

Education is the most powerful weapon
which you can use to change the world.
- Nelson Mandela

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Determinants of Engineering Female Students' Academic Success and Causes of Their Attrition in Public Higher Education Institutions of Ethiopia

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ABSTRACT

The purpose of this study was to investigate the determinants of engineering female students' academic success and causes of their attrition in Higher Education Institutions of Ethiopia. Out of 22 public higher institutions of Ethiopia, six public higher institutions were selected by using stratified random sampling technique. The participants of the study were 319 randomly selected female engineering students from eight departments of institutes of technology. Descriptive survey method was employed to conduct this study. Questionnaires and in-depth interviews were used to gather information about the factors that account for female students' discontinuation of their education. Document analysis was also used to obtain the attrition rate of students over ten semesters. For analysis, both qualitative and quantitative techniques were employed. The quantitative data were analyzed using logistic regression and ANOVA to identify the significant predictor variables of students' dropout among female engineering students. The qualitative data collected through in-depth interview and documentary sources were analyzed, narrated, and organized. Analysis data gathered through both techniques revealed that anxiety, homesickness, social and institutional adjustment, peer pressure, inaccurate perception of a certain competence, lack of information about college life and study skills, falling in love, sexual harassment, large class size, student's departmental choice, background knowledge, lack of time management skills, parental socio-economic status, tutorial delivering system, early childhood schooling, and teachers competence to subject matter knowledge were the major predictors of students to successfully complete their educational study and causes of attritions. The study finding suggested that students council, Gender Affairs Office and other university communities should work collaboratively to strength female students study skills, tutorial delivery system, good ethics, way of sharing common resources among themselves, and provide financial support for those who need help without discrimination. Besides, proper follow-up, well scheduled bridge courses on Mathematics and Mechanics, guidance and counseling programs should be made by host institutions to encourage female students only to focus on their academic matters. Generally, much efforts is needed to address the institutional, cognitive, socio-economic, and social factors to maximize engineering female students' academic achievements.

Keywords: Determinant, Attrition, Academic Achievement, Engineering Female Students'.

1. Background and Rationale of the Study

The benefits of higher education to all-round human development cannot be overstated. Higher education can be considered as an important engine for overall socio-economic and political advancement of nations.

Most importantly, it has been a crucial instrument through which knowledge has been created and disseminated. In an increasingly competitive world and knowledge based economy, tertiary education provides the required ingredients to enhance academic and technical competence as well as overall competitiveness at individual, regional, and international levels. The production and dissemination of knowledge have been the major preoccupations of higher educational institutions. The level of advancement witnessed by humanity today could not have been imagined without the contributions of higher education. In Africa in particular, where underdevelopment and poverty continue to remain rampant, higher education is expected to make immense contributions towards the attainment of the Millennium Development Goals (UNESCO, 2009).

Despite steadily rising enrollment rates in Ethiopia postsecondary institutions, weak academic performance and high dropout rates remain to be persistent problems among undergraduates' female students (MoE, 2010; Tesfaye, 2006; Alemayehu et al., 2009). For academic institutions, high attrition rates complicate enrollment planning and placement added burdens on efforts to recruit new students. For students, dropping out before earning a degree represents untapped human potential and a low return on their investment in college (Card and Krueger, 1992; Jaeger, 2002). Poor academic performance is often indicative of difficulties in adjusting to college and makes dropping out more likely (Pascarella, Ernest, John, Smart and Corinna, and Ethington, 1993.)

Yeshimebrat et al (2013) pointed that as the grade level in school increases the number of female students starts to decline due to various factors. Consequently, higher education remains an area of learning from which females are less represented both as student and staff. The very few girls that are fortunate enough to join higher institutions are characterized by lower academic performance and high withdrawal. As a result, such inequity in higher education representation has a serious lifelong impact on their opportunities to participate in the country's political power sharing, economic privileges as well as social representations. This is because, currently, joining higher education has become an avenue to upward social mobility status, political power, economic privilege and social prestige especially for female students.

In higher learning institutions; however, there are multitudes of factors that impinge the academic success of students. Individual variables such motivation, interest, attitude, cognitive style, attribution style, learning strategies, teachers' competence, self-esteem and self-efficacy are important in learning process and performance of learners. Environmental variables like climatic conditions of the area, learning atmosphere, social interactions among students and their interaction with teachers also account for great deal of achievement variability. The nature of the curriculum, the subject matter to be learned, the availability of learning materials and facilities, the administrative nature of the institution, access of students to relevant information are climacteric to the attainment of educational objectives (Yalew, 2003)

According to Tesfaye (2007) argued that female academic progress may be untangled and the majority of the problems remain unsolved and may drive the individual female out of the learning institutions due to lack of proper study skills and social adjustment and economic problem in campus. Moreover, research studies indicate that a great number of conditions are responsible for the dropout of female students from their schooling in higher institutions. For example, according to Kelly [as cited in Yalew (2003)] classifies the causes of attrition or inability to continue or complete one's educational career for whatever reasons in two broad categories: social and socio-economic status, the first instance factors encompassed were students and family behavior, performance in school, psychological states and family background of the students. Thus, dropping out from the learning institute is reckoned to be an individual act suggesting that it could be a failure of individual learner to cope with the task of learning or the failure of family or culture of the students.

For female students', first year at university is specially a critical transition period. This is because it is a time when students lay the foundation on which their subsequent academic success and persistence rest. A bulk of literature on the predictor of academic success and retention among first year university students show that most students, despite of their academic, social, emotional and other challenges, successfully complete their transition period and achieve academic success (e.g. Mcmillan, DeBerad, and Spielmans, 2004).

Early college leaving is often associated with negative consequences for students, their socio-demographic background, economic factors, academic preparedness, institutional characteristics, degree of social engagement and psychological processes. It can cause heavy unrealized costs to universities and families. A student leaving university

without having completed her/his study may also be exposed to various psycho-social problems. Dissatisfaction with college experience, disruption of life plans, and being jobless or being engaged in minor jobs to much less over a life time are some among others (Alemayehu et al,2009,Mlama, 2001).

Generally speaking, the problem of attrition and its consequence varies with the context and structure. Since the introduction of new educational and training policy in 1994, expansion of higher education has been a main agenda in Ethiopia. Within the past few years, besides regional and private colleges, the number of public universities in the country has increased from 9 to 43 (MoE, 2014). Following this, the yearly public universities' acceptance rate has dramatically increased from approximately less than ten thousand (two decade ago) towards nearly more than four hundred thousand of which 28 % were female students (MoE, 2013). However, irrespective of the increment in enrollment rate, female students' attrition rate has been frequently reported to be high in public universities (Getahun et.al 2009; Shiferaw, 2009; Habtamu, 2007 and Tesfaye, 2006). Evidently, the consequences of early departure from university become more severe in such countries where almost 29.6 % of the population is living below the poverty line (World Bank, 2011), and where education is the main vehicle to escape from it.

Over the years, education has focused on access and parity that is, closing the enrollment gap between girls and boys while insufficient attention has been paid to retention. Providing a quality, relevant education leads to improved enrollment and retention (UNESCO, 2010). Moreover, ESDP IV (MoE, 2010) also points out that the share of female academics remains far below the target, and suggests serious efforts to encourage female participation both at the undergraduate and postgraduate level without indicating the efforts to be done in reducing attrition.

ESDP IV (MoE,2010) also points out that the share of female academics remains far below the target, and suggests serious effort to encourage female participation both at the undergraduate and postgraduate level without indicating the efforts to be made in reducing attrition.Low femalestudents' graduation rate (23%) was also observed (MoE, 2012). Besides, high engineering female students' dropout were observed as compared with other department's female students. For instance AAU,48%,HwU 28%,HrU 42%,AdU 38% were dropout from the campus in the year 2008,2012 (MoE,2008-2012). A Study conducted at Mekelle University indicated that the level of attrition varied from nearly 3% to 66% across different departments: S.Sc., FEB, N.Sc. and Engineering Departments and also in this study female students were found to be low achievers (Tsehaye and Yesuf,2012:119).

Few studies have been conducted to look into female students' academic achievement and attrition in some PHEIs of Ethiopia (Yeshimebrate et al, 2013; Getahun et.al 2009; Shiferaw, 2009; Habtamu, 2007; Tesfaye, 2006;Yalew 2003; Asmerom et al.,1999; Hailsilassie,1998 and Temesgen, 1991).The majority of these studies have been descriptive or correlational in design. In addition, they were more of case studies and they did not show the combined effects of variables on female students' academicsuccess in PHEIs; hence the studies failed to give the general picture of the combined effects of the variables and lacking generalizability.

The current study is different as it attempts to reach relatively large number of engineering female students in Ethiopian Higher Education Institutions, and give a broader understanding of the causesof attrition of female students engineering faculties of HEIs of Ethiopia.The rationale and the gap indicated above would make the problem worth studying.

Therefore, there is a need for more predictive studies to be conducted, using regression analysis to identify multiple factors that affect students' academic success (Bondmass, 2008). The study, therefore, attempts to answer the following basic research questions to address the problems.

1. What are the determinant factors (institutional, cognitive, socioeconomic and demographic factors) that lead to academic success/attritions of engineering female students' in Public HEIs of Ethiopia?
2. To what extents do the determinant factors affect female students' academic success and attrition rates?
3. How do engineering female students' of public higher institutions perceive the causes of their attrition

1.1. Objective of the Study

1.1.1. General Objective

The general objective of this study is to examine the determinants of female students' academic success and causes of their attrition in engineering institutes of public higher education institutions of Ethiopia.

1.1.2. Specific Objectives

The specific objectives of this study are aimed to:

1. identify determinant factors that contribute to engineering female students' academic success in PHEIs of Ethiopia.
2. examine the extent to which the determinant factors affect female students' academic success and attrition rates.
3. explore female engineering students perceived causes of their attrition in public higher institutions of Ethiopia.

1.2. Significance of the study

- The results of this research will provide a material developer, curriculum designer and policy makers a broader understanding of engineering students' academic success and causes of attrition in the selected public higher education institutions.
- The study findings could hint the MoEto work on the recruitment of well trained staff and teacher's high turnover.
- It is believed to help the university officials (Dean of institutes, Department heads, Gender directorate) to work hard in implementing affirmative action in order to increase engineering female students' retention and decrease wastage of human capital.
- It helps other researchers to make use of the present study as stepping stone to conduct further investigation

1.3. Scope of the study

For the sake of making the research manageable, this study is limited in area coverage and subjects. Accordingly, the study was undertaken in six selected public institutions which hosted engineering disciplines. Moreover, the selection of the institutions considered old and new institutions equally to compare female attrition and retentions situations. In addition, the analyses of the study restricted to investigate the major determinants of female students' academic success and causes attrition in the engineering fields of public higher institutions of Ethiopia.

1.4. Limitation of the Study

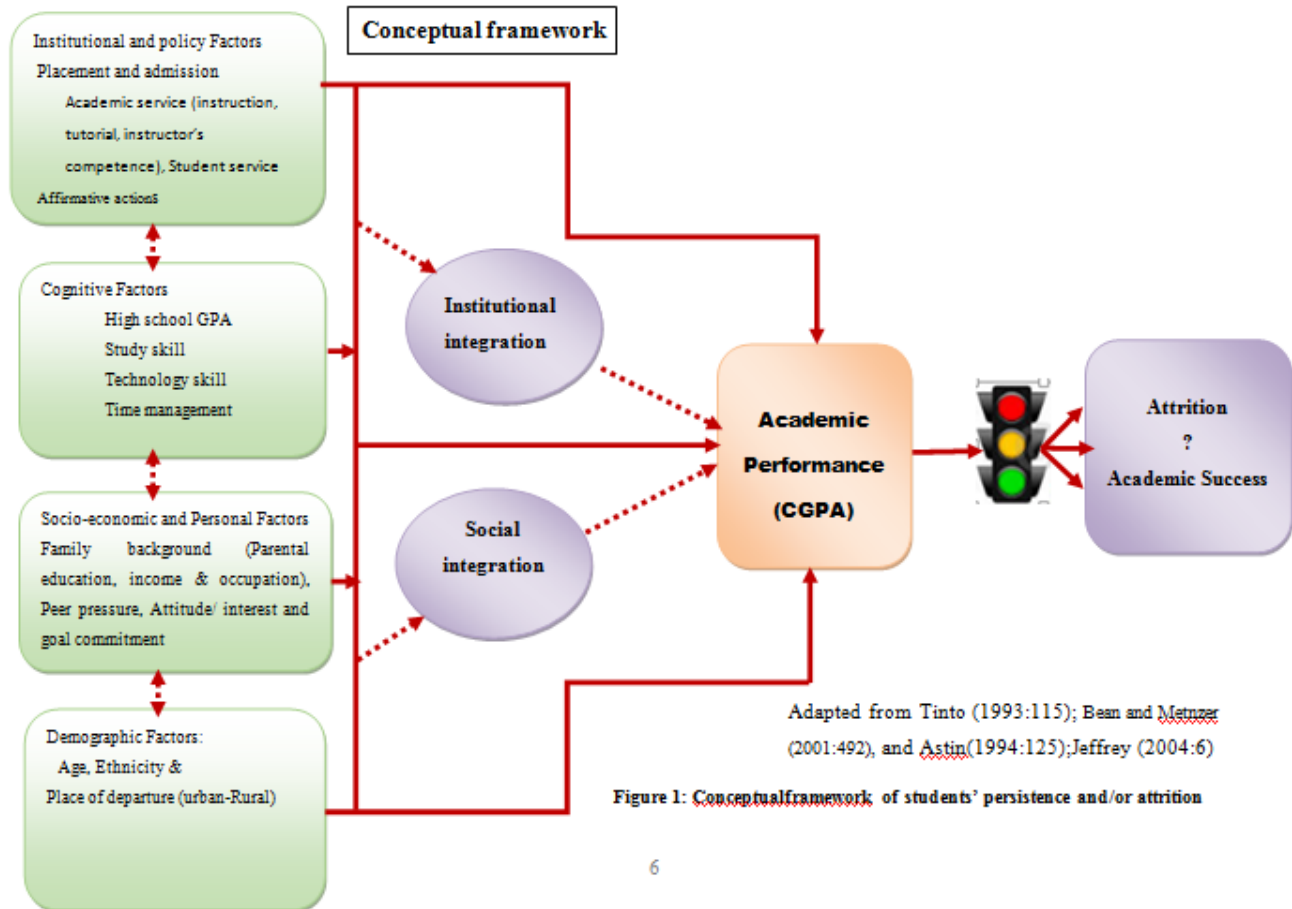
The researcher does not fully claim that the study has no limitation.

- The study was only delimited to studying major determinates factors of engineering female students' academic success and causes of attrition.
- Due to limited time and financial constraints the study was limited to public higher education institutions(PHEIs). Thus, the study would have been more compressive if it had considered subjects from private universities.
- Some students failed to return some of the questionnaires due to administrative inconveniences. However, possible efforts were exerted to overcome the above constraints and accomplish the desired work successfully.

1.5. Operational Definition of Terms

- Determinant refers to the combined effect of many factors or variables that affect students' academic success with respect to their CGPA.
- Successfulstudents are those students who are able to score above the minimum requirement of CGPA during her educational study programs in the institution.
- Attrition: non-completion of a program; or withdrawal from a program, either voluntarily or involuntarilyfrom their academic study in higher education institutions
- Academic success/Academic Achievement: Student's academic performance at the end of the ten semester program courses; having earned grades of C or above in all courses, and having no course of withdrawals.
- Engineering female students: Female students who were enrolled in regular engineering programs to study in higher education institutions of Ethiopia.
- Old public higher institution: Ethiopian higher institutions that have indispensable experience in teaching and research activities as well as adequate professional and material resources and established before 2003.

- New public higher institution: Ethiopian public higher institutions established between 2003 and 2012, having at least one graduated batch in engineering programs.



6

3. Research Design and Methodology

3.1. Research design of the Study

The main purpose of the study is to identify the determinants of engineering female students' academic success and cause of attritions in engineering programs of public higher education institutions of Ethiopia. The study employed descriptive survey design. Yin and Cresswell (2003) show that, in situations where two strategies might be considered, it is possible to use multiple strategies in a given study. Therefore, survey with both quantitative and qualitative study method and participatory research approach was applied. The quantitative data was gathered by using structured questionnaire whereas the qualitative information was collected by using in depth interview and document analysis methods. According to Best (2008) and Cresswell (2003), a descriptive study describes and interprets that is concerned with conditions or relationships that exist, opinions that are held, process that are going on, effects that are evident or trends that are developing. Thus, the use of descriptive method is found appropriate for this study.

1.2. Source of data

On the basis of the study objectives, the primary data were collected from engineering female students, Head of University's Gender Office Directorates and instructors using a structured questionnaire and secondary data sources were gathered from universities registrar, conferenceproceeding MoE educational abstracts and minutes of departments.

1.3. Population and sampling techniques

Sample size may depend upon the nature of the population of interest or the data to be gathered and analyzed, subject availability and lost factors are legitimate considerations in determining appropriate sample size (Best & Kahn 1993). Accordingly, using Cochran (1977) sample size formula out of 3891 female students from six institutions: Addis Ababa, Hawassa, Haramaya ,Adama, WolaitaSodo, Wollo Universities 363 were selected by using simple random sampling techniques.

1.4. Data Collection tools

Questionnaires in five Likert scale were used to gather information from students, instructors and department heads, whereas interview was used to collect information from head of gender office, departmentheads. Document analysis was used to collect information from the university registrar and MoE educational abstract.

1.5. Method of data analysis

Data collected from the survey entered into a computer for analysis using Statistical Package for Social Sciences (SPSS). Before running the analysis, some internal consistency checks such as reliability and validity tests were made to assess the quality of the data. The analysis part consists of inferential statistics part, such as chi-square test and Logistic regression analysis were used. In order to test the strength of the relationship between each predictor (independent variable) and dependent variable, different types of analysis of variance (ANOVA) were undertaken. After selecting the important variables data interpretation and analysis were employed to fit the data with best explaining variables. Whereas data collected through open-ended questionnaire and in-depth interview were narrated following the quantitative data results.

4. Results and Discussions

Introduction

The present study is aimed to examine the determinants of engineering female students' academic success and causes of their attrition in public higher education institutions of Ethiopia. Besides, the study explores female students' academic success and attrition practices among first and second higher education institutions of Ethiopia. Hence, the study employed both qualitative (in depth interview and document analysis) and quantitative (separate survey questionnaire) method to get adequate information from the study participants. Thus, this study aimed to answer the following research questions.

Q1. What are the determinant factors (institutional, cognitive, socio-economic and demographic factors) that affects engineering female students' academic success in PHEIs?

Table 1: Summary analysis of determinant factors that affects female students' academic success

Institutional related factors	χ^2	Sig.
Placement of the students to the field of specialization by their GPA and interest	11.36	.022
Assignment of competent and Instructors	28.60	.032
Tutorial offerings of the institutions	6.76	.009
Effectiveness of tutorial delivery system	9.57	.048
Large class size	13.32	.010
Other services provided by institutions like library, Ref. books, laboratory, dormitory, etc.	51.99	.000
Institutions' implementation of affirmative actions	19.04	.001
Students' choice to their field of interest	11.86	.010
Instructors' course coverage and lesson presentation approach	3.52	.111

Cognitive related Factors	χ^2	sig.
Early childhood schooling	1.14	.888
Grade 10 National exam result	18.36	.001
Grade 12 average class score on female students' academic success	19.21	.000

Time spent for study	5.03	.287
Time spent in browsing internet for academic purpose	12.81	.012
Prior knowledge of Science and Mathematics	77.63	.000
Socio-economic and personal related factors		
Family background by educational Level	12.14	.032
Occupational status of female students family head	10.21	.037
Households monthly income on female students' academic success	11.16	.004
Time spent on religious practice	12.97	.005
Female students' relationships with their peers, instructors and department head	8.63	.071
Demographic related factors		
Age	2.46	.653
Ethnicity	5.32	.256
Place of origin/departure (Urban/Rural)	11.89	.001

Source: Survey analysis

There were quite a number of determinant factors that affect engineering female students' academic success in higher education. Among these the main factors were lack of strong mathematical and science background knowledge, departmental choice, teachers competence, peer pressure, lack of adequate facilities in the campus, place of departure, and harassment and others are the most significant variables (see Table 1).

Q2 to what extents do the determinant factors affect female students' academic success and attrition rates?

4.3. Extent to which the determinants factors affect engineering female student' academic success/ attrition in higher education

Research question number 1 reads *"What are the determinants and to what extents do this factors affect female students' academic success and attrition rates?"* To answer this question, the researcher used cumulative grade average points to form multiple dependent variables. The numeric and scaled type of dependent variables create good environment to predict the impacts of the selected explaining/independent variables on students' academic achievements through multiple logistic regression analysis

Table 2: Regression analysis result

Mode /	Explaining Variables of Female students Success	Coefficients		t	Sig.
		β	S errors(SE)		
1	(Constant)	1.459	0.542	2.691	0.009
2	Departmental Choice	-.333	0.086	-3.868	.000***
3	Assignment of competent and effective instructors	-.085	0.05	-1.7	.093*
4	Course coverage, and lesson presentation of the instructors	.073	0.045	1.606	.112
5	Tutorial deliver and its effectiveness	-.022	0.034	-0.658	.512
6	Student other services like library facility, reference books, dormitory etc?	.078	0.045	1.757	.082*
7	Implementation of affirmative action's	.060	0.034	-1.763	.081*
8	Early child hood education(Schooling)	.072	0.029	2.487	.015**
9	Grade 10 National Exam Result(GPA)	.017	0.035	0.487	.628
10	Grade 12 National Exam result	.090	0.06	1.512	.134
11	Age	-.028	0.044	-0.625	.534
12	Time spent for study per week	.043	0.029	1.482	.142
13	Time spent for browsing internet per day	.072	0.038	1.878	.064*

14	Understanding & scoring good grade in Mathematics	-.076	0.035	-2.144	.035**
15	Repeating courses	.289	0.101	2.868	.005***
16	1HHH[1]prior to admission to the universities	-.044	0.031	-1.449	.151
17	Educational status of the head of the households	.019	0.024	0.81	.42
18	Occupational status of the head of the households	-.021	0.03	-0.71	.479
19	HH monthly income	.044	0.025	1.73	.087*
20	Time spent for religious activities	.065	0.057	1.145	.255
21	Relationships with your peers& others,	.073	0.038	1.907	.060*
22	Time spent for relaxation or entertainment per week	-.165	0.055	-3.022	.003***

Dependent Variable: Current Cumulative GPA/ECTS

Source: SPSS output (2013); *, **, * Significant at 1%, 5% and 10% probability level**

Here under are mentioning the Effects of the selected explaining variables on the academic success of female students in higher education in Ethiopia i.e., CGPA in the study area.

i. Institutional related factors

Assignment of competent and effective instructors: Academicians and intellectuals recognize the assignment of competent, committed and effective instructors to the teaching-learning processes, as one of the basic requirements for the success of the program. But, in this study the regression result show negative outcomes, i.e., according to the data collected instructors assigned to the teaching learning process of the engineering and common courses in the some sample institutions lacks the mentioned quality of effective teacher. Meaning, by considering other things being constant 1% increase assignments (employment) of instructors who are not capable of teaching efficiently, decreases student academic achievement i.e., CGPA in university decreased by 8.5%.

Student services like library facility, reference books, dormitory etc: Availing needed students' services have paramount importance for the success of students in higher education in general and female students in particular. Hence, the current regression result displays the presence of positive association between the offering students other services and reduction female students attrition problems in higher education in Ethiopia. Accordingly, if other factors are assumed to be constant and the effects of Student other services like library facility, reference books, dormitory etc. are increased by 10%, it resulted in 7.8% increase in CGPA in the university.

Implementation of affirmative action's: Implementation of affirmative action's for emerging regions and female students were promoted after the approval of the 1994 education and training policy of Ethiopia and more recently got high recognition in higher education reforms of 2003. Basing these, lots of measures were undertaken and achieved remarkable progresses in Ethiopian higher education institutions to implement the policy and reforms especially in solving the problems of female students though its implementation level is differ from institution to institutions. This difference in implementation also seen in the current study and have very small effects, i.e., regression analysis result confirmed a 10% increases in the current situation the implementation of the affirmative or positive actions, it resulted in increase of 0.6% of female students' academic scores or CGPA. Meaning, there are proper implementation problems of the affirmative action for the female students'.

ii. Cognitive factors

Early childhood education (schooling): Availability of access to early childhood education is very important requirements for later cognitive, skill, and emotional development of the students. Besides, the Ethiopian government currently implementing accessing 4-6 years old children to the program. This study show the presence of statistically significant difference at ($p=0.015$) among the students who have the experience of early education have greatly academically success. Meaning, if other things are being constant, 10% increase access to early education, increases

[1] HHH refers to House Hold Head

the female student academic success by 7.2%. If proper attention even taken on this issue in the future remarkable success may be achieved.

Time spent to browse the internet programs for academic success: Allocating available time for their study have a positive impact upon the academic achievements of the female students, among this utilizing proper time for browsing the internet for additional references and knowledge grasping is one method. Accordingly, the regression analysis of this study also confirmed the presence of positive associations between time spent for the study and female students' academic success in scoring better CGPA. Meaning according to the result a 10% increase in time spent for the study using the internet, it has increased female students' academic CGPA by 0.72 % in the study area. The small beta effect has shown very low of female students experience in using the internet for the knowledge formation and reference sources. This may be mostly because of the inadequacy of the computers, internet connections and other female students' personal problems like computer knowledge etc.

Mathematics Background: having strong understanding of mathematical background can have remarkable importance for the successfulness of the female students especially in engineering fields; this is because Mathematics is the foundation courses for engineering programs. Accordingly, the regression analysis result of the present study displayed the presence of negative association among students current CGPA and students mathematical background. That is, lacking mathematical background by 1% in the institutions if everything is being constant resulted in decrease of academic female students CGPA by 0.076

Repeating Courses: Though repeating courses at normal situation is not advisable for the students it costs their time, energy and capital etc. but it enhances female students' success if their scores are below the minimum requirements. Thus, in the current study also confirms the presence of positive association between repeating courses and female students' academic success at probability level of p (.005). Meaning the effects of allowing repeating courses have tremendous out comes for the repeaters. Accordingly, if everthing is being constant allowing course repeat for the needed female students increased by 10%, it resulted 28.9% increase in CGPA in the university. The impacts of allowing for the female students to repeat courses in areas of needs without limitation is one the most predicting factors for reduction of attrition problems and female students academic success in the higher education.

iii. Demographic Factors

Household monthly income: As confirmed by different scholars household monthly income has a direct relationship on the student's cognitive achievement if it appropriately invested on the schooling of children's. That is, may create an opportunity of getting good reference books, ample prior knowledge, competent teachers, home tutors etc. in this regard, the results of this study also confirmed the presence of positive impacts of household incomes on the academic success of female higher education in the engineering fields at probability level of p (0.087), i.e., a 10% increase of household incomes if everything is assumed to be constant, it has the predicting value of 0.44% on CGPA of the female students.

iv. Social Factors

Relationships with your peers & others: Socialization of the female students in this regression analysis has a positive correlation with their academic success in their higher education. That is, by assuming the effects of other variables being constant the 10% increase in female student staff and peer relation resulted in 0.73% increase in female students' academic achievements (CGPA) in higher education. Though this impact seems very small, has its own effects and needs intervention activities.

Time spent for relaxation or entertainment per week: Time for relaxation has negative effects on female students' academic success in this study. That is, as the time spent increases for relaxation increases female students' academic Cumulative grade Points decreases, i.e., increasing time for relaxation and entertainment by 10% in the institutions if everything is being constant resulted in decrease of female students' academic grades by 16.5%. As a result this factor also among the remarkable variables needs immediate consideration by the institutions.

Q3 How do engineering female students' of public higher institutions perceive the causes of their attritions?

4.6. Female students perception on causes of attrition

The cause of attrition challenges from public institutions of Ethiopia in this study treated qualitatively basing on institutional and Socialization integration problems as it mentioned in Conceptual frameworks of this study. Moreover, the qualitative study is selected for this part because it is meant for digging out detail information from the

participants. Thus, before mentioning the challenges it is better to raise few words about the understandings of their academic success and its counter parts of attrition. In this regard, most of the respondent explained that female students were successful in their education in the campus in the way that they think depending on their commitment i.e., success in education comes only when they successfully completed or promoted from semester to semester or graduated with minimum requirement of CGPA. Some of the respondents also said; success by itself will not come unless we perform what is expected from us with determination and encouragement. Particularly for female engineering students, they have to work hard in order to achieve their goal of success. Besides some of the respondent also described that female students are successful in her academic performance only if they stick to their study and guide themselves in any circumstance with confidence, for instance during their stay for the last five years in the campus they passed through many challenges such as academic problem, psychological problem, peer pressure towards sexual motives by their dorm mate or classmate influence, social life disorder.

The researchers have tried examining whether the outside environment has some factors that detract female students from their focus on their academic work and study. In doing so, attempts were made to visit some night club houses and Traditional Music Houses in three towns, Wello, Hawassa and Adama. The majority of participants in these recreation places were university students. One observation has indicated that six female students have rented their own house outside of the university so as to pass the nights after enjoying in night club in town of Hawassa. This problem has also been indicated by students as one of the major problems female students. The interview made with some people revealed that some female students work as sex workers to get money.

In addition to this, another engineering female student's interview report presented with amusing results below. Some female students have identifies that they have a good contacts in the towns with brokers to work as sex workers for money. That is, the brokers call them in the night whenever they are wanted and picked up by their taxi customers at any time. Two reasons were obtained why female students participate in such type of activity. One group of females reported that they do it to satisfy their financial requirements and to cope up with the competition with other female students in the university. The second group of female students does it for leisure. That is, they need extra money to enjoy in various recreation places of the town. This indicated that economic problem is one of the challenges for female students in higher learning institutions.

The interview made with Nurses and Gender Office Directorate's working in the universities' clinics has reported that pregnancy is the major problem in the universities. At an average, three female students come to the clinics seeking help and advice due to pregnancy issues. In addition to this, there were some female students who delivered in the campus and dropped out from their education. Specially, it is sever during immediately after students are admitted to the university during their first year entry. This might be attributed to the fact that this is the time that the majority of female students become free of parental control without having adequate awareness about how to deal with opposite sex mates. This issue has been raised by female students as a major problem. The other possible reason may be that female students immediately after admission might not get adequate social and academic orientation that helps them to adjust to the requirements of life in the universities which intern may expose them for bad senior students.

Female students have reported that they have real problems with some teachers that they are requested to sexual practice by teachers. However, if they refuse to respond positively then teachers hurt them during grading. The problem becomes sever when no concerned officials in the universities accept their appeal. One of the university's Dean of Students explained that female students come to appeal and when the attempt was made to discuss the issue with departments it is usually observed that the whole effort is to protect the teacher than to help female students solve their problems.

Gallacher (2005) identified a number of school factors that promote female students' success in higher education. The most critical is sound counseling, and providing staff training to help teachers serve female students more effectively. However, in this study, it was reported that lack of support from teachers, absence of concerned people in the university about female students' problems and absence of adequate counseling services are problems mentioned by students.

In general, reason for female students' dropout taken from students' interview analysis was summarized and presented as follows:

Institutional factors

- Improper placement of the students to the fields of their interest.
- Lack of assigning competent instructors at MSc (competence in teaching advanced courses in case of new established universities)
- Instructors lack pedagogical skill in teaching and providing feedback to student's questions.
- Large class size
- Lack of proper and safe place for discussion with their peers in the campus.
- The influence of male students, instructors.
- poor interaction between instructors and female students in during advising and counselling

Cognitive factors

- Lack of prior knowledge in Science and Mathematics subjects
- Lack of study and technological skills (applying Math lab software)
- Lack of exerting adequate effort on academic work
- Lack of skill of using internet service particularly those from rural area

Socio-economic and personal related factors issues

- Lack of finance to support oneself.
- Lack of commitment and self-confidences, carelessness and absenteeism, Lack of ability to be competent, lack of time management
- Being addicted to drinking, smoking, dancing in night clubs, etc, tension, and falling in love easily with their peers

Demographic factors

- Lack of adjusting oneself with campus life (Rural students)

Results of analysis drawn from instructors and officials through interview**According to instructors students:**

- Lack the background knowledge especially in mathematics and physics concepts.
- The existence of relatively high cheat during exam instead of sticking to their studying.
- Often missing classes
- Do not participate in class discussion (submissive)
- Give little attention to their study and tutorial programs

5. Conclusions and Recommendations**Conclusions**

Based on the assessment of the determinants of female students' academic success and causes of attrition in engineering institutes of public higher education institutions of Ethiopia, the following conclusions have been made.

Lack of time management, lack of mathematical background, carelessness, tension, and fear of failure and lack of adequate effort on academic matters, large class size, lack of competent instructors, institutional preference were the nine factors that threatened or encountered female students' academic success in engineering fields of public higher education institutions. As it has been indicated in the institutional factors, ineffectiveness of tutorial delivery system, lack of facilities (like, library, internet room, well equipped laboratory, updated reference books etc.) Adjusting oneself with the campus life, and lack of special support services were found to be the major challenging factors in the university environment. These mentioned problems almost similarly in most institutions.

As indicated in the socio-economic factors, majority of the respondents reported that lack of money for learning purpose (coping, buying books and high level software, laptops, for project and assignment typing etc), shortage of money to support oneself (e.g. to buy modes, pocket money) were reasons for female students dropout.

With regard to circumstances that would make students less likely to leave were lack of providing them a good orientation session in the beginning of academic years, lack of participating them in short term training (study skill, time management, life skills), lack of providing support from academic advisor, lack of giving training on assertiveness were some of the factors that lead to students' dropout.

The regression analysis has pulled out the effects of the major variables categorized under institutional, cognitive, socioeconomic and personal related and demographic factors as important predictors of female students' academic success (university CGPA) as indicated in Table 2.

The interview made with female students has revealed that previous academic background (high school GPA and transcripts), peer pressure, poor guidance and counselling and lack of adjusting one self, large class size were the main factor for their low academic performance and attrition.

Recommendations

On the basis of the findings of the study and conclusions made, the following recommendations are forwarded:

1. As the assignment of competent instructors shows positive outcomes on female students' academic success in engineering fields of higher education, much attention is required in upgrading the existing graduate assistants' academic status and/or urgently recruit staff with the rank of lecturer and above in the area of engineering specially for the newly established Universities.
2. Besides using students' GPA as a major criteria of student's placement, the University should look ways to entertain female students' interest while placing them to different field of study and universities placement.
3. As the assignment of competent instructors shows positive outcomes on female students' academic success in engineering fields of higher education, much attention is required in upgrading the existing graduate assistants' academic status and/or urgently recruit staff with the rank of lecturer and above in the area of engineering specially for the newly established universities.
4. As large class size has negative effect on female students' academic success, the MoE and the universities have to work collaboratively on the students' intake capacity.
5. Gender office, College Deans and Department heads should make strict follow up of class schedules and proper implementations of affirmative action and academic advising. Moreover, Ministry of Education should set workable policy guideline that will be implemented by all higher learning institutions to protect female students from being harassed by students, teachers and other members of the institutions.
6. Besides using students' GPA as a major criteria of students' placement, the University should look ways to entertain female students' interest while placing them to different engineering programs.
7. The effects of student services like library facilities, Laboratory service, reference books, and internet services tested and confirmed positive impacts on female students' academic success in engineering fields. The universities should work to provide this facilities to their female students. In addition to this, it is advisable to allocate separate study and internet rooms for female students' to enhance their academic success and reduce attrition.
8. Female students' mathematical background has been generally found to be poor, developing their critical thinking experience with mathematics problems solving skills is critical. Remedial classes need to be arranged. Moreover, the Ministry of Education in collaboration with Regional Educational bureaus and universities should arrange a bridge foundation courses like calculus and Mechanics during summer (before they are admitted to the campus) for those who took grade 12 national exam to fill the existing gap happened in the universities to bring both rural and urban female to platform stage in the campus.
9. The Departments and the Gender Office should arrange on the possible extension of the duration of tutorial classes addressing the needs of students. It should not be limited to first year first semester.
10. Allowing students to take supplementary exam is a good opportunity for the students to stay in the program. However, arranging supplemental exam with some remedial class would greatly help female students.
11. The Institute of Technology should arrange and provide pedagogical training workshop for the new recruited instructors in collaboration with college of Education and behavioral science in order to enrich their competence in pedagogical skills.
12. Financial assistance to the students was found to have a positive impacts on academic success of female students in higher education. Thus, assistance has to be extended to those needy female students without discrimination.
13. Gender office and university communities should work collaboratively and arrange training on study skills, time management, peer pressure influence, how to browse internet for academic propose (particularly for

rural students), how to share common resources among themselves without discrimination in collaboration with NGOs and Behavioral Science Department. Besides, The Gender Office and the university official should provide awareness creation workshop for female students' to build up their confidence or assertiveness by inviting model female engineers.

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