ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES

DEPARTMENT OF SCIENCE AND MATHEMATICS EDUCATION

EFFECT OF CONDITIONING EXERCISE ON SKILL RELATED PHYSICAL FITNESS COMPONENTS AT AMURU HIGH SCHOOL OF OROMIA REGION

BY

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ADDIS ABABA, ETHIOPIA

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This is to certify that the thesis prepared by KassahunGetaentitled; ***Effect of Conditioning Exercise on Skill Related Physical Fitness Components at AmuruWoreda High Schools of Oromia Region*** in partial fulfillment of the Degree of Master of Education in Teaching Physical Education complies with the regulations of the University and meets the accepted standards with respect to originality and

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ABSTRACT

Effect of Conditioning Exercise on Skill Related Physical Fitness Components at AmuruHigh School of Oromia Region

KassahunGeta

Addis Ababa University, 2017

This study attempted to investigate the effect of conditioning exercise on skill related physical fitness components through instructional intervention at Amuru high school.

Purposive sampling method to select for four section of grade 9thAmuru secondary school technique because in quasi experimental method

Simple random sampling method to select the subjects with experimental group and control group by lottery was used to select 76 female and 74 male grade 9th students aged 15 to 17 years fromAmuru high school. Exercise programs of conditioning exercises were performed in a form of training for the experimental group under this study for eight weeks. The activity was given from April 25 to June 25/ 2015, with the frequency of 3 days per week for 2 months and the duration was 40 minutes per session. The skill related physical fitness variables selected for the study were: speed, coordination, agility, balance, power and reaction time. Data were analyzed by using paired samples t- test with pair wise comparison of means at 95% confidence interval for both pre and posttests, and across comparison and experimental groups. The results indicated that there were significant improvements on skill related physical fitness variables due to the effects of conditioning exercise training with active rest ($p \leq 0.05$). This study confirmed that conditioning exercise training with active rest was significant to improve the speed, coordination, agility, balance, power and reaction time variables. The study showed that students who were exposed to conditioning exercise training have revealed positive outcomes towards the speed, coordination, agility, balance, power and reaction time.

Key words: conditioning exercise, fitness, intensity, physical activity, physical fitness

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List of Acronyms

AAHPER	- American Alliance of Health and Physical Education Related
ACSM	- American College of Sports Medicine
PE	– Physical Education

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Education is the process by which person acquires knowledge, skills and habits or behaviors that help him/ her become useful member of a society. It also helps people develop an appreciation of their cultural heritages and try more satisfying their lives(Richards, 1995:1).Physical education is mainly given through physical activities to develop and maintain all aspects of personality whichinclude physical, mental and social wellbeing (Sahile&Gezegn, 2012).Carbine et al., (2002) also suggested that the relationship between a healthy life and regular exercise is undeniable. Exercisers have an all-cause mortality rate that is less than one-third of that of non-exercisers. Moreover, some forms of regular physical activity, even if it is very mild form of activity, of low and moderate amounts of physical activity, can also have beneficial health results. Many research works including Wuest, (1999); Orban and Ashton, (1984); Hadfield, (2000); Dick, (1997); Diamond, (2001) and Carbin, et al.., (2002), have shown that numerous health benefits have been ascribed to physical exercise. These include that regular physical activity can lower the risk of disability and death from heart disease, helps to strengthen the cardio-vascular system, maintain normal blood pressure, and decrease blood cholesterol, increase toleration of stress and maintain weight, It increases the energy level of the individual for work and play, leads to improved sleep, and strengthens the body, better enabling it's to cope up with illness oraccidents, increases the ability to withstand fatigue, improves concentration and alertness, improves posture and enhances body appearance, improves individual's mental health, reduces anxiety, helps to alleviate depression, increases feeling of accomplishment of work, increases productivity and decreases health cost, etc.

The study of physical activity, physical fitness and academic achievement research were reviewed from historical perspective by providing an over view of existing publications focused on children and adolescents. Such review is growing exponentially resulting in the

emergence of new terminology, methodologies and identification and moderating factors. The concept of physical fitness is as old as humankind. Throughout the history of mankind

Physicalfitness has been considered an essential element of everyday life. The ancient people were mainly dependent upon their individual strength, vigor and vitality for physical survival. This involved mastery of some basic skills like strength, speed, power, coordination, reaction time, agility for running, jumping, climbing and other skills employed in hunting for their livings. Over the past four decades, there has been an increase in the prevalence of overweight and physical fitness deterioration in adult across all genders, ages and racial/ethnic groups (Ichinohe e*t al.*2004).

Physical fitness is the state of health and wellbeing and more specifically, the ability to perform aspects of sports, occupations and daily activity (president counseling of physical fitness and sports, 2012)

Physical fitness has relationship with enhanced performance in sports and motor skills (Matte, 2015). The negative effects of degraded physical fitness on both the individual and society are serious and multi-dimensional. It can cause many risk factors to health including coronary heart disease, certain forms of cancer, diabetes, hypertension, stroke, gall bladder diseases, osteoarthritis, respiratory problems, and gout and is associated with increased all-cause mortality (Cataldo, 1999:145).

In adults, relationship among physical activity, health related fitness, and health are fairly well established.Physicalfitness is the ability to perform daily activities willinglyac tively and includes not only components of sports but those of health as well. Every person has a different level of physical fitness which may change with time, place of work situation and there is also an interaction between the daily activities, and the fitness of an individual where to put the level of optimum fitnessandphysiologically physical fitness to have ability at the body to adopt and recover from strenuous exercise. It is well established that healthier students learn better as educators, as a scientist alike have come to recognize the vital role physical, cognitive and brain health in education (Basch, 2011).

National physical activity guidelines suggest that minimal threshold of 60 min of moderate to rigorous activities can serve both to prevent and treatment of risk for disease (USDHHS, 2008), which in turn can facilitate academic success. The physical benefits of participating in regular physical activities improve or maintain physical fitness widely established. It has been clearly indicated that physically decreased risk of developing cardiovascular disease, stroke, some cancer and it also effect in the treatment of these disease. And also growing interest in the benefits of physical activity for mental, social, emotional and spiritual health and strong evidence base that regular activity, improved fitness health, increasing psychological wellbeing (Biddle, Fox, Boucher, 2008:48).

Two components of physical fitness have been declared that include health related and skill related physical fitness components. Health related physical fitness component is concerned with the health and wellbeing. Health related physical fitness component involves, cardiovascular endurance, flexibility, muscular strength and endurance and body composition. On the other hand the skill related physical fitness components refer to ability to learn sports and other kinds of physical activities. This ability includes agilities, balance coordination, power, speed and reaction time (Moe, 2010).

Conditioning exercise on skill related physical fitness component should be a primary objective in all school education programs and in health promotion programs (McGraw-Hill companies, 2003). Conditioning exercises are body movements that increase athletic or student's performance skill related fitness components. Types of conditioning exercises may vary greatly depending on fitness goals and are adaptable to any level of fitness, from beginners to advanced athletes(Paul 2017 , p 207-216).The basic conditioning exercise isthat the body must be challenged in such a way that it adapts to the stress of exercise.

To improve athletic performance, athletes use targeted, specific movements that mimic the moves used on the field or court (ACSM 2005-2012). One of the goals ofconditioning exercises is increasing the amount of stress the body can endure before experiencing injury the body to become more tolerant of sustained effort (Dhār, 2009).Conditioning training and deconditioning training are also known as training and detraining, that are responsible for

gains and losses, respectively, in fitness levels. Conditioning exercise is a gradual process and should take six to eight weeks to see specific effects (Cochrane, 2016)

Effect of conditioning exercise on skill related fitness components is a term given to grouping of aspects related to conditioning and attributes variables that students can perform on sports (Riches, 2017).Skill related physical fitness is essential and important for success of sports and also it helps ensure that the students or players have good endurance to enhance their technical skills related physical fitness components (George, 2004 andRiches, 2017). Skill related fitness areas focuses on the performance of technical and tactical activities involved in sports specific movements (Richs 2015).

Based on the stated background the underlying effect that conditioning exercise can lay on Skill Related Physical Fitness Components of students is important, and hence this study tries to investigate the effect of conditioning exercise on Skill Related Physical Fitness Components of students at Amaru secondary school.

1.2 Statement of the Problem

The purposes of this study weretoinvestigate the effect of conditioning exercise on skill related fitness components at Amuru High school inOromia. Education is the process by which a person acquires knowledge, skills and habits or behaviors that help the students to become useful member of society (Richards, 2009). Coaches and athletes, or teachers and students are highly dependent on one another, and this relationship is a crucial component of sport and development of skills.

As all-round fitness is a key to quality of life, to be able to carry out daily tasks without undue fatigue or to enjoy leisure-time pursuits requires a certain degree of conditioning exercise on skill related physical fitness components so that a person looks better, feels better and thinks better and so lives better (Blair 2007). Skill related physical fitness is a group of basic abilities that helps students to perform well in sports and motor skill requiring certain physical skills. The development of such skill related fitness component is dependent on how they are treated and how the relationship between coaches and athletes, or teachers and students is fundamental. However, many of our students at Amuru high school at

Oromia region either are not physically fit or do not attempt to develop it. Given such a problem it got out to be of interest to look for an instructional intervention and seek how such conditioning – intervention impacts the physical fitness components is of a paramount importance.

For this reasons that the researcher got initiated to investigate the effect of conditioning exercise on skill related physical fitness component.

1.3. Research Questions

Based on the causes stated above the research attempted to answer the following research question;

1. Is there a significant difference between the mean scores of experimental group of between pre and post-test?
2. Is there a significant difference between the mean scores of comparison and experimental groups?
3. What is the moderate intensity of conditioning exercise in terms of time and energy expenditure that maximizes the skill related physical fitness?
4. What is the effect of conditioning exercise on skill related fitness?

1.4 Objectives of the Study

1.4.1 General Objective

The main objective of the study is to investigate the effect of conditioning exercise on skill related physical fitness components in case of Amuru secondary school. This general objective is specified as follows.

1.4.2 Specific Objectives

The specific objectives of this study are:

1. Examine if there is a significant difference between the mean scores of pre and post of experimental groups on skill related physical fitness components

2. Identify whether there is significant difference between the mean scores of comparison and experimental group onskill related physical fitness

3. Investigate the moderate rate of energy expenditure in Cal/min to maximize the skill related physical fitness

4. Show the effects of conditioning exercise on skill related physical fitness

1.5 Significance of the Study

Achieving the objectives of the study and through the provision of answers to the research questions, this studyis expected to have several significances some of which include:

- raises essential information of the effect of conditioning exercise on skill related physical fitness components during physical education class.
- helps seek alternative approaches on instructional intervention to draw better conditioning for a better physical fitness.
- givesan insight for Amuru secondary school students to participate in physical exercises during physical education session.
- giveshint to the teachers and other stakeholders to have better knowledge and understanding on the effects of conditioning exercise on skill related physical fitness components.
- can be used as a source for other researchers to conduct further and detailed study on similar topics.

1.6 Delimitation of the Study

As the study cannot address all conditioning exercises and all schools in the surrounding, it is delimited in scope. Accordingly, thestudy was delimited to onlyAmuru secondary school, and to limited variables of conditioning exercise. It is also delimited methodologically into quasi experimental design to help identify significance differences.

1.7 Limitation of the study

As any study cannot be free of limitations this study also had limitations that influenced the conclusions. Since all students study in same school it was not easy to control intervention from other confounding variables, and hence may influence the conclusion. Limited experience of the researcher himself has contributed as limitation to the depth of the study, ,e.g. lack of use of covariance. Measurement error could also affect the conclusion and hence limited the study. Gap in fulfilling, recent literature and some published relevant materials and documents were also found to be a limitation in this study.

1.8Definitionof Terms

- **Physical activity**: the movement of the body that uses energy
- **Physical fitness**: the capacity to perform physical activity
- **Fitness:** is a condition in which an individual has sufficient energy to avoid fatigue and enjoy life.
- **Intensity**: is the amount of effort that must be invested in a specific exercise work out.
- **Skill**: is ability to react and get effectivelyreadily to unexpected mobility with coordinated complex activity, and to perform accurately.
- **Conditioning exercise**: suiting oneself on increasing the energy and endurance for particular task, getting fit to a certain condition of activity.

CHAPTER TWO

REVIEW RELATED OF LITERATURE

2.1 Exercise

Exercise is physical activity that is planned, structured and repetitive for the purpose of conditioning any part of the body .Exercise is used to improved health and maintain physical fitness component and is important as means of physical rehabilitation. Exercise is useful preventing coronary heart disease, obesity depression and improving motor skill or physical fitness components. Range of motion exercise is one of aspect of exercise important for increasing or maintains joint function strengthening. Exercise provides appropriate resistance to the muscle to increase endurance and strengthening. A well balanced exercise program can improve general health, builds, and endurance and physical fitness components (USDHHS, ACSM, 1996; 2000).

Physical Activity is defined as bodily movement produced by the contraction of striated muscle that substantially increases energy expenditure. This definition includes exercise, which is planned, structured, and repetitive physical activity aimed at improving maintaining physical fitness, organized sports or striated muscle that substantially increases energy expenditure(USDHHS, ACSM 1996; 2000).This definition includes exercise, which is planned, structured, and repetitive physical activity aimed at improving maintaining physical fitness, organized sports or games (football, basketball), transport (walking, cycling), occupational physical activity(manual labor, household chores) and non-organized, recreational physical activities(Okely, Patterson &Bother, 1998).

Exercise can be divided into aerobic exercise and anaerobic exercise. Aerobic exercise, which uses oxygen to keep large muscle groups moving continuously at intensity that, can be maintained for at least 20 minutes. Aerobic exercise uses several major muscle groups throughout the body, resulting in greater demands on the cardiovascular and respiratory systems to supply oxygen to the working muscles. Aerobic exercise includes walking, systems to supply oxygen to the working muscles. Aerobic exercise includes walking,

jogging, and swimming, and is the form recommended for reducing the risk of heart disease and increasing endurance. Unlike anaerobic exercise, anaerobic exercise involves heavy work by a limited number of muscles, for example during weight lifting. These types of activities are maintained only for short intervals, and the supply of oxygen is insufficient for aerobic metabolism, resulting in a substantial oxygen debt and anaerobic metabolism within those muscles. Another example is sprinting, in which the exercise is high in intensity but short in duration, resulting in substantial oxygen debt. Weight lifting and other types of anaerobic exercise increase strength and muscle mass, but are of limited benefit to cardiovascular health (Microsoft Encarta Encyclopedia Deluxe, 2003).

2.2 Conditioning Exercise

Conditioning exercise focuses on increasing athletes', skill related physical fitness component and coordination for a particular task. Essentially, the goal is to make easier to do something, and for a longer period of time. Although the primary adaptation to conditioning exercise seems to occur in athlete muscles, particular in the early stages of exercise, conditioning exercise also works the cardiovascular system. Conditioning exercise can give tremendous improvements in skill performance (Richs, 2015).

2.2.1 Types Conditioning Exercise

2.2.1.1Flexibility

Flexibility is the ability to move without restriction during a normal range of movement: it is the quality of being bent without stiffness of bones. It is measured by the range of motion present through the connective tissue of ligaments and tendons that surround the joints between the bones and other parts of the body. Natural flexibility decreases with age. Child's body is flexible because the skeleton contains more cartilage, the bones are soft, and the muscle, ligament and tendons are more elastic, journal of bone and joint surgery, (Flaherty, 2015).

Kenneth Cooper states that 'the loss of the flexibility from childhood through adulthood cannot be avoided. However, it can be delayed by regularly performed exercises that stretch

and improve the range of motion of muscle and joint movement'. Adults who maintain their flexibility through stretching exercises feel better, have more energy for everyday activities, and are less susceptible to injuries during physical activities. 'Stretching is a simple and painless method of preparing for vigorous physical activity without causing undue strain upon the body. Trainers ability, past or present, is not necessary .However, before beginning stretching exercises, It is important that the potential exercise carefully assess his or her physical condition and capacity for muscle tension and flexibility ,since stretching exercises should be individually tailored.

2.2.2 Cardiovascularendurance is the ability of the heart and lungs to work together to provide the needed oxygen fuel to the body during sustained workloads. The cooper test is used most often to test cardiovascular endurance (www.spps.org)

2.2.3 Muscular strength is the amount of force the muscles can produce. The push up test is most often used to the muscular strength (www.spps.org)

2.2.4 Muscular endurance is the ability of muscle to perform continues fatigue. The sit up test most often used to test muscular endurance (www.spps.org)

2.2.5 Body composition is the amount of fat mass compared to lean muscles mass, bone and organs. This can bemeasured skin fold readings and bioelectrical impedance (www.spps.org)

2.3 Designing Conditioning Exercise

Physical training works best when we have good designed conditioning exercise .A design helps the learners make gradual but steady progress toward the goals. Once you have determine that exercise is safe for students ,designing for physical fitness consists of assessing how fit are now, determining where the students want to be and choosing the right activities to help the learners get there (Albert, 2000).

2.3.1 Assessing Conditioning Exercise

The first step in creating skill related physical fitness conditioning design is to assess the students current level of physical activity and skill related physical fitness components for

each of the six skill related physical fitness components. The results of the assessments tests will help the learners set specific physical fitness goals and design the physical fitness program. Assessment test will help to evaluate for each of six skillsrelated physical fitness components (Albert, 2000).

2.3.2 Setting Goals

The ultimate goals of every skill related physical fitness components design is the same wellness that lasts a life time. What every students specific goals the must be important enough to keep motivated .Most sport psychologists states that setting and achieving goal is the most effective (William and Wilma, 2009).

2.3.3 Choosing Activities for Balanced Program

A conditioning design is only as successful individual's ability to commit to it .For most, activities time is limited so the key is to prioritize.

An ideal fitness program combines a physical active life style with systematic exercise program to develop and maintain physical fitness. If the learner currently level sedentary the goal should be to focus on activities at the short duration and low intensity and gradual increase the amount of moderate intensity physical activity in their daily life (Lusty,et al., 2004).

2.4 Components of Physical Fitness

Physical fitness is a set of attributes that people have or achieve. Being physically fit has been defined as the ability to carry out daily tasks with vigor and alertness, without undue fatigue (Gutin, 1980).

Fitness is defined as a condition in which an individual has enough energy to avoid fatigue and enjoy life. Physical fitness is divided into five health related and six skill related (agility, balance, coordination, speed, and power and reaction time) components. Skill related fitness components are fitness types which enhances one's performance in athletic or sports settings(Karol, 1993).

Skill-related physical fitness consists of those components of fitness that have a relationship with enhanced performance in athletic activities. Skill related fitness abilities increases one's ability to perform in various activities and only has an indirect connection with health. The skill-related components of fitness are; agility, balance, coordination, power, speed, and reaction time Agility; refers to a person's ability to move their body quickly and easily. Balance; refers to a person's ability to maintain their equilibrium when moving or when they are in a stationary position. Coordination; refers to a person's ability to perform complex movements due to the working together of the nervous system and the muscles of the body. This is also referred to as a person's ability to do two things at the same time.

Power; refers to a person's ability to transfer energy into force at a rapid pace also known as explosive body movement. Speed refers to a person's ability to move fast. Speed combined with strength will provide power and force. It relates to the ability to perform a movement within a short period of time. Reaction time is a skill-related component of physical fitness that relates to the time between one of your senses recognizing a stimulus and your body moving in response.

Table 2.1 Summary of physical fitness

Physiological fitness	**health related fitness**	**skill related fitness**	**Sport**
Metabolic body	Body composition	Agility	Team
Morphological	Cardiovascular fitness	Balance	Individual
Bone integrity	Flexibility	Coordination	Lifetime
Other	Muscular endurance	Power	Other
	Muscle strength	Speed	
		Reaction time	

2.4.1. Skill-related Physical Fitness Components

Agility: - is the ability to quickly change body position and make directional changes in body movement. Agility is the ―ability to rapidly and accurately change the direction of the entire body in space (Payne &Bahn, 1999, p 53) .Agility is the ability to move quickly with frequent direction position, enhance your performance in a in variety of activities (Barro& Gee, 2004). This is the combination of speed and coordination. It allows you to efficiently

change direction and body position at speed. Agility most commonly measured via the ill ions agility runs (Wesson, 2002).

Balance: - is the maintenance of equilibrium while stationary or while moving. Theharmonious development of physical, mental and spiritual aspects of person; Balance is the ability to maintain equilibrium in other words, something is balanced when is seems as something natural and simple to perform, or is balance when its center of gravity is over its area of support.

Coordination: - is the ability to use the sense and body parts in order to perform motor tasks smoothly and accurately. But according to John, (*1996:97*) Coordination involves putting the relevant motor programs in the right order and effectively using the neuron muscular system to produce smoothly an efficient movement. Hence, coordination is the ability to integrate sensor and motor systems to produce efficient movement.

Power:-is the ability to transfer energy swiftly in to force. And also it is an explosive strength, is the ability to effectively integrate strength and speed to produce maximum muscular force at a maximum speed. It is the rate at which energy is expended or work is done. Then Shorkey(1997, p. 145) defined power as work divide by time, or the rate of doing work if one can perform the same work better than the other with in the same time interval, then we have got a better power. It combines strength (force) and velocity or speed (Distance/time). Power is measured by throwing heavy object or vertical jumping (Hetzler, 2015). According toBosco and Gustafson (2003), power is function of force and time (power = work / time) is defined as the rate of performing work (work= Force x Distance). Since work is a production of force x distance; Power is the combination of strength with explosiveness (speed), maximum muscular force released at speed. Power is a fundamental factor in jumping, throwing and striking (Flaherty, 2013)

Speed: - is the ability to perform a movement quickly. It is the time that takes us to respond to a stimulus. Johnet.al, (1996, p. 96) also state that speed is basically how fast you can move partial your body or the whole of your body, and is measured in meters per second. Therefore, speed is the rate of movement and often refers to the ability to move rapidly and it is an important factor in all explosive sports and activities that require sudden changes in

space. The simplest measures of speed is a 30m, mark a non-slip surface and sprint as hard as the competent can perform from a flying start over the course and record the time taken(Wesson, 2002).

Reaction Time: -is the ability to perform movements and actions of the body or body-part at a particular moment to produce to best effect. This is the time between a stimulus being perceive and the first movement made in response to it. It also depends on how long you take to process the information and this can be improved with practice. So reaction time measures how swiftly the competent interpret and the react to expected and unexpected events happening around his or her (Hetzler, 2015).The most accurate measures of reaction time involve a simple test is a stick drop test (Wesson, 2004).

2.4.2 Objective of Physical Fitness Development

The long term, overall objective of physical education program is to maintain and improve the health of human beings. This refers to all aspects of health including physical, mental, social, and emotional. It applies to all individual, regardless of race, color, and economicsof students, creed and national origin.

Physical development objective help build big muscles and develop the human organic system. Organic refers to the digestive, circulatory, excretory, heart regulatory, respiratory and other systems of the human body. As Bucher (1993, p. 27) stated it results in the ability to sustain adaptive efforts, to recover, and to rest fatigue.This objective also includes physical fitness, physical conditioning organic development or biological development that concerned with increasing the capacity of the body for movement.

The short term and long term physiological and psychological benefits of physical fitness and exercise are well documented. This section will define the components of physical fitness and review current research across all of these components. Physical fitness is divided into three components: health-related, skill-related, and physiologic components. The health related components of physical fitness are cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. The physiologic components of fitness are metabolic fitness, morphologic fitness, and bone integrity. The

skill related components of physical fitness are speed, power, agility, coordination, balance, and reaction time (Whaley, 2006, p.3).

These definitions of the physical fitness components come from the American College of Sports Medicine (ACSM), the largest sports medicine and exercise science organization in the world and widely accepted as the standard for information and reference in sports medicine. Crossfit.com is an on-line fitness community that has become extremely popular for its daily workouts based on a concept of functional movements that are constantly varied and performed at high intensity. Cross fit emphasizes the importance of functional fitness and has modified the ACSM definitions of skill and health related components of fitness to arrive at the components of functional fitness: cardiovascular endurance, stamina, strength, flexibility, power, speed, coordination, accuracy, agility, and balance.

2.4.3 Phases of Fitness Conditioning

According to Head Quarters Department of the US army, (1998) and Wuest, and Lombardo, (1994) the physical fitness training program is divided in to three phases: - preparatory, conditioning, and maintenance. The starting phases for different units or individuals vary depending on their age, fitness levels, and previous physical activity. Young, healthy persons may be able to start with the conditioning phase, while those who have been exercising regularly may already be in the maintenance phase. Persons who have not been active, especially if they are age 40 or older, should start with the preparatory phase.

2.4.3.1 Preparatory Phase

The preparatory phase helps both the cardio respiratory and muscular systems get used to exercise, preparing the body to handle the conditioning phase. The work load in the beginning must be moderate. Progression from a lower to a higher level of fitness should be achieved by gradual, planned increases in frequency, intensity, and time. Recovery days should be evenly distributed throughout the week, and training should progress slowly. This point leads to the conditioning phase

2.4.3.2 Conditioning Phase

To reach the desired level of fitness, trainees must increase the amount of exercise and or the workout intensity as their strength and or endurance increases. To improve cardio respiratory endurance, for example, trainees must increase the length of time they run. They should start with the preparatory phase and gradually increase the running time by one or two minutes each week until they can run continuously for 20 to 30 minutes. At this point, they can increase the intensity until they reach the desired level of fitness. They should trainat least three times a week and take no more than two days between workouts (Wayyen, 2008)

2.4.3.3 Maintenance Phase

The maintenance phase sustains the high level of fitness achieved in the conditioning phase. The emphasis here is no longer on progression. A well designed, 45 to 60 minutes work out including warm-up and cool-down at the right intensity three times a week is enough to maintain almost any appropriate level of physical fitness (Wayyen, 2008)

2.5 Conditioning Exercise Intensity

Conditioning exercise intensity refers to how hard your body is working during physical activity. Your health and fitness goals, as well as your current level of fitness, will determine your ideal exercise intensity. The goal is work hard, but not too hard. Typically, exercise intensity is described as low, moderate, or vigorous. For maximum health benefits, the goal is to work hard, but not too hard, described as moderate-intensity by the (National Physical Activity Guidelines for Australians). These guidelines recommend that for good health, you should aim for at least 30 minutes of moderate-intensity physical activity on most days. This is the same for women and men (Matsumoto, 2014). The process of determining and controlling appropriate exercise intensity presents a challenge, which has implications related to both physiological changes and to individual compliance within an exercise program (K and EPLM, 2001).

Depending on the time available for each session and the way training sessions are conducted, all components of fitness can be developed using a three-day-per-week schedule (Blackmon, 2015). A pioneer uncontrolled study showed that a 8 week training intensity program is crucial foundation for moderate intensity training principle system (Brand, Gustafson, et.al, 2009).

2.5.1. Moderate Intensity Circuit Training Aerobics Fitness Work out

Moderate intensity circuit training aerobic fitness is an effective ways to improve the athletes or students aerobics physical fitness and muscular endurance (Quine, 2015).Circuit training aerobics is vary between 20 to 60 sec in which trainers may rest slightly (Quine, 2015) .

2.5.2. How Many Weeks or Months will taketo Notice the Benefits of Moderate Intensity Training

Initial improvements in aerobics fitness should occur as early as two weeks after beginning a circuit training program. In order to continue to see improvements in aerobic s fitness, it is necessary to change athlete's routine as often every six to eight weeks, either by performing different exercise increasing the load or number of repeat ion (Hitchcock, 2011)

2.6. Energy levels

Energy levels should improve almost immediate after beginning aerobics fitness training program, exercise increases blood throughout the body. Within two or three weeks of exercising 3 times per week the athlete body will start to adapt increased activity levels as a results, athletes feel more energetic throughout the day (Wayne, 2017)

2.6.1How Many Calories Burned After Circuit Aerobic Fitness Training in Moderate Intensity

Fitness coach Ben Cohn reports that there are two popular kinds of circuit training; these are aerobics and resistance training (Wayne, 2017).

According to information at fitness resource health status, athletes donning aerobic fitness 16kcal, 32kcal, 64kcal burns in low intensity of 2minute, 4minute and 8minute training intervals respectively (Deluxe, 2013). On the other hand 96 kcal burns in 12 minutes and 16minutes of moderate effort in respectively training intervals and lastly, 102 kcal and 210 kcal burned in 20minutes and 32 minutes respectively training intervals.

2.7 Effects of Conditioning Exercises

Burning up energy by participating in physical activity may pay off with increased energy in the long run (ECU, 2007). Regular exercise can increase energy levels (West & Shores, 2008). Physical activity every day can provide the energy built on the idea that physical movement leads to mental organization. One of the most basic benefits of physical activity is the development of motor skills. Every child's earliest learning is based on motor development (Wolfson, 2000). Fundamental movement skills, including locomotors and object control skills, usually evolve between the ages of one year of age to seven years old (Burton & Miller, 1998).

Providing students with these opportunities to learn conditioning exercises in skill related fitness exercises is important (Richardson, 2006). It is believed that there is a relationship between motor skills, fitness, and physical activity (Haga, 2009). Children with low motor competence are likely to have poor physical fitness when compared to children with high motor competence (Haga, 2009). Physical activity helps children learn and develop their complex, fine, and gross motor skills in order to be successful in being physically active. Physical activity and active play are vital to the development of children and young people (Hessler, 2009).

School grounds, therefore, have become important places, where children and young people can enjoy and benefit from physical activity and active play. Active play is an important part of children's culture and should be valued for its own sake, but it is also fundamental to their development of learning, creativity, and independence (Garaigordobil, 2006). Children love to move, and play keeps children healthy and active (Williams, 1999).

Regular physical activity and active play form the basis of a healthy lifestyle, which will help children to be fit and well throughout their lives. Conditioning exercise increases student's capacity for learners (Kong, 1999).Learning through movement is vital for successful experience in school."(Exercise, besides shaping up bones, muscles, heart and lung also activates major growth of neurons and nerve nets in the basal ganglion, cerebellum and corpus callosum of brain. Aerobic exercise increases the supply of blood and oxygen to the brain" (Hannaford, 2005, p.107)

In 2008 Douglas Hartmann of the University of Minnesota presented a comprehensive review past studies done on the link between physical activity and academic achievement of high schools students. He found that the overwhelming majority of studies demonstrate of correlation exists between the two and that the correlation should not be questioned. In fact, isolating the causal factors connecting the two is goal of more recent studies. Physical activity helps students concentrate and focus (Young, 2001).Being physical active in school has positive impacts on academic achievement. Obviously, as everybody is aware that most of the brain is activated during some sort of physical activity, much more than when sitting a behind a desk (Maier, 2001).Movement expands bloods vessels that allow for the delivery of oxygen, water and glucose to the brain, which optimizes the brain's performance (Pica 2004).Therefore, physical activity increases the blood flow, which in turn, increases cognitive function or academic success.

2.8Principles of Exercise Training

Research in exercise training has led to the recognition of a number of general principles of conditioning. These principles must be applied to the development of a successful exercise program.

A. Specificity

The principle of specificity derives from the observation that the adaptation of the body or change in physical fitness is specific to the type of training undertaken. Quite simply this means that if a fitness objective is to increase flexibility, then flexibility training must be used. If one desires to develop strength, resistance or strengthening exercises must be

employed. This principle is indeed simple; however, it is frequently ignored. Many fraudulent claims for an exercise product or system promise overall physical fitness from one simple training technique. A person should be suspicious of such claims and should consider whether or not the exercise training recommended is the type that will produce the specific changes desired (kern, 1999).

B. Overload

Overload, the second important principle, means that to improve any aspect of physical fitness the individual must continually increase the demands placed on the appropriate body systems. For example, to develop strength, progressively heavier objects must be lifted. Overload in running programs is achieved by running longer distances or by increasing the speed (Dick, 1997 and Carbin et al., 2002).

C. Progression

Individuals frequently make the mistake of attempting too rapid a fitness change. A classic example is that of the middle-aged man or woman who has done no exercise for 20 years and suddenly begins a vigorous training program. The result of such activity is frequently an injury or, at the least, stiffness and soreness. There are no hard-and-fast rules on how rapidly one should progress to a higher level of activity. The individual's subjective impression of whether or not the body seems to be able to tolerate increased training serves as a good guide. In general it might be reasonable not to progress to higher levels of activity more often than every one or two weeks (Dick, 1997 and Corbin et al., 2002).

D. Warm-up/cool down

Another important practice to follow in an exercise program is to gradually start the exercise session and gradually taper off at the end. The warm-up allows various body systems to adjust to increased metabolic demands. The heart rate increases, blood flow increases, and muscle temperatures rise. Warming up is certainly a more comfortable way to begin an exercise session and is probably safer. Progressively more vigorous exercises or a gradual increase in walking speed are good ways to warm up. It is equally important to cool down—

that is, to gradually reduce exercise intensity—at the end of each session. The abrupt cessation of vigorous exercise may cause blood to pool in the legs, which can cause fainting or, more seriously, can sometimes precipitate cardiac complications. Slow walking and stretching for five minutes at the end of an exercise session is therefore a good practice.

The heart rate should gradually decline during the cool down, and by the end of the five minutes it should be less than 120 beats per minute for individuals under 50 years of age and less than 100 beats per minute for those over 50 (Kern, 1999).

E.Individuality

Everyone is different and responds differently to training. Some people are able to handle higher volumes of training while others may respond better to higher intensities. This is based on a combination of factors like genetic ability, predominance of muscle fiber types, other factors in your life, chronological or athletic age, and mental state (Gaal, 2012).

F.Adaptation

Over time the body becomes accustomed to exercising at a given level. This adaptation results in improved efficiency, less effort and less muscle breakdown at that level. That is why the first time you ran two miles you were sore after, but now it’s just a warm up for your main workout. This is why you need to change the stimulus via higher intensity or longer duration in order to continue improvements. The same holds true for adapting to lesser amounts of exercise.

G. Recovery

The body cannot repair itself without rest and time to recover. Both short periods like hours between multiple sessions in a day and longer periods like days or weeks to recover from a long season are necessary to ensure your body does not suffer from exhaustion or overuse injuries. Motivated athletes often neglect this.

H. Reversibility

If you discontinue application of a particular exercise like running five miles or bench pressing 150 pounds 10 times, you will lose the ability to successfully complete that exercise. Your muscles will atrophy and the cellular adaptations like increased capillaries (blood flow to the muscles) and mitochondria density will reverse.

You can slow this rate of loss substantially by conducting maintenance/reduced program of training during periods where life gets in the way, and is why just about all sports coaches ask their athletes to stay active in the offseason.

The principles of specificity, progression, overload, adaptation, and reversibility are why practicing frequently and consistently are so important if you want to improve your performance. Missed sessions cannot really be made up within the context of a single season. They are lost opportunities for improvement. Skipping your long ride on weekend Ameans you can't or shouldn't go as far as originally planned on weekend B (progression & overload). Skipping your Monday swim means your swimming skills and muscles won't be honed or stressed that day (specificity). Missing a week due to a vacation sets you back more than one week (adaptation and reversibility).

I. Frequency, intensity, and duration

To provide guidance on how much exercise an individual should do, exercise physiologists have developed equations based on research. It is generally agreed that to develop and maintain physical fitness, the exercise must be performed on a regular basis. A frequency of about every other day or three days per week appears minimally sufficient.

Many individuals exercise more frequently than this, and, of course, such additional exercise is acceptable provided that one does not become overtrained and suffer illness or injury (Kern, 1999).The intensity of exercise required to produce benefits has been the subject of much study. Many people have the impression that exercise is not doing any good unless it hurts. This is simply not true. Regular exercise at 45 to 50 percent of one's maximal capacity is adequate to improve one's physiological functioning and overall health.

This level of intensity is generally comfortable for most individuals. A reliable way to gauge exercise intensity is to measure the heart rate during exercise. An exercise heart rate that is 65 percent of a person's maximal heart rate corresponds to approximately 50 percent of his maximal capacity. Maximal heart rate can be estimated by subtracting one's age in years from 220 (or, in the case of active males, by subtracting half of one's age from 205). Thus, a sedentary 40-year-old man has an estimated maximal heart rate of 180 beats per minute. Sixty-five percent of this maximal rate is 117 beats per minute; thus by exercising at 117 beats per minute, this individual is working at about 50 percent of his maximal capacity.

To determine exercising heart rate, a person should exercise for several minutes, to allow the heart rate to adjust. The exerciser should then stop exercising, quickly find the pulse, and count the number of beats for 15 seconds. Multiplying this by four gives the rate in beats per minute. The pulse must be taken immediately after stopping exercise, since the heart rate rapidly begins to return to the resting level after work has been stopped. As noted above, exercising at the 50 percent level of intensity will improve physiologic functioning and provide health benefits. This level of exercise will not produce the maximum fitness needed for competitive athletics.

J. Overall conditioning

Much emphasis has been given in the foregoing discussion to aerobic fitness, because this form of conditioning is extremely important. It should be noted, however, that other types of conditioning also have benefits. A total exercise program should include strengthening exercises, to maintain body mass and appropriate levels of strength for daily functioning, and stretching exercises to maintain joint mobility and flexibility.

The specificity principle described above indicates that no one exercise is likely to produce the overall conditioning effect. In general an exercise plan should consist of aerobics, exercises that increase the strength and endurance of various skeletal muscle groups, and flexibility exercises to maintain good joint function (Kern, 1999).

K. Individual differences

The principles of exercise training discussed above should be viewed as general guidelines. Individuals differ in both physiological and psychological adaptations to exercise. Two people who are similar in many respects and who start the same exercise program may have entirely different impressions of it. One person may feel that the exercise is too easy, while the other may believe that it is much too hard. It is certainly appropriate that the exercise plan be adjusted to account for preferences. Likewise some individuals will progress to more intense training levels far more rapidly than others do. As mentioned earlier, exercise progress should be adjusted according to the exerciser's own assessment (Dick, 1997 and Corbin et al., 2002).

Individuals also differ in the type of exercise they like or can tolerate. Jogging, for instance, is not for everyone. Many people who dislike jogging, or who suffer running injuries, can find other satisfactory exercise activities, such as cycling, walking, swimming, or participating in a sport. Many kinds of exercise activities are appropriate and can provide physiological and health benefits to the participant. There is no one best exercise. The important thing is to be regular in exercise participation and to follow the general guidelines outlined in this section.

2.9 The Development of Fitness Test for Youth

In the early 1950s, physical fitness testing indicated that European children had higher levels of fitness than American children. This led the United .States former President Eisenhower to establish what has become the President's Council on Physical Fitness and Sport. American Alliance for Health, Physical Education, Recreation(AAHPER Youth Fitness Test (1961) was designed to evaluate the fitness levels of the American children (Morrow et al., 2000); it includes performance related tests that measured strength, endurance, running, agility, and jumping ability (Safrit, 1990).

During the 1970s physical education professionals and researchers became more interested in health-related fitness (Safrit, 1990). Because the AAHPER Youth Fitness test items included a 50- yard dash and a standing long jump that were not evaluate the fitness levels

of the American children (Morrow et al., 2000); it includes performance related tests that measured strength, endurance, running, agility, and jumping became more interested in health-related fitness (Safrit, 1990). Because the AAHPERYouth Fitness test items included a 50-yard dash and a standing long jump that were not considered health-related fitness items, however, the 600-yard run is not a good measure of aerobic capacity.

The health-related fitness test, its components include more health-related items such as cardio respiratory fitness, body composition, musculoskeletal fitness, which has a strong relationship with overall health. The test use the norm-reference standard, it just compare with other children and youth rather than to tell the level the children ought to achieve for health. The test use Criterion referenced standard, it tell children must achieve all minimum level of its items to be considered fit. It compares with the standard, or criterion.

The standards fitness grams were established by a panel of experts who used a combination of professional judgment, normal data, and empirical data (Cureton& Warren, 1990). It is a timely break-through in the youth fitness field. The program of fitness gram is much more than just an assessment of physical fitness. Students who participate in the health-related test receive personalized reports on their performance.

They are also given valuable feedback on ways to establish positive exercise behavior geared to improving their level of physical fitness. It helps students learn at a young age that regular exercise can pave the way for a lifetime of good health. To date, over 8 million children have been tested under the Fitness gram format in North America, and it is rapidly becoming the standardized measure for assessing students in U.S. and Canada (Collis, 2000).

The development of fitness tests in school systems in European countries occurred twenty years after the development of the American model. The Belgium and the Netherlands published their test batteries in the 1960s; other countries followed their lead. A more coordinated effort began in 1978, when upon the initiative of the Council of Europe Committee for the Development of Sport, aims and concepts of a Euro fit test battery were formulated. Between 1980 and 1982, the evaluation and choice of both motor fitness and endurance fitness tests were carried out, and as a result of their international effect, in 1983 a

provisional and in 1988 a final Euro fit handbook was published in French and English. The test items cover strength, power, speed, flexibility, balance, endurance, as well as body composition measured with height, weight and skin fold thickness (Kemper & Van Mechelen, 1996). Euro fittest are aimed at measuring abilities rather than skills, but development of the Euro fittest battery is an important step in Europe.

However, it is only a first step. Although the Euro fit handbook allows people to use these tests, it still needs to construct norm-referenced or criterion-referenced scales in the future.

2.10 Summary

Exercise is physical activity that is planned, structured and repetitive for the purpose of conditioning any part of the body. Exercise is used to improve health and maintain physical fitness component and is important as means of physical rehabilitation (ASCM, 2009). Essentially, the goal is to make easier to do something, and for a longer period of time. Although the primary adaptation to conditioning exercise seems to occur in athlete muscles, particular in the early stages of exercise, conditioning exercise also works the cardiovascular system. Conditioning exercise can give tremendous improvements in skill performance. Skill also can be expressed in terms of grace, beauty, and aesthetics. Skillful physical performance is also the result of neuromuscular coordination .finely tuned coordination can be both in born and acquired. Acquired skills are the result of physical conditioning, fitness, and practice. No matter how much natural physical ability a person possesses, proper coaching and training will develop skill. Accomplished students' physical ability continually improves their skills through the demonstration of more refined techniques, and not necessarily by building greater strength and endurance.

The skill-related components of fitness are; agility, balance, coordination, power, speed, and reaction time. The intensity of exercise required to produce benefits has been the subject of much study. Training principles include specificity, overload, Progression, warm-up/cool down, frequency, intensity, and duration, overall conditioning and Individual differences.

CHAPTER THREE

Research Design and Methodology

3.1 Introduction

This chapter presents the methods used throughout the research. These include the research method and design, the study area, sources of data, sampling and sampling techniques, variables, data collection instruments and procedures, data analysis, validity and reliability, data analysis employed and ethical considerations.

3.2 Research Method

The study was conducted to investigate the effect of conditioning exercise on skill related physical fitness. Hence, it holds actual field test performance of students on skill related physical fitness components. Many researchers support the use of field test in different ideas. For example, field test requires lower costs, it is reliable, and is feasible (Morgan,

2011). Different field tests have been shown to be valid, reliable and have been used in adolescent populations throughout the world (Collins, 2008).

The field test performance was employed based on research design on the skill related physical fitness components. Such skill related physical fitness components are largely measured quantitatively employing numbers. In addition, this study also attempted to investigate the effect and hence employed actual field performance test.

3.3 Research Design

Because true experimental research cannot be employed in human being as it requires pre-requirement or preparation of the participants of the study with the same back ground, and control of variables and interaction. The quasi-experiment approach would be suitable for the desired field test (Campbell, 1969).In order to get the data required for the stated problem in AmuruWoreda, HorroGudduru zone,Oromia regional state, the researcher used the actual performance field test or quasi experimentaltype.

This method was used to gather appropriate data to the problem of the study. The methods were appropriate to describe effects of conditioning exercise on skill related physical fitness components.

Quasi -Experimental study as an approach is used to gather information related to the students' regular exercising to increase their skills related fitness components, because the students' activity on skill related physical fitness in Amuru secondary school was observed to be low.

The field test was designed to be held on eight consequent weeks in order to identify the difference between the comparison and experimental groups, and effects of conditioning exercises with different intensity and their performance that recorded on each component.

The subjects were divided into two groups. The first group 9^{th} A and 9^{th} D sections were selected under exercise schedule, and the second groups 9^{th} B and 9^{th} C section were selected as "Controlled Group for comparison". This selection was employed by means of simple random sampling method. During daily experiment period, all the subjects of

selected groups were involved with their respective training schedules, while the subjects of controlled group were kept with the regular schedule maintaining the regular instructional approach and activities in Physical Education classes.

Step-I Pretest

Before the beginning of the experiment, motor fitness components as required by the samples were assessed by implementing standard tests (Frost &Cureton, 1977). The scores of skills and fitness components were recorded carefully.

Step-II during intervention

After pre-testing, the subjects of experimental groups received conditioning exercise followed by the corresponding fitness tests. The tests were held for a series of 8 weeks and the intensity of conditioning exercise increasing from time to time. The conditioning exercises were for 4, 8, 12, 16, 20, 24, 28 and 32 minutes as per the preser standards of (MOE, in grade 9^{th} in 2005 on p.21-22)

Step-III Post Test

After completion of the 8 weeks of experiment, as stated above, all the subjects of both the comparison and experimental groups were directed for post-testing. Here the testing procedures were same as mentioned in the pre-test.

3.4 Research Site

The study was conducted in Amuru Secondary School of Amuru district in HoroGuduru zone ofOromia Regional National State. It is located in the west, Ethiopia at about 350 km distance from Addis Ababa.

3.5. Sample and Sampling Techniques

The study specified its scope to grade 9 selected purposively as this grade stays the whole year in school. All students in the four section of grade 9at Amuru secondary school were included to help reduce extraneous variable effect and other confounding variables,

andbecause in quasi experiment intact groups cannot be manipulated from the selected populationin the study (Andrich, 1981; Leary, 2004).The subjects were divided into two groups; experimental and comparison.

The researcher used simple random sampling to divide the sections in to two groups or exercise schedule groups by using lottery method assigning the four sections from A-D. Then, the researcher prepared four pieces of wrapped paper and draws two sections by chance to be selected as an experimental group and the other left two sections as comparison groups.

Therefore, these four sections had an equal probability of being selected from the population for experimental and comparison groups. Accordingly, sections 9^{th} A and 9^{th}D were selected as experimental group and sections 9^{th} B and 9^{th} C were selected as comparison groupsfor this study.

While the four sections were selected for this study, some students in the grade 9 were excluded from the study – those who were given official permission not to take physical education.

Accordingly, the following samples of students were included in this study.

Table 3.1. Sample of sections and students by group

	Section	M	F	Total	Total by Group
Experimental	A	27	10	37	75
	D	20	18	38	
Comparison	B	17	33	40	75
	C	18	17	35	

3.6. Source of Data

The sources of data to support this research were the primary sources (students and data measured from the students) to get the required information or data. The primary source of data was obtained from students by using actual performance field test.

3.7 Data CollectionInstruments and Procedures

In order to investigate the effects of conditioning exercises on skill related physical fitness components, the researcher employed actual performance test as instrument so that there will be consistent tool to measure data.

Primary data were gathered from the subject by three phases (pretest, during intervention test and posttest)to collect actual data with 8 weeks interval as pretest , during test and posttest while training was undertaken. The data were collected from the subjects in the area where comfortable place and skill related physical fitness test equipment are accessible through structured program. To get data from the subjects' tests were taken at three phases, at beginning, mid and at the end of the two months. Then ,final data were collected at the end of the experiment. The data were collected on same day and at the same time of the day to control biological and between subject variations (Reilly and Brooks,1982) with the skill related physical fitness tests and procedures.

Hence, the actual performance test was recorded so that the effect of conditioning exercise can be shown with different levels of intensity. The data were documented with two additional assistants to the researcher including the researcher himself so that the averages of the three documented pretest, during intervention test and posttest were employed to ensure reliable data justified with inter rater agreement.

Materials were validated instruments used by referring to the experts in the field test of physical education and sports for vetting so as to determine its relevance and clarity to the study. The materials of the study were field tested by the researcher in line with the independent variables. The physical fitness battery included a combination of physical fitness and skill related tasks. All tests were administered during the school day, detailed descriptions of each fitness test are described below including the procedure followed by the researcher:

1. 30m Sprint Run test -watch
2. Illinoi's Agility Run test- cones
3. Stick Drop Test-stick(reaction time

4. Vertical Jump test-pole
5 Coordination eye- hand test
6 Balance one-leg test

3.7.1 Procedures for Administration of Skill Related Physical Fitness test

A. Evaluating 30m run Test

The aim of this test was to measure the speed of students 30m run test during pretest, at the middle and posttest.30m sprint run test was suitable for this test because it does not require wide area, it demands lower price materials and also it consolidates the tactical knowledge during a sport activities of players to move quickly.

Table 3.2 Summary of physical fitness and rating

Male	Grade	Female	Grade
<3.8 sec.	Excellent	4 sec.	Excellent
4 sec.	Good	4.2 sec.	Good
4.2- sec.	Average	4.4 sec.	Average
4.4 sec.	Fair	4.8 sec.	Fair
>4.5 sec.	Poor	>5 sec.	Poor

The steps were the following:

1. Wear cleats to run faster.
2. Focus on sprinting running as quickly as possible without interferenceof each other.
3. Becoordinated forfast leg movement.
4. Should control balance
5. Explosive running by power performing 30m sprint run test (Stewart Flaherty, 2013)

B. Evaluating Agility Test

Agility is an important component of many team sports, though it is not always tested, and is often difficult to interpret results. The Illinois Agility Test (Getchell, 1979) is a commonly used test of agility in sports, and as such there are many norms available.

- **purpose:** to test running agility
- **equipment required:-**
    - flat non-slip surface,
    - mark materials like cones
    - stopwatch is used to measure the result record
- **Procedure:** The length of the course is 10 meters and the width (distance between the start and finish points) is 5 meters. Four cones are used to mark the start, finish and the two turning points.

  Another four cones were placed down the center at an equal distance apart. Each cone in the center is spaced 3.3 meters apart. Subjects should lie on their front (head to the start line) and hands by their shoulders. On the 'Go' command the stopwatch is started, and the athlete gets up as quickly as possible and runs around the course in the direction indicated, without knocking the cones over, to the finish line, at which the timing is stopped.

Table 3.3 Illinois agility test standard

Male	Grade	Female	Grade
<15.2 sec.	Excellent	17 sec.	Excellent
16.1 sec.	Good	17.9 sec.	Good
18.1 sec.	Average	21.7 sec.	Average
18.3 sec.	Fair	23.sec.	Fair
>18.3 sec.	Poor	>23.0 sec.	Poor

C. **Evaluating Reaction Time stick drop Test**

Here is a simple reaction time test using only a ruler, and a little bit of calculating. This is a good science class project. This test uses the known properties of gravity to determine how long it takes a person to respond to the dropping of an object by measuring how far the object can falls before being caught.

Table3.4 Stick drop test

Male	Grade	Female	Grade
43.5 sec	Excellent	42.5 sec	Excellent
38 sec	Good	36sec	Good
30 sec	Average	28 sec	Average
23 sec	Fair	22 sec	Fair
<22 sec	Poor	<21 sec	Poor

D. **Evaluating Hand Eye Coordination Test**

Testing and measurement are the means of collecting information upon which level activities are done.

The objective of the test is to monitor the ability of the athlete's vision system to coordinate the information received through the eyes to control, guide, and direct the hands in the accomplishment of catching a ball (hand-eye coordination).

- ✓ Equipment resources
- ✓ Ball
- ✓ Stopwatch
- ✓ Smooth wall

This test requires player to throw and catch the ball off a wall.

The Athletes stand warm up for 10 minutes.

- The athlete stand two meter away from a smooth wall
- The assistance gives the command “GO” and starts the stopwatch
- The athlete throws a tennis ball with their right hand against the wall and catches it in the left hand
- The assistant counts the number of catches and stops within the test seconds
- The assistance records

E .**Evaluating Balance Test**

The Purpose of testing balance was to measure the ability of athletes on an activity to keep their balanceequilibrium.

Equipment used for testing balance; stop watch and stick like stairs

Procedure

- Look straight ahead and keep his or her handon hips
- Lift leg off the ground behind without restingand standing on one leg as long as possible

Table 3.5 Balance test standard

Male	Grade	Female	Grade
59.8 sec	Excellent	46.9sec	Excellent
46.9sec	Good	41.1sec	Good
41.1 sec	Average	24.9 sec	Average
24.9sec	Fair	15.4 sec	Fair
15.4 sec	Poor	12.0 sec	Poor

F.Evaluating power test

Thepurpose of vertical jump test is to measure the strength and power of legs of participant.

Equipment used for power testwall, chalk mark to the wall and meter

The Procedures were:-

- Measure the point as the standing and has the participants stand away from the wall and jump vertical as high as s/he can.
- Support them to use both arms and bent their legs.
- They do three times and record the best and measure distance of the reach height and the jump height.

Table 3.6 Vertical jump test standard

Male	Grade	Female	Grade
>70.0 cm	Excellent	>50.0 cm	Excellent
61 cm	Good	39 cm	Good
50 cm	Average	32 cm	Average
30. cm	Fair	31 cm	Fair
<29 cm	Poor	<26.0 cm	Poor

3.8 Research Variables

Variables of this study include the skill related physical fitness components (dependent) and the respective conditioning exercises as independent variable. These variables were included in the field test.

Table 3.6 Variables of the research

skill related physical fitness	Independent variable		Dependent variables
	Conditioning exercise	Measured by	
Speed	Conditioning exercise	Time (seconds)	Sprinting(30m)
Balance	Conditioning exercise	Minute	One foot-stand test
Agility	Conditioning exercise	Time (seconds)	Cone stone (3m)
Reaction time	Conditioning exercise	Time(seconds)	Yardstick drop
Power	Conditioning exercise	Meters	Vertical jump

Coordination	Conditioning exercise	time	Eye hand test

Source: adopted from journal exercise science and physiotherapy 3(2), p 156-160 (2003).

3.9 Data Analysis Method

The researcher used data analysis process by using simple statistics such as mean, standard deviation, and correlation. In addition, Paired sample t-test and independent samples t-test were used to show the significance of the differences within and between the experimental and the comparison groups of the samples using SPSS software.

The comparison groups of the study were used as a reference of analysis to see the change of the variables in the experimental group so that the observed effect and mean gain due to the intervention could be explicated.

The analysis involves reading and re-reading all the data and the analysis which was systematically used for repeatedthemes. The field test was analyzed based on the recorded data of the actual performance of the students.

3.10 Validity and Reliability

Reliability refers to the consistency or dependability of a measurement technique (Andrich, 1981; Leary, 2004). If the measurement of this field test is reliable, then there is less chance that the obtained score is due to random factors and measurement error so that the accuracy of the data can be increased. Multiple recording and agreement among records is one of the methods used to determine the reliability of a certain test which refers to the stability of test scores recorded by different observers. In addition Test-retest over time that involves repeating the same test on at least one other occasion was used to ensure reliability. These methods were used in this field test to make sure that the scores of the students in the field testsis reliable. Moreover, the data from the actual field test was not biased as the researcher himself and two others were recording the results of the students consciously with reference to the test standards provided (Appendix A).

The pilot test was conduct in Agemsa high school whichwere not considered as purposive in this study.So, 54 students were participated in in the pilot study. The conclusions of the study were derived from the analysis of the data collected from the students of Amuru secondary School. This unbiased data were helpful for the conclusion to be reliable and externally valid.

Validity is required for this research to focus on measurement strategy measures and how well it does so. Content-related validity was used for this research as it refers to the relevance of the instrument or measurement strategy to the construct being measured in the actual field test of this research. The measurement approach was related to the construct being measured based on recognized test standards that has been validated globally.

The approach for determining the validity of the tests was started with the operationalization of the construct of interest. As indicated in the research variables, the appropriate corresponding tests were used to measure each of the skill related physical fitness components. In addition face validity was assured through review and revision by subject experts.

3.11Ethical Considerations

While conducting research, and especially on human being the assurance of ethical considerations is important. Accordingly the following were performed to ensure ethical consideration.

1. Permission from the school was obtained to conduct the research
2. The researcher explained to the respondents about the research and that the study was for academic purposes only.
3. It made clear that the participation is voluntary and that the respondents were free to decline or withdraw at any time during the research period.
4. Respondents weren't forced into participating in the study.
5. The participants were informed to give consent to make the choice to participate or not.

Moreover, the researcher showed the value and appreciation for knowledge of the locality by inviting research assistants from the target population. However, in relation to the participants, any activity done by the researcher was based on the informants and he was kindly requesting them to tell truth that they had in their minute.

An attempt was also made to give similar intervention for the students in the control group after the completion of the study period to help them achieve what they would miss being assigned in the comparison group.

CHAPTER FOUR

DATA PRESENTATION ANALYSIS AND INTERPRATION

This chapter deals with analysis and interpretation of data collected through experimental result from Amuru High School. For the case of analysis and interpretation of the data, the items which had got some sort of similarities were treated in tabulation form.

4.1Participants of the Study

In this quasi experimental study four sections of all available grade nine students at Amuru secondary school were involved, with some students omitted who obtained permission from the school: students that have cases such as physical disabilities, pregnancy, and medical cases.

Table 4.1 Students who participated in the study

	Section	M	F	Total	Total by Group
	A	18	19	37	

Experimental	D	20	18	38	75
Comparison	B	17	33	40	75
	C	18	17	35	

From Table 4.1 one can see that the students who involved in this study accounted both sexes and have sufficient size to run comparison analysis. Hence, this sample size and representation would be sufficient to get proper information from both sexes and conduct proper descriptive and inferential statistics.

4.2 Results and Discussion of the Data Analysis

In order to make analysis and presentations, the following key terms were used as guiding concepts.

- **Mean**: The aggregate average of the measured values determined by dividing the total sum to the number of participants in the measurement.

- **Standard deviation:** In statistics, the standard deviation (SD, also represented by the Greek letter sigma σ or the Latin letter s) is a measure that is used to quantify the amount of variation or dispersion of a set of data values.

  Standard deviation is a number used to tell how measurements for a group are spread out from the average (mean), or expected value. A low standard deviation means that most of the numbers are very close to the average. A high standard deviation means that the numbers are spread out.

  It is a measure of the dispersion of a set of data from its mean. The more spread apart the data, the higher the deviation. Standard deviation is calculated as the square root of variance.

- **Sig. (2-tailed):** this indicates that the significant digit or the precision level of the calculated statistic thatindicates how much it approaches to the hypothesis. This is also known as P-value.

  The p-value for each term tests the null hypothesis that the coefficient is equal to zero (no effect). A low p-value (< 0.05) indicates the rejection ofthe null hypothesis. Conversely, a larger (insignificant) p-value suggests that changes in the predictor values were by chance and not a true difference.

- **N=number of respondents:** the number of respondents that participated in the test analysis. The total number of students in this case was 75 for experimental and 75 for comparison groups.

- **t-test:** is an inferential method of comparing means. In this study both paired t-test and independent samples t-test were used at .05 significance level.

Based on the key terms stated above and the data generated from the sampled students the gathered data were presented for both the pre intervention and post intervention measures, analyzed and interpreted.

Table 4.2 Data presentation of measures during pre and post intervention

Variables physical fitness	Measure	Experimental Group		Comparison Group	
		Mean	Standard Deviation	Mean	Standard Deviation
Vertical jump test	Pre	37.4231	13.2805	38.1701	13.8644
	Post	45.9320	16.11602	36.9347	15.51874
Illinois agility test	Pre	18.5907	2.3028	19.3253	2.2114
	Post	17.3505	1.59575	19.0865	2.38141
30 m Run Test	Pre	4.3400	0.25298	4.4000	.23905
	Post	4.2267	.26583	4.4933	.29633
Stick Drop Test	Pre	27.7933	5.3073	25.6053	5.94961

	Post	34.2600	5.81420	25.1587	5.17898
Balance Test	Pre	13.2667	2.3442	12.0667	1.38701
	Post	24.0000	3.00000	12.8667	2.06559
Coordination Test	Pre	11.1733	1.1195	10.4267	1.39665
	Post	23.6000	2.06646	13.0800	1.89423

From vertical jump test standards those who can jump more than 70cm (for males) and more than 50cm (for females) was excellent. Equally those who can jump less than 29 (for males) and less than 26 (for females) were poor. Table 4.2 presents mean of 37.4 (experimental) and 38.2 (comparison) which stands to be below average for males and an average for females. Though there seems to have increased mean score for the experimental group (M = 45.9), this stands to be average for the males. From numerical presentation one can see that the experimental group improved in their vertical jump test results.

For the agility test, the standard for the measure of more than 18.3 seconds is poor for male which is more than 23 sec for females. The standard becomes excellent for those who can perform less than 15.2 sec for males and 17.0sec for females stands to be excellent. In this regard the mean score of 18.5 (experimental) and 19.3 (comparison) are both at the poor level of the standard. Even after intervention the means are 17.3 (experimental) and 19.08 (comparison) stands to be at the level of average.

The 30m run test also falls to be between fair for males and average for females as compared against the following standard.

Male	Grade	Female	Grade
<3.8 sec.	Excellent	4.0 sec.	Excellent
4.0 sec.	Good	4.2 sec.	Good
4.2-4.0 sec.	Average	4.4-4.3 sec.	Average
4.4-4.3 sec.	Fair	4.8-4.7 sec.	Fair
>4.5 sec.	Poor	>5.0 sec.	Poor

The standard for the Stick Drop test presented in Table 3.4 gives the range for males (between 23 and 30 sec for males) and (between 22 and 28 sec for females) to be fair, while 30 – 38 sec for males and 28 – 36 sec for females is average. In this regard, the students were at the fair level before intervention. After intervention, the comparison group remains to be fair while the experimental group improves into average.

The balance test results for both the experimental and comparison groups lies to be poor before intervention. After intervention the experimental group improved from poor into fair.

Despite the observed improvements discussed above, comparison analysis was conducted to check whether these improvements are real or by chance. The results of the comparisons are presented below.

Table 4.3 Mean, standard deviation and t-test value of vertical jump

		Mean	N	Std. Deviation	t	Sig.
Pair 1	pre experimental vertical jump test	37.4231	75	13.28045	0.558	0.000
	post experimental vertical jump test	45.9320	75	16.11602		
Pair 2	pre comparison vertical jump test	38.1701	75	13.86440	0.802	0.070
	post comparison vertical jump test	36.9347	75	15.51874		

The vertical Jump test was designed to measure an applicant's lower body strength. The test was conducted using a vertical jump test gauge. The jump must be completed from the original set up position with both feet flat on the ground and without taking a step or run up. It was usually performed with a counter movement, where there was bending of the knees immediately prior to the jump. The test could also be performed as a squat jump, starting from the position of knees being bent. Other test variations were to perform the test with no arm movement.

As Table 4.3 shows, the mean difference between the pretest (37.42) and posttest (45.93) of the experimental group of the sample in vertical jump test is (8.51) greater than the difference in the comparisongroups which is (1.24). The difference between the means of

the experimental group during pre and post was found to be statistically significant (p=.000). In addition, the mean differences in the experimental groups have positive value from pre intervention to post intervention, while the controlled one has negative. This implies that the test has positive result for the hypothesis since the test value in the posttest was bigger than in the pretest. They have positive effect of conditioning exercise on skill related physical fitness.

The t value and p-value also supports the mean result suggests that the conditional exercise have positive effect on skill related physical fitness. In the case of this research, the mean value of the experimental group of the vertical jump test was greater than the comparison group. This suggests that there is satisfactory change and positive effect of conditioning exercise on skill related physical fitness on the experimental group of test whereas no or little change happened in the comparison groups of the research. Although sex comparison is not made, however, the mean score of the vertical jump test in comparison to the standards of vertical jump test presented in Table 3.6 of page 35 is much below average, and needs other mechanisms that would help improve this skill component.

This finding raises concern on the conditioning or that of the motor skill of the students. Blackmon (2015) stated that depending on the time available for each session and the way training sessions are conducted, all components of fitness can be developed using a three-day-per-week schedule. Equally, Brand, Gustafson, et. al, (2009)showed that a 8 week training intensity program is crucial foundation for moderate intensity training principle system. But, the result of this study does not exactly fit these generalizations. There could be some more explanations as to why the increase is not much higher, one could be exercise progress should be adjusted according to the exerciser's own assessment (Dick, 1997 and Corbin et al., 2002) where as in this study all students were trained as a group which seeks further investigation.

Table 4.4 Mean, standard deviation and t-test value of Illinois agility test

	Mean	n	Std.	t	Sig.

				Deviation		
Pair 1	pre experimental Illinois test	18.5907	75	2.30283	0.762	0.000
	post experimental Illinois test	17.3505	75	1.59575		
Pair 2	pre comparison Illinois test	19.3253	75	2.21140	0.869	0.058
	post comparison Illinois test	19.0865	75	2.38141		

Agility is the ability ofmoving quickly and change directions while maintaining control and balance. Good agility requires a combination of speed, balance, power and co-ordination. Below is a collection of agility fitness tests.

The Illinois Agility Test (Getchell, 1979) is commonly used test of agility in sports, and as such there are many norms available. The Illinois agility test is a fitness test designed to test one's sport agility. It is a simple test which is easy to administer and requires little equipment. It tests the ability to turn in different directions and at different angles

The mean difference of the pre and posttest of experimental group, and the controlled group in the Illinois agility test have similar fashion as in the vertical jump test. The mean difference in experimental group is 1.24 while the controlled group is 0.24. Even if the difference is very small, Illinois agility test also have positive effect of conditional exercise on skill related physical fitness.

Likewise, the t-value and p-value also support that the mean result that the conditional exercise of Illinois agility test has positive effect on skill related physical fitness. In the output above, we can see that the predictor variable of Illinois agility test in the experimental group is significant because its p-value is 0.000.

Systematic observation, however, depicts that the intervention does not seem to be of greater impact in changing the ability of the students since the average in the experimental group declined from pre to post intervention. This demands further scrutiny. Yet, maximum average of 19.33 shows poor results for male and average for females. This result as presented here is way off from the theoretical consideration.

This finding seems to be against that of Haga who stated that there is a relationship between motor skills, fitness, and physical activity (Haga, 2009). It is also in contrast with the findings of USDHHS, ACSM (1996; 2000) who depicted that a well-balanced exercise program can improve general health, builds, and endurance and physical fitness components (USDHHS, ACSM, 1996; 2000).

Table 4.5 Mean, standard deviation and t- value of 30m run test

		Mean	N	Std. Deviation	t	Sig.
Pair 1	pre experimental 30m run test	4.3400	75	.25298	0. 785	0.024
	post experimental 30m run test	4.2267	75	.26583		
Pair 2	pre comparison 30m run test	4.4000	75	.23905	0.424	0.116
	post comparison 30m run test	4.4933	75	.29633		

The 30m run test was a simple maximal test that could be carried out quickly, and the equipment for the test is readily available. The disadvantage with this test was that it was affected by the running surface, weather conditions and the starting position, therefore to ensure a consistent and reliable test these factors must remain the same each time the test is carried out. One should also consider the time of day with regard to meals and other activities which might influence performance.

Changes in one's maximum sprint speed occurs quite fast when one first start exercising, and then plateau as his/her fitness increases. One reaches a point where the speed is determined more by technique than by fitness level. From that point, research and advice on sprinting technique is more beneficial than increased fitness. The degree to which one pursues depends on whether sprinting is a goal or simply a running speed measuring tool.

In the result of Table 4.5 above, the mean difference did not support the true hypothesis of the research, where the mean value of the experimental group has smaller difference between the pretest and posttest. So this gives negative implication for the hypothesis of this research. In this regard, one would conclude that conditioning exercise has no effect on this skill related physical fitness. Identification of possible causes for the decline in the results of

the 30m run test from pre-test to post-test seeks attention and further research. This finding is ones again contending prior researches stated above Riches (p. 207-216,2017)as stated in the types of conditioning exercises may vary greatly depending on fitness goals and are adaptable to any level of fitness, from beginners to advanced athletes. Equally, conditioning exercise is a gradual process and should take six to eight weeks to see specific effects (Cochrane, 2016). Hence, if the problem is associated with the type and duration of the conditioning exercise, it would be useful to conduct further detailed study.

Table 4.6 Mean, standard deviation and t-value of stick drop test

		Mean	N	Std. Deviation	t	Sig.
Pair 1	pre experimental stick drop test	27.7933	75	5.30727	0.632	0.000
	post experimental stick drop test	34.2600	75	5.81420		
Pair 2	pre comparison stick drop test	25.6053	75	5.94961	0.636	0.230
	post comparison stick drop test	25.1587	75	5.17898		

The stick drop test measures the time needed to react to a dropped object and catch it in your hand. This test is used to assess reaction time. This test uses the known properties of gravity to determine how long it takes a person to respond to the dropping of an object by measuring how far the object moves.

In a drop test analysis, the time varying stresses and deformations due to an initial impact of the product with a rigid or flexible plane surface (the floor) are calculated. As the product deforms, secondary internal and external impacts are also calculated, locating critical weaknesses or failure points, as well as stresses and displacements.

The maximum “gravity force” experienced by individual components is one of the primary unknowns before a drop test. This is a critical parameter since many electronic and mechanical components are not rated for further use above a specified maximum gravity force. Using drop test analysis with solid works, Simulation designers and engineers can measure the time varying accelerations (gravity force) at any location within the product, providing critical design information and reducing the number of physical tests needed. A

design team can easily verify performance while they design and select the correct materials, component shape, and fixture methods to ensure that critical components stay within their "max gravity force" limits.

Table 4.6 shows that the mean difference of the pre (27.79) and posttest (34.26) of the experimental group of the sample in stick drop tests has bigger difference (6.47) than the mean difference of pre (25.61) and post (25.16) test of the controlled group (0.45). In addition, the experimental group mean difference have positive value. This implies that the test has positive result for the hypothesis since the test value in the posttest was bigger than in the pretest. This shows that conditioning exercises have positive effect on this skill related physical fitness.

The paired t-test and p-value also support that the mean result due to conditional exercise of stick drop test has positive effect on skill related physical fitness. In the output of Table 4.6 above, we can see that the predictor variable of stick drop test is significant for the experimental group because the p-value is 0.000. This is in agreement with the findings of Richs, (2015) who concluded that conditioning exercise can give tremendous improvements in skill performance, and that of Blackmon, (2015) who stated that depending on the time available for each session and the way training sessions are conducted, all components of fitness can be developed using a three-day-per-week schedule.

Table 4.7Mean, standard deviation and t-value of balance test

		Mean	N	Std. Deviation	Correlation	Sig.
Pair 1	pre experimental balance test	13.2667	75	2.34419	.934	0.000
	post experimental balance test	24.0000	75	3.00000		
Pair 2	pre comparison balance test	12.0667	75	1.38701	.726	0.082
	post comparison balance test	12.8667	75	2.06559		

Balance is an ability to maintain the line of gravity (vertical line from center of mass) of a body within the base of support with minimal postural sway. Sway is the horizontal movement of the center of gravity even when a person is standing still.

Balance may be static or dynamic. Static balance refers to the ability of a stationary on object to its balance. This happens when the objects center of gravity is on the axis of rotation, whereas dynamic balance is the ability of an object to balance whilst in motion or when switching between positions.

Table 4.7 shows that the mean difference of the pre (13.27) and post (24.00 test of the experimental group of the sample in balance tests has bigger difference (10.73) while the mean difference of pre (12.07) and post-test (12.87) of the comparison group is (0.80). This implies that the test has positive result for the hypothesis since the test value in the posttest was bigger than in the pretest of the experimental group. This shows that conditioning exercise has positive effect on this skill related physical fitness.

Despite the reported statistically significant difference, the mean values in each category of groups is much less that the expected standard stated in the balance test presented in Table 3.5. As presented in the table the standard of below 15.4 sec for Male and 12.0 for Female is declared poor achievement. In this regard, the conditioning exercise does not seem to enhance the skill related fitness to be above average. This is against the findings of Richs, (2015) who concluded that conditioning exercise can give tremendous improvements in skill performance, and that of Blackmon, (2015) who stated that depending on the time available for each session and the way training sessions are conducted, all components of fitness can be developed using a three-day-per-week schedule. Hence, this again demands further detailed investigation.

Table 4.8 Mean, standard deviation and t-value of coordination test

		Mean	N	Std. Deviation	Correlation	Sig.
Pair 1	pre experimental coordination test	11.1733	75	1.11952	-0.040	0.735
	post experimental coordination test	23.6000	75	2.06646		

Pair 2	pre comparison coordination test	10.4267	75	1.39665	0.447	0.000
	post comparison coordination test	13.0800	75	1.89423		

Coordination is the ability to move two or more body parts under control, smoothly and efficiently. Manual dexterity tests or tests of hand-eye coordination also fall into this category. Coordination is a complex skill that requires good levels of other fitness components such as balance, strength and agility. On a sporting field, someone who appears to be well coordinated may also be displaying good reactiontime. It is also a difficult skill to teach; rather it is something that is achieved through proper development throughout early life development. As such, coordination tests are often used in a test battery for monitoring a young person's development or lack thereof.

Table 4.8 above shows, the mean difference of the pre (11.17) and post-test (23.60) of the experimental group of the sample in coordination tests have bigger difference (12.43) than the mean difference of pre (10.43) and post-test (13.08) of the comparison groups (2.65). This implies that the test has positive result for the hypothesis since the test value in the posttest was bigger than in the pretest. Thus, conditioning exercises have positive effect on skill related physical fitness.

As reported in Table 4.8 both the experimental and comparison groups have shown to have positive and statistically significant mean differences though the difference of the experimental group was much higher. This goes in agreement with Brand, Gustafson, et. al, (2009) who stated that an 8 week training intensity program is crucial foundation for moderate intensity training principle system, and that of Richardson, (2006) who justified that providing students with these opportunities to learn conditioning exercises in skill related fitness exercises is important. Here , it may be important to mention the idea of Haga (2009) who stated that it is believed that there is a relationship between motor skills, fitness, and physical activity (Haga, 2009),which is explained in agreement with the findings of this study that the experimental group showed much higher gain in coordination. But, versus the findings of the other fitness components stated earlier, it is worth mentioning that the

findings might generate a question as to whether coordination improves as a function of time, which needs further research.

Table 4.9 Paired sample t-Test results for the mean gain of each paired sample

		mean	SD	Std. Error Mean	t	df	Sig.
Vertical Jump Test	pre experimental and post experimental vertical jump test	8.509	14.048	1.622	5.246	74	.000
	pre controlled and post controlled vertical jump test	1.235	9.388	1.084	1.140	74	.258
Illinois Agility Test	pre experimental and post experimental Illinois test	1.240	1.499	0.173	7.165	74	.000
	pre controlled and post controlled Illinois test	0.239	1.186	0.137	1.743	74	.085
30m Run Test	pre experimental and post experimental 30m run test	0.921	1.470	0.170	5.427	74	.000
	pre controlled and post controlled 3cm run test	1.636	8.018	0.926	1.767	74	.081
Stick Drop Test	pre experimental and post experimental stick drop test	6.467	4.796	0.554	11.678	74	.000
	pre controlled and post controlled stick drop test	0.447	4.800	0.554	0.806	74	.423
Balance Test	pre experimental and post experimental balance test	10.360	1.332	0.154	67.361	74	.000
	pre controlled and post controlled balance test	0.560	1.081	0.125	4.486	74	.000
Coordination Test	pre experimental and post experimental coordination test	12.427	2.389	0.276	45.047	74	.000
	pre controlled and post controlled coordination test	2.653	1.782	0.206	12.895	74	.000

In the paired sample t-Test analysis, all the variables of physical fitness test were found to have positive mean gain from pre-test to post-test. This shows that the conditional exercises in the research sample have shown to have positive effect on the skill related physical fitness components. In some of the components such as balance test and coordination test, the comparison group also shown to have positive difference, whilst the other variables were not. From the six components considered in this research the other four variables were not found to be statistically significant. Failure to get significant mean gain in the comparison groups but that of significant mean gain in the experimental groups justifies that conditioning exercise positively impacts the development of skill related to physical fitness

components. Despite this, the achievement of significant mean gain in the comparison groups for the components of balance and coordination demands further examination. In spite of this demand, however, the extent of the mean gain was larger in the experimental group than the comparison group reveals the importance of the conditioning exercise. This is in agreement with Richardson, (2006) who stated that providing students with these opportunities to learn conditioning exercises in skill related fitness exercises is important.

From the questions stated for this research it was found that there a significant difference between the mean scores of experimental group between pre and post-test in the fitness components. There was also statistically significant difference between the mean scores of comparison group and experimental groups.

While the moderate intensity of conditioning exercise was found to be improving, the measured values of the moderate intensity of conditioning exercise in terms of time and energy expenditure were not up to the expected level of excellence depicted as measurement scales. This seeks further investigation of possible instructional interventions that maximize the skill related physical fitness with improved intensity as a function of time and energy.

Finally, the effect of conditioning exercise on skill related fitness was found to be positive except for agility and 30m run test that stand to be way far from literature. In these two components the result of the post experiment was found to be lesser than the result during pre-test. This seeks further scrutiny and examination to unpack the causes for such a declining gap while it was expected to be improving.As conditioning exercise can give tremendous improvements in skill performance (Richs, 2015) and conditioning exercise on skill related physical fitness component should be a primary objective in all school education programs and in health promotion programs (McGraw-Hill companies, 2003)It will be important to conduct further research on the contending findings and adjust the physical education program to meet achievement of intended improvements of fitness and general health conditions. .

CHAPTER FIVE

Summary, Conclusions and Recommendations

This chapter deals with the presentation of summary of findings, conclusions and recommendations of the research

5.1 Summary

The main objective of this study was to investigate the effect of conditioning exercise on skill related physical fitness components at Amuru high school. To meet the objective in detail, the following research questions were raised.

- Is there a significant difference between the mean scores of experimental group pre and post-test?
- Is there a significant difference between the mean scores of comparison and experimental groups?
- What is the moderate intensity of conditioning exercise in terms of time and energy expenditure that maximizes the skill related physical fitness?
- What is the effect of conditioning exercise on skill related fitness?

In order to investigate the effect of conditioning exercise on skill related physical fitness components, quasi-experimental research method was employed. The relevant data to the study were gathered through actual performance field test with the reference to the six components of physical fitness through the measures of vertical jump test, Illinoi's agility run test, 30m sprint run test,Eye-Hand Coordination test, balance test and stick drop test. In general, 150 participants grouped into two – experimental and comparison groups were involved in the study. The data were analyzed using both descriptive analyses by using frequency, mean, and standard deviation and inferential analyses by using paired and independent samples t-test based on the actual performance field test results. Based on the data gathered, the following major findings were obtained from the study.

In the paired sample t-Test analysis, all the variables of physical fitness test were found to have positive mean gain from pre-test to post-test.

In some of the components such as balance test and coordination test, the comparison group also shown to have positive difference, whilst the other variables were not.

From the six components considered in this research the other four variables were not found to be statistically significant.

Conditioning exercise positively impacts the development of skill related to physical fitness components.

There is significant difference between the mean scores of experimental group between pre and post-test in the fitness components.

There was also statistically significant difference between the mean scores of comparison group and experimental groups, experimental group gaining better results in majority of the components.

The moderate intensity of conditioning exercise was found to be improving in terms of time and energy expenditure.

Finally, the effect of conditioning exercise on skill related fitness was found to be positive except for agility and 30m run test that stand to be way far from literature. In these two components the result of the post experiment was found to be lesser than the result during pre-test. This seeks further scrutiny and examination to unpack the causes for such a declining gap while it was expected to be improving.

5.2 Conclusions

Based on the data that the researcher obtained and analyzed, the following basic points were presented as a conclusion.

- The study discovered that, there was a significant difference in the scores for experimental group on majority of the fitness components justifying that the intervention of conditioning exercise was found to be of positive effect in developing the physical fitness components.
- The effect of conditioning exercise on skill related fitness was found to be positive for the four components except agility and 30m run test. In these two components the result of the post experiment was found to be lesser than the result during pre-test. This seeks further scrutiny and examination to unpack the causes for such a declining gap while it was expected to be improving.
- Planned conditioning exercises were found to be useful to develop the skill related physical fitness components at Amuru high school.

5.3 Recommendations

On the bases of the conclusions mad the following points are recommended.

- As conditioning exercise was found to have positive impact of developing physical fitness components, it is wise to work further on improving the intensity of such gains on the physical fitness.
- The results of the experimental group did not show improvement for the variables of agility and 30 m run test. This does not go in line with the literature. Hence, it is recommended to have further research with increased sample size and intervention alternatives and intensity.
- Since conditioning exercise was found to have positive gain on the development of physical fitness components, except agility and 30 m run test, it would be wise to give emphasis on such conditioned exercise in the school teaching learning.
- Lastly the researcher recommends those interested individuals to conduct a detail and further investigation on the issue under the study to develop better understanding of the situation and mark-up the variation observed with the agility and 30m run.

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APPENDIX-A

ADDIS ABABA UNIVERSITY

DEPARTEMENT OF NATURAL SCIENCE AND MATHEMATICS

A. Field test standards

Stick Drop Test (Reaction Time (sec.))

Male	Grade	Female	Grade
43.5 sec	Excellent	42.5 sec	Excellent
38.0-43.5 sec	Good	36.0-42.00 sec	Good
30.0-38.00 sec	Average	28.0-36.0 sec	Average
23.0-30.0 sec	Fair	22.0-28.0 sec	Fair
<22.00 sec	Poor	<21.0 sec	Poor

Source: adopted from journal exercise science and physiotherapy 3(2), p 156-160 (2003).

B. Vertical Jump test (cm)

Male	Grade	Female	Grade
>70.0 cm	Excellent	>50.0 cm	Excellent
61.0-69.0 cm	Good	39.0-40.0 cm	Good
50.0-60.0 cm	Average	32.0-38.0 cm	Average
30.0-49.0 cm	Fair	31.0-26.0 cm	Fair
<29.0 cm	Poor	<26.0 cms	Poor

Source: adopted from journal exercise science and physiotherapy 3(2), p 156-160 (2003).

C. Illinois Agility Run test (sec.)

Male	Grade	Female	Grade
<15.2 sec.	Excellent	17.0 sec.	Excellent
16.1-15.2 sec.	Good	17.9-17.0 sec.	Good
18.1-16.2 sec.	Average	21.7-18.0 sec.	Average
18.3-18.2 sec.	Fair	23.0-21.8 sec.	Fair
>18.3 sec.	Poor	>23.0 sec.	Poor

Source: adopted from journal exercise science and physiotherapy 3(2), p 156-160 (2003).

D. For 30m Sprint Run test (sec.)

Male	Grade	Female	Grade
<3.8 sec.	Excellent	4.0 sec.	Excellent
4.0 sec.	Good	4.2 sec.	Good
4.2-4.0 sec.	Average	4.4-4.3 sec.	Average
4.4-4.3 sec.	Fair	4.8-4.7 sec.	Fair
>4.5 sec.	Poor	>5.0 sec.	Poor

Source: adopted from journal exercise science and physiotherapy 3(2), p 156-160 (2003).

E. Coordination test (sec)

Male	Grade	Female	Grade
5.8 sec	Excellent	7.7 sec	Excellent
7.5 sec	Good	8.5 sec	Good
7.7 sec	Average	8.9 sec	Average
8.5 sec	Fair	9.3 sec	Fair
8.9 sec	Poor	9.6 sec	Poor

F. Balance test (sec)

Male	Grade	Female	Grade
59.8 sec	Excellent	46.9sec	Excellent
46.9sec	Good	41.1sec	Good
41.1 sec	Average	24.9 sec	Average
24.9sec	Fair	15.4 sec	Fair
15.4 sec	Poor	12.0 sec	Poor

Source AAHPERD Youth FITNESS TEST 1991

Raw data for experimental and comparison groups

ID	Sex	Age	Pre Experimental	post Experimental In	Pre control vertical	Post control group Vertical	Pre Experimental	Post Experimental	Pre Control Illinois	Post control Illinois	Pre Expermental 30m run test	Post Exnermental	Pre control group 30m run	Post Control	Pre Expermental stick drop (sec.)	Post Expermental	Pre Control Stick drop (sec.)	Post Control Stick drop (sec.)
1	1.00	3.00	67.00	69.00	41.00	41.00	15.70	16.00	17.70	18.80	4.00	3.80	4.30	4.20	43.00	45.50	39.00	33.00
2	2.00	2.00	47.00	41.00	37.00	67.00	18.80	17.60	16.10	16.20	4.30	4.20	4.10	3.90	33.00	40.00	43.00	42.00
3	1.00	1.00	60.00	68.00	32.00	32.00	16.20	15.80	18.00	18.70	4.20	3.90	4.40	5.00	28.00	44.00	34.00	35.00
4	2.00	4.00	37.00	42.00	48.00	58.00	18.80	17.90	17.40	16.40	4.40	4.20	4.20	4.10	35.00	42.00	44.00	29.00
5	1.00	3.00	60.00	67.00	30.00	30.00	16.40	15.70	19.00	21.50	4.10	4.00	4.20	4.70	31.00	42.00	25.00	25.00
6	1.00	2.00	48.00	64.00	37.00	30.00	16.70	17.30	21.90	23.50	4.30	4.10	4.50	4.80	30.00	35.00	24.00	26.00
7	1.00	4.00	49.00	55.00	31.00	26.00	16.20	17.00	22.00	24.00	4.40	3.90	4.70	4.80	23.00	36.00	26.00	23.00
8	1.00	3.00	37.00	50.00	24.00	20.00	16.30	17.50	21.00	21.00	4.50	4.20	4.80	4.40	22.00	38.00	29.00	18.00
9	1.00	4.00	30.00	35.00	20.00	23.00	18.40	18.30	25.00	25.00	4.20	4.30	4.60	4.70	36.00	29.00	20.00	20.00
10	2.00	3.00	36.00	44.00	49.00	45.00	18.50	21.00	18.30	16.30	4.70	4.40	4.30	4.30	25.00	37.00	28.00	30.00
11	2.00	2.00	29.00	35.00	66.00	60.00	21.50	18.00	18.10	16.70	4.20	4.30	4.50	4.40	26.00	36.00	27.00	29.00
12	2.00	2.00	28.00	32.00	60.00	40.00	21.00	19.00	18.20	18.40	4.50	4.30	4.50	4.50	23.00	35.00	30.00	20.00

14	2.00	2.00	25.00	30.00	28.00	26.00	26.70	22.00	18.50	15.60	4.80	4.70	3.90	4.50	20.00	29.00	21.00	35.00
15	1.00	3.00	27.00	28.00	23.00	29.00	18.50	18.20	24.00	19.00	3.90	4.40	4.60	4.70	33.00	30.00	19.00	27.00
16	1.00	3.00	60.0	68	63	47	16.70	15.20	19.70	19.65	4.80	4.50	4.75	4.70	38	41	23	24
17	2.00	3.00	25.10	26.10	25.12	25.10	18.20	18.15	18.25	18.20	4.30	4.25	4.5	45.1	30.0	34	21.40	21.40
18	1.00	3.00	60.0	67	60	65	18.90	16.90	23	22.70	4.90	4.80	4.70	4.57	23	30	29.1	29.2
19	2.00	2.00	26.10	27.40	26.30	2.4	18.40	17.70	18.25	18.20	4.20	4.15	4.4	4.4	23	23.40	22.6	22.3
20	1.00	1.00	63	67	60	61	17.80	16	18.90	18.20	4.20	4.10	4.90	4.88	30	39	30.1	30.2
21	2.00	4.00	30.0	31.10	29.90	30	17.30	16.20	17.50	17.40	4.2	4.1	4.4	4.4	23.5	30	23	23
22	1.00	3.00	62.0	69	30	31	19.6	17	19.80	19.60	4.70	4.50	4.75	4.67	34.6	42	23.10	24.1
23	1.00	2.00	31.10	32.10	27.10	27.40	18.20	17.30	18.30	18.20	4.0	3.9	4.3	4.3	29	32	22	22
24	1.00	4.00	64.0	68	61	61	17.50	15.10	17.60	17.40	4.10	4.0	4.60	4.50	26	30	20.1	21.9
25	1.00	3.00	34.0	38	27	29	16.40	16	17.50	17.40	4.4	4.15	4.6	4.5	29	32	23	22
26	1.00	4.00	47.0	56	49	51	19.50	16.12	18.80	18.60	4.80	4.60	4.80	4.780	29.30	38	19.1	21.1
27	2.00	3.00	48	58	49	51	20.10	18.10	19.80	19.77	4.90	4.80	4.90	4.80	30	37.40	22.1	22.5
29	2.00	2.00	31.0	33	27.30	28	18.20	18.15	18.10	18.05	4.3	4	4.4	4.4	29	31	21	22
30	2.00	3.00	49.0	57	48	49	17.30	15.20	23.20	23.10	4.80	4.70	4.75	4.75	31.10	39.20	27.1	28

31	2.00	2.00	35.10	38	30	31	17.40	16.90	17.30	17.35	4.5	4.3	4.6	4.5	27.0	29.10	21	21.6
32	1.00	3.00	32.0	46	34	36	23	19	23.40	23.30	4.10	4.0	4.50	4.45	29.10	37.40	29.1	29.15
33	1.00	3.00	29.0	31.10	28.10	29.10	16	16.10	17.2	17.10	4.4	4.3	4.5	4.5	24	25	22	21
34	2.00	3.00	24.0	27.10	25.10	25.10	16.70	16	17.60	17.40	4.4	4.2	4.6	4.5	20	23	20	20.6
35	1.00	3.00	62.0	69	39	40	22.10	21.30	23.10	23.05	4.70	4.50	4.50	4.48	29.60	37.60	31.4	31.5
36	2.00	2.00	47.70	55.00	31.00	26.00	16.20	17.00	22.00	24.00	4.40	3.90	4.70	4.80	23.00	36.00	26.00	23.00
37	1.00	1.00	27.0	50.00	24.00	20.00	16.30	17.50	21.00	21.00	4.50	4.20	4.80	4.40	22.00	38.00	29.00	18.00
38	2.00	4.00	29.0	35.00	20.00	23.00	18.40	18.30	25.00	25.00	4.20	4.30	4.60	4.70	36.00	29.00	20.00	20.00
39	1.00	3.00	26.0	44.00	49.00	45.00	18.50	21.00	18.30	16.30	4.70	4.40	4.30	4.30	25.00	37.00	28.00	30.00
40	1.00	2.00	25.10	35.00	66.00	60.00	21.50	18.00	18.10	16.70	4.20	4.30	4.50	4.40	26.00	36.00	27.00	29.00
41	1.00	4.00	29.10	32.00	60.00	40.00	21.00	19.00	18.20	18.40	4.50	4.30	4.50	4.50	23.00	35.00	30.00	20.00
42	1.00	3.00	28.70	29.00	51.00	27.00	24.00	20.00	18.40	18.40	4.60	4.70	4.40	4.40	18.00	27.00	29.00	19.00
44	2.00	3.00	30.0	28.00	23.00	29.00	18.50	18.20	24.00	19.00	3.90	4.40	4.60	4.70	33.00	30.00	19.00	27.00
45	2.00	2.00	30.0	68	63	47	16.70	15.20	19.70	19.65	4.60	4.80	4.90	4.85	38	41	23	24
46	2.00	2.00	27.0	41.00	37.00	67.00	18.80	17.60	16.10	16.20	4.30	4.20	4.10	3.90	33.00	40.00	43.00	42.00
47	2.00	3.00	29.0	68.00	32.00	32.00	16.20	15.80	18.00	18.70	4.20	3.90	4.40	5.00	28.00	44.00	34.00	35.00

48	2.00	2.00	25.90	42.00	48.00	58.00	18.80	17.90	17.40	16.40	4.40	4.20	4.20	4.10	35.00	42.00	44.00	29.00
49	1.00	3.00	27.0	67.00	30.00	30.00	16.40	15.70	19.00	21.50	4.10	4.00	4.7	4.70	31.00	42.00	25.00	25.00
50	1.00	3.00	31.10	56	49	51	19.50	16.12	18.80	18.60	4.80	4.60	4.55	4.55	29.30	38	19.1	21.1
51	2.00	3.00	32.0	58	49	51	20.10	18.10	19.80	19.77	4.70	4.50	4.90	4.85	30	37.40	22.1	22.5
52	1.00	3.00	40.0	31.20	29.75	31	17.40	16.10	18.25	18.20	4.5	4.2	4.5	4.5	23	31	22	22
53	2.00	2.00	29.0	33	27.30	28	18.20	18.15	18.10	18.05	4.3	4	4.4	4.4	29	31	21	22
54	1.00	1.00	32.0	57	48	49	17.30	15.20	23.20	23.10	4.70	4.60	4.70	4.70	31.10	39.20	27.1	28
55	2.00	4.00	25.90	38	30	31	17.40	16.90	17.30	17.35	4.5	4.3	4.6	4.5	27.0	29.10	21	21.6
56	1.00	3.00	31.10	46	34	36	23	19	23.40	23.30	4.10	3.7	4.40	4.35	29.10	37.40	29.1	29.15
57	1.00	2.00	31.10	31.10	28.10	29.10	16	16.10	17.2	17.10	4.4	4.3	4.5	4.5	24	25	22	21
58	1.00	3.00	30.0	26.10	25.12	25.10	18.20	18.15	18.25	18.20	4.30	4.25	4.5	4.5	30.0	34	21.40	21.40
59	1.00	3.00	30.0	26.10	25.12	25.10	18.20	18.15	18.25	18.20	4.30	4.25	4.5	4.5	30.0	34	21.40	21.40
60	1.00	4.00	60.0	67	60	65	18.90	16.90	23	22.70	4.90	4.10	4.70	4.90	20	30	29.1	29.2
61	2.00	3.00	62.0	27.40	26.30	2.4	18.40	17.70	18.25	18.20	4.20	4.15	4.4	4.4	23	23.40	22.6	22.3
62	2.00	2.00	64.0	67	60	61	17.80	16	18.90	18.20	4.20	4.60	4.90	4.70	30	39	30.1	30.2
63	2.00	2.00	47.0	31.10	29.9	30	17.30	16.20	17.50	17.40	4.2	4.1	4.4	4.4	23.5	30	23	23

64	2.00	3.00	48.0	69	30	31	19.6	17	19.80	19.60	4.50.	4.20	4.65	4.40	34.6	42	23.10	24.1
65	2.00	2.00	62.0	32.10	27.10	27.40	18.20	17.30	18.30	18.20	4.0	3.9	4.3	4.3	29	32	22	22
66	1.00	3.00	47.70	68	61	61	17.50	15.10	17.60	17.40	4.	3.60	4.6	4.5	26	30	20.1	21.9
67	1.00	3.00	27.0	38	27	29	16.40	16	17.50	17.40	4.4	4.3	4.6	4.5	29	32	23	22
69	2.00	3.00	29.0	67	60	65	18.90	16.90	23	22.70	4.70	4.10	4.70	4.68	20	30	29.1	29.2
70	1.00	3.00	26.03	27.40	26.30	24	18.40	17.70	18.25	18.20	4.20	4.15	4.4	4.4	23	23.40	22.6	22.3
71	2.00	2.00	25.10	67	60	61	17.80	16	18.90	18.20	4.20	4.	4.5	4.7	30	39	30.1	30.2
72	1.00	1.00	29.10	31.10	29.9	30	17.30	16.20	17.50	17.40	4.2	4.1	4.4	4.4	23.5	30	23	23
73	2.00	4.00	28.70	69	30	31	19.6	17	19.80	19.60	5.0	4.20	4.75	4.80	34.6	42	23.10	24.1
74	1.00	3.00	27.0	69	30	31	19.6	17	19.80	19.60	4.6	4.20	4.75	4.60	34.6	42	23.10	24.1
75	1.00	2.00	30.0	32.10	27.10	27.40	18.20	17.30	18.30	18.20	4.0	3.9	4.3	4.3	29	32	22	22

Raw data for experimental group

ID	Sex	Age	Pr.EB(sec.)	Po.EB(sec.)	Pr.CB(sec.)	Po.CB(sec.)	Pr.EC (sec.)	Po.EC(sec.)	Pr.CC(sec.)	Po.CC(sec.)
1	1.00	3.00	13.00	25.00	10.00	12.00	9.00	22.00	10.00	12.00
2	2.00	2.00	14.00	26.00	12.00	10.00	10.00	25.00	11.00	13.00
3	1.00	1.00	16.00	27.00	13.00	15.00	8.00	23.00	12.00	12.00
4	2.00	4.00	12.00	22.00	14.00	16.00	10.00	24.00	13.00	10.00
5	1.00	3.00	14.00	26.00	12.00	12.00	12.00	26.00	10.00	14.00
6	1.00	2.00	16.00	28.00	15.00	15.00	11.00	24.00	9.00	10.00
7	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00
8	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00
9	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
10	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
11	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
12	2.00	2.00	12.00	22.00	12.00	12.00	10.00	20.00	14.00	14.00
13	2.00	3.00	10.00	21.00	11.00	11.00	10.00	22.00	10.00	16.00
14	2.00	2.00	11.00	22.00	13.00	16.00	12.00	24.00	12.00	12.00
15	1.00	3.00	15.00	26.00	12.00	15.00	11.00	27.00	13.00	13.00
16	1.00	3.00	14.00	26.00	12.00	12.00	12.00	26.00	10.00	14.00
17	1.00	2.00	16.00	28.00	15.00	15.00	11.00	24.00	9.00	10.00
18	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00
19	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00

20	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
21	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
22	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
23	1.00	3.00	14.00	26.00	12.00	12.00	12.00	26.00	10.00	14.00
24	1.00	2.00	16.00	28.00	15.00	15.00	11.00	24.00	9.00	10.00
25	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00
26	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00
27	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
28	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
29	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
30	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00
31	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
32	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
33	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
34	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
35	1.00	3.00	14.00	26.00	12.00	12.00	12.00	26.00	10.00	14.00
36	1.00	2.00	16.00	28.00	15.00	15.00	11.00	24.00	9.00	10.00
37	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00
38	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00
39	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
40	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
41	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
42	1.00	3.00	14.00	26.00	12.00	12.00	12.00	26.00	10.00	14.00
43	1.00	2.00	16.00	28.00	15.00	15.00	11.00	24.00	9.00	10.00
44	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00

45	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00
46	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
47	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
48	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
49	2.00	2.00	11.00	22.00	13.00	16.00	12.00	24.00	12.00	12.00
50	1.00	3.00	15.00	26.00	12.00	15.00	11.00	27.00	13.00	13.00
51	1.00	3.00	14.00	26.00	12.00	12.00	12.00	26.00	10.00	14.00
52	1.00	2.00	16.00	28.00	15.00	15.00	11.00	24.00	9.00	10.00
53	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00
54	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00
55	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
56	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
57	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
58	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00
59	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00
60	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
61	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
62	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
63	2.00	2.00	11.00	22.00	13.00	16.00	12.00	24.00	12.00	12.00
64	1.00	3.00	15.00	26.00	12.00	15.00	11.00	27.00	13.00	13.00
65	1.00	3.00	14.00	26.00	12.00	12.00	12.00	26.00	10.00	14.00
66	1.00	2.00	16.00	28.00	15.00	15.00	11.00	24.00	9.00	10.00
67	1.00	4.00	18.00	29.00	12.00	12.00	10.00	25.00	8.00	11.00
68	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00
69	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00

70	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
71	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00
72	1.00	3.00	11.00	20.00	11.00	11.00	11.00	21.00	10.00	13.00
73	1.00	4.00	13.00	21.00	13.00	13.00	12.00	26.00	11.00	12.00
74	2.00	3.00	10.00	20.00	10.00	10.00	10.00	23.00	12.00	16.00
75	2.00	2.00	14.00	25.00	11.00	13.00	13.00	21.00	10.00	15.00

Declaration

I here declare that thesis is my original work and has not been presented for a degree in any other university and that all sources of material used for the thesis have been duty acknowledged.

Name; _____

Signature, _____

Date; _____-

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

Name; _____

Signature; _____

Date; _____