Quality of Education: A Gender Perspective, Quality of Education in Ethiopia Visions for the 21st Century,** Institute of Education Researches Addis Ababa University.
- Why Do So few Students Want to Become Scientist?** (1988). Harvard Education Letter, 4 p.6
- World Bank (1995). **Ethiopian Public Expenditure Review: Issues in Public Expenditure,** Washington DC: World Bank.
- _____. (1998), **Implementing the Ethiopian National Policy for Women,** Washington D.C.
- Yater Barbara (1982). "Church, State and Education in Belgian Africa". In Gait P.Kelly and Carolyn M. Elliott (Eds), *Women's' Education in the Third World: Comparative Perspectives.* New York: State University of New York Press.
- Yelfign Worku (1998). **Participation of Girls and Women in Scientific Technical and vocational Education in Ethiopia.** MOE (Unpublished).

APPENDIX- I

University Profile, Enrollment and Dropout

Departments	Instructors status												Total no of instructors		
	Qualification														
	Adv. diploma			1 st degree BSC			2 nd degree MSC			Phd					
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Hydraulics	2	-	2	9	-	9	5	-	5	1	-	1	17	-	17
Irrigation	1	-	1	10	-	10	9	-	9	2	-	2	23	-	23
Civil	2	-	2	11	-	11	10	2	12	1	-	1	25	2	27
Electrical	4	-	4	4	-	4	6	-	6	-	-	-	14	-	14
Mechanical	5	-	5	2	-	2	7	-	7	-	-	-	14	-	14
Computer	1	-	1	2	-	2	2	2	4	-	-	-	5	2	7
Total	15	-	15	40	-	40	39	4	4	4	-	4	98	4	102
Grand total															102

Enrollment in university by sex (1988-1997E.C)

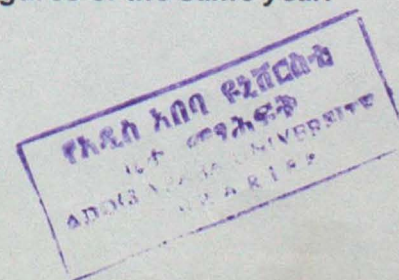
Year	Enrollment				
	M	F	T	%F	%M
1988	365	3	368	0.8	99.2
1989	409	11	420	2.6	97.4
1990	555	22	577	3.8	96.2
1991	764	33	797	4.1	95.9
1992	968	32	1000	3.2	96.8
1993	1260	55	1315	4.2	95.8
1994	1521	35	1556	2.2	97.8
1995	1923	157	2080	7.5	92.5
1996	1487	422	1909	22.1	77.9
1997	1939	598	2537	24.0	76.4

Note: The years are given in Ethiopian calendar

Dropout in the six engineering departments by sex (1993 – 1996E.C)

Year	Dropout				Total	
	M		F		N	%
	N	%	N	%		
1993	324	6.8	25	16.0	349	11.4
1994	345	5.5	7	14.3	352	9.9
1995	325	2.2	7	28.6	332	15.4
1996	315	6.6	118	29.7	434	18.2
Total	1310	21.1	157	88.6	1467	54.9

Percentage calculation is based on the enrollment figures of the same year.



APPENDIX - II

University Facilities

Facilities	Sufficiently available	Partly available	Not at all
Classroom	5	5	-
Water	3	7	-
Electricity	6	3	-
Library	-	8	-
Clinic	-	4	4
Reading rooms	-	8	3
Latrine	3	6	-
Textbooks	-	6	1
Entertainment	-	8	2

Appendix - III

Women Response Towards Institutional Effort to Sensitize the Campus Climate

Efforts to sensitize the campus climate	Women rating	
	N	%
Sensitizing campus community climate through campaign, orientation, conference etc	-	-
Producing journal publication, conducting research on gender issue	-	-
Improving gender relation between males and females students make faculty and female	-	-
Establishing co-curricular activities that allow maximum interaction between campus community	-	-
Acquisition of various books, publication on gender issue in library	-	-
Provision of gender related course	-	-
Establishing of gender studies program	-	-
Establishing gender studies oriented research center	-	-

Appendix - IV

Women and Officials Response Towards Sufficiency of Academic Support Service in Percent

Sufficiency services	Women response			Officials response		
	Very much	Indifference	Not at all	Very much	Indifference	Not at all
	%	%	%	%	%	%
1. Provision of consultation service	-	20	80	-	20	80
2. Provision of tutorials	-	20	80	-	20	80
3. Provision of academic counseling	20	-	80	40	-	60
4. Provision of personal counseling	-	20	80	-	20	80
5. Provision of career counseling	-	-	100	-	-	100
6. Supply of stationary	60	-	40	80	-	20
7. Borrowing service of reference, texts	-	40	60	-	40	60
8. Financial aid package	-	40	60	60	20	20
9. Mentoring	-	-	100	-	-	100
10. Entertainment	40	-	60	60	20	20
11. Compensatory education	-	20	80	-	20	80

APPENDIX – V

ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES DEPARTMENT OF CURRICULUM AND INSTRUCTION

Questionnaire to be filled by Arab Munch University Female students in engineering streams

This questionnaire is designed for the purpose of Masters Thesis. The main purpose of this study is to get genuine information on the underlined demand and supply -side factors that facilitate or hinder educational access (enrolment), Performance (achievement) of girls on the level of engineering fields. I appreciate your willingness to support my effort, and look forward to receiving your earnest reply. All information obtained from you will be used only for the purpose of research.

You need not write your name

Thank you for your Cooperation

I. Background information (fill in the space provided or thick one of the given alternatives)

1.1 Name of the school (faculty) -----

1.2 Grade level (year) -----

1.3 Sex Male Female

1.4 Age -----

1.5 Religion -----

1.6 Your first language -----

1.7 Your parent's address

Town Country side

1.8 Your parent's livelihood (profession)

- Mother (female guardian) -----

- Father (male guardian) -----

1.9 Your parent's level of education

No	Level	Mother	Father
1	No schooling of any kind		
2	Read and write		
3	Primary (1-8)		
4	Secondary (9-12)		
5	Certificate, Diploma or above		
6	I don't know		

II. Information related to the education of the respondents (Fill in the space provided or thick one of the alternatives)

2.1 What is the general attitude of your parent's towards your education?

No	Attitude	Mother	Father
1	Support my education		
2	Does not support my education		
3	Is in different		

2.2 Do you think that you can perform as good as your opposite sex peers in academic matters? Yes No

2.3 Who usually helps you in your studies in the university

- Teachers Student friends
 Women representatives of the university University councilor
 None

2.4 Do you frequently complete your assignment out of the class?

- Yes No

2.5 If your response to question 2.10 " No " What problem do you have not to do your assignment out of the class?

- Lack of text books
 I don't usually understand the lesson give in class
 I don't have time for assignment
 Lack of library

Other-Specify -----

2.6 Have you ever been a dropout in any year (grade) level ?

- Yes No

2.7 If your response to question 2.13 is "Yes" What were the causes? (Please rank them in their order)

- Environmental factor
- Health problem
- Difficulty of the subject matter
- Economic problem
- Fear of academic failure

Other- Specify -----

2.8 What do you think the reason for female students choose engineering fields instead of choose none- engineering fields? (Please rank them in their order)

- From Job Opportunity
- From Job Applicability
- Interest on the fields
- Based on technological application

Other- Specify -----

2.9 Is there any motivational factor that facilitated you to join engineering fields?

- Yes No

2.10 If your response to question 2.15 is "Yes" What do think were the factor that facilitate you to join this field? (Rate the following)

- Family encouragement
- Environmental exposures
- From teachers and friends awareness
- Good educational background from families

Other- Specify -----

2.11 Rate on the following pointes based on your believe

	Engineering instructor behavior	Agree	Moderately agree	Disagree
A	Females can be effective equally as boys in the engineering fields			
B	Engineering is not comfortable and difficult to females			
C	Females are gifted in social science and language instead of engineering fields			
D	Naturally, males are more scientifically creators and researcher			
E	It is easily females to be a nurse or a medial server instead of researcher and engineer			

2.12 Rate the following points based on your believe

	Students attitudes	Agree	Moderately agree	Disagree
A	Females can be effective equally as boys in the engineering fields			
B	Engineering is not comfortable and difficult to females			
C	Females are gifted in social science and language instead of engineering fields			
D	Naturally, males are more scientifically creators and researcher			
E	It is easily females to be a nurse or a medial server instead of researcher and engineer			

APPENDIX - VI

ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES DEPARTMENT OF CURRICULUM AND INSTRUCTION

Questionnaire to be filled by Arba Minch University Department Heads and Instructors

This questionnaire is designed for the purpose of Postgraduate studies. The main purpose of this study is to get genuine information on the underlined demand and supply -side factors that facilitate or hinder educational access (enrolment), Performance (achievement) of females compared to their male counterparts on the level of engineering fields. I appreciate your willingness to support my effort, and look forward to receiving your earnest reply. All information obtained from you will be used only for the purpose of research.

You need not write your name

Thank you for your Cooperation

I. Back ground (Fill in the space provided or tick one of the given alternatives)

1.1 School / University | name -----

Region -----

Town -----

1.2 Your sex Male

Female

1.3 Teaching Experience in years -----

1.4 Your qualification

Diploma Degree Masters PhD

If others specify -----

1.5 What years (grades) do you teach? -----

1.6 What subject (s) do you teach? -----

1.7 What is your weekly load? -----

II University related information

2.1 If you asked to choose between males and females for teaching, whom do you think you will prefer?

Male females both makes no difference.

2.2 How do you rate the academic achievement of girls and boys in your university in the following subjects at present?

Subject	Girls			Boys		
	High	Average	Low	High	Average	Low
Mathematics						
Language						
Social Science						
Engineering						

2.3 Rate the following activities of girls and boys in class

	Activities	Girls			Boys		
		High	Average	low	High	Average	low
1	Attend class regularly						
2	Ask question during class						
3	Do home work and assignment						
4	Pay more attention during class						
5	Feel more independent in class						
6	Self-confidence						
7	Self-efficiency						

2.4 To what level do you rate your capacity to understand Gender issues in education?

Sufficient Average Insufficient

For Department heads only

2.5 What is the total no of pupils in your Department?

	Condition	Female	Male
1	Registered at the beginning of the year		
2	Available in class at present		
3	Dropped out		

2.6 If there are dropouts, rate the extent to which the following factors affected girls to dropout

Factors	High	Average	Low
Economic problem			
Environmental factor			
Dislike of the curriculum			
Difficulty in the subject area			
Discouragement due to frequent repetition			
Health problem			
Lack of separate facilities in the university			

2.7 What does the availability of the following facilities look like in your university?

Facilities	Available	Partly available	Not available
Class rooms			
Water			
Electricity			
Sport facilities			
Library			
Clinic			
Reading rooms			
Latrine			
Text books			

For all teachers and department heads

1.8 Do you advice for female students to join the engineering fields ?

- Yes No I don' know

2.9 If your answer is ' yes' for question 2.11 what is your advice ?

- A. Joining based on their interest and decision
 B. Advising not joining the field, because it is too difficult
 C. Encouraging joining engineering field.
 D. Others-----

2.10 What are the reason female students choose engineering fields instead of choose non-engineering fields?(Please Rank them in order)

- From Job Opportunity
 From Job Applicability
 Interest on the fields
 Based on technological application

Other- Specify -----

2.11 Rate on the following points based on your believe

		Agree	Moderately agree	Disagree
A	Females can be effective equally as body in the engineering fields			
B	Engineering is not difficult to females			
C	Females are gifted in social science and language instead of engineering field			
D	If things are comfortable to females they can perform equally as boys in the engineering fields			

2.12 Do you know any motivational factors that facilitate females to join engineering fields? Yes No

2.13 If your response for question N0 2.12 "Yes" What motivational factor do you suggest?

2.14 Rate on the following ideas based on your assumption?

		Very High	High	Moderately low	Low
A	The Effort and ability reach to gain knowledge of engineering				
B	Encouragement obtained from family, friends, teachers and the society to effective in the engineering fields				
C	Psychological barriers that hinder females students in joining the engineering fields				
D	Societies stereotypes and culture hinders the participation of females in the fields				



APPENDIX - VIII

ADDIS ABABA UNIVERSITY SCHOOL OF GRAGUATE STUDIES DEPARTEMENT OF CURRICULUM AND INSTRUCTION

Interview question for president, vice presidents and faculty deans of Arba Minch University (AMU)

1. To What extent do you know females students stops choosing and completing engineering streams?
2. What do you suggest parents of girls can do of encouraging their children to go into (and stay in) engineering?
3. Has anyone thought of having a college devoted to science and maths exclusively for females?
4. What reason you might have as to why female students are so underrepresented in engineering streams (fields)? Why doesn't this provide us with ideas for programs?
5. At the present time, there aren't many female students coming out of college with advanced degrees. Do propose giving them time to work their way up or massively recruiting them and then hoping for the best?
6. What efforts do think need to be made to get more females students participating in the engineering fields?
7. How do you compare internationally other than by achievement exam-for example, attitudes toward science and engineering?
8. Do believe that most of the problem of the low participation of females in engineering fields is primarily a product of expectation that others have of us?
9. In order to tackle the problem, and enhance the participation of females in engineering fields, what kind of intervention mechanism do you suggest?
10. What is the reason that few females' pupils choosing engineering and others choose other fields?
11. What makes the educational inequalities among females and male groups in general?
12. What factor do you suggest that, the participation and performance of female's students in engineering fields particularly in your university?