

**THE INFLUENCE OF SELF-EFFICACY ON MATHEMATICS  
ACADEMIC PERFORMANCE OF STUDENTS: THE CASE OF NAFYAD  
SECONDARY SCHOOL, ADAMA TOWN**

**BY**

**GEZAHAGN GEBREHANA**



**A RESEARCH PAPER SUBMITTED TO COLLEGE OF EDUCATION  
AND BEHAVIORAL SCIENCES, DEPARTMENT OF PSYCHOLOGY  
FOR PARTIAL FULFILMENT OF MASTERS OF ART IN  
EDUCATIONAL PSYCHOLOGY**

**JIMMA UNIVERSITY**

**COLLEGE OF EDUCATIONAL AND BEHAVIORAL SCIENCES  
DEPARTMENT OF EDUCATIONAL PSYCHOLOGY (POST GRADUATE  
PROGRAM)**

**JIMMA, ETHIOPIA**

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**JIMMA, ETHIOPIA**

**FEBRUARY, 2021**

**Approved by the Board Examiners**

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Co-advisor-----Signature-----Date-----

## Declaration

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

Name \_\_\_\_\_

Sign. \_\_\_\_\_

Date \_\_\_\_\_

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

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## **Abbreviations and Acronyms**

**ABC:** Attendance Behavior and Course performance

**ASH:** Academic Self Hand capping

**FGD:** Focus Group Discussion

**GPA:** Grade Point Average

**MD:** Mathematics Disability

**RD:** Reading Disability

**SEE:** Self Efficacy

**US:** United State

## Table of Contents

Contents	Page
Approved by the Board Examiners.....	3
Name of chairman -----signature-----Date-----....	3
Acknowledgments.....	1
Abbreviations and Acronyms .....	2
Abstract .....	7
CHAPTER ONE .....	<b>Error! Bookmark not defined.</b>
1. INTRODUCTION.....	7
1.1 Background of the study .....	8
1.2. Statement of the Problem .....	11
1.3 Research Questions .....	12
1.4 HYPOTHESIS .....	13
1.5 Objectives of the study .....	13
1.5.1 General objectives .....	13
1.5.2 Specific Objective.....	13
1.6. Significance of the study .....	13
1.7 Scope of the study .....	14
1.8. Limitation of the study .....	14
1.9 Organization of the study .....	14
CHAPTER TWO.....	16
2. REVIEW OF RELATED LITREATURE .....	16
2.1. DEFINATION AND CONCEPT OF SELF EFFICENCY AND ACADEMIC PERFORMANCE .....	16
2.1.1. Source of Self Efficiency.....	16
2.1.1.1 Mastery Experiences.....	19
2.1.1.2 Social /Persuasion.....	20
2.2.3 Vicarious Experiences .....	21
2.2 Developing Self-Efficacy Source Beliefs .....	23
2.3 Self-Efficacy and Academic Motivation/Performance .....	24
CHAPTER THREE.....	31
3. Research Methodology.....	31

3.1 Research Design .....	31
3.2. Research Methods .....	32
3.2.1 Quantitative approach.....	<b>Error! Bookmark not defined.</b>
3.3 Population/ Participant of the study .....	33
3.4 Sample size and sampling Techniques.....	33
3.5. Data collection instrument .....	34
3.6 Data collection procedure.....	34
3.7. Data Analysis .....	35
CHAPTER FOUR.....	36
DATA ANALYSIS AND INTERPRETATION .....	36
4.1. Quantitative Analysis .....	36
4.2. Qualitative Analysis .....	<b>Error! Bookmark not defined.</b>
4.3. Data of experimental and control group students at Nafyad No.1 high school at Adama .....	<b>Error! Bookmark not defined.</b>
Table 4.1. Data of experimental and control group students at Nafyad No.1 high school at Adama .....	50
The mean scores on academic performance of mathematics grade 10-A and 10-B of the experimental and control groups were computed before the intervention to check their equivalence.....	36
Table 4.2. Pre-test.....	37
The mean score on self-efficacy belief in mathematics for the experimental and control group was 8.96 with SD of 2.83 and 8.95 with SD of 2.46 respectively to check the observed differences on mean score of self-efficacy belief in mathematics between the experimental and control group were statistically significant. The independent T- test was applied. The independent sample T-test showed that there was a statistically significant mean differences in the two groups on mean scores of self-efficacy belief in mathematics with SD experiential group=108 and control group= 99.566]=0.030,P=0.002.....	37
4.5. Validity and reliability Check .....	35
4.6. Intervention .....	37
Table 4.3 Substance of the intervention treatment for experimental group for Four weeks.	39
4.7. Differences on academic achievements in mathematics 10-A and 10-B between the experimental and control groups after the intervention. ....	39
Table 4.4 Mean scores on academic performances in 10th grade mathematics academic ...	40
Table 4.5 Refreshment of the grade 10 mathematics teacher .....	41
4.9 Qualitative Findings .....	<b>Error! Bookmark not defined.</b>
4.10 Discussions.....	43



CHAPTER FIVE.....44  
Conclusions, Finding, and recommendations .....44  
5.1. Conclusion.....44  
5.3 Recommendations .....45  
REFERENCE .....47

## List of Tables

Table	Page
Table 4.1. Data of experimental and control group students at Nafyad No.1 high school at Adama .....	50
Table 4.2. Intervention Packages .....	<b>Error! Bookmark not defined.</b>
Table 4. 3 Elements of the intervention treatment for experimental group for Four weeks	39
Table 4.5 Refection of the grade 10 mathematics teacher .....	41
Table 4.4 Mean scores on academic performances in 10th grade mathematics academic ...	40

## **Abstract**

*This study aimed on assessing the influence of self-efficacy belief on mathematics academic performance between experimental and control group of students in case of Nafyad No.1 Secondary School at Adama town, and identifying the major effects of self-efficacy belief difference between experimental and control group performance on mathematics achievement. The methodology used for the study was quasi experiment while participants were purposively selected for experimental and control groups. The participant of the study were 110 students out of which, 55 students for experimental group came from grade 10-A while the 55 students of the control group were from grade 10-B. For this research achievement, two Nafyad High School principals and three mathematics teachers were involved. After groups were selected the first semester mathematics mid-test of students was taken as pretest. Then, the treatment was given which was prepared to enhance the thinking of self-efficacy belief of the experimental group. The treatment substances were given through training for four weeks. The collected data was interred in to SPSS with the value of pretest and post test data. The major findings of the research questions were approved by mean, t-testes, standard deviation and P value obtained from statistical package of social science. The collected data were analyzed and explained both quantitatively and qualitatively so as to reach the findings. The major findings obtained from pretest and post test score were that there were differences before and after the treatment between experimental and control groups. Secondly, self-efficacy belief differences were also seen between experimental and control group. The conclusions were the enhanced self-efficacy belief brought change on mathematics achievement score. The treatment generally changed the thinking of self-efficacy belief of students to enhance self-belief towards mathematics. It was evident that the treatments / training given for the experimental groups have caused major changes on students.*

# CHAPTER ONE

## 1. INTRODUCTION

### 1.1 Background of the study

Self-efficacy is a personal belief in one's capability to organize and execute course it action required to attain designated type of performances often described as task specific self-confidence self-efficacy has been a key component in theories of motivation and learning in verbal context further more over the last 34 years educational researchers from divers field of inquiry have used the nation of self-efficacy to predict and explain a wide range of human functioning from athletic skill to academic achievement (US national library of Medicine, 2012). Under African journal studies in mathematics and science Vol. 15 (2019) and according to May and Glyun (2008), persons with low mathematical self-efficacy will avoid mathematical tasks or situation a number of studies have also revealed a strong relationship between mathematics self-efficacy and mathematics achievement (Aldridge et al, 2013; May & Glynn 2008; Liu & Koirala 2009 and Kabiri & Kiamanesh 2004). In their conclusion they claim that the higher a person rates on mathematics self-efficacy scale the better this person performs mathematical in problem.

A study by Wal (2001) had investigated intelligence as a correlate of achievement in mathematics across different level of socio economic status. The study intended to examine the relationship of intelligence with achievement in mathematic in content with different level of socio economic status. Two hundred student of class 11 were selected randomly from the colleges of Tehri district who served as a sample for the study and found out that there was significant correlation between intelligence and achievement in mathematics. Saileela (2012) had also conducted a study on self-regulation, self-efficacy and attitude toward mathematics of higher secondary students in relation to achievement.

The purpose of the study was to compare self-regulation scale, and self-efficacy scale in relation to achievement test. Hlanganipai Girande (2014) had investigated to explore mathematics anxiety of mathematics student experiences. The purpose of the research was to explore students' mathematics anxiety level at a selected tertiary institution in South Africa. The result also show high levels of mathematics anxiety among female students and the t-test also showed that the mean difference between mathematics anxiety and gender was significant.

Gbolagade, Waheed & Sganganoy (2013) had investigated “ a study the quest by Nigerians to join the league of 20 industrialized nation by the year 2020 may be mirage if phobia for mathematics learning in secondary school is not taking in to cognizance” the result revealed that there was significant on student phobia for mathematics and factors like in competence on the part of mathematics. The construct of self-efficacy was introduced by Albert Bandura who defined ‘self-expectations as beliefs in ones capabilities to organize and excites the courses of action required to produce given attainments’ (1997 p.3). The researchers of SEE such as Schunk and Pajare (2010) Zimmerman (2000) and Bong and Skaalvik (2003) to version of the original conceptualization proposed by Bandura self-efficacy is either referred to as a belief (Dultonetal. 1991 Schunk and Pajare (2010) or an expectation (Hacket and Betz 1989; Schukajilow et.al., 2012) we use the term expectation to emphasize the focus prospective future attainment.

See differ from other self-beliefs in their relation to specific future challenge or tasks and their relative context specific to (bong and skealvik 2003 pajare1996 Bivalentinetal 2004) Roty and Michael (2008) had conducted “a study on the relationship between mathematics anxiety and emotional intelligence” this study examined the relationship between mathematics anxiety and emotional intelligence. The results suggest that students would benefit from having access to emotional intelligence coaching experiment at the effect of emotional intelligence coaching on mathematics anxiety should be conducted further studies are needed to examine the relationship between mathematics anxiety self-efficacy is an important concept in social cognitive theory which has been widely recognized as one of the most prominent theory about human learning (Mrod , 2008).

Fort development by Albert bandura (1977: 1986) self-efficacy refers to learners beliefs about their ability to accomplish certain tasks many research including bandura have demonstrated that self –efficacy affect human motivation persistence efforts action behavior and achievement (bandura 1977 -2000 zemmarman Bandura & Martinez pons 1992) research have indicated that higher self – efficacy is predictive of higher performance (Bong & Skoolvik, 2003)

in an effort to improve student cognitive and effective outcomes in educational psychologists and mathematics educators have continued to search for variable (personal) of academic gains especially in the subject mathematics due to student’s disposition low involvement and poor performance in the subject (chief examiner report 2005, 2006 and 2007 ) of all the personal

variable that have attracted research in this area at educational achievement mathematics self – efficacy seem to be gaining more popularity (Pajare & Miller 1994; Zemmarmarman, Bandura & Martinez-pons, 1992 ) Lawrence (2007) had conducted a study on relationship between anxiety and academic achievement of B.sc mathematics student.

The objective of this study was to find out the level of anxiety of B.sc mathematics student to find out the relationship between anxiety and academic achievement of B.sc mathematic. The findings of the study were the level of anxiety of B.sc mathematics II years students is average the level of anxiety it B.sc mathematics III years students is average. There are significant association between B.sc mathematics student of women’s college and co- education college in their academic achievement there are significant relationship between anxiety and academic achievement it B.sc mathematics students with regard to sex there are significant relationship between anxiety and academic achievement of B.S.C mathematics students with regard to locality of college.

Self-efficacy was first developed by Albert Bandura (1977, 1986). Self-efficacy refers to learners beliefs about their ability to accomplish certain task. Many researchers including, Bandera, have demonstrated that ‘self-efficacy affect human motivation persistence efforts action behavior thought and achievement’. Like many other research, this research investigated Grade 10<sup>th</sup> students’ achievement of Mathematics from Nafyad High School by enhancing self-efficacy belief of the students in the intervention group by giving continuous intervention training. The contents were- Mathematic is simple, mathematics is simple as other subject and tell for your mind I can do Mathematics, think I can do mathematics.

By applying these intervention points, the researcher gave tests for intervention group (grade 10<sup>th</sup>A students) and for comparison group (10<sup>th</sup> B students) from Nafyad High School and the test was given as planned. The first pretest was given on January 04, 2020 and the second posttest was given on January 08, 2020.

In this study, the operational definition of self-efficacy is refers to the global view of “one’s coping abilities in a wide variety of situations and global person’s belief in his or her ability to organize and execute the courses of action required to achieve specific goals”.

Earlier researches show that ‘efforts and persistence are one of the attributes of students with high self-efficacy’ (Zajacova, Lynch, & Espenshade, 2005). Such students continuously work, if unable to follow course, they find out effective ways to control difficulties in achieving their goals. While students with low self-efficacy will discontinue, they are unable to remove barriers in achieving and learning (Ormrod, 2000). Earlier researches (Pintrich & Schunk, 1996) found ‘important role of memory’. According Kinde & Asfawossen research and various research works also demonstrates ‘the relationship between student’s self-efficacy belief in mathematics and academic achievement in mathematics’.

Based on the above mentioned problems, the researcher was interested to examine the difference between the influence of student’s self-efficiency belief and mathematics academic performance in case of Nafiyad Secondary School at Adama town.

## **1.2. Statement of the Problem**

Infants and young children are propelled by curiosity, driven by an intense need to explore, interact with, and make sense of their environment. Children enter into Pre-Keji and kindergarten programs with expectations of success. However, research has demonstrated that motivation decreases as students proceed through each grade level (Applegate & Applegate, 2010; Capen, 2010; Froiland, Oros, Smith, & Hirschert, 2012). Bandura (1997) suggests later failures in life may not negatively impact efficacy beliefs to the same extent as earlier failures. Many types of experiences occur in students early academic careers to form students’ self-efficacy source beliefs. Often the crucial factor that accounts for cases like these is the students own motivation to learn.

According to the Center on Education Policy (2012), ‘motivation is a central part of a student’s educational experience from preschool onward, but it has received scant attention amid an education reform agenda focused mainly on accountability, standards and tests, teacher quality, and school management. Education reform could benefit from a robust conversation about the overlooked element of student motivation’ (Center, 2012).

Bergin (2013) states, “If students do not have the confidence to work through a difficult task, how will they be the innovative leaders of the future?” (p.2). Academic self-efficacy appears to be the most important form of self-efficacy to investigate (Joseph & Baker, 2014). A higher

motivation to learn has been linked not only to better academic performance, but also to greater conceptual understanding, satisfaction with school, self-esteem, social adjustment, and school completion rates” (Center on Education Policy, 2012).

Bergen (2013) conducted a literature review study of eighteen articles from 1970- 2010 on varying levels of self-efficacy. The study specifically “focused on how students persevere when tasks are difficult, and how self-efficacy can be a predictor of academic achievement”. A search from one search engine revealed 60 initial studies before inclusion and exclusion criteria were applied. Eighteen articles utilizing various research methods were found. The results were as follows: Qualitative Method-one; Mixed Methods-one; Research and Literature Review Methods-five; Quantitative Methods-eleven. Out of those 18 studies, only four studies were conducted using a sample of students in grades 8th-12th. More qualitative research should be conducted in order to fulfill the gaps of non-cognitive skills that explain high school students’ willingness to perform and be successful.

Many quantitative studies using self-efficacy ratings scales for middle school students, teachers, and college students are reported. However, little quantitative research exists on why and how high school students develop self-efficacy source beliefs, and how those beliefs foster academic motivation. The goal of this quantitative research is to study a relatively small number of individuals in rural settings while preserving the individuality of each student. Other self-efficacy studies have focused on “collecting data from urban settings with large samples and aggregating the data across individuals or situations” (Maxwell, 1996).

As gap of the research, the study examined the influence of self-efficiency belief difference between Mathematics Academic performance of the students in case of Nafyad Secondary school at Adama and the major problems hindered the mathematics score of students.

### **1.3 Research Questions**

In order to gain a clear influence of self-efficiency belief on the mathematics academic performance of students in case of Nafyad secondary school, the following research questions were needed to be answered.

- Were there any statistically significant mean differences on mathematics academic achievements between those who took “self-efficacy” training and those who did not?



- How different were the students' mathematics achievements between those who took "self-efficacy" training and those who did not?

#### **1.4 Hypothesis**

**H<sub>1</sub>:** students who received self- efficacy training scored a higher academic achievement than student who did not receive the self-efficacy training.

$$\mathbf{H_1: M E.g \geq M Cg}$$

**H<sub>0</sub>:** students who received self-efficacy training did not differ on academic achievements from students who did not receive self-efficacy training.

$$\mathbf{H_0: M E.g = M Cg}$$

#### **1.5 Objectives of the study**

##### **1.5.1 General objectives**

The general objective of this study was to examine the differences between experimental and control group of students on their mathematics academic performance in case of Nafyad no.1 secondary school at Adama town.

##### **1.5.2 Specific Objective**

Up on the completion of the study, this research is specifically able:

- To examine differences between experimental and control group of students on their mathematics achievement.
- To examine differences between experimental and control group of students on their self-efficacy belief.

#### **1.6. Significance of the study**

The study was expected to give significant solution to the influence of self-efficacy belief on mathematics academic performance of various bodies. First, the findings of this study was hoped to enhance students mathematics score and create high motivation. It was also hoped to be useful to teachers, school Administrators, parents and officials from the educational sectors.

Even if the study was conducted worldwide, especially in western countries, it is scarce in Africa and in Ethiopia. As such research was conducted among students of universities, the present one was focused on high school students because high schools are the base for universities. So, in this respect, this research was expected to reveal or give answer to problems of lower stage

students, such as, to students of elementary and secondary schools in Ethiopia. The study was also hoped to be of significant advantage for lower stage schools than universities.

Moreover, as the research was conducted using research of professor Kinde & Asfawossen research as model at high school level, the finding had revealed that the performance of students mathematics score was enhanced by applying treatments; and thus, the treatment improved student's self-efficacy beliefs since the finding of the study showed differences between pretest and posttest mathematics score of experimental and control group of students.

### **1.7 Scope of the study**

The objective of the study was to assess the influence of self-efficiency on the mathematics academic performance of students in case of Nafiyad Secondary School. The scope of the study was delimited to Nafiyad Secondary School, which is found at Adama town, for its data gathering. The study was conducted at Nafiyad No. 1 High School at Adama town between January 12, 2020 up to January 29, 2020. Due to the research method, the scope of the study was delimited to purposively selected students of grade 10 A & 10- B at Nafiyad Secondary School, in Adama.

### **1.8. Limitation of the study**

When the research was conducted, the researcher faced different challenges while giving pretest and posttest experiments such as doubt of the intervention group and comparison group became aware of the experiment, lack of students attention for the test, absentees from the test, lack of budget, shortage of time, security problem and Covid 19 pandemic were some of the limitation. Though the study comes up with important findings, it has some limitation. Some of the limitation were shortage of the training period, security and Covid 19 problem also shortage of time in case of share some tasks of the intervention to the control group was under intense strict supervision of the teacher may limit the external validity of the research and conducting the intervention only in one department could also limit the generalization at the study to other settings.

### **1.9 Organization of the study**

The study was divided in five chapters. Chapter one of the study discusses about introduction, background of the study, statement of the study, statement of the problem, research questions, hypothesis, objective of the study, general objectives, specific objectives, significance of the

study, scope of the study, and limitation of the study. Chapter two reviews of the international and national literature on source of self-efficacy problem and mathematics score. This chapter also briefly explains, self-belief, self-esteem, motivation emotion, model mastery experiences social persuasion, vicarious experiences self-efficacy and academic performance, self-efficacy and grade levels self-efficacy and parental involvement, self-efficacy and teacher/student relationships, sophomore students and thinking of students on mathematics achievement score. Chapter three of this study describe the research methodology, research design, research methods, population sample size, sampling techniques, data collection instruments and data collection procedure. The analysis of two sets of grade 10 mathematics achievement which were generated by quasi experimental study of experimental and control group score were presented in Chapter four. Chapter five presents conclusion, findings and recommendation of the study.

## **CHAPTER TWO**

### **2. REVIEW OF RELATED LITREATURE**

#### **2.1. DEFINATION & CONCEPT OF SELF-EFFICACY & ACADEMIC PERFORMANCE**

##### **2.1.1. Source of Self Efficacy**

“Successes build a robust belief in one’s personal efficacy. Failures undermine it, especially if failures occur before a sense of efficacy is firmly established” (Bandura, 1994a, p. 2). The self-efficacy component of Bandura’s social-cognitive theory has had a profound impact on the study of motivation and achievement in academic settings. Self-efficacy is a domain-specific belief in one’s ability to successfully perform a task, which influences engagement in and successful completion of a task (Bruning, Dempsey, Kauffman, McKim, & Zumbunn, 2013; Klassen, 2002; Pajares, 2003).

Academic self-efficacy is defined by Chemers, Hu, and Garcia (2001) as “student’s confidence in mastering academic subjects” (p. 56). Students with high self-efficacy beliefs are more willing to participate in difficult tasks, persist longer, and work harder (Bruning& Horn, 2000; Zimmerman, 2000). Results from “a meta-analysis of more than 100 empirical studies conducted over the last 20 years found that of nine commonly researched psychosocial constructs, academic self-efficacy was the strongest single predictor of students’ academic achievement and performance” (Artino, 2012). “Perceived student self-efficacy is informed by four sources: mastery experience, social persuasion, vicarious experience, and physiological states” (Bandura, 1994, 1997).

Mastery experience, “the most prominent source, develops over time as students experience successes and failures. Overall, success resulting from overcoming obstacles produces positive mastery experiences and higher levels of efficaciousness. Social persuasion is developed as students interact with the individuals around them. For instance, verbally encouraging parents and teachers can raise a student's self-efficacy. Vicarious experiences occur as students view the successes and failures of others. A student's sense of self-efficacy is more positively impacted by others who experience success, if common characteristics are shared such as age, gender, and

perceived similar abilities. Lastly, as students are judging capabilities, emotional states are also relied upon. For example, Hibbs (2012) attests that anxiety and stress lowers self-efficacy while excitement and positive mood increases self-efficacy”. Pajares and Schunk (2002) ‘‘contend that self-efficacy beliefs impact students in a variety of ways. Self-efficacy plays a role in academic self-motivation’’ (Bandura, Martinez-Pons, & Zimmerman 1992). ‘‘Students with high self-efficacy tend to perceive themselves as capable of regulating learning and are apt to set challenging personal goals.

More efficacious students are able to be more resistant to negative affective impacts of failure (Bandura, 1986). Students make choices based upon what they are confident in attempting. For instance, efficacious students will select rigorous coursework having the confidence to complete challenging material. Students with low self-efficacy may even perceive a task as more difficult than it really is and will give up prematurely. Williams and Williams (2010) attest that while ‘‘students with high self-efficacy feel motivated to approach complicated tasks, students with low self-efficacy develop anxiety and nervousness.

A study conducted by Bjornebekk, Diseth, and Ulriksen (2013) investigated ‘‘the achievement motives, self-efficacy, achievement goals, and academic achievement at multiple stages of post-secondary education. The primary intention of the researchers was to develop an analysis into the understanding of the factors behind the combined effects of achievement motives, self-efficacy, and achievement goals in enhancing student performance’’. The researchers found that naturally the longer students were in the program; the more successful they felt which increased student’s self-efficacies.

However, the students’ performances were based on the fear of failure. The research findings indicated that the self-efficacy was negatively related to fears of failure in examinations. Science students who feared failing in exams found it difficult to cope with regard to finding confidence in themselves to achieve better results. The study also found that science students who took part in the research were fond of drawing motivation towards improved performance from academic achievement. Hence, the promise of attaining a degree is what drives the motivation of science students towards excellence in achievement (Bjornebekk, Diseth, &Ulriksen, 2013). The

research found that in actual sense it is fear that drives motivation of individuals to perform by avoiding failure.

Moreover, as individuals graduated from one level to the next the closer they got to academic achievement. It is the promise of academic achievement at the end of the degree course that was found to develop motivation among students to better their performance in academics'' (Bjornebekk et.al. 2013). Based on the findings of the study by the scholars it was apparent that as individual students graduated from one level to the next the more their goals became focused towards academic achievement.

Bong, Cho, Ahn and Kim (2012), conducted a study to investigate ''the trend between students in elementary school and those in middle school. Students in elementary school were subdued by those in middle school in terms of their level of confidence in mathematics subjects was higher among middle school students as compared to students at elementary level'' (Bong, Cho, Ahn, & Kim, 2012). Primarily, the common element between Bjornebekk's et al. (2010) study and Bong's et al. (2012) study is that both advances that level of experience in students inspires confidence. In this regard, the higher the level of education a student is the higher their level of confidence as self-belief that they can achieve better performance results and vice versa. In respect to the assumption that students at a higher level have more levels of confidence, higher self efficacy is more among older students in higher levels of learning than among younger students in lower levels of learning.

Gore (2006) suggested that academic self-efficacy beliefs can be used to predict college student's academic performances and persistence by examining first-year college students, their ACT scores, and a self-reported self-efficacy survey. The results however may not be a predictor of college success and could be partially dependent on ''(a) when self-efficacy beliefs are measured, (b) what aspect of self-efficacy is being measured, and (c) what college outcome one wishes to predict'' (Gore, 2006, p. 112). Gore's (2006) results also suggested that students need feedback on their performance (both social and academic) before they can realistically assess their ability to achieve academic goals. Schunk (1991) emphasizes that students who possess high self-efficacy recognize the importance of academic goals, getting superior grades,

surpassing other students, embracing new experiences, and diligently proving intelligence through schoolwork.

Against this, there are students with lower self-efficacy who assume that intelligence is an entity that offers no possibility of improvement, who feel unable to succeed, and therefore are less likely to target any kind of goal, mastery or performance. Bandura (1977) hypothesized that individuals form self-efficacy beliefs based on the interpretation of information from the environment, specifically from the four crucial sources (mastery experiences, social experiences, vicarious experiences, and physiological experiences), and attests that the most powerful source of information is interpreting one's own previous performance, or previous mastery experience (Klassen, 2004; Pajares, Johnson & Usher, 2007; Usher & Pajares, 2006).

#### **2.1.1.1 Mastery Experiences**

Bandura (1977, 1994) posits that mastery experiences, or personal performance accomplishments, are the most effective way to create a strong sense of efficacy. With mastery experiences and personal performance accomplishments being the most efficacious source of self-efficacy, little qualitative research exists with secondary students. Most recent research is focused on teachers, middle school students, and college students. Research with mastery experiences as a source is conducted quantitatively in various forms. Arslan (2012) found that the factor "performance accomplishments" was the strongest predictor of the students' self-efficacy beliefs for learning and performance. The data accounted for 36.7% of the change in the students' self-efficacy beliefs for learning and performance. Therefore, vicarious experiences and verbal persuasion accounted for only 2.1% of the total variance.

Jenson, Petri, Day, Truman, and Duffy (2011) found that STEM classes added to students overall sense of accomplishment and self-confidence as they made their way through college. Representative statements include, "Success has made me more confident," and, "I didn't think I could, but I got through it." The most frequent response to clicker questions about academic confidence (i.e. earning good grades in STEM courses, getting help with class work, and working with faculty on accommodations) was, "I am certain I can do it." Students reported that several factors contributed to mastery experiences in college, ranging from the role of

instructors, family, friends, and classmates to the assistance of the college's academic and disability support offices.

Having opportunities to apply learning was also reported as valuable. As one student noted, "When I work with other people and accomplish a goal, that teamwork makes me feel successful." Students also reported that personal attributes such as perseverance, self confidence, and an unwillingness to fail contributed to these mastery experiences. One student discussed the connection between a course and confidence: "I took speech class and worked on becoming more comfortable talking in front of people and am now more confident." Students recognized self-responsibility in content mastery. Students generally did not consider struggle to be the fault of the instructor and success was attributed to studying and going to class. The participants credited instructors as having the most impact on their ability to experience success in their classes. Several students told of instructors who went out of the way to provide extra support: "We had class two days a week, but we convinced the teacher to host extra study sessions once a week."

Another student associated attention from a teacher with an increased ability to be engaged in class: "When I was going through [personal] ... drama in 2007, I was in a math's class. The teacher stayed after class and talked to me. [This] helped me not to hesitate to ask questions." Instructors created a valuable culture for learning in a class that students appreciated and that promoted mastery experiences. The post-secondary participants reported, not only did mastery experiences improve students self-efficacy beliefs, but another self-efficacy source, social/persuasion, proved to be beneficial for the students.

#### **2.1.1.2 Social /Persuasion**

Klassen and Lynch (2007) conducted 'interviews with 8th and 9th graders with learning disabilities. Both individual and focus group interviews were conducted.' 'Two quotes particularly captured how students' beliefs can affect motivation towards a task. Well, if you have no confidence, you're not going to be able to do anything at all. (Klassen& Lynch, 2007), and from a 14 year old boy, "Somebody with low confidence levels might just think, 'Oh, I can't do it' and then not do it at all—or just half [hearted] ly" (Klassen& Lynch, 2007). The feedback that teachers give to students and the manner in which it is presented is a very important source



of self-efficacy, even if you do not think it is significant at the time. Students commented that when a teacher gives praise or encouragement, “You don’t really think it helps at the time, but when it comes down to it, it does” (Klassen & Lynch, 2007).

Based on all the literature reviews conducted in the study, Bergen (2013) attests that “a major focus of instruction should move towards improving students’ level of self-efficacy, providing a shift in delivery and instruction.” “If we can improve how a student tackles and prepares for things by providing them with a more realistic view of their skills (calibrating), we consequently bolster their belief and actual ability to tackle a problem. As noted, in Bergen’s (2013) research, few “qualitative studies have been conducted and few studies focus on the teachers’ interactions with students and how those early interactions can improve or impede the formation of sufficient self-efficacy.

Jungert and Andersson (2013) examined the role that self- efficacy had in mathematics, native language literacy, and foreign language in students with and without learning disabilities. The data revealed that “children in the non-learning-disabled group had significantly higher self-efficacy in mathematics than children in both the MD (mathematics disability) only and MD-RD (mathematics disability and reading disability) groups with  $p < .001$  (Jungert & Andersson, 2013). The MD-only children displayed lower self-efficacy in mathematics, completely accounted for by lower mathematic achievement.

The lower self-efficacy for children with learning disabilities may primarily be explained by the history of low achievement interpreted as failures and emphasis on negative appraisals (Jungert and Andersson, 2013). Improving a student’s ability to accurately depict abilities in a content area will improve performance. According to Jungert and Andersson (2013), “specific content programs and meaningful teacher interactions with students may improve self-efficacy beliefs.” Bandura (1994, 1997) also explains that vicarious experiences through observance of social models also influence one’s perception of self-efficacy.

## **2.2.3 Vicarious Experiences**

### **Types of Modeling**

Research shows that models can have profound effects on self-efficacy, motivation, and achievement. The vicarious source where students may increase self-efficacy through modeling

has the highest volume of research. However, most recent studies involve the self-efficacies of teachers and the effects teachers have on students. Earlier case study research focuses on the different types of modeling for students and the most efficacious modeling types. The Vicarious/Model sources encompass different types of modeling such as cognitive modeling, confident and pessimistic modeling, coping and peer modeling, self-modeling and group modeling.

### **Cognitive Modeling**

Schunk (1981) provided “low-achieving children with either cognitive modeling or didactic instruction. Cognitive modeling and didactic instruction raised self-efficacy equally well. However, modeling led to greater gains in division skill and to more accurate perceptions of capabilities as the children’s efficacy judgments corresponded more closely to actual performances. Didactic subjects sometimes overestimated performance. Regardless of treatment condition, self-efficacy related positively to persistence and achievement.

### **Confident and Pessimistic Modeling**

Other achievement research supports the influence of models on self-efficacy. Zimmerman and Ringle (1981) “had children observe a model unsuccessfully attempt to solve a puzzle for a long or short time and verbalize statements of confidence or pessimism, after which children attempted the puzzle themselves.” Observing a low persistent but confident model raised self-efficacy. However, children who observed a pessimistic model persist for a long time lowered their self-efficacy. Relich, Debus, and Walker (1986) found that “exposing low-achieving children to models explaining mathematical division and providing them with feedback while stressing the importance of ability and effort had a positive effect on self-efficacy.”

Perceived similarity to models is an important attribute. Observing similar other students ‘success can raise observers’ self-efficacy and motivate them to try the task. If they are apt to believe that if others can succeed, they can as well’ (Schunk, 1987). “Similarity may be especially influential when individuals are uncertain about their capabilities, such as when they lack task familiarity and have little information to use in judging efficacy or when they previously experienced difficulties and have doubts about performing well.” Weibell (2011) also suggests that “the most important factor determining the strength of influence of an observed

success or failure on one's own self-efficacy is the degree of similarity between the observer and the model.”

## **2.2 Developing Self-Efficacy Source Beliefs**

‘Cultivating student’s academic self-efficacy is a worthwhile goal for any educator. The major goal of formal education should be to equip students with the intellectual tools, efficacy beliefs, and intrinsic interests needed to educate themselves in a variety of pursuits throughout their lifetime’ (Bandura, 1997). In many cases, however, educational researchers have inaccurately measured ‘self-efficacy due, in a large part, to their misunderstanding of the construct’ (Pajares, 1996; Bandura, 1997; Bandura, 2006).

‘Judgments of self-efficacy are task and domain specific; global or inappropriately defined self-efficacy assessments weaken effects’ (Pajares, 1996). A researcher attempting to predict or explain an academic outcome is more likely to find a strong relationship between self-efficacy and the outcome of interest if the efficacy scale follows two theoretical guidelines: (a) it assesses specific aspects of the task and (b) the specificity corresponds to the characteristics of the task being assessed and the domain of functioning being analyzed.

Although it is clear that task and domain-specific measures of perceived efficacy have greater predictive power than global measures of the construct, Bandura (1997) ‘warned that it is incorrect to believe that self-efficacy is concerned solely with specific behaviors in specific situations, and posits that domain particularity does not necessarily mean behavioral specificity.’ Bandura (1997) distinguished among three levels of generality of assessment. The most specific level measures self-efficacy for a particular accomplishment under a narrowly defined set of conditions. The next level measures perceived efficacy for a class of performances within the same domain and under similar conditions.

Finally, the most general level measures belief in personal efficacy without specifying the activities or the conditions sharing common properties. As discussed before, however, undifferentiated, context less measures of perceived self-efficacy have meager predictive power. Bandura (1997) advises that ‘the optimal level of generality at which self-efficacy is assessed varies depending on what the researcher seeks to predict and the degree of foreknowledge of the situational demands.’

Academic self-efficacy has been consistently shown to predict grades and persistence in college (Bandura, 1989; Lane & Lane, 2001; Poyrazli, Arbona, Nora, McPherson, & Pisecco, 2002). “Self-efficacy beliefs affect college performance outcomes by increasing student’s motivation and persistence to master challenging academic tasks and by fostering efficient use of acquired knowledge and skills” (Bandura, 1993).

Efficacy beliefs are thought to be so important to academics that Bandura (1997) stated, “Perceived self-efficacy is a better predictor of intellectual performance than skills alone” (p.216). Bandura’s (1963) social cognitive theory has linked student’s self-efficacy and motivation in academic settings. Moreover, there is extensive research literature showing that “self-efficacy is a strong predictor of academic performance” (Pajares, 1995) and emotional adaptation, such as “adjusting to a new academic environment, is aided when a person has a strong sense of self-efficacy about their abilities and competence” (Bandura, 1986).

Finally, self-beliefs can be developed through experiencing physiological and emotional states, such as exhilaration, anxiety, or other mood states (Bandura, 1977; Usher & Pajares, 2007). Bandura’s (1994) research shows that “people who doubt their capabilities more easily fall victim to stress and depression. Expectation alone will not produce desired performance if the component capabilities are lacking. Given appropriate skills and adequate incentives, however, efficacy expectations are a major determinant of people’s choice of activities, how much effort they will expend, and of how long they will sustain effort in dealing with stressful situations” (Bandura, 1977). Engagement is viewed in the literature as very important for enhanced learning outcomes of all students (Schlechty, 2001; Woolfolk & Margetts, 2007). Motivation is seen as a pre-requisite of engagement and a necessary element for student learning.

### **2.3 Self-Efficacy and Academic Motivation/Performance**

Motivation research has identified “the self-efficacy construct of Bandura’s social cognitive theory as a fundamental component of academic motivation. A socio-cognitive perspective assumes that individuals are self-regulating, and possess self-beliefs that influence their thoughts, feelings, and actions” (Bandura, 1977; Pajares, 2003). Bilge, Cetin, and Dost (2014) examined “high school student’s levels of burnout and school engagement with respect to academic

success, study habits, and self-efficacy beliefs.” The results suggested that “students with low self-efficacy beliefs had higher burnout levels.

In addition, students with inadequate study skills and those with low self-efficacy beliefs were at higher risk of losing their beliefs. Another finding was that students with high academic success also had high self-efficacy. Unexpectedly, students with inadequate study skills and low self-efficacy beliefs were found to have high self-efficacy. Students with adequate study skills and high self-efficacy beliefs also had high school engagement levels. While providing viable information, this study was quantitative and relational, examining relationships between the variables. Sinan and Jongur (2016) examined “the relationship between mathematics performance and academic self-efficacy and found that there was a strong positive correlation between academic self-efficacy of students in mathematics and the performance of students in mathematics among secondary school students”.

Another study conducted by Dogan (2015) aimed to explore the relations among student engagement, academic performance, self-efficacy, and academic motivation in middle and high school students and to reveal whether student engagement, self-efficacy, and academic motivation predict academic performance. Findings included “a relationship between the students’ academic performances and student engagement sub-dimensions (cognitive, emotional, and behavioral), academic self-efficacy, and academic motivation, as well as how these variables predict academic performance.” Dogan (2015) found that “academic self-efficacy and academic motivation are positively changing variables, whereas the behavioral dimensions of student engagement and academic performance are negatively changing variables.” Moreover, Dogan’s (2015) research findings suggest that “academic motivation meaningfully predicts academic performance and these two have a positive and meaningful relationship.”

Consistently, studies attribute low self-efficacy beliefs to lower school engagement levels as well as higher self-efficacy beliefs to high motivational levels. However, little qualitative research provides rich, thick description for development of low self-efficacy or high self-efficacy beliefs in adolescent students. In another quantitative study conducted by Chemers, Hu, and Garcia (2001), academic self-efficacy was shown to be a major factor in academic performance.

Participants were first year college students who were given surveys near the end of the first quarter and at the end of the last quarter of the year. Chemers et al.(2001) used the Academic Self-Efficacy Scale to measure self-efficacy. Researchers found that “students with high academic self-efficacy also had higher grade point averages (GPAs). In addition, students with higher high school GPAs demonstrated higher academic self-efficacy, academic expectations, and academic performance in college compared to students with lower high school GPAs” (Chemers, Hu, & Garcia, 2001).

Vuong, Brown-Welty, and Tracz (2010) conducted a study “to investigate the effects that self-efficacy had on academic performance improvement of first-generation college sophomore students.” The researcher’s definition of first-generation sophomore college students refers to those students who were first ever to attain college education in their families heritage. Students who had a history of generations of parents who had attended college showed better results in their performance as opposed to those who were first-generation college students.

Hence, the more the generations a student came after, the higher the chances that such a student would outperform a first-generation student who joined the same college (Vuong, Brown-Welty, &Tracz, 2010). Gadbois (2011) relates the findings that Vuong et al. (2010) developed “in regards to poor performance of first-time or first-generation sophomore college students to academic self-handicapping or ASH. Academic self-handicapping (ASH) is taken to mean the opposite of academic self-efficacy that causes disbelief in oneself rather than belief in oneself that is an attribute of self-efficacy. In essence, the lack of self-belief among first-generation college sophomores causes them to belittle their skills and capabilities in regards to academic achievement. Therefore, “poor performance is directly attributable to a lack of belief of achieving good results in academic performances” (Gadbois & Sturgeon, 2011).

Galyon, Blondin, Yaw, Nalls, and Williams (2012) conducted a study on 165 undergraduate students investigating the relationships among academic self-efficacy and students’ class participation, examination performance, and GPA. Galyon et al. (2012) found “a stronger relationship between academic self-efficacy and exam performance than with class participation.” However, academic self-efficacy levels were relatively the same among students with high, medium, and low GPAs (Galyon et al., 2012). Additionally, Robbins, Lauver, Le,

Davis, Langley, and Carlstrom (2004) did a meta-analysis on over 109 studies on psychosocial and study skill factors that affect GPA. Robbins et al. (2004) tested multiple academic factors including academic self-efficacy. They found academic self-efficacy to be the most influential factor on GPA” (Robbins, Lauver, Le, Davis, Langley, & Carlstrom, 2004).

Ramos-Sanchez and Nichols (2007) conducted “a study on 192 freshman students to examine differences in academic self-efficacy levels between first generation (i.e., students without a college graduate parent) and non-first generation college students (i.e., students who have a college graduate parent), and the possible impact on academic performance” (Ramos-Sanchez & Nichols, 2007). They found that “non-first generation college students had higher levels of academic self-efficacy and outperformed first generation college students academically.” This indicates that “some students may enter college better prepared and, as a result, have higher levels of self-efficacy, allowing them to perform better than their peers” (Ramos-Sanchez & Nichols, 2007).

Aguayo, Herman, Ojeda, and Flores (2011) “found similar results between 408 Mexican American immigrant (i.e., born in Mexico) and non-immigrant (i.e., born in the United States) students.” They found that “self-efficacy was strongly correlated with academic performance for non-immigrant students. However, there was no significant correlation between self-efficacy and academic performance for immigrant students” (Aguayo et al., 2011). Bouffard-Bouchard, Parent, and Larivée (1991) found that “high school students with high self-efficacy for problem solving demonstrated greater performance monitoring and persistence than did students with lower self-efficacy.” Students who harbor negative beliefs about themselves limit the potential for achievement”. “They feel they are unable to perform as well on a task or not good enough to perform above expectations hence mediocrity is maintained” (Rice & Dolgin, 2008).

Students are said to use strategies in school to portray themselves as unable to do school work. According to Rice and Dolgin (2008) these strategies include; procrastinating, deliberately not trying, allowing others to keep them from studying, and using other self-defeating strategies, students can thus convey that circumstances, rather than lack of ability, as the reasons for poor and mediocre performance. Long, Monoi, Harper, Otterbein, and Murphy (2007) conducted a study with a primarily poor, urban, African American, adolescent sample. The data revealed the following findings. “First, students expressed moderate levels of all three motivational variables

(i.e., self-efficacy, domain interest, and personal goal orientations) in both 8<sup>th</sup> and 9th grades, but grades were significantly lower in high school. Second, levels of efficacy and learning goals strongly predicted domain interest in both grades. Third, self-efficacy consistently contributed to achievement at either grade level. Fourth, although interest's contribution to achievement could have been masked by self-efficacy and goal orientation in middle school, interest emerged as a significant but negative contributor to achievement in high school. Fifth, the negative effect of work-avoidant goals on achievement became prominent in high school. Sixth, gender's effect on motivation and achievement varied between grades.

Li (2012) attests that research proves that attitude, self-efficacy, effort and academic achievement are positively correlated with one other. However, even though they are related to one another, it is found that attitude and self-efficacy can significantly predict effort. However, when attitude, self-efficacy and effort are considered as independent variables while academic achievement is considered as the dependent variable, it is discovered that effort cannot predict academic achievement. Therefore, effort can only be regarded as an indirect factor that can influence both attitude and self-efficacy, but not necessarily academic achievement. Stennis (2016) measured the self-efficacy of different ethnic groups at Southern Adventist University and findings concluded that there was no difference in self-efficacy and academic performance among ethnic groups. Additionally, the results showed that 'neither academic discipline nor age affects self-efficacy, higher GPA is associated with higher self-efficacy and that gender plays a role in self-efficacy.

### **2.3.1. Self-Efficacy and Grade Levels**

A recent longitudinal study conducted in the Netherlands by Reed, Kirshner, and Jolles (2015) focused on students from 6th grade and 9th grade. The study investigated 'the extent to which self-beliefs mediate the relation between math performance at the end of 6th grade and the end 9th grade in a highly differentiated early tracking educational system. While 6th grade students compare themselves to classmates of all ability levels, the highly differentiated tracking structure of Dutch secondary education means that 9th grade students, who are established in ability-homogeneous tracks, compare themselves to classmates in the same track as themselves. Findings suggested that self-efficacy in 6th grade and math self-concept in 9th grade both uniquely mediated the relation between math performance in 6th grade and in 9th grade, but self-



efficacy in 9th grade only added to the mediation effects in the lowest track. Math self-concept was the most influential mediator, explaining nearly a quarter of the total effect of math performance in 6th grade on math performance in 9th grade. Causality was not assumed and the findings suggested that higher math performance at the end of primary school may positively influence math self-concept, which, in turn, may be conducive to math performance in the lower secondary grades.

### **2.3.2. Self-Efficacy and Teacher/ Student Relationships**

Teacher-student relationships are important in transition years; the years when students transition from elementary to middle school or middle to high school (Midgley, Feldlaufer, & Eccles, 1989). Studies of math competence in students transitioning from elementary to middle school have found that “students who move from having positive relationships with teachers at the end of elementary school to less positive relationships with teachers in middle school significantly decreased in math skills” (Midgley et al., 1989).

For students who are considered at high risk for dropping out of high school, math achievement is significantly impacted by the perception of having a caring teacher” (Midgley et al., 1989). Furthermore, “students who went from low teacher closeness to high teacher closeness significantly increased in math skills over the transition year, from elementary to middle school” (Midgley et al., 1989). These studies show that “relationships with teachers in the later years of schooling can still significantly impact the academic achievement trajectories of students” (Midgley et al., 1989).

Mojavezi and Tami (2012) attest that “teacher self-efficacy also plays a crucial role on student motivation”. “A study investigated the relationship between teacher self-efficacy and students motivation and achievement.” The analyses revealed that “there is a reasonably positive correlation between teacher self-efficacy and students motivation.” Thus, it can be argued that teacher self-efficacy positively influence students motivation.

### **2.3.3. Sophomore Students**

The National Commission on Excellence in Education (2009) conducted a longitudinal study of a representative panel of 15,362 sophomore students. From 1972- 2009, student dropout choices increased with students developing more reasons for dropping out of school. Based on the

results, students who drop out of school experience push, pull, or falling out factors that affect student dropout decisions (Jordan, Lara, & McPartland, 1994).

The key differences between push, pull, and falling out factors have to do with agency. With push factors, the school is the agent whereby a student is removed from school as a result of a consequence. With pull factors, the student is the agent, such that attractions or distractions lure them out of school. Finally, with falling out factors, neither the student nor school is the agent. Instead, circumstances exist that neither the school nor the student can remediate, and as a result, the connection students have with school gradually diminishes. The causes for the increase reflected more areas of students' educational experience.

In addition, a special emphasis on new factors with No Child Left Behind that reflected higher expectations over students and of schools, such as could not keep up with schoolwork, Thought could not complete course requirements, and Thought would fail competency test. To this end, students reported that dropout resulted mainly because of school-related reasons. Secondly, additional factors included missed too many school days and was getting poor grades/failing school ranked highest among all dropout causes and is consistent with the ABCs (Attendance, Behavior, and Course Performance). The survey results exhibited low self-efficacy push factors that schools can address early in students high school careers.' In the United States, the drop out age limit is different from state to state. Out of 51 states, 30 states currently allow students to legally drop out of school at ages 16 or 17.

Therefore, addressing push, pull, or falling out factors with sophomore students who are not of age to make decisions about dropping out school would decrease the nations' dropout rate. High School sophomore students who are contemplating dropping out of school still have time to gain credits if failing classes are a push factor. Additionally, typical ages of sophomore students are fourteen to fifteen. Many students at this age are unable to acquire drivers' licenses or are unable to work before the age of sixteen. These factors are also considered to affect academic performance at school. In many schools, freshmen students typically have the support of a small learning community such as a freshmen academy where students are able to re-do low grades, have freshmen only classes, often have a separate building for classes, and are provided with more teacher support. As the students progress to sophomore status and are considered as upper classman, that extra support diminishes leaving many students fail in.

## **CHAPTER THREE**

### **3. RESEARCH METHODOLOGY**

The study used quasi experimental design which involves purposively selected students which were assigned to Experimental and Control groups. Secondly, first semester mid-test was taken as pretest, and then treatments were given to experimental group students for four weeks next post tests were given for both groups. Then, after the obtained score or data were calculated, the self-efficacy beliefs of students before and after the training and before and after post test of students' mathematics score. In order to achieve the stated objectives quantitative approaches of data collection were used since the aim of the quantitative approach was to assess the self-efficacy problem between Experimental and Control group students of grade 10-A and 10-B. Based on this, this section deals about the research methodology, in which to conduct the expected task.

#### **3.1 Research Design**

The study was quasi experimental design which involves experimental and control group of students with training given to experimental group. So, in order to examine the difference between self-efficacy belief on mathematics score, pre-test and post-test were given. In order to achieve this objective, quantitative approach of data collection were used. The aim of the quantitative approach was to assess the self-efficacy belief on mathematics score difference between experimental and control group. And also to assess the self-efficacy belief difference between experimental and control group.

The objective of the research was to assess about the influence of self-efficacy belief on the mathematics academic performance of students in case of Nafyad secondary school. The design was Quasi experimental, which used both qualitative and quantitative tools. So, as Kinde and Asfawoseen argue, quasi-experimental design was important because it was not possible to randomly assign students to either the treatment or the control group as the group (classroom) was already formed. Accordingly, the experiment was conducted before and after pretest was given next for four weeks training was performed only for experimental group then mathematics posttest was given for experimental and control group of students. So, the test was corrected on the basis of collected score or data of pretest and posttest of 10-A & 10-B student. These

approaches were used because the researcher considered as satisfactory to collect accurate data from the sample population of 10-A & 10-B student pretest posttest to investigate the topic under study.

### **3.2. Research Methods**

The main objective of the study was to assess about the influence of self-efficacy on the mathematics academic performance of students in case of Nafyad Secondary School. Based on the main objective of the study, the research used both quantitative and qualitative research methods.

Using quasi experiment design involved selecting groups upon which a variable was tested without any random pre selection processes to perform effect of self-efficacy belief on mathematics academic performance. Quasi experimental research design was the most widely used research approach and it was employed because it evaluates the outcomes of social work program and policies. Besides, the quasi experimental design was chosen because it was not possible to randomly assign students to either the intervention or the comparison group. So, this research paper used quantitative research approach based on the data obtained from experimental and control group.

In such a way, the pre-test and post-test data were collected from grade 10-A & 10-B Nafyad School student at Adama town. The collected data were analyzed from the pretest and posttest of the intervention and from the comparison group of students. All information from per test and posttest mathematic score was entered in to computer using statistical package for social science (SPSS) version 19 computer programs to generate descriptive statistics.

However, by using qualitative method, the researcher used semi-structured interview or FGD. Then, the researcher explained the phenomena with confirmable theories derived for students mathematics score. Like many other research, this research studied the influence of self-efficacy belief on mathematics academic performance. In order to respond the basic research questions, both quantitative and qualitative methods. As a result, the qualitative data were analyzed quantitatively by using descriptive statistics frequencies, interpretation and summarization of conducted data while the qualitative data was analyzed qualitatively statements and narratives.

As the basic aim of this research was to bring significant change on mathematics academic performance by using quasi experiment, the researcher selected two purposively selected groups from grade 10 students. Accordingly, the researcher selected grade 10-A as intervention group while grade 10-B was selected as comparison group and the intervention was given to grade 10-A students. This changed students' self-efficacy belief because of continuous intervention or training was given for four weeks from January 12, 2020 up to January 29, 2020. by mathematics teacher.

### 3.3 Population/ Participant of the study

The study was conducted in Nafiyad no.1 high school at Adama town Oromia Ethiopia. The total population of students in Nafiyad no.1 high school was 650. The target population included the experimental and control group of students from this school. Saunders (2007) defines research population are a full set of cases from which a sample is taken or a group of people who are subject to a particular research. To this end, the total population from the selected grade was made up of purposively selected experimental group 10-A & 10-B students at Nafiyad No. 1 High School in Adama town.

### 3.4 Sample size and sampling Techniques

Thus, from this total population of 650 students, a sample size of 110 students was selected purposively as the study consisted of two sections of students. The selection of the respondent was based on their grade level to collect data about the issues and to ensure that the samples were purposively selected for the experimental and comparison group and to draw the conclusion about the parameter (total population).

**Table 3.1: Control and experimental group of students at Nafiyad No.1 H.S**

R.N	Grade	Group	Sex	Age			Total
				15	16	17	
1.	10 A	Experimental	M	3	14	8	25
			F	8	17	5	30
			<b>Total</b>	<b>11</b>	<b>31</b>	<b>13</b>	<b>55</b>
2.	10 B	Control	M	5	14	7	26
			F	5	23	1	29
			<b>Total</b>	<b>10</b>	<b>37</b>	<b>8</b>	<b>55</b>
	Grand	<b>Total</b>		<b>21</b>	<b>68</b>	<b>21</b>	<b>110</b>

In this way, the intervention group consisted students from 10-A, whereas the comparison group consisted students of 10-B who were selected purposively. Other participants of the research were the school Administration and mathematics teacher of section A & B in addition to the total population of 650 students of Nafyad No. 1 Secondary School.

### **3.5. Data collection instrument**

During conducting of the research, the researcher used pretest and post test and FGD as primary data sources. The first semester mid test was taken as pretest which was given on January 12, 2020 while post-test was given on January 29, 2020 and the minimum score for the pretest was taken to be out of 20%.

. Before the post test, self-efficacy belief training was given to the intervention class only and the intervention training was given by mathematics teacher every day before introduction and reviewing the lesson by encouraging and orienting students which were in grade 10-A.

The intervention time took for four weeks January 12, 2020 up to January 29, 2020. Using the intervention training core points they were - mathematics is simple, saying I can do mathematics, mathematics is as simple as other subjects tell for your mind that I can do mathematics and to think that a can do mathematics were thought by mathematics teacher to enhance students self-efficacy belief as planned.

### **3.6 Data collection procedure**

The procedures undertaken for the purpose of data collection were as follows. First, by presenting the letter of cooperation from Jimma University, permission was secured to conduct the study in the selected Nafyad School. Second, the sampled participants were briefed how to do the tests and what were expected of them during the study. Third, the prepared pretest and posttest tests were distribute to students by mathematics teacher, school administrator and the researcher to selected groups (experimental and control group). Then, the researcher collected the answer sheet and the exam paper for correction. Finally, the sampled students for focus group discussions were taken to the room selected for this purpose for discussion and their data were recorded or collected using the note book prepared for this purpose.

### **3.7. Validity and reliability Check**

Caring for the validity and reliability at data collection instruments before providing to the actual study is the core for assurance at the quality of the data (Yalew, 1998). To ensure the validity of instruments, the instruments were developed under close guidance of the mathematics department of the school. In addition, experimental group, pretest, intervention training and posttest were checked by school principals and mathematics teachers as well. Based on the procedures undertaken, it was possible to realize that corrected tests and the data were found to be accurate.

### **3.8. Data Analysis**

For the purpose of data analysis, the collected data were checked for accuracy and clarity. Then, the collected data were analyzed quantitatively based on the Mean, SD and T-test on independent sample t-test value were obtained from the pretest, posttest of the intervention and comparison group students' mathematics achievement score. That is, the analysis was carried out using descriptive statistics, such as, frequencies, percentage, mean, SD, interpretation and summarization of data were conducted and different tables and charts were used for presentation. All information from pre-test & post-test mathematic score was operated using computer software for Statistical Package for Social Science (SPSS) Version 19 to generate descriptive statistics. Finally, the finding was described with qualitative approach. And the researcher explained the phenomena with confirmable theories derived from student's influence of self-efficacy belief on mathematics score.

## **CHAPTER FOUR**

### **4.1 DATA ANALYSIS AND INTERPRETATION**

Under this chapter the researcher used different steps before Analysis and interpretation of the obtained data consequently the first step was discussion with the school Administration and mathematics teachers about the Academic achievement on mathematics score at Nafyad No 1 high school grade 10 students. The discussant teachers said that the achievement of students was lower in mathematics than other subjects in Nafyad No.1 High School, in Adama.

The second step was how to decide the experimental group and control group and discussion was performed with the school Administration. After discussion was concluded the experimental group and control group were formed. They were purposely selected students from grade 10-A and 10-B section. The third step was giving pretest for both experimental group and control group and list the score. The pretest was given on January 12, 2020 out of 20% and the post test was given on January 29, 2020 out of 20%.

#### **4.1. Quantitative and Qualitative Data Analysis**

Group statistics and independent samples t- test were used to check differences on experimental and control group mathematics achievement scores of pretest and post test scores before and after the interventions. However, qualitative data analysis was conducted by transcribing and coding key data elements. Then, the codes were merged to thematic parts for findings presentation.

##### **4.1.1. Differences on academic achievement in mathematics score between the experimental and control groups before the intervention**

The mean scores on academic performance of mathematics scores of grade 10-A and 10-B of the experimental and control groups were computed before the intervention to check their equivalence as given in Table 4.2 below.



**Table 4.1. Pre-test Scores of students**

<b>Groups</b>	<b>X</b>	<b>SD</b>	<b>DF</b>	<b>T</b>	<b>P</b>
Experimental group	8.9636	2.82348	108	0.03	0.002
Control group	8.9455	2.4677	92.336		

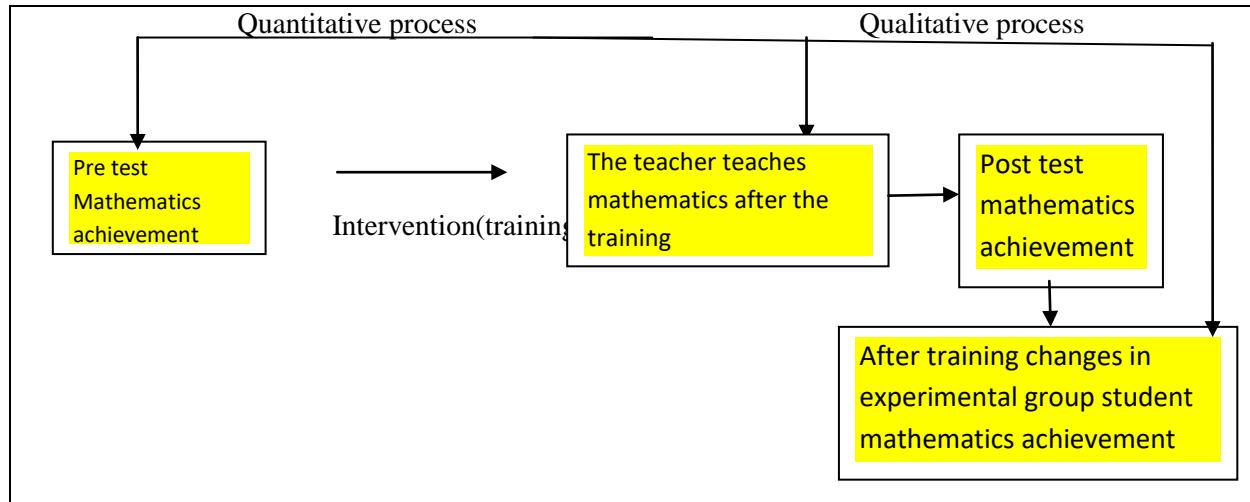
As can be seen in Table 4.1 above, the mean score on self-efficacy belief in mathematics for the experimental and control group was 8.96 with SD of 2.83 and 8.95 with SD of 2.46 respectively. To check the observed differences on mean score of self-efficacy belief in mathematics between the experimental and control group were statistically significant the independent t- test was applied. The independent sample T-test showed that there was a statistically significant mean differences in the two groups on mean scores of self-efficacy belief in mathematics with SD experimental group=108 and control group= 92.34] T=0.030,P=0.002.

#### **4.2. Intervention**

As it was planned quasi-experimental design was applied for experimental research action. Step first-first semester mid test was taken as pretest for experimental action followed by qualitative design. Step second training was given to the experimental group followed by mathematics posttest. Quasi- experimental design was chosen because it was not possible to randomly assign students to either the experimental or the control group as the group 10- A and 10- B was already formed.”

According to researchers in the area of self-efficacy suggest that quantitative study should be complemented by qualitative inquiry to get additional information” accordingly I conducted FGDs with some teachers of mathematics department at the conclusion of the intervention to document their experience in teaching grade 10 mathematics and their achievement before the intervention, change in self-efficacy, academic achievements, positive and negative aspect of the intervention training the research was conducted in four weeks periods in first semester of 2012 E.C academic year in 110 (51 males, 59 females) 10<sup>th</sup> grade students of Nafyad No 1 high school at Adama town Oromia Ethiopia.

**Table 4.2.: Data on the Quantitative and Qualitative process**



### 4.3 Implementation

Mojavezi (2012) attests that teachers self-efficacy also plays a crucial role on students motivation” accordingly I used mathematics teacher to give the training to enhance self-efficacy belief after pretest for the intervention grade 10-A for four weeks. The elements of the intervention training for the experimental group were designed to change the student’s self-efficacy belief and mental thinking.

Therefore, continues training was given for the experimental group to raise their self-efficacy belief where we need to focus to bring change. The main elements were: 1. Mathematics is simple, 2. Mathematics in as simple as other subjects, 3. Tell to yourself I do mathematics and think, 4. Think that I can do mathematics and tell to your mind based on these four main elements the teacher gave the training by explaining the elements every day for four weeks. After four weeks training the teacher gave them posttest mathematics test for experimental and control group.

Grade 10 mathematics achievement score was operational zed as a numerical grade. Students received the first semester mid exam as pretest and posttest was given on January 29/04/12.

Intervention training was adapted as mentioned above and used for the study from the experimental research view researchers like Bandera mentioned about “thought to enhance students belief”. I also stud on thought to enhance student’s belief and mathematics score.

FGDs with mathematics teacher were performed to share experiences in teaching mathematics before and after the intervention training. After the training possible changes in self-efficacy belief and academic achievements score were improved as result of the intervention training. There were positive and negative aspects of the intervention training were observed.

The researcher implemented the training for the experimental group with daily lesson plan of mathematics teacher with collaboration. The training elements and the training plan were described in Table 4.3.

**Table 4.3: Substance of the intervention treatment for experimental group for Four weeks**

<b>Plan</b>	<b>Time of implementation</b>
Starting the training before the lesson by brain storming	Every day before the lesson
Mathematics is simple	Every day before the lesson
Mathematics is simple as other subjects	Every day before the lesson
Tell to yourself I do mathematics and think	Every day before the lesson
Say that can do mathematics and tell to your mind	Every day before the lesson

**4.4. Differences on academic achievements in mathematics 10-A and 10-B between the experimental and control groups after the intervention.**

## Post Test

**Table 4.4: Mean scores on academic performances for the experimental and control groups after the intervention**

Groups	X	SD	DF	T	P
Experimental group	14.8304	2.28330	108	4.133	.001
control group	12.5273	3.45797	99.566		

The mean scores on self-efficacy belief in mathematics for experimental and control groups were 14.83 with SD of 2.28 and 12.52 with SD of 3.46 respectively. The independent sample t-test implied that there was a statistically significant mean differences between the experimental and the control group [ $t [-,-] = 4.133, P=0.001$ ]. Therefore we reject  $H_0$  that students those received the treatment in experimental group did not exhibit a statistically significant mean difference on measure of self-efficacy belief in mathematics compared to students in control group.

### 4.4 Procedures

First among grade 10 mathematics teachers who were teaching 2012 E.C at Nafyad No 1 high school Adama one teacher was selected. The criteria for the selection were teaching at least two sections as they serve as the intervention and control groups. Students of 10- A were assigned in experimental group while students of 10-B were assigned in the control group purposively selected.

Then orientation to the selected teacher was given for about one and half hour by the researcher on how to give the intervention training elements- Then the intervention was focused on how to give the training before the daily lesson plan at teaching learning process.

At the beginning of the experiment students were not given any briefing. Then, the first mid semester test was taken as pretest and compared to see whether the experimental and control group were equivalents on their mathematics achievement with this the researcher checked the equivalence of the two groups on grade 10 mathematics achievement scores at the onset.

There were 55 students in the experimental group and 55 students in the control group. Next students in the experimental group were given intervention training for four weeks daily for 15 minutes by grade 10 mathematics teachers while students in the control group were thought with the usual teaching learning plan.

Then posttest was given to both experimental and control groups on grade 10 mathematics test. Finally the experimental group mathematics achievement scores were compared to the control group. More over FGD with mathematics teachers at grade 10 was conducted to secure additional information on changes between self-efficacy belief and mathematics achievement score due to the intervention training differences between pretest and post test academic achievement score.

#### 4.5 Refreshment of the Classroom Teacher

The grade 10 Nafyad No. 1 high school teacher mentioned several improvements among students as a result of the intervention. The teacher mentioned different things which were categorized under the three themes thinking, feeling and wanting.

**Table 4.5: Refreshment of the grade 10 mathematics teacher**

Topic	Contents
Thinking	Working hard consciously To tell to one self I can do mathematics Attending the class actively increasing effort
Feeling	Using all senses Believe one self Prioritize your mind use Developing the sense at I can do Mathematics is as simple as other subjects Feel high emotion at doing mathematics and achieve
Wanting	High mathematics achievement score under stood the subject matter solving the given test

The teacher pointed out some weaknesses of the intervention training, such as, not to attend the class, and also the teacher said that the intervention training time was not enough to the intervention group.

#### **4.6 Focus Group Discussion**

Focus group discussion (FGD) was carried out with mathematics teacher of grade 10-A and 10-B the FGD discussants were presented different experiences in mathematics score between experimental and control group.

The teachers were asked about whether the student's self-efficacy belief in mathematics has increased decreased or remained unchanged as a result of the intervention training all mathematics teachers of the Nafyad No 1 high school said that 1. Due to the training student's confidence in mathematics had improved. 2. The teachers added that the training raised the self-efficacy belief and was very important to enhance thinking ability of the students mind function in the experimental group.3.The teacher witnessed that the evidence was shown on mathematics pretest and posttest score of grade 10 students.

In addition the researcher also asked the experimental group students whether their self-efficacy in mathematics has increased decreased or remained unchanged as a result of the training.1. Almost all of the discussants said that due to the training their confidence on self-efficacy belief in mathematics had improved. 2. In general they said that the training was important in teaching learning activity to elevate self-efficacy belief of students in mathematics.

Plus the discussants were also asked about whether their academic achievements have increased decreased or remained unchanged as a result of the intervention. 3. Most of the discussants said that the intervention was important in influencing their academic achievement.

Then the discussants were also asked about the positive aspects of the intervention. 4. The discussants said that the intervention was important to help the students to be aware of their self-efficacy belief and one's potential rational capacities in mathematics academic achievement at grade 10.

The discussants were also asked about the negative aspects of the intervention and things that need improvement in the future the discussants said that 5.It would have been better to give more time for the intervention.

Finally the discussants were invited to forward suggestions and comments about the intervention. The discussants said that 6.The intervention should be continued as it is important to learn mathematics in grade 10 and it should be extended to other departments in order to achieve educational goals.

#### **4.7 Discussions**

This research I attempted to change the student's self-efficacy belief and academic achievements in 10 grade mathematics through experimental research in experimental and control group strategy. To this end student received treatment showed a significant improvement in their mathematics academic achievements in grade 10 Nafyad Adama No. 1 High School.

The most likely explanation for the improvement in students' academic achievement in the experimental group was the result at which they performed the training as it was indicated on the plan that change students self-efficacy belief thinking towards mathematics achievement which was based on the training given every day before the lesson for four weeks to raise students thinking and emotion and this brought about the sense of I can do mathematics by working hard consciously.

According to Mojavezi and Tami (2012), teacher's self-efficacy also plays a crucial role on students' motivation'' this realizes that the training given for experimental group brought significant differences between the experimental and control groups in mathematics achievements. The reasons for findings success were the training substances given by mathematics teacher was evidence secondly the value difference between experimental and control group students was rationalized on their academic achievements.

The training was done with the tenet of self-efficacy thought elements have shown the potential at the intervention training plan to influence students self-efficacy belief.

## CHAPTER FIVE

### 5. CONCLUSIONS, FINDING, AND RECOMMENDATIONS

#### 5.1. Conclusion

This chapter deals with the summary, conclusion and recommendation of the study in general. Therefore general conclusions were drawn from the findings arrived in the analysis, presentation and discussion part, and recommendations were given to the concerned Administrators and school directors at Nafyad No 1 high school to enhance mathematics score in the school

The objective of the study was to find out how the experimental research based training influences self-efficacy belief and academic achievement in grade 10 mathematics. The experimental research based strategy for the intervention group was effective in influencing student's academic achievement in grade 10 mathematics.

This finding could have a practical significance for classroom instruction if mathematics teachers use the intervention training regularly before the lesson change's the mental program of students and encourage them to think that they can do and work harder on the daily basis then students' academic performance will be enhanced.

#### Findings

Analysis and the interpretation of the data summarized under chapter four came up to the following findings as an answer for the research questions.

- Regarding the major problems of students, that of performing very good mathematics academic performance, the study shows that the student's self-efficacy beliefs to do mathematics were so lower and their mathematics score was also low.
- The trend of students was that mathematics was hard to study and very hard to score it, the miss understanding at selecting modeling and pessimistic student's relationships.
- Regarding potential solution to overcome lower performance in mathematics academic performance at Nafyad No. 1 Secondary School, Adama, and the quasi experimental design was performed.



- The intervention training that was given to the experimental group brought significant change by enhancing students' self-efficacy belief and score high achievement in mathematics.
- These show that giving training made the students achievement to score high as the experimental research revealed, that was showed by the statistical package for social science [SPSS].

According the new science that proves, 'Our mind is the most power full instrument in learning' (Dr. Christine Northrop unlock quantum powers San Raphael, California 94901-3581 U.S).

Regarding potential solution to minimize the effect, according to the study many researchers revealed that 'High self-belief self-steam motivation and modeling minimize the effect'. In addition in this, researches the researcher revealed that giving training on self-efficacy belief to students develop their thinking and raise emotion to improve students' self-efficacy belief. To proof the research finding, the evidence was explained in Table 4.2 and 4.4. Also it was described in analysis at the self-efficacy mathematics score at quasi experimental post test score.

### **5.3 Recommendations**

The findings and conclusions drawn from the study lead to the following recommendations to curb the self-efficacy belief difference between experimental and control groups of students mathematics score before and after the training of 10-A and 10 B students of at Nafyad No.1 Secondary School in Adama town. The student's pretest and posttest score were mentioned and described. The evidence of the data or score was taken from pretest 20% score of 110 students and posttest score 20 %of 110 students.

The experimental research designed for promoting students self-efficacy belief and academic achievements in grade 10 mathematics academic achievement of the experimental group and control group on purposely selected class rooms.

- Thus, for the applicability and generalization of the results, training should be given to students of grade 10 Nafyad No. 1 High School at Adama town for the 55 experimental group of students from grade 10-A and for the 55 students of grade 10-B taken as control group.

As it was observed from pretest results of the Statistical Package for Social Science (SPSS) the mean score on self-efficacy belief in mathematics score for experimental and control group were statistically significant.2.

- Thus, to promote and to elevate the self-efficacy belief, it is suggested that training should be given like that of the training given by mathematics teacher .3.
- The evidence came after posttest was tested as it was indicated by statistical package for social science [SPSS] in table 4.4 shows that the independent sample t- test implied that there was a statistically mean difference.

Since the observed statistically significant mean differences on academic achievements was between the experimental and control groups. The findings could have practical significant improvement in mathematics score.

- Therefore, it is strongly recommend that trainings and workshops should be organized and applied at Nafyad No. 1 High School for teachers.
- Secondly, it is also strongly recommend training students before the lesson as such to implement it.
- Over all, it is recommended that the training brings changes on mathematics achievement by enhancing self-efficacy belief of students.
- In addition, it seems recommendable that the finding helps to assure educational quality therefore the output was essential for educational sectors.

In order to curb problems of such types, it is recommended that;

- Future research works should be conducted to investigate whether students self-efficacy belief on thought, emotion and achievements in mathematics respond better to one sources of self-efficacy interventions belief and academic achievements in mathematics more over a research work is needed with follow up component to ascertain whether the improvement shown in Nafyad No. 1 High School concerning academic achievement whether this study was sustained or not.

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## Appendix A

### Results of the SPSS data out put

#### Data of experimental and control group students

#### I. Pretest value of mathematics achievement of experimental and control group students of 10-A and 10- B.

A=7, 7, 20, 8.5, 6, 5, 3, 8, 4, 6, 3, 10, 7, 10, 11, 9, 15, 4, 5, 1, 4, 5, 7, 8, 12.5, 7, 8, 7, 12, 11, 9, 13, 10, 10, 10, 9, 2, 5, 10, 9, 11, 15, 9, 12, 10, 6, 15, 12, 9, 10, 12, 15, 14, 15, 10.

B=8,4,5,15,8,10,6,8.5,5,6,9,8,9,8,7,6,10,7,12,9,8,17.5,10,10,6,6,14.5,8,8,10,9,9,10,9,10,10,10,10,10.5,10,10,9,9,9,9,8,5,8,11,9,10,8,9,14.

#### II. Posttest mathematics score of experimental and control group of students

10=A-

14,15,20,18,17,16,13,16,16,13,14,16,15,13,16,14,14,15,12,13,14,13,19,16,13,20,14,15,9,14,16,15,14,15,15,13,10,11,16,15,15,14,14,18,17,13,16,14,16,10,18,18,17,16,13.

10=B-

8,12,10,18,13,10,8,15,12,8,11,15,6,17,8,15,8,19,9,18,13,13,19,15,15,15,9,17,7,17,17,11,15,8,9,13,15,13,9,14,17,13,17,8,13,13,13,13,17,12,14,11,10,6,18,12.