ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY (ASTU)

SCHOOL OF APPLIED NATURAL SCIENCE

STATISTICAL INVESTIGATION OF FACTORS AFFECTING ACADEMIC ACHIEVEMENT OF SCIENCE AND TECHNOLOGY STUDENTS, THE CASE OF ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY

BY:

HANNA TEFERA (MSc. in Statistics)

April 2017

Adama, Ethiopia

1. Introduction

1.1 Background of the Study

Education plays a major role in the development of a country as the amount of knowledge, skills and attitudes acquired in school are considered important for survival and growth of society. A person's education is closely linked to her/his life chances, income, and well being (Battle and Lewis 2002). In education, academic performance of students plays an important role in producing the best qualified and competent graduates who can lead, skill full to contribute and responsible for the country's economic and social development. The performance of students in schools and universities should be a concern not only to the administrators and academicians, but also to corporations in the labor market. Therefore, it is important to have a clear understanding of what benefits or hinders one's educational attainment / academic performance.

The traditional thinking is that, if a student is intelligent she/he can perform well at school or higher education. However, intelligence is not the only factor that affect academic performance of students, since besides intelligence, there are many factors affecting academic performance of students (Antonia, 2002).

Factors affecting student's academic performance are an important issues in schools and higher learning institutions. Many students often join higher educations, every academic year but it is observed that, there is dropout due to low academic performance especially in science and technology fields. On other hand, many of them face problems to accomplish their education at the expected duration of time, due to different reasons like health problems, discipline related problems, and problems related to family.

There are several topical areas that are most commonly linked to academic performance including school environments factors, such as school size, neighborhood, and relationships between teachers and students influence test scores (Crosone, Johnsons, and Elder 2004).

Research has found that socioeconomic status, parental involvement, parent's level of education are important family factors which affect academic performance of students (Girma Lema, Zebenay Leulseged, 2014). Especially mothers are the most influential toward academic performance of their children (Yekunoamlak Alemu, Tiruwork, Tadesse, 2014). The research also shows that, academic motivation like attitude towards study and attitude towards time allocation for study, have a significant impact on examination performance. i.e. the longer time a student study results in improved academic performance (Shoukat Ali et.al, 2013). However other study reviled that longer time of study and parent/guardian socio economic status are not significantly related with academic performance of students which contradicts the previous finding. (Syed Tahir Hijaz and Raza Naqri 2006).

In another study, student role performance like; (extracurricular activities, student effort) are found to be determinants of academic performance of students. (S. Valli Jayanthi. et al, 2014). Research also revealed that, Peer influences also affect student's academic performance. Peer pressure and peer conformity can lead to an individual participating in risk-taking behaviors which have been found to have a negative, indirect effect on test scores (Santor, et. al, 2000).

On another hand, test anxiety is also another factor which affect academic performance of students negatively (Spielberger and Sarson, 1989).

However, the finding by Darge Wole and Amsalework Legesse, (2014) show that there is no significant difference in the academic performance (GPA) among the University students by their levels of test anxiety.

Now a days Ethiopian public universities have been working in designing various strategies in order to attain quality education and better performance, through changing old curriculums and developing the new one. For instance, many public universities in Ethiopia are implementing **"Modular approach" (block courses, with continuous assessment** and **"fixed grading system")** aimed at increasing quality education, engaging students purely in their education in order to acquire, better performance.

Since this approach is linked to test scores and directly affects student's grade it becomes important to examine whether or not there is some change after its implementation, and by gaining a better understanding of students performance, current federal legislation can be critically analyzed. In addition it becomes important to identify what factors influence test scores of science and technology students.

Therefore this study takes a holistic approach to analyze whether or not these factors also influence academic performance of science and technology students at university level by creating a five-part model. This model includes many of the factors like; SRP, family-level factors, peer factors, school factors and test anxiety that have previously been linked to affecting test scores. In this study, academic motivation and academic self-concept were added to measure Student role performance factor (SRP) in addition to extra curriculum activities student effort academic honor. It is expected that the higher a students' SRP the higher the test scores will be.

1.2 Statement of the Problem

Many students are suspended from their higher education studies especially from science and engineering fields, due to poor academic achievement and social adjustment. For instance, about 2845 Adama Science and Technology (ASTU) students were dismissed from their education due to low academic performance in four consecutive years (2005E.C to 2008 E.C) according to the report of ASTU Registrar office, (2016). This is a big crises for students, family, society as well as development of the country. As stated in different findings this may be due to influence of different factors on their academic performance which needs to be investigated.

Various researches show the influence of school factors, family socioeconomic status, educational level and parent support, on student's academic achievement in elementary and high school (Girma Lema, Zebanay Luleseged, 2014). But other studies show that economic status of the parent has week impact on academic performance of their children Beblo and Lauer (2004) . In addition different studies revealed the impact of SRP, Peer influence and test anxiety on academic performance of students. However, other research revealed no significant difference in academic performance by the level of their test anxiety (Darge Wole and Amsalework Legesse, 2014).

On the other hand the magnitude of the impact of these factors may not be the same at lower school level and university level. At elementary or high school level children needs follow up and academic support as well as economic support to choose better schools which will depend on the capacity of their parents. But this may not be the same at university level where students separated from their parents, live in dormitories and learn in almost same atmosphere.

Therefore, this study is aimed to investigate the impact of these factors by considering science and technology students at university level which are separated from their parents/guardians and leaving in dormitories.

In addition, in this study some components like academic motivation, academic self-concept were additional components added to SRP factor.

On the other hand, majority of the Universities in our country are implementing the new approach called Modular approach to enhance quality education for the country. Therefore, it is important to assess whether or not this approach contributes in reducing student's attrition rate/dropout rate. Accordingly the following research questions will be expected to be answered by this study.

1. Does student role performance (SRP) influence academic achievement of science and technology students in university?
2. Does school factor has an impact on academic performance of science and technology students in university?
3. Does family factors affect academic performance of science and technology students in university?
4. Does peer factor determine academic performance of science and technology students in university?
5. Does level of test anxiety influence academic performance of science and technology students in university?
6. Is there a change in attrition rate of student's after new approach/ modular approach (Continuous assessment and fixed grading system) is implemented?

1.3 Objective of the Study

1.3.1 General Objective of the study

The general objective of this study is to investigate and identify statistically factors affecting academic achievement of science and technology students at university level.

Specific Objectives

1. To assess whether or not SRP influence academic achievement of students science and technology at university level
2. To investigate the impact of school factor on academic performance of science and technology students at university level
3. To investigate whether family factors affecting science and technology students' academic achievement at university level
4. To assess the impact of peer factor on academic performance of students at university level
5. To see whether or not the level of test anxiety influences academic performance of students at university level
6. To investigate whether there is a change in attrition rate of student's after a new approach is implemented.

1.4 Scope of the Study

This study has been conducted on Science and Engineering students of Adama Science and Technology University. The study is delimited in this university, because of resource constraints like financial and time. Therefore, the study particularly focusses on Natural Science, and Engineering students.

1.5 Significance of the Study

There are evidences from literature which show many factors affecting academic performance of students. As stated previously, some of these factors are; SRP, peer factor, family factor, school factor and test anxiety. Nevertheless little is known, whether these factors affect academic achievement of science and technology students in Ethiopia context. On another hand some of the finding obtained by previous researches are contradicting which need farther investigation. This study help also determine whether or not current policies are benefiting students or if perhaps other policies would be more beneficial.

Therefore, the study is expected to have some theoretical contribution in the sense that the finding would shed some light on these matters. In addition, it will provide useful information for students, universities and policy makers in the education sectors. Furthermore, the study will hopefully initiate other researchers to focus on the topic and may have its own contribution to existing body of knowledge regarding the relationship of academic achievement with Student Role Performance (SRP) factors, family-level factors, peer factors, school factors and test anxiety.

1.6 Operational Definitions

The definition of selected terms which are used in present study are given below (Carbonare 2005; Sansagiry et al., 2006; Timothy A 2008; Gardiner, 1985; Harter, 1982; Crosnoe, Johnson, and Elder 2004b; Spielberger and Sarson, 1990).

- **Academic Performance**- refers to CGPA of students in this study.
- **Student role performance (SRP) –** According to this study it refers to how well an individual fulfills the role of a student in an educational institution.

It involves factors such as, effort of student (time management and energy), academic motivation, academic self-concept extracurricular activities and academic honors.

- **Time Management-** It has been defined as: the completion of tasks within an expected time frame while maintaining quality through planning, organizing prioritizing or multitasking (Timothy, 2008).
- **Academic self- concept** refers to individual's knowledge and perceptions about the selves in achievement situations.
- **Continuous assessment-** evaluating students with series of tests/quizzes, assignments, mid examination and a final examination.
- **School factor –** According to this research school factors refers to school structure, school composition, school climate (i.e. library, laboratory facilities, student teachers' relation, mode of course delivery.
- **Family Factor**- refers to factors such as socio-economic status (SES), parents' educational level and occupation in the current study.
- **Test anxiety** refers to the anxiety states/fear and worry conditions that are experienced during examination.

1.7 Limitations of the Study

The limitation of this study deals mainly with the cross-sectional nature of the data. This data was obtained at one point in time therefore it is difficult to determine how long an individual has been at a certain SES level. For example, an individual may have recently experienced a shift in their economic standing due to parents' divorce or other circumstances. In that case the full effects of the new SES standing may not have set in by the time of the survey. Insufficient information on certain variables was another limitation, for example due to privacy laws it is not possible to ask students about drug and alcohol use or sexual activity involving the student or their peers. If this information was available the peer-level factor might have a larger impact and become more clear-cut.

2. Review of Related Literature

Several literatures have been reviewed for this study in order to gather information regarding factors affecting academic performance of students. Up to date many studies have been developed concerning the factors that influence students' performance such as demographic, active learning, student attendance, extracurricular activities, and peers influence and course assessment.

A review of the literature have indicated that student attitudes toward study, study habits and strategic learning, student psychological characteristics, learning style, family background, teachers role and many others are closely related to students' academic performance (Eccles & Wigfield, 1985; Eccles & Harold, 1993; Hanson, 1994, Ali et al.,2009) .

Different researchers had identified determinants of academic performance as it can be seen in the following literatures.

2.1 Student Role Performance and Its Link with Academic performance

Student Role Performance (SRP) is how well an individual fulfills the role of a student in an educational institution. SRP involves factors such as, effort of student (time management, academic motivation, and academic self-concept), extracurricular activities and academic honors.

William Carbonare defines school effort as “the amount of time and energy that students expand in meeting the formal academic requirements established by their teacher and/or

school" (2005). He has also identified three different types of school efforts. These are rule oriented effort (showing up to and behaving in class), procedural effort (meeting specific class demands such as completing assignment on time), and intellectual effort (critically thinking about and understanding the curriculum). It is expected that a student who puts forward significant effort in all three categories will perform the best. And studies have shown that school effort is an indicator of academic performance (Ceballo et al 2004, Carbonaro 2005).

A consensus on whether or not a student participating in extracurricular activities, such as sports or clubs, will have a positive effect on academic performance has not been reached.

The leading crowd theory hypothesizes that participating in activities outside of class raises one's status and creates bonds with teachers and therefore enhances academic performance (Hunt 2005).

Student deviance and delinquency have been linked to academic outcomes (Murdock, Anderman, and Hodge 2000, Voelkl, Welte, and Wieczorek 1999). Deviant behavior ranges from less severe acts such as disorderly conduct in the classroom to more severe acts like committing criminal offenses (Voelkl et al 1999). Poor academic performance is often accompanied with deviant behavior.

Time management skills are also vital to academic success. Time management has been defined as: the completion of tasks within an expected time frame while maintaining quality through planning, organizing prioritizing or multitasking (Timothy, 2008). Balancing time for study has an effect on academic achievement of students. Time management skills include activities performed by students such as planning in advance, prioritizing work test preparation, and following schedules (Sansagiry et.al., 2006).

On another hand, academic self- concept is viewed as a valued educational outcome.

Self-concept as the perception each person has of himself or herself is the component of personality development. Self-concept as a construct has had a long history with in psychology and education, because it provide a gauge to determine the effect of academic and social functioning on the emotional well-being of the individual (Harter, 1982).

Most cognitive theorists and researchers have acknowledged that poor academic self-concept, low self-esteem, negative attitudes toward study, or erroneous perceptions of students may be associated with poor academic performance. In another study by Syed Tahir Hijaz and Raza Naqri (2006), it is found that attitude towards study and time management has a significant influence on examination performance.

2.2 Test Anxiety and Academic performance

Test anxiety is another factor which may influences students academic achievement. Spielberger and Sarson, (1989) define test anxiety as situation specific trait that refers to the anxiety states and worry conditions that are experienced during examination. According to Zbornik, (as sited in black, 2005), students who suffer from test anxiety tend to be consumed with feeling of anxiousness, worthlessness, and/ or dread in regard to their academic achievement. Research shows that, test anxiety of higher education students is inversely and significantly correlated with their academic performance with weak relationship and female university students reported significantly higher test anxiety level compared to their male student counterparts. However no significant difference was found on academic performance of students based on the level of their test anxiety. (Darge Wole and Amsalework Legese, 2014).

2.3 School Environment

A student's educational outcome and academic success is greatly influenced by the type of school that they attend. School factors include school structure, school composition, and school climate.

Crosnoe, Johnson, and Elder (2004b) suggested that school sector (public or private) and class size are two important structural components of schools. Private schools tend to have smaller class sizes than public schools (Crosnoe al 2004b). Smaller class sizes create more intimate settings and therefore can increase teacher-student communication which has been shown to have a positive effect on student's success (Crosnoe et al 2004b).

School composition or the general makeup of a school is another important factor regarding academic achievement (Crosnoe et al 2004, Bali and Alvarez 2004, Eamon 2005).

The racial make-up of a schools' student body has shown to influence test score and students' attachment to their school (Crosnoe et al 2004, Bali and Alvarez 2004).

Crosnoe et al defines school climate as '' the general atmosphere of a school (2004). School climate is closely related to the interpersonal relation between students and teachers.

Trust between students and teachers increase if a school encourages teamwork.

Research shows that student who trust their teachers are more motivated and as a result perform better in school (Crosnoe et al 2004, Eamon 2005).

In the study by Demaray and Elliot (1998) it can be conclude that teachers are able in predicting their students' achievement on standardized tests such as academic competence evaluation scale and distinguishing between students with low or high academic performance.

Research shows that students are more motivated to learn when teachers ask them to wrestle with new concepts, explain their reasoning, defend their conclusions, or explore alternative strategies and solution (National Research Council, 1999). Furthermore, students enjoy learning more when their teachers employ active pedagogical strategies. Meece suggested that when classroom instruction draws on students' pre-existing knowledge and real-life experiences the learning session will be become more interesting and enjoying which result in the student learn more better and achieved better grades in examination and academic (Meece, 1991). Cohen (1994) strengthen this finding that when students can put their heads together rather than work in isolation they are receptive to challenging assignments which will directly boost their performance. Study also shows that interest toward fields of study also influence academic performance of students.

Many students are assigned by departments to fields which is not their own choice which result in their failurity. (Yekunoamlak Alemu, Tiruwark Tedese, 2014).

2.4 Family Background (Socio Economic Status and Parent's level of Education) Linked with Academic Performance

Family background is key to a students' life and outside of school, is the most important influence on students learning and includes factors such as socio-economic status (SES), The environment at home is a primary socialization agent and influences a child's interest in school and aspiration for the future. Socio-economic status (SES) of a child is most commonly determined by combining parents' educational level, occupational status and income level (Jeynes, 2002, Pedrosa et.al 2006).

Studies have repeatedly found that socio economic status affects student outcomes (Ali, Shoukat, et al 2013, Eamon 2005, Hochschild 2003,). Students who have a low SES earn lower test scores and are more likely to drop out school (Eamon 2005, Hochschild 2003). It is believed that low SES negatively affect academic achievement because low SES prevents access to vital resources and creates additional stress at home (Eamon 2005, Jeynes 2002). This is due to the fact that students lack learning at better school, important school materials like reference books, stationary materials and other related resources which is supported by finding of Dills, 2006. The economic hardship that are caused by low SES lead to disruption in parenting, an increasing amount of family conflicts and an increased likelihood of depression in parents and single-parent household (Eamon2005). For these reasons SES closely tied to home environment and one could argue that SES dictates the quality of home life for children.

This is because poverty or low income of parents has elastic effects on their children academic works as they lack enough resources and funds to sponsor their educational requirements and this leads to poor performance of their children.

An investigation conducted by Agus and Makhbul (2002) indicated that students from families of higher income levels perform better in their academic performance as compared to those who come from families of lower income brackets. Checchi (2000) also concluded family income provides an incentive for better student performance; richer parents internalize this affect by investing more resources in the education of their children.

Once the investment is undertaken, the student fulfill parents' expectations by perform better in their studies. Based on the research done by him, he demonstrated that children from richer families perform better than those from poorer families. On the other hand, Syed Tahir Hijazi and Raza Naqvi (2006) found that there is negative relationship between student performance and student family income. Research done by Beblo and Lauer (2004) also found that parents' income and their labor market status have a weak impact on children's education.

Parent's Educational Level

In another study it was found that educational level of mothers has significant influence on academic performance as compared to level of education of father. Research also revealed that students whose mothers have completed higher education performed even better in their academic than whose mothers have completed secondary school. From the literature search on the influence of parent's educational level on student's performance, mother's educational level is a strongest predictor factor and it was assumed that educated mothers can help follow their children academically to improve and keep proper check on their activities. Syed Tahir Hijazi and Raza Naqri (2006).

2.5 Peer Influence

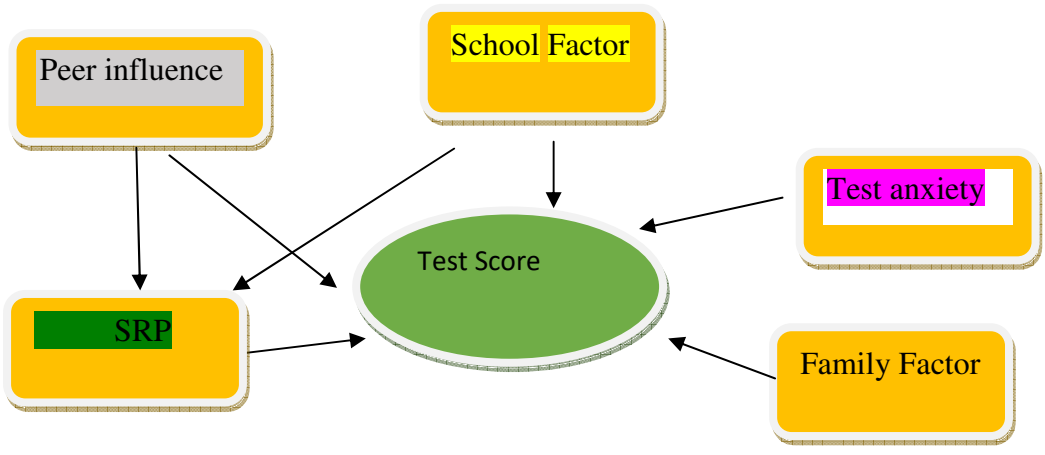
Peer groups are important socialization agents. Participating in peer group activities is a primary stage of development and adolescents' identifies are often closely associated with that of their peers (Santor et al, 2000).

Because peer groups are a key part of the developmental process they can have a negative effect on young people due to peer pressure and peer conformity. Higher degrees of peer pressure, which is the pressure from others to participate in certain activities, and peer conformity which is the degree to which an individual adopts actions that are sanctioned by their peer group, have been shown to increase the likelihood of risk taking behavior such as substance abuse and sexual activity. These risk taking behaviors indirectly affect school performance in negative way (Santor et al, 2000). However, other study shows that peer interaction could increase student ability on solving problem-solving questions and the peer instruction will also promotes student's participation and improve student's performance (Giuliodori, Lujan and DiCarlo 2006). This shows that the outcome of peer pressure is determined by the behavior of that peer group and how they influence each other either negatively or positively.

2.6 Alternative Model and Hypothesis

This study proposes a holistic alternative model that combines student role performance, school, family, and peer effects and test anxiety on academic achievement of students in ASTU based on previous findings and expecting these factors have contribution.

Alternative hypothesis model



The arrow show that the mentioned independent factors are expected to affect test score /academic performance of students as it has been seen from previous finings.

3. Methodology

3.1 Study Area and Population

This study has been conducted in Adama Science and Technology University which is found in Adama City, Ethiopia.. It is located at 8.54°N 39.27°E at an elevation of 1712 meters, 99 km southeast of Addis Ababa the capital city of Ethiopia. The city sits between the base of an escarpment to the west, and the Great Rift Valley to the east.

Based on the 2007 Census conducted by the Central_Statistical_Agency of Ethiopia (CSA), this city has a total population of 220,212, an increase of 72.25% over the population recorded in the 1994 census, of whom 108,872 are men and 111,340 women. With an area of 29.86 square kilometers, Adama has a population density of 7,374.82; all are urban inhabitants. A total of 60,174 households were counted in this city, which results in an average of 3.66 persons to a household, and 59,431 housing units (Source:Wkipedia).

The present study targets, students of Adama Science and Technology University under two schools namely School of Applied Natural Science and School of Engineering. According to registrar report ASTU has about 22,367 of population of students (regular program and extension program) during data collection time.

3.2 Source of Data

Both primary and secondary data were used for this study. Primary data was collected from students by using questionnaire method and the secondary data was obtained from office of the registrar on the attrition rate and CGPA of students which measures academic performance of students.

The primary data was collected randomly from Applied natural science particularly from Biology, chemistry mathematics and physics students. Whereas data of Engineering Schools are obtained from Civil engineering, Chemical engineering, Mechanical engineering and Electrical engineering.

3.3 Sampling Techniques

The universe of this dataset consisted of about 22,367 students of Adama Science and Technology University during academic year of 2014.

A cross-sectional survey study with two level sampling has been conducted in which students were selected from two schools: Natural Science and Engineering Schools as stated above, by using stratified random sampling technique. Sample size for each stratum was taken proportional to its population size. About 367 students were participated in this study based on population size in each school.

The stratification is:

Stratum1: population of Natural science students with population size N_1 and sample size n_1.

Stratum2: population of Engineering students with population size N_2 and sample size n_2.

Let $N= N_1+N_2$ be total number of students in the School of Natural Sciences and Engineering at time of data collection and $n= n_1+n_2$ be total sample size of students who have been participated in the study. The sample of the study was determined according to the following concept.

Sample size Determination

The decision of sample size determination cannot always made satisfactorily; often we do not possess enough information to be sure that our choice of sample size is the best one (Cochran, 1997). Sampling theory provide a frame work within which to think intelligently about the problem. The statement of precision for the size of a sample desired may be made by giving the amount of error (d) that we are willing to tolerate in the sample estimate. Sometimes it is difficult to decide how much error should be tolerated.

Accordingly the following formula (Cochran, 1997) was employed for sample size determination using margin of error d =0.11. Firstly sample size n_1 for Natural Science students was obtained using the following formula and then sample size for engineering students was obtained using proportional allocation based on result n_1 obtained.

$$n_1 = \frac{t^2 pq}{d^2\left(1 + \frac{1}{N_1}\left(\frac{t^2 pq}{d^2} - 1\right)\right)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

P=0.7 was approximately taken with margin of error d= 0.11

q= 1-p= 1-0.7= 0.3

t= 2

Where p is proportion of students having good academic achievement

q is proportion of students below good status

d= is margin of error,

t is abscissa of normal curve that cuts off an area of *α at the tails* value at 95% confidence interval.

α = 0.05, Level of significance

n = Sample size

$$n_1 = \frac{\frac{t^2 pq}{d^2}}{1+\frac{1}{N}\left(\frac{t^2 pq}{d^2}-1\right)} = \frac{\frac{4x0.7x0.3}{0.11^2}}{1+\frac{1}{2800}\left(\frac{4x0.7x0.3}{0.11^2}-1\right)}.= 67.79$$

$$n_1 = 68$$

From the above result, a sample of 68 students was calculated from total population of 2800 students, therefore, using proportional allocation a sample size n_2 was obtained from the total of 12336 students as follows:

$$n_2 = \frac{(68x123366)}{2800} = 299$$

A sample of 299 students were selected from school of Engineering.

Therefore the following table shows the summarized form of the data taken from the registrar on Natural science and Engineering School students.

Strata no	Strata	Number of Students in each strata	Proportional Allocation
Stratum 1	School of Natural Science	2,800	68
Stratum 2	School of Engineering	12,336	299
Total		**15,136**	**367**

Table 1. Data of students from School of Natural science and School of Engineering

3.4 Instruments of Data Collection

3.4.1 Questionnaire

The questionnaire consists of five set of items. The first part was concerned with students' personal information and family background like; educational level and socio-economic status of the parents. The second part of the questionnaire consists of items on student role performance (SRP). The third part was on school environment, the forth part was on peer factor and the 5th part consists of items on anxiety level of students. The questionnaire is attached as appendix. 5

The first part of the questionnaire on background information was developed by investigator, the second part that measures student's role performance (SRP) was adapted from Alan, 2004; Smith, 2000 and Sansagiry et al., 2006). Likert scale rated from 1 to 5, 1= strongly disagree, 2= disagree, 3 undecided, 4= agree and 5= strongly agree the average of these numbers was used to measure each component of the SRP variable. (Alan, 2004, Smith, 2000, Sansagiry et al., 2006), The third part measures school factor(school composition, resources like library, laboratory, climate like student- teacher relationship, mode of course delivery) was developed by the researcher.

The items used to measure peer influences included friends' emphasis on grades, friends' emphasis on negative activities was adapted from used scales and reliability was checked.

In similar way Likert scale rated from 1 to 4 was used, as 1= no pressure, 2= a little, 3 somewhat, 4= a lot of pressure and the average of these numbers was utilized to measure peer factor.

The fifth part of the questionnaire measures test anxiety level of student which was adapted from previously validated test anxiety inventory.

Test anxiety was measured using 10 items with 5point likert scale to rate students emotionality and the average was calculated and used (Sansagiry et al., 2006).

3.4.2 Preliminary Study

Before collecting data for the main study instrument of data collection should be tested to check the clarity reliability and feasibility of the items. Accordingly a pilot study on 64 students (both on female and male students) of Engineering and Applied Natural science schools. These students were not taken for the main study.

The objective of the preliminary study was to test the instruments and to see whether students can easily and willingly respond to items of the different instruments.

Reliability/ internal consistency of multiple item scale was also checked. The most commonly used type of internal consistency reliability, Cronbach's coefficient alpha was employed to check the reliability of items used for each scaled variables separately.

It is based on the average correlation among items. Cronbach alpha coefficient equals zero when the true scored is not measured at all hence there is only an error component. Alpha equals one when all items measured are the true scores and there is no error component.

By convention, a lenient cut-off of 0.6 in exploratory study (Cronbach, 1951) and some researchers require the cut-off 0.8 for "a good scale". As a general rule of thumb, a reliability coefficient alpha is excellent if alpha is larger than 0.75; good if Alpha is between 0.4 and 0.7 and poor if Alpha is less than 0.4.

Accordingly, Cronbach's alpha was employed to check the reliability of items in each scale and Cronbach's alpha coefficient was obtained to be good. α was 0.77 for student role performance scale. The reliability analysis for peer pressure and test anxiety were found to be α = 0.81 and α= 0.76 respectively, after deleting items which have low correlation with other items, so that this was enough to measure the variables. After this, the instrument was used to collect the data and the corresponding average/ mean of items to each variable was used for analysis (Cronbach, 1951).

3.5 Variables of the Study

3.5.1 Dependent Variable (DV): The dependent variable of this study was the cumulative grade point average (CGPA) of students which is continuous variable and it measure academic performance of students.

3.5.2 Independent Variables (IDV) - these variables are discrete variables since they were measured by likert scale rated from 1 to 5. The variables are:

1. **Student Role Performance Variable** it is the cumulative of other variables which are mentioned before.
2. **School factor**- the variable used to measure school factors included facilities in departments, services given for students, teachers related and school hindrances.
3. **Family Factor-** the variable used to examine family factors included socio-economic status, educational background of parents.
4. **Peer Factor-** measure peer influences related to friends' emphasis on grades, friends' emphasis on positive /negative activities.
5. **Test anxiety-** is measured by 10 items.

3.6 Method of Data Analysis

After necessary data were collected, different statistical methods were utilized for data analysis. The methods were explanatory data analysis (EDA) to summarize and see the picture of the data, bivariate analysis to check relationship between dependent and independent variables as well as multicoolinearity and multiple linear regression analysis to model the relation of dependent variable with independent variables using statistical equation. SPSS for window version 23 was employed for data analysis.

3.6.1 Exploratory Data Analysis (EDA)

After the data are entered to SPSS the first step to complete (before running any inferential statistics) is EDA, which involves computing various descriptive statistics and graphs. Explanatory data analysis is used to examine and get to know the data.

Some of the reasons:

1. To see if there are problems in the data such as outliers, non-normal distributions, problems with coding, missing values, and or errors inputting the data.
2. To examine the extent to which assumptions of the statistics that is planned to use are met.
3. To examine relationships between variables (multicollinearity) to determine how to conduct the hypothesis-testing analysis.

3.6.2 Multiple Linear Regression Analysis

Regression analysis is statistical technique for investigating and modeling the relationship between variables. Application of regression is numerous and occurs in almost every field of study. It is used to model and investigate the nature of relationship between variables.

The relationship is expressed in the form of an equation or a model relating response variable and one or more explanatory variables.

Model: The basic aim of modeling is to drive a mathematical representation of the relationship between an observed response variable and a number of explanatory variables together with a measure of the inherent uncertainty of such relationship (Collett ,1991).

Model:

$$Y_{ij} = \beta_o + \beta_1 X_1 + B_2 X_2 + ... + B_K X_K + \varepsilon \text{ ……..(2)}$$

Where i= 1, 2, 3...n n is number of observations (sample data)

Y_{ij} is dependent variable i.e academic performance (CGPA)

β_o is constant or y intercept

β_i s are regression coefficients

β_o and β_i are regression parameters which are fixed but unknown and to be estimated.

$X_1, X_2, X_3 \ldots, X_K$ of K explanatory/independent variables and

ε is noise term or random error.

Random error is a random variable that captures all other factors which influence the dependent variable Y other than the selected explanatory variable X. Random error accounts for the variability in the output variable that cannot be explained by the relationship with

input variables. It does not mean that a random error is a mistake that is being made. It is simply a symbol used to indicate the absence of an exact relationship between the output and input variables. Error term is a random variable that should have a certain probability distribution.

It is usually taken to have a normal distribution with mean equal to zero and variance σ^2:

- In the statistical model equation (2), the output variable Y is a random variable as the error term is a random variable.
- Moreover, $\beta_o + \beta_1 X_1 + B_2 X_2 + ... + B_K X_K$ is taken to be the deterministic or fixed part of the model.
- Regression model building is a process of creating or developing a probabilistic model that best ascertain the association between response variable and explanatory variables. In regression model building are **finding the proper form of the relationship** (linear, curvilinear or non-linear) and selecting the independent variables to be included in the model.
- More generally, there are **four** stages or phases to build regression model which is an iterative process as shown in Figure 1.
- If the model is not appropriate, it is a must to go to the first step to specify another form of regression model or to make some adjustments.

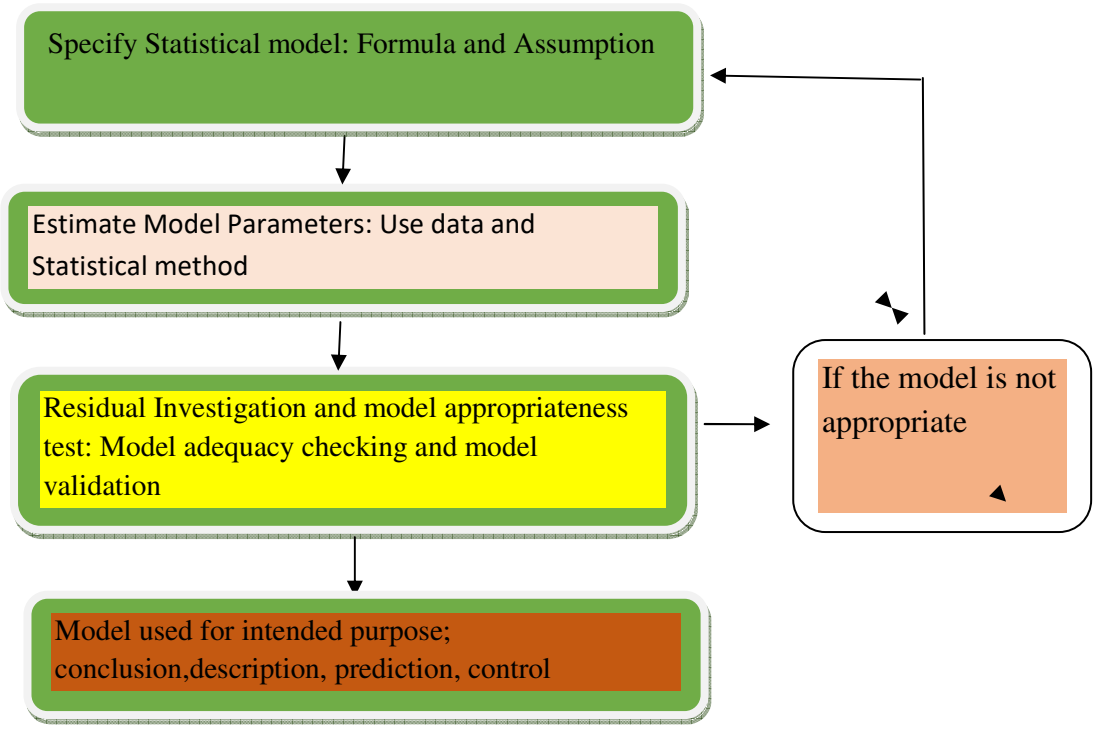


Fig. 1. Stages or phases to Regression Model Building

3.6.3 Parameter Estimation

The main purpose of a **statistical method** is to estimate model parameters based on the collected data. Model fitting is the use of statistical method to estimate model parameters based on the collected data.

As method of estimation of unknown parameters β, we used ordinary least square (OLS) estimation method which depend on minimizing the total sum of squares of the errors $\varepsilon_1, \varepsilon_2, \varepsilon_3, ..., \varepsilon_n$ to arrive at OLSE of unknown parameter β.

We use a criterion that depend on β.

In order to arrive at the OLSE we have to differentiate $\varepsilon'\varepsilon = \sum_{i=1}^{N} \varepsilon_i^2$ with respect of each of

β_0, β_1, β_2 ... β_K and set each differential equation to 0

i.e $\frac{\partial \varepsilon' \varepsilon}{\partial \beta} = 0$ ……(3)

then solve for the OLSE

Let $\hat{\beta}$ *be the OLSE* the normal equation given as follows:

$X'X\hat{\beta} = X'Y$ ……....(4)

$\hat{\beta} = (X'X)^{-1} X'Y$ ……....(5)

If $(X'X)^{-1}$ Exists, i.e if X has full rank, that is the $r_k(X'X)$ is equals to number of linear independent column of X.

Therefore, ordinary least square estimator (OLSE) of coefficients is given by the following formula:

$\hat{\beta} = (X'X)^{-1} X'Y$

Where X'X is the matrix of sum of squares and the product of observed X's and X'Y is the vector of sum of products of the observed X's and Y's.

3.6.4 Hypothesis for Multiple Linear Regression Analysis

There are two hypothesis null hypothesis (H_0) and alternative hypothesis (H_1)

H_O: $\beta_1 = \beta_2 = \beta_3 = ...\beta_K = 0,$ meaning all explanatory/independent variables

$X_1, X_2, X_3 \ldots, X_K$ do not have effect on the academic achievement.

H_1: not H_O (or at least one of them, is different from zero, meaning at least one of the variables has an impact on academic achievement.

Test Statistics

The test statistic used to test the cumulative effect/contribution of all explanatory variables together is called F statistics which is developed by Fisher.

$$F = \frac{\left(\frac{SSR}{K}\right)}{\left(\frac{SSE}{N-k-1}\right)} \quad \text{...}(6)$$

Where SSR is sum of square regression and SSE is sum of square error

K is number of explanatory variable

Decision Rule

Reject H_O if $F_{cal} > F_{\alpha(k, n-k-1)}$, $\alpha = 0.05$ significance level

Where $F_{\alpha(k, n-k-1)}$ is tabular value of F –distribution at α level of significance. Rejection of null hypothesis H_O: $\beta_1 = \beta_2 = \beta_3 = ...\beta_K = 0,$ implies that at least one of the explanatory variables contribute significantly to the model. The procedure is summarized in analysis of variance table as table

Table 2. Analysis of Variance (ANOVA)

Source of Variation	Sum of Squares	Degree of Freedom	Mean Square	Computed F
Regression	SSR	k	MSR = $\frac{SSR}{K}$	
Residual	SSE	n-k-1	MSE = $\frac{SSE}{n-k-1}$	F = $\frac{MSR}{MSE}$
Total	SST	n-1		

Both standard errors and F-statistic are measures of goodness of fit.

The higher F- statistics and the lower standard error (closer to zero) imply the better the goodness of fit (Montgomery D.C, 2001).

To test the whether each variable contribute significantly in explaining variation in academic performance hypothesis is formulated as follows:

$H_{o:}\ \beta_j = 0$ against the alternative hypothesis $H_{A:}\ \beta_j \neq 0$ for each j = 1, 2, 3..k

To test the null hypothesis $H_{o:}\ \beta_j = 0$ against the alternative hypothesis $H_{A:}\ \beta_j \neq 0$ for each j = 1, 2, 3, ….k confidence interval and t- statistic are used. The test statistics for this purpose is T-statistics as given in the following: (Montgomery D.C, 2001).

$T_j = \frac{\beta_j - m}{S\hat{E}(\beta_j)}$ The test is carried out by comparing the observed value T_j with appropriate critical value $t_{\left(n-k-1,\frac{\alpha}{2}\right)}$.

T- Statistic - Should be greater 1.96 for p-value to be less than 0.05. $S\hat{E}(\beta_J)$ is Standard error of β_j.

As Std. Error close to zero the better is prediction (Montgomery D.C, 2001).

In another words the hypothesis can be formulated as follows:

- H_0: Student Role Performance (SRP) does not affect academic performance of science and technology students at university level.
- H_A: Student Role Performance (SRP) affects academic performance of science and technology students at university level.
- H_0: School Factors (SF) has no impact on Academic achievement of science and technology students at university level.
- H_A: School Factors (SF) has an impact on Academic achievement of science and technology students at university level.
- H_0: Academic achievement of student is not affected by Family Factors (FF) at university level.
- H_A: Academic achievement of student is affected by Family Factors (FF) at university level.
- H_0: Peer Factors (PF) does not determine academic achievement of students at university level.
- H_A: Peer Factors (PF) does determine academic achievement of students at university level.

- H_O: Test-anxiety does not affect academic achievement of students at university level.
- H_A: Academic achievement of students is influenced by test-anxiety at university level.

3.6.5 Assumptions of Multiple Linear Regression

The validity of a statistical model or regression model in particular can be seen with regard to certain assumptions.

- The assumptions are usually imposed on the model and data. The accuracy of results obtained from the fitted model depends on the validity of the assumptions. It is nonsense to draw conclusions from the analysis without checking the validity of the assumptions.
- Moreover, regression analysis is considered to be an iterative process.
- It means that the outputs are used to diagnose, validate, criticize and possibly modify the inputs.
- The model fitting has to be repeated until the estimated model satisfies the stated assumptions and fits the data reasonably well
- **Normality-** Error terms are assumed to be normally distributed with zero mean and variance σ^2 . i.e. $\varepsilon \sim iidN(0, \sigma^2)$

  That means Error terms are identically independently normally distributed.

1. **Linearity** the relationship of response and explanatory variable/s should be linear. "True" model should be linear.
2. **Homoscedasticity** -all residuals are from a distribution with the same variance

3. **No multicollinearity-** relevant variables included (no strong relationship between explanatory variables).

   It results in misleading and inaccurate results. Multicollinearity occurs when there is high intercorrelations among some set of independent/ explanatory variables. In other words it happens when two or more predictors contain much of the same information.

   Effect of Multicolinearity

The presence of Multicoolinearity has the number of potentially serious effect on the least square estimate of regression coefficients. For example

a) None identifiably of regression coefficients vector β this means if extreme multicoolinearity does exist one cannot distinguish between two different models:

   $Y = X\beta + \varepsilon \; and \;\; Y = X\tilde{\beta} + \varepsilon$

   Under such circumstances, the above two models are called observationally equivalent

b) Over or under estimation of regression coefficients,
c) The estimators may have unexpected or unrealistic signs (i.e positive relationships might turn out to lead to negative signs and vise versa)
d) Some estimators of regression coefficients have large variances (variances are inflated).

Diagnostics of Multicollinearity

Several techniques have been proposed for detecting multicollinearity.

Tolerance and variance inflation factor (VIF).

Both Tolerance and variance inflation factor (VIF) give the same information

$$VIF = \sum_{j=1}^{k} \frac{p^{2}_{ij}}{\lambda_j} \quad i = 1,\ 2,\ 3...k \ \ k \quad number\ of\ \exp lanatorey\ \text{var} iables.$$

Where λ_j are eigen values of $XX^{'}$ and p is matrix of orthogonal eigen vectors corresponding to the eigen values λ_j

$VIF(\hat{\beta}_I) = \frac{1}{1 - R_i^{\ 2}}$ where R^2 is the coefficient of multiple determination obtained from regression X_i on the other regressor variables X_1, X_2, X_3, ….$X_{i-1,}$ …X_k

(Tolerance= 1/ VIF).

They tell us if there is multicollinearity

If the tolerance value is low (< 1-R^2adj) there is probably a problem with multicollinearity.

Where R^2adj is adjusted coefficient of determination which is used to check the goodness of feet of the linear regression model.

$$R_{adj}^{\ 2} = 1 - \frac{MSE}{MST}$$

Where $MSE = \frac{SSE}{n-k-1}$ *and* $MST = \frac{SST}{n-1}$

Since $SSE/_{n-k-1}$ is residual mean square and $SST/_{n-1}$ is a constant, adjusted coefficient of determination R^2_{adj} will only increase when a regressor or explanatory variables added to the model and if the new regressor reduces the residual mean square.

To circumvent multicollinearity

a) Include additional observations maintaining the original model. such that a reduction of the correlation among variables is attained
b) Use coefficients about regression coefficients from source other than the sample at hand
c) New modeling ⟶ Drop some variables
d) Use biased linear estimator of β
e) Combine the predictor variables if it gives senses otherwise discard one of them. (Montgomery, 2001)

4. **Independent errors:** having information about the value of a residual should not give you information about the value of other residuals. And residuals are uncorrelated with explanatory variable.

Chapter Four: Result and Discussion

After a data is coded and entered in to computer different statistical methods have been employed to summarize and analyze the data as given below.

4.1 Result of Exploratory Data Analysis (EDA)

After the data are entered to SPSS EDA, computing which various descriptive statistics and graphs has been employed to examine the data for errors and get to know the data .i.e it shows the picture of the data.

The following Boxplot has been used to access whether there are outliers or not. If "O"s are there at above or below the end of the "whiskers" of the box plot, it indicates there is outlier in the data (Leech et al. 2005).

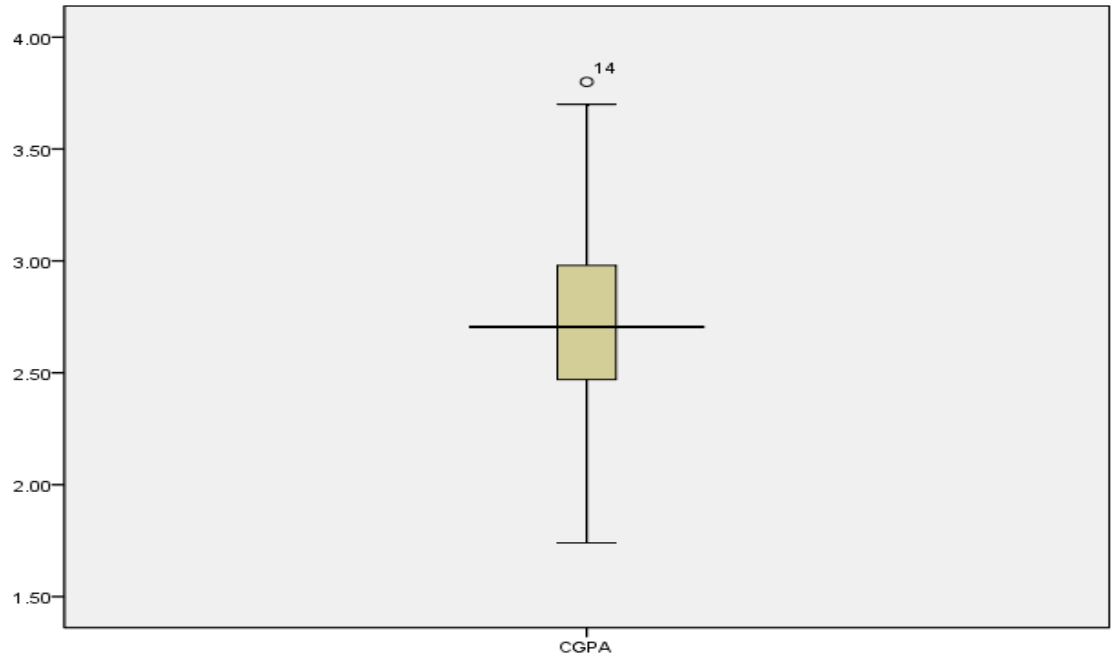


Fig. 2 Boxplot of Academic Performance

As it can be seen from the figure 2 there is one outlier in CGPA of students which needs to check the raw data to be sure there is no error. Accordingly the data were checked and found that the value on number 14 on SPSS data view was found to be 3.85 which was largest compared to other CGPA values, but it is not an error.

The figure also shows the dependent variable CGPA is approximately normally distributed as it can be observed from whiskers cut the box at middle.

To summarize the data of the study, descriptive statistics has been employed as can be seen from the following charts.

4.2 Descriptive Statistics for Student's Family Background

Descriptive statistics is used to summarize the data using percentages, averages, standard deviation and graphs or diagrams etc. without going beyond the data at hand.

The descriptive results of the study are presented using tables and charts in order to summarize the data facilitate comparison between different groups.

The following pie-charts revealed educational level of students' parents and it was used to compare the level of education of male and female parents.

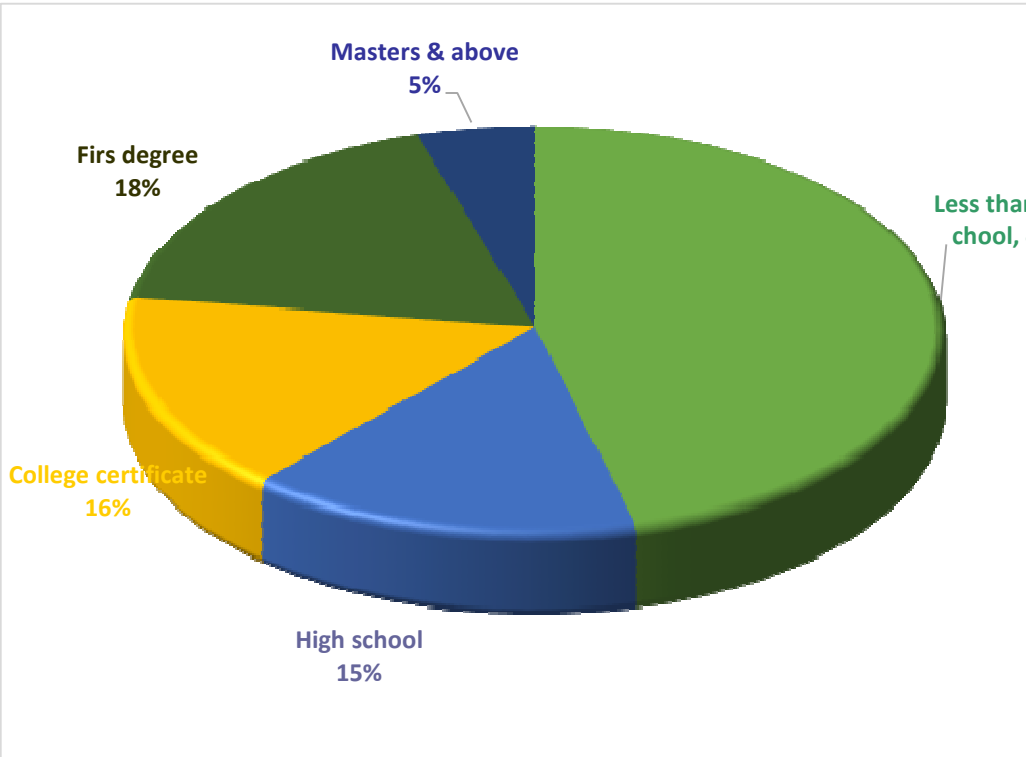


Fig. 3 Pie-Chart Fathers' Educational level

As it can be observed from Fig. 3 the highest percentage of students' fathers are less than high school in educational level (46%). Only 23 % of them are degree and above in educational level. This shows majority of students were come from fathers who have low educational level.

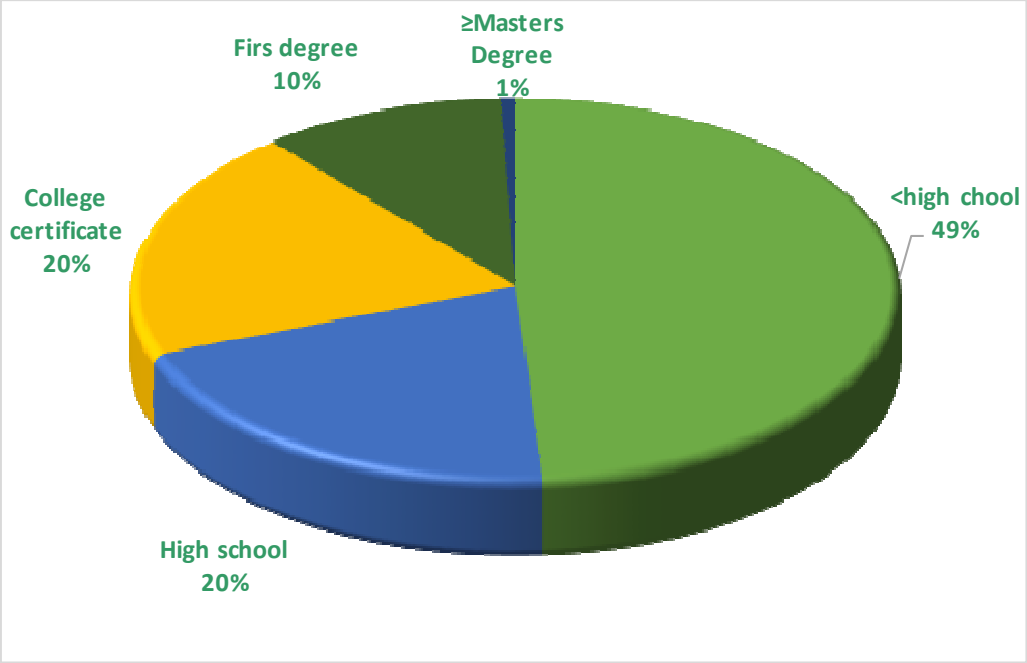


Fig. 4 Pie-chart for Mothers' Educational Level

From pie-chart one can observe that 49% mothers are less than high school educational level. Only 1% of students came from mothers with master's degree educational level and above.

From both charts s we can see that majority of students are come from parents with lower educational levels.

The following pie-chart depict student's parents' monthly income which is going to be seen for its contribution for students' academic performance.

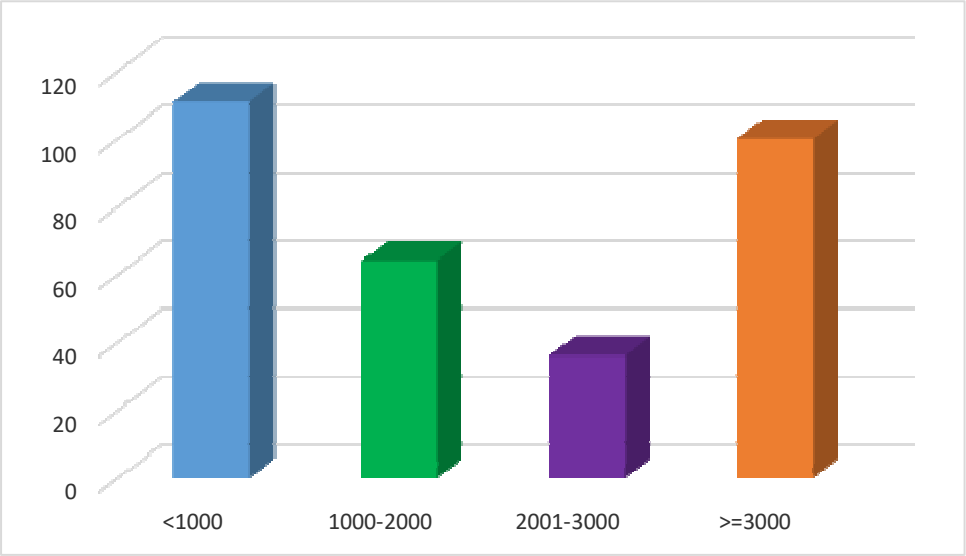


Fig. 5 Parents Monthly Income

From simple bar chart of Fig. 5 one can observe that almost one third of student's parents get monthly income of less than 1000 Birr.

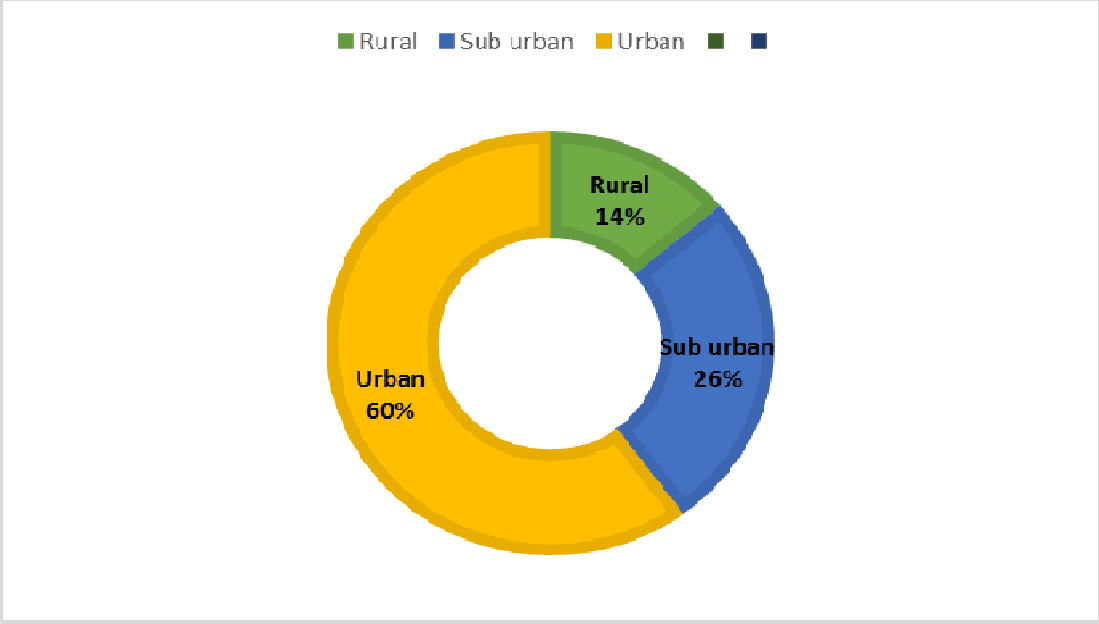


Fig. 6 Students' Place of Birth (Residence)

The chart shows students come from rural area are only 14% while the remaining students (86%) came from Urban and sub-urban areas. This shows that students from rural area are less likely to join science and technology fields.

To assess attitude of students to ward implementation of new approach (conducting continuous assessment and fixed grading system) in ASTU, the collected data was summarized in the following bar-chart.

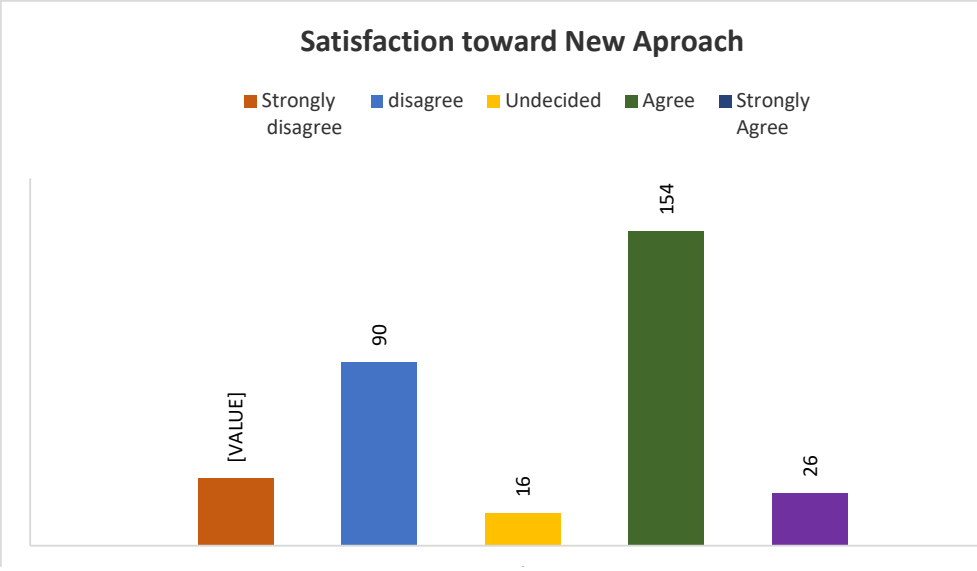


Fig. 7 New Approach/Continuous Assessment and Fixed Grade/

From bar- chart in Fig. 7, we can observe that about 180 (56.1%) of students believes that the new approach has contribution in improving their academic performance and reducing attrition rate of students.

To summarize ideas raised by students on problems related to school environment (problems related to teachers such as teaching learning process, refrences materials,

labratories, café, water, weather condition), personal factors (poor time management, test anxiety, adiction, peer pressure, health problems) and economic problems, the following figure was used.

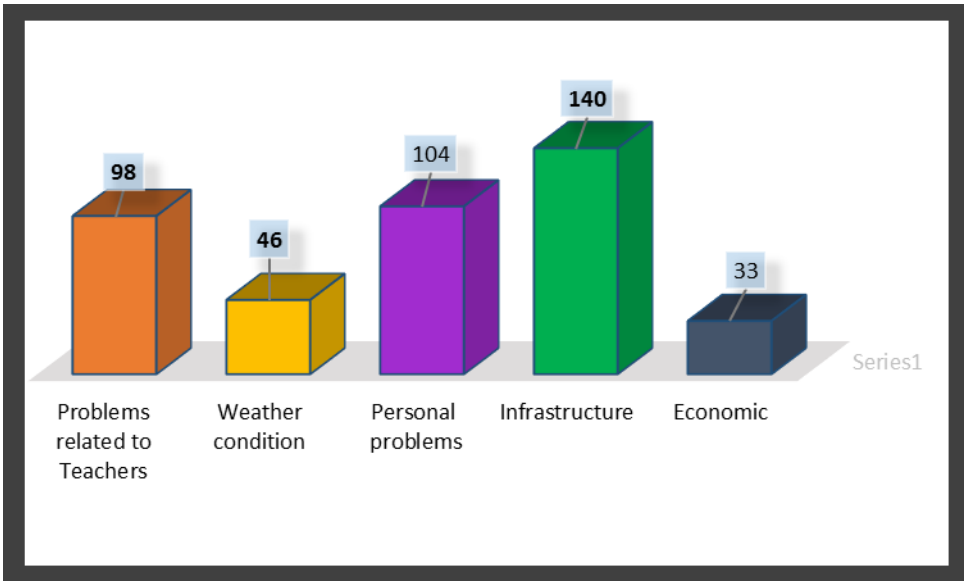


Fig.8 Charts of Factors related to Academic Performance

As it can be seen from fig.8 differrent factors which become hindirances to academic performance of students were raised, and infrastructure was found to be with highest frequencey relative to other factors. That means (Library, laboratory, cafteria services, water, launge services and recretional area, ICT etc).

4. 3 Test for Assumptions of Multiple linear regression.

Before running multiple linear regression we shall check for its assumptions in order to avoid problems of misleading results.

1. **Normality-** Error terms are assumed to be normally distributed with zero mean and variance σ^2 i.e

$$\epsilon \sim iidN(0, \sigma^2)$$

2. **Homoscedasticity** -all residuals are from a distribution with the constant variance
3. And residuals are uncorrelated with explanatory variables.

   To check these three assumptions either linear regression scatter plot or normal probability plot can be used.

If the dots of scatterplot created a pattern, it indicates that the error terms are not normally distributed, the residual is correlated with the independent or explanatory variables and the variances of the residuals are not constant. This indicates that there exist a problem of heteroscedasticity, which is violation of assumption homoscedasticity or constant variance.

Normal probability plot is also a graphical technique for normality testing. It is used to access whether the data is approximately normally distributed or not. The data are plotted against a theoretical normal distribution in such a way that the points should form approximate straight line

Therefore, to check these assumptions linear regression plot and normal probability plot were used, as it can be seen from the following figures.

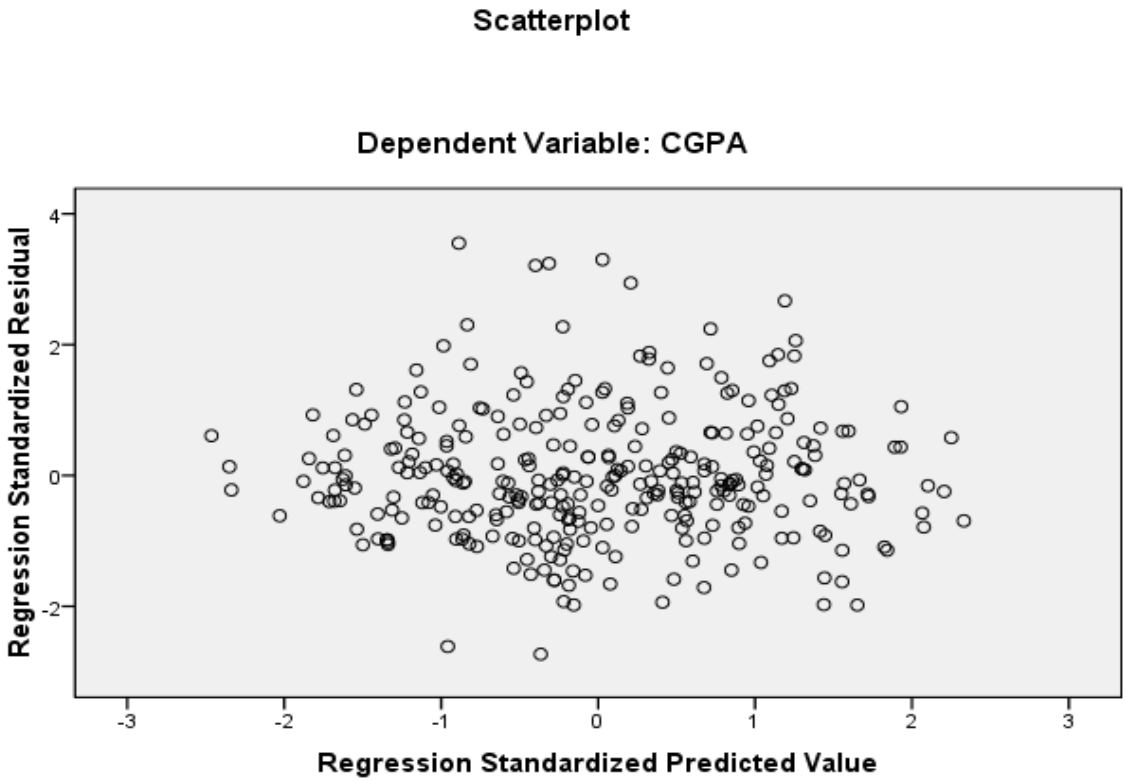


Fig. 9 Scatter plot of CGPA

From Fig 9– it can be observed that the dots are scattered, it indicates the data meet the assumptions of the errors/residuals being approximately normally distributed and the variances of the residuals being constant.

As a sample size (n) increases the linear pattern is tend to be stronger which shows the normality.

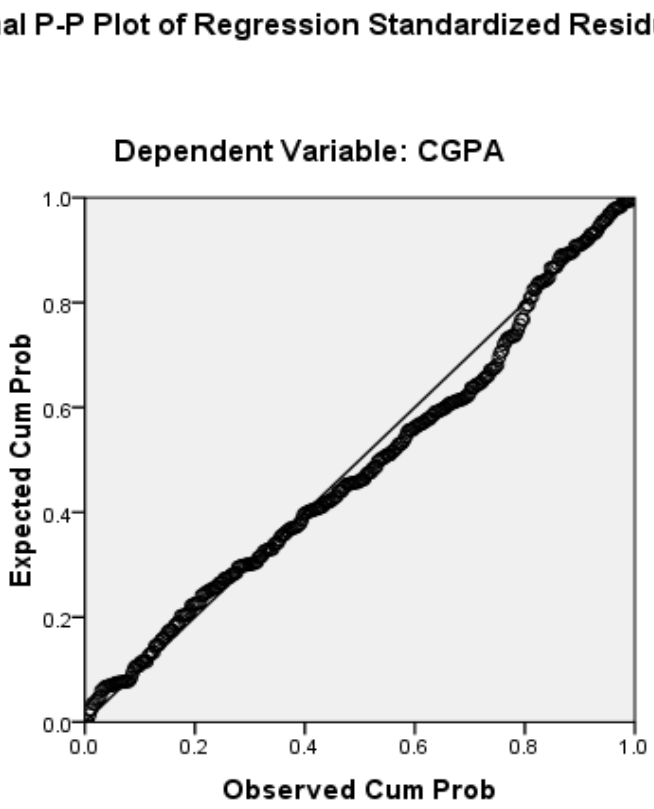


Fig.10 probability plot of CGPA

Fig –10 also shows it can be seen that the dots or points form approximate straight line which indicates the data is approximately normally distributed. This indicates that, it meets the assumptions of the errors/residuals being approximately normally distributed and the variances of the residuals being constant.

4. **<u>Assumption of linearity-</u>** relationship between explanatory variables and dependent variable CGPA should be linear

   To check the linearity assumption and get visual idea about whether there is likely to be the problem with multicollinearity we use matrix scatter plot.

To do this we use CGPA, SRP, school factor, peer influence, test anxiety, mother educational level, father educational level and parent income.

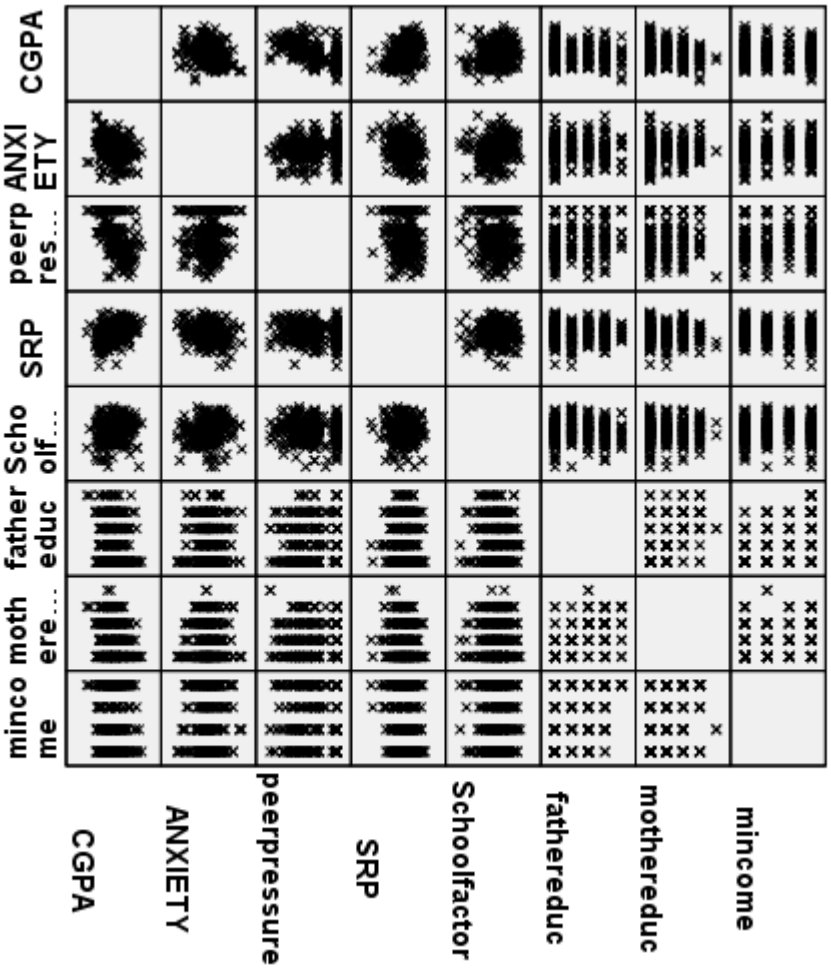


Fig.11 Matrix of Scatter Plot for Correlation of Variables

The matrix scatter plot creates multiple bivariate scatter plots.

If a straight line can be drawn and so that, most of the x_s lie relatively close to it we can assume that, the two variables are related in linear fashion. Therefore CGPA of students is linearly related with anxiety, peer pressure, SRP and School factor as it can be observed from the first row and first column, which full fill the assumption multiple linear regression

which states that, response/dependent variable should be linearly related with explanatory variables.

5. Checking Assumption of Multicollinearity

Bivariate analysis was conducted as in the following table, to see how the values are correlated and then after, assumptions of multicolinearity will be checked.

Table 3 . Bivariate Analysis for Correlations of Variables

		CGPA	School factor	SRP	Anxiety	Peer-influence	Father education	Mother education	Income
CGPA	Pearson Correlation		.255**	.520**	-.275**	-.478**	-.141*	-.157**	-.063
	Sig. (2-tailed)		.000	.000	.000	.000	.012	.005	.273
School factor	Pearson Correlation			.060	.051	-.114*	-.055	-.019	.010
	Sig. (2-tailed)			.287	.359	.042	.326	.734	.854
SRP	Pearson Correlation				-.233**	-.214**	-.147**	-.151**	-.165**
	Sig. (2-tailed)				.000	.000	.009	.007	.004
ANXIETY	Pearson Correlation					.094	.035	.079	.008
Peer pressure	Pearson Correlation						.096	.041	.064
Father education	Pearson Correlation							.695**	.566**
	Sig. (2-tailed)							.000	.000
Mother education	Pearson Correlation								.474**
	Sig. (2-tailed)								.000
Income	Pearson Correlation								

**Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The above table 3 shows the correlation of CGPA with other variables and how other variables are correlated. It can be seen that CGPA is significantly correlated with school factor (r= 0.255, p-value 000), student role performance (SRP), (r= 0.520, p-value =000), test anxiety(r=-0.275, p-value=0.00) and peer-influence(r=-0.478, p-value=0.00).

CGPA is significantly and negatively correlated with test anxiety and peer-pressure whereas School factor and Student role performance (SRP) are positively and significantly correlated with CGPA. The table depicts also fathers' educational level and mothers educational level are significantly and positively correlated (r= 0.695, p. value= 0.00) also Parents' monthly income was positively correlated with both fathers' educational level (r= 0.566, p-value= 0.00) and mothers' educational level(r= 0.474, p-value= 0.00). However parent monthly income is not significantly correlated with response variable CGPA of students(r= -0.063, p= 0.273) This may be due to the problem of multicollinearity and to be checked by the value of tolerance and variance inflation factor (VIP).

4.4 Result of Multiple Regression

Multiple regression analysis was conducted to investigate over all significance of the model when all explanatory variables are entered in to the model, as well as the result of multicolinearity of variables as shown in the following tables.

The value of tolerance and Variance inflation factor (VIF) tells us whether or not multicolinearity affects the result of analysis

Table4. Analysis of Variance to test the significance of model

Model		Sum of Squares	df	Mean Square	F	Sig.	R^2	Adj. R^2
1	Regression	21.446	7	3.064	41.062	.000	0.491	0.479
	Residual	22.235	298	.075				
	Total	43.681	305					

a. Predictors: (Constant), School factor, monthly income, Anxiety, peer-influence, SRP, mother educational level, father educational level

From the results in table 4 the explanatory variables entered to the model significantly/ contributes for the variation of response variable (Academic performance). (F= 41.062 with p –value =0.00).

The result of coefficient of determination (R^2) indicates that, 49.1% of variation in academic performance was explained by these entered variables.

However this doesn't mean that there is no problem of multicolinearity. For this reason, VIP and tolerance were computed for checking multicolinearity as it is depicted in the following table

Table 5. Result of Multiple Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.994	.200		9.968	.000		
	SRP	.359	.039	.406	9.112	.000	.862	1.160
	Test-Anxiety	-.110	.032	-.147	-3.424	.001	.922	1.084
	Income	.024	.015	.080	1.563	.119	.659	1.517
	Mothers' Education	-.038	.020	-.109	-1.871	.062	.500	1.999
	Fathers' education	.003	.018	.009	.150	.881	.438	2.284
	Peer-Influence	-.183	.022	-.351	-8.189	.000	.932	1.073
	School factor	.156	.031	.210	5.003	.000	.967	1.035

a. Dependent Variable: CGPA

Coefficients table also depicts that, SRP (β= 0.359, T= 9.112 with p-value= 0.00), Test anxiety (β= -0.11, T= -3.424 with P- value=0.002), peer-influence (β= -0.183, -8.19 with p-value= 0.00) and School factor (β=0.156, T=5.0, P- value= 0.00) are significantly predict academic performance of students. Parent monthly income with (β= 0.024, T=1.563, p-value= 0.119), mother educational level with (T=-1.871, p-value= 0.062), fathers' educational level (T=0.150 P-value= 0.881) have no significant contribution for the

variation in academic performance. This may be because of multicollinearity among these independent variables as it can be seen from the table above.

It can be observed that fathers' educational level with (Tolerance=0.436) and mothers' educational level with (Tolerance= 0.498) are correlated with each other, in both cases tolerance factor < $1-R^2$ = 1-0.491= 0.509. Therefore, it is better to combine both factors (taking average of the two variables) as parent educational level /family factors. It can be also seen that parent monthly income is correlated with both educational level of fathers' and mothers, but has no significant association with CGPA of students. Therefore, it will be better to omit it from the model to avoid problems related to multicollinearity. And stepwise regression was employed to select relevant variables for the model after merging regressor variables which creates the problem of multicollinearity.

4.5 Result of Stepwise Regression

After checking assumptions of multiple linear regression, Stepwise regression has been employed in order to select relevant variables which can contribute to predict academic performance of students. The results are as given in the following tables.

Coefficient of determination (R^2) has been used to see how proportion of variation in response variable has been explained by explanatory variables which are added to the model step by step. The result can be observed from the following table.

Table 6. Result of Coefficient of Determination (R^2) in Stepwise Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.525[a]	.276	.274	.32227
2	.644[b]	.415	.411	.29018
3	.671[c]	.450	.445	.28175
4	.688[d]	.473	.466	.27622

a. Predictors: (Constant), SRP

b. Predictors: (Constant), SRP, peer influence

c. Predictors: (Constant), SRP, peer- influence, School factor

d. Predictors: (Constant), SRP, peer-influence, School-factor, Anxiety

Table 6. Shows the values of coefficient of determination (R^2) increases as more explanatory variables are added step by step, to the model (R^2 is increased from 0.276 to 0.473).

It shows proportion of variation in response variable was more explained as more of the explanatory variables were added in the model.

In order to check the overall significance of the model, after inclusion of the relevant variables step by step the following ANOVA table was run. Therefore irrelevant variables are going to be excluded from the model.

Analysis of variance (ANOVA) is another approach to determine whether or not a linear relationship exists between the response variable and explanatory variables. It helps to test the null hypothesis.

H_O: $\beta_1 = \beta_2 = \beta_3 = \ldots. \beta_K = 0$.

Against the alternative hypothesis:

H_A: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \ldots. \beta_K \neq 0$ or HA: $\beta_j \neq 0$ for at least one of the coefficients is different from zero. Where j=1, 2, 3…k

Table 7. ANOVA for Multiple linear Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.342	1	12.342	118.835	.000
	Residual	32.403	312	.104		
	Total	44.745	313			
2	Regression	18.558	2	9.279	110.199	.000
	Residual	26.187	311	.084		
	Total	44.745	313			
3	Regression	20.137	3	6.712	84.554	.000
	Residual	24.609	310	.079		
	Total	44.745	313			
4	Regression	21.169	4	5.292	69.361	.000
	Residual	23.576	309	.076		
	Total	44.745	313			

a. Predictors: (Constant), SRP

b. Predictors: (Constant), SRP, peer-influence

c. Predictors: (Constant), SRP, peer-influence, School-factor

d. Predictors: (Constant), SRP, peer-influence, School-factor, Anxiety

e. Dependent Variable: CGPA

ANOVA table shows the model is significant at 5% level of significance, in all steps when the explanatory variables are added to the model as it can be observed from F- values and p-values in each step.

In order to select relevant explanatory variables and check the significance of each variables for the model coefficients table was run.

Table 8. Result of Coefficients in Stepwise Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.315	.131		10.006	.000
	SRP	.465	.043	.525	10.901	.000
2	(Constant)	2.108	.150		14.047	.000
	SRP	.392	.039	.443	9.967	.000
	Peer-influence	-.200	.023	-.382	-8.592	.000
3	(Constant)	1.727	.169		10.222	.000
	SRP	.384	.038	.434	10.056	.000
	Peer-influence	-.190	.023	-.362	-8.340	.000
	School-factor	.140	.031	.189	4.459	.000
4	(Constant)	2.084	.192		10.857	.000
	SRP	.350	.039	.396	9.085	.000
	Peer-influence	-.186	.022	-.355	-8.329	.000
	School-factor	.150	.031	.203	4.858	.000
	Anxiety	-.117	.032	-.157	-3.678	.000

a. Dependent Variable: CGPA

From the coefficients table, we can observe that variables are entered in to the model step by step. In each step the variables entered are significantly contributes for the significance of the model at 5% level of significance, see beta coefficients, T – values and p- values =0.00 in each step.

As Stepwise regression enter the relevant variables step by step in to the model, the following table shows excluded variables from the model during each step of the selection.

Table 9. Excluded Variables from the Model in Stepwise Regression Analysis

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	School-factor	.226[a]	4.844	.000	.265	.995
	Anxiety	-.153[a]	-3.118	.002	-.174	.939
	Peer-pressure	-.382[a]	-8.592	.000	-.438	.953
	Family factor	-.081[a]	-1.669	.096	-.094	.975
2	School factor	.189[b]	4.459	.000	.246	.985
	Test-Anxiety	-.139[b]	-3.146	.002	-.176	.938
	Family factor	-.066[b]	-1.508	.133	-.085	.974
3	Test-Anxiety	-.157[c]	-3.678	.000	-.205	.930
	Family-factor	-.062[c]	-1.447	.149	-.082	.973
4	Family-factor	-.060[d]	-1.438	.151	-.082	.973

a. Predictors in the Model: (Constant), SRP

b. Predictors in the Model: (Constant), SRP, peer-pressure

c. Predictors in the Model: (Constant), SRP, peer-pressure, School-factor

d. Predictors in the Model: (Constant), SRP, peer-pressure, School-factor, Test anxiety

e. Dependent Variable: CGPA

From the result of stepwise regression, in table 9, we can observe that predictor variables of academic performance are obtained to be student role performance (SRP), peer-influence, and school factor and Test- anxiety in all cases p-value <5%, whereas family factor is avoided from the model T= -1.438, P-vale = 0.15.

From this result there is no evidence to reject the null hypothesis which state β_4 (regression coefficient of family factor) is equals to zero, at 5%level of significance. This indicates that family factor has no contribution in explaining variation in academic performance of students at 5% level of significance.

After stepwise regression has been employed and relevant variables for the model were selected the multiple linear regression is re-fitted by including only relevant variable to the model.

4.5 Result of Multiple Regression after Selection of Relevant Predictor Variables

Stepwise regression had avoided irrelevant variable from the model and relevant variables have been selected to be included in the model so that the model was re-modeled.

To investigate over all significance of the regression model after exclusion of irrelevant variables, analysis of variance (ANOVA) was utilized as it is displayed in the following table. The result of F- statistics in ANOVA table helps to test the null hypothesis which states none of the included variables are irrelevant to predict the model. i.e

$H_O: \beta_1 = \beta_2 = \beta_3 = \ldots. B_k = 0$

Against the alternative hypothesis

$H_A: \beta_1 \neq \beta_2 \neq \beta_3 \neq \ldots. \beta_K \neq 0$ Where j=1, 2, 3,

In addition, Coefficient of determination was employed after relevant variables are selected by stepwise regression, in order to see how much proportion of variation in the model is explained by included explanatory variables as given in the following ANOVA table.

Table 10. Analysis of Variance (ANOVA) for Selected Variables

Model		Sum of Squares	df	Mean Square	F	Sig.	R^2	$R^2_{adj.}$
1	Regression	21.259	4	5.315	69.974	000	0.472	0.465
	Residual	23.774	313	.076				
	Total	45.033	317					

a. Predictors: (Constant), peer-pressure, Anxiety, School-factor, SRP

b. Dependent Variable: CGPA

From table 10. We can see that the model is significant since F= 69.974 with p- value = 0.00. Therefore the null hypothesis which states all of the variables entered to the model are not relevant to predict academic performance was rejected.

This indicates that the included variables namely; student role performance (SRP), peer-influence, test anxiety and school factor together significantly predicted the response variable (academic performance of students). Therefore at least one of them are different from zero.

In addition the value of R^2 = 0.472 indicates that 47.2% of variation in academic performance was explained by explanatory variables namely; student role performance (SRP), peer- influence, test anxiety, and school factor.

Multiple linear regression was fitted to the data to test the null hypothesis $H_{o:}\ \beta_j = 0$ against the alternative hypothesis $H_{A:}\ \beta_j \neq 0$ for each j = 1, 2, 3 and 4

Confidence interval and t- statistic have been computed to test the null hypothesis or testing significance contribution of each variable. The test is carried out by comparing the observed value T_j with appropriate critical value $t_{\left(n-k-1,\frac{\alpha}{2}\right)}$ - tabulated value and

$$T_j = \frac{\beta_j - m}{S\hat{E}(\beta_j)}$$

j= 1, 2, 3, 4

The null hypothesis will be rejected if $|T_j| \geq t_{(n-k-1,\alpha/2)}$ at 5% level of significance ($\alpha = 5\%$)

Table 11 Result of Multiple Linear Regression (Coefficients)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.107	.190		11.088	.000	1.733	2.481
	SRP	.348	.038	.394	9.128	.000	.273	.424
	School-factor	.148	.030	.201	4.859	.000	.088	.207
	Anxiety	-.121	.031	-.163	-3.860	.000	-.183	-.059
	Peer-influence	-.187	.022	-.358	-8.459	.000	-.231	-.144

a. Dependent Variable: CGPA

In order to attain the first to the fifth objectives multiple linear regression was utilized and the results of each variables is displayed in the above table. Coefficient table depicts that student role performance (SRP) (t=9.128 p-value= 0.00) is a significant predictor in explaining the variation of academic performance given that the other variables are in the model. School factor, with (t= 4.859, p- value= 0.00) is also a significant predictor in

explaining the variation of academic performance given that the other variables are in the model. The variation in academic performance is also significantly explained by Test Anxiety (t= -3.86, p = 0.00) given that other variables are in the fitted model.

Moreover, Peer-influence (t=-8459, p- value= 0.00) is significant predictor of variation in academic performance of students given that other regressor variables are in the model. Therefore, the null hypothesis that states $H_{o:}\ \beta_j = 0$ for each j should be rejected.

In addition, table shows SRP and school factors were positively affect academic performance of students, while test anxiety and peer-influence were negatively affect academic performance of students.

SRP is the factor which has highest power in explaining variation in academic performance as it can be seen from the value of T= 9.128, P=00 and 27% of variation in academic performance is explained by SRP only, (table 10).

It is recalled from the result of stepwise regression that, family factor is deleted from the model since it did not significantly contribute in explaining variation in academic perf0ormance of students.

Accordingly, the fitted multiple regression model is given as follows

$$\hat{Y} = 2.107 + 0.348X_1 + 0.14X_2 - 0.121X_3 - 0.187X_4$$

In matrix form, the predicted model comes:

$$\begin{bmatrix} \hat{Y}_1 \\ \hat{Y}_2 \\ \hat{Y}_3 \\ . \\ . \\ \hat{Y}_{321} \end{bmatrix} = \begin{bmatrix} 1 & X_{11} & X_{12} & X_{13} & X_{14} \\ 1 & X_{21} & X_{22} & X_{23} & X_{24} \\ 1 & X_{31} & X_{32} & X_{33} & X_{34} \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ 1 & X_{321,1} & X_{321,2} & X_{321,3} & X_{321,4} \end{bmatrix} \begin{bmatrix} 2.107 \\ 0.348 \\ 0.14 \\ -0.121 \\ -0.187 \end{bmatrix}, \text{Where}$$

$\hat{Y}$ *denotes estimated CGPA of students*

X_1, X_2, X_3 X_4 *denotes SRP, School factor, Test anxiety and Peer* − inf *luence respectively*

According to this study, more than half of the students were satisfied to ward implementation of new approach (evaluated through continuous assessments in class, using fixed grading system) in ASTU (Fig.7)

To investigate the last objective; i.e whether or not there is a change in attrition rate of students after implementation of **"New Approach"** in our university, the following trends were run as follows, for four consecutive academic years (2005 E.C to 2008 E.C).

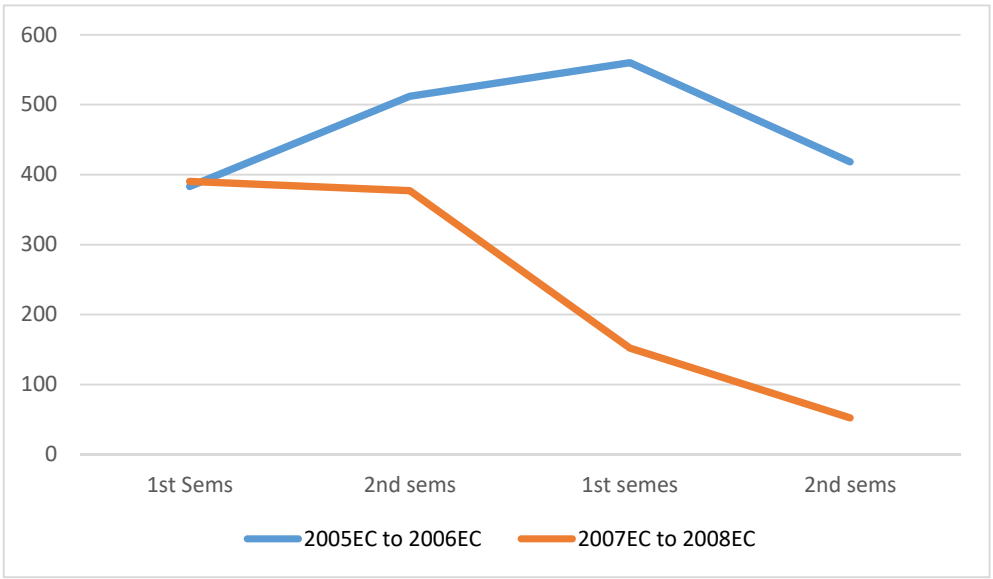


Fig. 12 Trend of Academically Dismissed Students

The Fig.12 depicts the comparison of number of academically dismissed student's per-semester during four consecutive academic years. As it can be observed there was a change in umber of academically dismissed students after implementation of this new approach (conducting continuous assessments and fixed grading system) in the university. Number of academically dismissal is declining more from 2007E.C to 2008E.C after new approach was implemented than from 2005 E.C to 2006E.C before its implementation.

Even though the trend showed reduction in academic dismissal, it is important to see the attrition rate, which indicates proportion of academically dismissed students relative to total students in the university.

The following fig shows trends of attrition rate after and before implementation of new approach in four consecutive years (8 consecutive semesters).

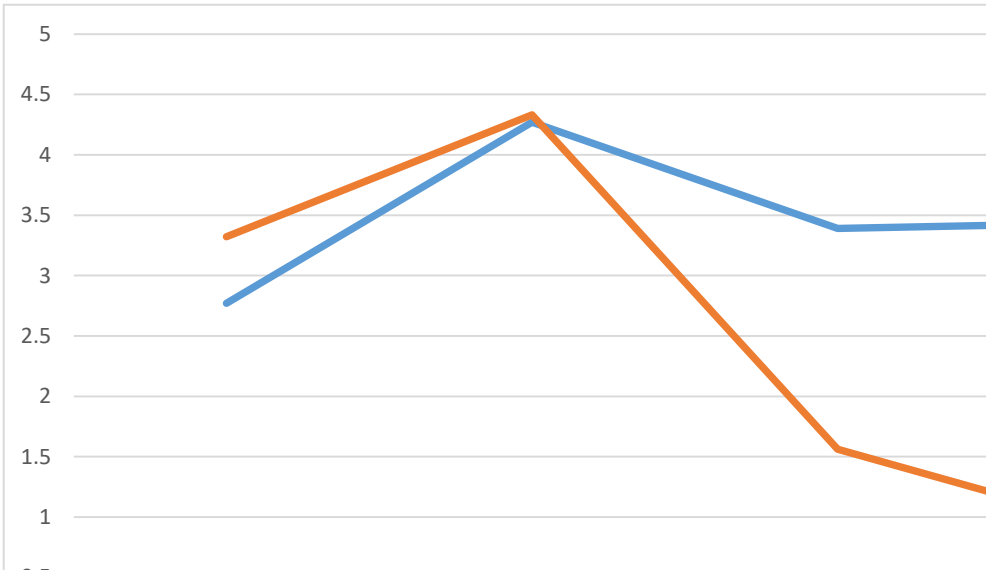


Fig.13 Students' Attrition Rate

The above trends showed attrition rate of students for 2005EC to 2006 and 2007 to 2008EC for 8 consecutive semesters. From the trends we can observe that attrition rate of students was declining more from 2007 E.C to 2008 E.C. than 2005EC to 2006EC except at some point.

From both fig.12 and fig.13 shown above, it seems that, the new approach has its own contribution for reduction for number of academic dismissal, and attrition rate of students given that other factors may also contributed their own role.

To compare attrition rate of female and male students in 4 consecutive semesters (2007E.C to 2008E.C), the following fig was used.

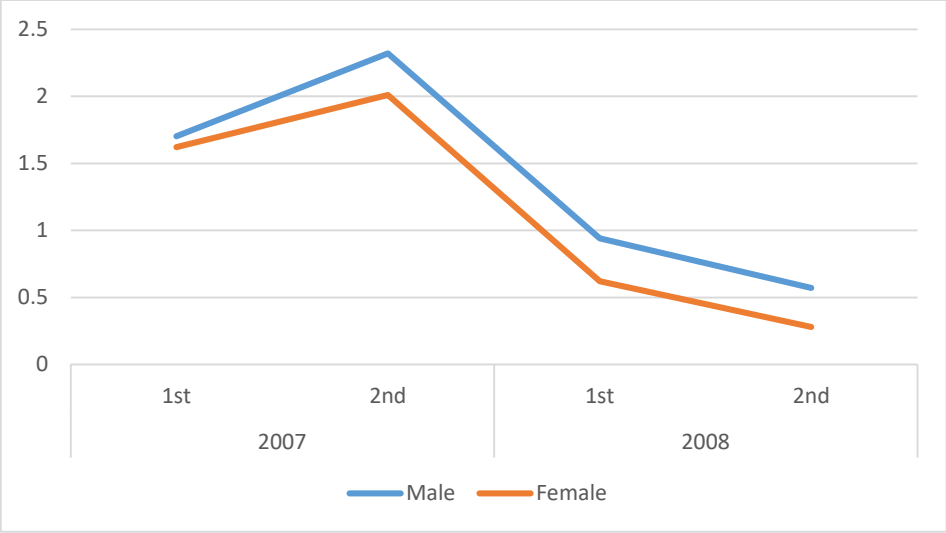


Fig.14 Attrition rate of female and male students

From the Fig. 14 we can observe that trend of females' attrition rate is below that of male students, which indicates that attrition rates of females is lower than that of male students. This might be due to the affirmative actions like academic supports/tutorial classes, economic supports, life skill training etc. given for females students.

In attempt to investigate factors affecting academic performance of students and whether or not the new system (continuous assessment mode of evaluation and fixed grading system) which public universities are implementing contributes to reduce attrition rate or dropout rate of students the present study raised some basic research questions. Therefore this section discuss results and examines whether or not the findings of present study are similar or contradict to the finding of previous researches.

The result of this study showed that from students of science and technology who involved in the present study come from rural area are only 14%, whereas 86% of students in science and technology were come from urban and suburban.

Assessment of factors associated with academic performance and their impact on academic performance of students were handled by employing bivariate analysis and multiple linear regression analysis. Before conducting any analysis the data were checked for outliers and related errors as well as for assumptions of multiple linear regression. The results obtained were enough to apply multiple linear regression.

From the result of multiple linear regression factors affecting academic performance of students have been identified. Accordingly, Student role performance (SRP), school factor, peer influence and test anxiety were found to be determinants of academic performance of students. According to results obtained, student role performance (SRP) was a factor which contributes more for prediction of students' academic performance. It affects the GPA of students positively.

This indicates that as student use their effort through managing their time (i.e planning in advance, prioritize work and doing assignments and test preparation in advance), and

motivated for her/his academic work, as well as they have high academic self-concept then academic performance of a student also increases which was similar to the previous findings (Carbonaro 2005, Sansagiry et al., 2006).

Motivated students are more creative and tend to retain knowledge of subjects they learn for longer period of time (conti et al., 1995; Ambile, 1996).

School factor was another variable which has significant and positive contribution for prediction of academic performance of students. This indicates that as conducive school environment is created (school composition, teaching learning climate, library, and laboratory facilities, student teachers relation, mode of course delivery, class size etc.) Student's academic performance is improved, which is similar to the finding of (Crosnoe et al 2004, Eamon 2005). In other words students under programs which owns good resources like laboratories, computer rooms, reference materials and good teacher- student relationship with good mode of course delivery, are better in their academic performance than other students who face a problem of scarcity of such resources.

The impact of Family factor (parent educational level, and their socio economic status) on academic performance was also investigated in this study. But this study showed that, family factor was not significant predictor of the students' academic performance which deviates from the previous finding (Baharudin and Luster 1998, Jeynes 2002, Eamon 2005, Majoribanks 1996, Hochschild 2003, Mc Neal 2001, Seyfried 1998).

This may be due to the fact that majority of students involved in this study (either they have high or low CGPA) came from parents with similar educational level i.e. majority are from less than high school educational level and no big difference was observed, parents are also

similar in their level of economic status. In another case since students are separately leaving from their parents there is no close follow up of parents, so that family background may not affect performance of students attending university education.

Peer influence was another factor which was obtained to affect students' academic performance negatively.

This was due the fact that there is high probability of being pressurized by their peer or dorm Mets i.e higher degrees of peer pressure, which is the pressure from others to participate in certain activities, and peer conformity which is the degree to which an individual adopts actions that are sanctioned by their peer group, participating on bad activities such as addictions and sexual activities which promote likelihood of developing risk taking behaviors. This in turn affect academic performance of students negatively. Therefore, this finding is similar with previous finding (Santor et al, 2000).

Another factor which affect students' academic performance of students in this study was found to be test anxiety. Test anxiety was affected academic performance of students negatively which was similar to the finding of (Spielberger and Sarson, 1989). This indicates the more a student is face anxiety during exam time the less she/he performs.

In this study the change in student attrition rate after implementation of new approach (Continuous assessment fixed grading system) was checked. According to this finding, more than half of the students were satisfied to ward implementation of new approach (evaluated through continuous assessments in class, using fixed grading system) in ASTU.

The study showed that both number of academically dismissed students as well as attrition rate of students were reduced after implementation of new approach.

The present research depicted that attrition rate of female students is lower than that of male students. This is most likely due to empowerment and affirmative actions; academic supports/tutorial classes, economic and material supports, life skill trainings given for female students.

Chapter Five: Conclusion and Recommendation

5.1 Conclusions

The general objective of the present study was to examine factors affecting academic performance of science and engineering students and to see whether there is a change in student's attrition rate after implementation of new approach (conducting continuous assessments and fixed grading system) in the university. To achieve this end different basic questions were raised.

The analysis of data revealed that, academic performance of students which is measured by CGPA of students was significantly correlated with independent variables, such as; student role performance (SRP), School factor, Peer -factor and test anxiety level of students.

SRP and school factor were positively correlated with academic performance of students.

Peer factor and test anxiety were negatively correlated with academic performance of students.

In order to identify factor affecting academic performance of students the data of students were analyzed and the result showed that SRP, school factor, peer factor and test anxiety were found to be predictors of academic performance of students.

Family factor was not found to be determinant of academic performance of students.

The result of trend also showed that there was a change in number of academically dismissed students and attrition rate of students, after implementation of new approach (continuous assessment and fixed grading system). The result showed that there was reduction in both attrition rate and number of academically dismissed students.

Higher reduction was observed in attrition rate and number of academically dismissal after implementation of new approach than before its implementation.

According to this study more than half of the students involved in this study were satisfied to ward implementation of new approach (evaluated through continuous assessments in class, using fixed grading system) in ASTU. From the reduction of attrition rate, it can be thought that implementing this new approach increases likelihood that students perform well on their education is increased since they are busy in series of quizzes, assignments and different projects continuously, which helps to engaged in reading and then in decreasing their academic dismissal.

This study showed that attrition rate of female students is lower than that of male students. This is most likely due to additional supports/affirmative action; academic supports/tutorial classes, financial and material supports, life skill trainings on self-esteem, assertiveness study skills, time management and stress managements etc. which are given for female students.

5.2 Recommendations

High officials, school deans, teachers, psychologists and policy makers and stake holders should work together by designing different strategies in order to improve quality education, academic performance of students and reducing student's attrition rate.

Students should work hard, use their full effort, manage their time properly, and take care of choosing their peers, in order to reduce test anxiety and increase their performance.

Special support such as; guidance and counselling, tutorial support and economic support shall be given for academically and economically needy students in order to reduce attrition rate of students through improving academic performance.

Life skill training on study skill, time management, stress management, self-esteem, self-awareness, reproductive health and healthy relationship shall be given for students in order to be assertive and choose appropriate peers so that academic performance of students will be improved and attrition rate will be reduced.

Infrastructures shall be fulfilled in universities in order to provide quality education, reduce attrition rate of students through improving academic performance of students.

Government and stake holders shall design strategy to encourage students from rural area to join science and technology fields.

Continuous assessment shall be continued to assess students in order to engage students purely in their academic work, so that, they invest their full time on their education rather than participating in activities which are full of risks.

LIST OF REFERENCES

Arce.Josephine.Debra Luna. Ali Borjian, and Marguerit Conrad.2005.No Child Left Behind?

Who Wins? Who Loses? Social Justice.32 (3).56 – 71

(Antonia, 2002).L.2002 Personal Family and Academic Factor Affecting Low Achieving in Secondary School, Electronic Journal of Research in Educational Psychology, 1(1,),43-66.ISSN.1696-2095.

Bali, Valentina, A.and R. Michael Alvarez.2003.Schools and educational outcomes: what causes the "race gap" in student test scores? Social Science Quarterly, 84(3) 485 – 508.

Bali, Valentina, A.and R. Michael Alvarez. The race gap in student achievement scores longitudinal evidence from a racially diverse school district.2004.Policy studies Journal 32(3), 396 - 416

Battle,Juan . And Michael Lewis.2002. The increasing significance of class: The relative effects of race and socioeconomic status on academic achievement. Journal of poverty, 6(2), 21-35.

Black S. 2005. Test anxiety. American school Board Journal, 192(6), 42-44

Carbonaro.Wiliam.2005. Tracking student's effort and academic achievement. Sociology of Education. 78 (I) 27- 49

Ceballo,Rosario.Vonnic C.Mcloyd, and Teru Toyokawa.2004. The influence of neighborhood quality on adolescents' educational values and school effort. Journal of Adolescent Research.19 (6). 716 – 739.

Chambers. Elisha A. and james B. Schreiber.2004. Girls' academic achievement: Varying associations of extracurricular activities. Gender and education, 16(3), 327 – 346

Cochran, W.G 1997. Sampling Techniques, (3rd ed.) AWiley Inter science Publication.

Collett, D. 1991. Modeling Binary Data. Chapman and Hall, London

Crosnoe, Robert, Monica Kirkpatrick Johnson, and Glen.H.Elder Jr.2004.School size and the interpersonal side of education: An examination of Race/Ethnicity and organizational context. Social Science Quarterly, 85(5), 1259 -1274.

Cronsnoe, Robert, Monica Kirkpatrick Johnson,and Glen.H. Elder Jr.2004. IntergenerationalBbonding in school: The behavioral and contextual correlates of student – teacher relationships. Sociology of Education.77 (1).60 – 81

Darge Wole and Amsalework Legese. June-2014. The Relation between Test anxiety and Academic Performance at Addis Ababa University Institute of Technology.

Dills, K.A(2006) Trends in relationship between socio-economic status and academic achievement. Retrieved on September 30, 2008

Domina. Thurston.2005. Leveling the home advantage: assessing the effectiveness of parental involvement in elementary school .Sociology of Education.78,233 – 249.

Eamon.Mary.keegan. 2005.Leveling the home advantage: assessing the effectiveness of parenting influences on academic achievement of Latino young adolescents. Journal of Youth and Adolescenc,34(2),163 -175

Eitle. Tamela McNulty. 2005 .Do gender and race matter? Explaining the relationship between sports participation and Achievement. Sociological Spectrum. 25(2) ,177 - 195.

Girma Lema, Zebanay Luleseged, 2014. Academic performance of female students in Adis Ababa. The case of Kirkos Subsity primary schools.

Harter, S. 1982. The preserved competence scale for children. Chiled development. Hinsdale, Newjersy: Lawrence Erlbaum Associetes

Hochschild, Jennifer L.2003. Social class in public schools. Journal of social Issues 59(4), 821 -840.

Hunt.H.Fasvid.2005/The effect of extracurricular activities in the educational process Influence on academic outcomes? Sociological spectrum, 25(4),417 – 445.

Jeynes,willizm H.2002 Examining the effects of parental absence on academic Achievement of adolescent: the challenge of controlling for family income. Journal of family and Economic Issues 23(2).

Majoribanks, Kevin.1996.Family Learning Environments and Students' Outcomes: A Review. Journal of comparative Family studies 27(2), 373 -394.

McNeal,Ralph B.2001.Differential effects of parental involvement on cognitive and behavioral outcomes by socioeconomic status. Journal as socio – Economics 30 (2), 171.

Miller,Kathleen E,Merril J.Menick,Grace M. Barnes,Michael P. Farrell, and Don Sabo.2005. Untangling links among athletic involvement, gender, race, and adolescent academic outcomes. Sociology of sport Journal, 22(2), 178 - 193.

Montgomory, D.C. 2001 Introduction to Linear Regression analysis, (3rd ed.). AWiley I nterscience Publication.

Murdock,Tamaera B, Lynley H. Anderman, and Sheryl A. Hodge. 2000. Middle – Grade predictors of students' Motivation and Behavior in High school. *Journal of Adolescent Research. 15 (3). 357 – 351.*

Sarason, I. G., Sarason, B. R & Pierce, G.R. 1990. Anxiety, Cognitive Inference, and Performance. *Journal of Social Behavior and Personality. 5.1-18*

Sansgiry, S. B hosle M., Sail, K. 2006. Factors that affect academic performance among farmacy students. American Journal of Pharmaciutical Education; 2006; 70(5)Article 104

Santor,Darcy A . Denna Messervecy, and Vivek Kusumakar. 2000. Measuring peer pressure. Popularity, and conformity in adolescent boys and girls: Predicting school

performance, sexual attitudes, and substance abuse. Journal of Youth and Adolescence 29(2) 163.

Seyfried, Sherri.F.1998. Academic achievement of African American preadolescents: The influence of teacher perceptions. American Journal of community psychology,26(3),381 – 402.

Shoukat Ali, et al. 2013, "Factors Contributing to the Students' Academic Performance: A Case Study of Islamia University Sub-Campus." *American Journal of Educational Research* 1.8 : 283-289.

Spieberger, C.D. and Sarason, I.G.1985. Stress and Anxiety (Vol.9) Washington: Hemisphere Publishing Corporation

Tam,Mo.Yin.S., & , Gilbert. W- Bassett Jr. 2004. Does diversity matter? Measuring the impact of high school diversity on freshman GPA. Policy studies Journal,32(1),129 – 143.

Timothy, A. 2008. Tween Time management: Personality, gender School performance,. Washingiton: Hemisphere Publishing Corporation.

Voelkl,Kristin E., E., John W. Welte, and William F. Wieczorek.1999. Schooling and delinquency among white and African American adolescents. Urban Education. 43(1) 68 -88.

Wright, David.2006/Seminar in sociological Theory. Spring. Wichita, KS: Wichita State Universit

(Yekunoamlak Alemu, Tiruwark Tedese, 2014). Streaming Female Students In To Different Fields Of Studies And Their Academic Performance In Government Tvet Colleges Of Addis Ababa City Administration.

List of Apendix

Appendix 1 Fathers' Educational Level

Educational Level	Frequency(Number of father's)	Percentage
Less than high school	146	45.5
High school level	49	15.3
College certificate	50	15.5
First degree	57	17.8
Masters and above	15	4.7
Missing values	1	0.3
Total	**321**	**100**

Appendix 2. Mothers' Educational Level

Educational Level	Frequency(Number of Mother's)	Percentage
Less than high school	154	48.0
High school level	64	19.9
College certificate	62	19.2

First degree	33	10.3
Masters and above	2	0.6
Missing values	3	0.95
Total	**321**	**100**

Appendix 3 Students' Place of Birth (Residence)

Students' Place of Birth of	Frequency	Percent
Rural	44	13.7
Sub urban	84	26.2
Urban	193	60.1
Total	321	100.0

Appendix.4 Parents Monthly Income

Parents Monthly Income	Frequency	Percent
<1000	111	34.25
1001-2000	64	19.75
2001-3000	36	11.1

3000 and above	100	30.86
Missing System	10	3.63
Total	**321**	**100.0**

Appendix 5. Questionnaire Used for the Study

Adama Science and Technology University

School of Applied Natural Science

Department of Statistics

Dear Sir/ Madam

This Questionnaire is prepared to collect data for research purpose. It consists of background information about students and their parents, different items which measure school factor, student role performance (SRP), peer influence and test anxiety. Please read the instruction under each part and questionnaire carefully and respond accordingly. I assure you that, the information you gave will be kept highly confidential and will not be divulged to anybody. It will be used purely for research purpose only. Therefore you are kindly requested to answer all questions trustfully and honestly.

Thank you in advance for your kind cooperation.

A.Background Information

Direction: Here are some items about students' and family background information. In some of the items you are required to write the necessary information in the space provided. When the questions are in the form of choice, you are required to indicate your response by encircling the number of your choice.

1.Your Department_____

2.Your Id No_____

3.Year of Study_____

4. Sex_____

5..Age_____

6..Place of birth A) Urban, B) Sub-urban C) Rural

7. Type of school you attended before A. Public school B. Private school

Parents Background

8. Your father's or guardian educational level

A. Less than high school B. High school level C. College certificate D. 1st Degree

E. Masters and above

9. Your Mother's or guardian educational level

A. Less than high school B. High school level C. College certificate D. 1st Degree

E. Masters and above

10. Parents' monthly income

A. ≤ 1000 B. (1000-2000] C. [2001-3000] D. Above 300

B. Student Role Performance (SRP)

For the following statement please rate yourself according to how well the statement describe you 1. Strongly disagree (SDA) 2. Disagree (DA) 3. Undecided (UD) 4. Agree (AG) 5 strongly agree (SAG)

NO	Items	SDAG	DA	UD	AG	SAG
1.	I find it very difficult to combine my study and	1	2	3	4	5

	leisure time					
2.	I find it difficult to study regularly	1	2	3	4	5
3.	I usually end up cramming fir exams	1	2	3	4	5
4	I can organize my study and leisure time easily	1	2	3	4	5
5	I always start preparing for an examination well in advance	1	2	3	4	5
6	I enjoy doing work for most academic subjects	1	2	3	4	5
7	I hate studying for many academic subjects	1	2	3	4	5
8	I like most academic subjects	1	2	3	4	5
9	I am good at most academic subjects	1	2	3	4	5
10	I am not particularly interested in most academic subjects	1	2	3	4	5
11	I learn quickly most academic subjects	1	2	3	4	5
12	I score good in most academic subjects	1	2	3	4	5
13	I would never achieve academic honors even if I worked harder	1	2	3	4	5
14	I pursue my academic interests outside of the class room	1	2	3	4	5
15	I enjoy learning new things in university	1	2	3	4	5
16	I enjoy discussing academic issues outside of class	1	2	3	4	5

17	I am in university because a University certificate is required to achieve my career	1	2	3	4	5
18	I finish my assignments carefully	1	2	3	4	5
19	I want to develop my skills to create new things	1	2	3	4	5
20	I read all appropriate references for my assignments	1	2	3	4	5
21	I believe that new approach (Conducting continuous assessment, fixed grading system) contributes to perform better, and reduce attrition rate of students.	1	2	3	4	5

C. School Factor/ Environment

NO	**Items**	**SDAG**	**DA**	**UD**	**AG**	**SAG**
1	The majority of our teachers effectively deliver the courses they teach	1	2	3	4	5
2	The majority of our teachers focus mainly on practical applications of the courses	1	2	3	4	5
3	Majority of teachers in our department are supportive than teachers in another departments	1	2	3	4	5
4	The majority of our teachers arrange makeup classes whenever they are absent from a class	1	2	3	4	5
5	Majority of teachers don't give tests, quizzes, assignments to follow up my progress in	1	2	3	4	5

	achieving the course objective					
6	Tests, quizzes, assignments and final exams in majority of the courses I took effectively measures what I was supposed to learn(according to course objective)	1	2	3	4	5
7	The school/ department has sufficient teaching learning resources; text books, journals reference books and good laboratories for the courses that are being offered	1	2	3	4	5
8	The majority of quizzes, test assignments and final exams I took so far evaluate my ability to solve problems in real life/work situation	1	2	3	4	5
9	The library has adequate space to accommodate at any time.	1	2	3	4	5
10	The majority of students in my department have easy access to ICT facilities at any given time	1	2	3	4	5
11	The class rooms in which we attend lecture are smart(equipped teaching aid, computers LCD, tables etc) so that teachers can use them during teaching	1	2	3	4	5
12	The university administration is supportive	1	2	3	4	5
13	I fill peace in my life in the university	1	2	3	4	5

D. Peer- Influence

Here are some statements describing peer-pressure which is when your friends encourage you to do some thing or not to do something else. For each pair read the statements and decide whether friends mostly encourage to do and mark an x on one of the boxes for each item depending on how much friends encourage you to do that ("no pressure"= 1 "A Little", =2"Somewhat" = 3"a lot'=4)

NO	**Items**	**No Pressure**	**A Little**	**Some what**	**A lot**
1	Study hard, do your home works etc	1	2	3	4
2	Smoke marijuana	1	2	3	4
3	Be sociable do things with other people	1	2	3	4
4	Not to be "tough", stay out of fights	1	2	3	4
5	Be part of any crowd at school that you want to	1	2	3	4
6	Go against your parent's wishes	1	2	3	4
7	Have a steady girl friend or boyfriend(opposite sex)	1	2	3	4
8	Drink beer or liquor	1	2	3	4
9	do not do many things with your family	1	2	3	4
10	Go to school dances mixes	1	2	3	4
11	Stay out past the curfew time your parents/university set	1	2	3	4
	How strong is pressure from your friend too: ….				
12	Not be better than your friends at something	1	2	3	4
13	Go to parties	1	2	3	4

14	Try to be friends with popular kids	1	2	3	4
15	Wear style of clothes different than your friends	1	2	3	4
16	Make out kissing or petting	1	2	3	4
17	Smoke cigarettes	1	2	3	4
18	Try to look or act older than you are	1	2	3	4
19	Finish your education	1	2	3	4
20	Not get involved in religious activities	1	2	3	4
21	Talk or act differently than your friends do	1	2	3	4
22	Get drunk or a buzz	1	2	3	4
23	Steal something(shoplift, raid a locker)	1	2	3	4
24	Not be liked by teachers	1	2	3	4
25	Wear your hair(or makeup) different than your friends	1	2	3	4
26	Go for sport team	1	2	3	4
27	Go out only with someone your friend say is ok to date	1	2	3	4
28	Talk back or smart off to adults	1	2	3	4
29	Cut classes or skip university	1	2	3	4
30	Not try for good grades	1	2	3	4
31	Have the same opinion about things as your friends do	1	2	3	4
32	ignore what your parents/university tell you to do	1	2	3	4

33	Have sexual intercourse(go all way)	1	2	3	4
34	Do hard drugs (Use chat shisha etc)	1	2	3	4
35	Not to manage your time and finish assignments on time	1	2	3	4
		1	2	3	4

E. Test Anxiety

NO	Items	SDAG	DA	UD	AG	SAG
1	Thought of doing poorly impede with my performance on examinations	1	2	3	4	5
2	During examinations I frequently get so nervous that I forgot facts I really know	1	2	3	4	5
3	While taking examinations, I perspire a great deal	1	2	3	4	5
4	During examinations, I find myself thinking of things unrelated to the actual study material	1	2	3	4	5
5	I fill very frightened when I have to take an examination	1	2	3	4	5
6	After examinations, I frequently so stressed that my stomach get so upset	1	2	3	4	5
7	I usually fill my heart beating very fast during an examination	1	2	3	4	5
8	I usually get very depressed after taking an	1	2	3	4	5

	examination					
9	I wish examination did not bother me so much	1	2	3	4	5
10	Even when I am well prepared for examination I feel very anxious about it	1	2	3	4	5