THE EFFECTS OF PHYSICAL ACTIVITY PROGRAM ON HEALTH-RELATED FITNESS FOR SEVENTH-GRADE STUDENTS IN BHUTAN

GAYLEY LHENDUP

A Thesis Submitted to the Graduate School of Naresuan University
in Partial Fulfillment of the Requirements
for the Master of Education in Physical Education and Exercise Science - (Type A2)
2024

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By Gayley Lhendup

has been approved by the Graduate School as partial fulfillment of the requirements for the Master of Education in Physical Education and Exercise Science - (Type A2) of Naresuan University

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Title	THE EFFECTS OF PHYSICAL ACTIVITY PROGRAM ON HEALTH-RELATED FITNESS FOR SEVENTH-GRADE STUDENTS IN BHUTAN
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ABSTRACT

The physical health of adolescents in Bhutan is of national importance, with rising non-communicable diseases (NCDs) like obesity and cardiovascular conditions necessitating early intervention. However, the current physical education (PE) curriculum has shown limited effectiveness in improving health-related fitness (HRF) due to insufficient activity frequency and targeted interventions. This study addresses this gap by evaluating a structured Physical Activity Program (PAP) grounded in the FITT principle, aiming to enhance HRF components; cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition, among seventh-grade students at Pema Gatshel Middle Secondary School in Bhutan. Employing a quasi-experimental design with pre-and post-tests, the study sampled 62 students, divided equally into experimental (PAP) and control (PE) groups. Through an 8-week intervention, HRF outcomes were measured using FitnessGram tests, with data analyzed via dependent and independent t-tests. Key findings indicate significant improvements in the PAP group across all HRF components except body composition, where both groups demonstrated comparable progress. Cardiorespiratory endurance rose from a mean of 23.23 to 30.57 ($p<0.05$), muscular strength from 7.47 to 12.37 ($p<0.05$), muscular endurance from a mean of 10.10 to 16.40 ($p<0.05$), and flexibility from 27.98 to 29.85 ($p<0.05$). Notably, cardiovascular endurance and muscular strength gains in the PAP group underscore the importance of targeted

physical activity for effective fitness outcomes. These results suggest that a structured PAP significantly benefits student fitness, providing a compelling case for integrating such programs into Bhutan's school curricula. The study recommends adopting a more frequent, structured approach to PE, focusing on progressive overload principles to sustain HRF improvements. This approach could inform policy adjustments and PE program designs in Bhutan, potentially reducing adolescent NCD prevalence and promoting lifelong health benefits.

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Gayley Lhendup

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CHAPTER I

INTRODUCTION

Background

Physical fitness is fundamental to overall well-being (Pocaan, 2024). Recently, the increased prevalence of sedentary lifestyles has emerged as a significant global health concern. This trend has resulted in an ongoing decrease in children's Health-Related Fitness (HRF) which has posed risks for various health issues such as cardiovascular diseases, metabolic syndrome, obesity, and a diminished health-related quality of life (Ye et al., 2018). An alarming pattern became evident, with a global prevalence of insufficient physical activity observed among adolescents aged 11-17 years with 75-81% and 25% for adults (Chaput et al., 2020; World Health Organization, 2019). In specific nations, a significant portion, potentially up to 70% of the population, faces heightened levels of inactivity, stemming from factors such as limited awareness and investment, changing transportation patterns, escalating dependence on technology such as persistent use of smartphones, video games, and digital entertainment leading to increased screen time and decreased outdoor physical activities among children, urbanization, and cultural values (Carlson et al., 2015; Tremblay et al., 2017). Simultaneously, the profound societal implications of sedentary behavior and inadequate physical activity are evident, resulting in annual healthcare costs associated with these factors reaching substantial figures in the billions of dollars (World Health Organization, 2019) contributing to 1-3% of the total national healthcare costs annually (Carlson et al., 2015). This worrisome pattern contributes to the increasing prevalence of Non-Communicable Diseases (NCDs) (Bull et al., 2020). Furthermore, the epidemic of childhood obesity has escalated, and changes in the curriculum have reduced chances for physical activity and the promotion of HRF among young people. As we can see, this will have negative effects on the level of HRF, especially for youths (Himmelstein et al., 2017). Hence, as technology continues to advance globally, prioritizing HRF becomes increasingly crucial and essential for overall well-being. The importance of HRF in today's world cannot be overstated, given

its critical role in preventing chronic diseases, enhancing quality of life, and improving the burden on healthcare systems. Nevertheless, several pressing issues and challenges are currently exposing the global status of HRF, demanding swift attention and comprehensive research efforts (Liguori & American College of Sports Medicine, 2020).

Amidst the global narrative of sedentary lifestyles and physical inactivity, Bhutan is no different, struggling with challenges similar to those encountered by nations across the globe. Despite its distinctive cultural identity and emphasis on holistic well-being, the kingdom is not isolated from the prevailing global trends contributing to a decrease in physical activity levels and a rise in sedentary behaviors. The findings from the Global School-Based Health survey state that the weighted prevalence of sedentary behavior among Bhutanese adolescents was 29.12%, which indicates that low level of HRF has led to a rise in NCDs among the Bhutanese population, causing death and premature mortality, accounting for 69% and 71% of all deaths in 2014 and 2019, respectively (Dendup et al., 2020). Similarly, the findings from the WHO STEPwise approach to surveillance (STEPS) survey state that physical inactivity emerged as a significant contributor to the surge in NCDs in Bhutan where 33.5% of participants reported being overweight. The study further highlighted that work-related activity (69.0%), commuting (15.5%), and recreational activities (15.4%) constituted the primary components of overall physical activity in the country. Notably, insufficient physical activity was most prevalent (28.7%) among individuals in the younger age group of 15–17 years. This alarming trend underlines the pressing need to implement appropriate measures during the early stages (World Health Organization, 2021). The study conducted by Gyaltshen (2023) revealed that there are shortcomings in the Bhutanese HPE curriculum, including insufficient emphasis on specific physical activities for fitness improvements.

Given these challenges, it is crucial to formulate effective strategies for promoting HRF and addressing the associated issues. One pivotal approach in tackling these concerns has involved the implementation of the Physical Activity Program (PAP) in schools. The cornerstone of HRF components is Physical Activity (PA), which exerts a direct and profound impact. The extensive study of regular PA reveals its

diverse benefits in enhancing HRF. PA is defined as “any bodily movement produced by skeletal muscles that requires energy expenditure beyond resting expenditure (Almnifi et al., 2023; Babic et al., 2014; Bearne, 2023; Chen et al., 2018; Fletcher et al., 2018; Kandola & Bann, 2021)”. It also refers to any bodily movement generated by skeletal muscles at the expense of energy utilization: lifting, working out, playing, traveling, walking, cycling, dancing, gardening, and housework (Caldwell et al., 2019; Dhuli et al., 2022; World Health Organization, 2019). Thivel et al. (2018), define PA as any body movement generated by the contraction of skeletal muscles that raises energy expenditure above the resting metabolic rate and is characterized by its modality, frequency, intensity, duration, and context of practice. It is also defined as bodily movement produced by skeletal muscle contraction that requires energy expenditure above basal levels (Fletcher et al., 2018) which results in a substantial increase over the resting energy expenditure (Babic et al., 2014).

Physical activity provides important health benefits and can enhance the quality of life for both children and adults. More specifically, regular participation in PA produces improvement in multiple dimensions of HRF such as aerobic capacity, body composition, muscular strength, muscular endurance, and flexibility (Cooper Institute, 2017a). It also plays a crucial role in promoting physical and mental well-being, making it a subject of paramount importance in contemporary research and public health initiatives (Melnyk et al., 2020). It has been associated with improved mental health, reduced symptoms of anxiety and depression, and enhanced cognitive function (Northey et al., 2018; Rebar et al., 2015). Engaging in regular PA improves cardiovascular endurance by strengthening the heart and increasing its efficiency. This results in a reduced risk of cardiovascular diseases such as Coronary Artery Disease (CAD) and hypertension (Powell et al., 2018). Similarly, resistance training exercises, a component of PA, enhance muscular strength and endurance contribute to improved daily functioning, and reduce the risk of musculoskeletal injuries. Incorporating activities that promote flexibility, like stretching exercises or yoga, helps maintain joint mobility and range of motion essential for preventing injuries and maintaining overall mobility (Myers et al., 2015). Regular PA can also assist in achieving and maintaining

a healthy body composition, reducing excess body fat, which is linked to various chronic conditions, including obesity and metabolic syndrome (Swift et al., 2014).

While extensive research has demonstrated the positive impact of physical activity on children's HRF globally, there is a lack of data focusing on Bhutanese adolescents. Bhutan's distinct cultural practices, dietary habits, and environmental conditions may significantly influence the outcomes of physical activity interventions. Additionally, the educational policies and infrastructure in Bhutan differ from those in more developed countries, necessitating a tailored approach to implementing and assessing PAPs. This study aims to fill the gap in the existing literature by providing insights into how such programs can be designed and executed effectively within the Bhutanese educational system, considering the unique demographic and environmental factors. Understanding these dynamics is crucial for developing sustainable health initiatives that promote physical fitness and overall well-being among Bhutanese youth.

The Bhutan government has recognized the importance of PA for youth and has initiated programs to promote physical education and sports in schools, further emphasizing its relevance to HRF (Minstry of Education, 2019). Bhutan's mountainous terrain provides ample opportunities for activities that challenge the cardiovascular system, helping students develop endurance and reduce the risk of heart-related diseases. Therefore, engaging in PA such as hiking and running in Bhutan's hilly terrain can improve cardiovascular endurance. This is crucial for ensuring a healthy heart and reducing the risk of cardiovascular diseases.

Incorporating activities like Yoga, which is an integral part of Bhutanese culture, can improve flexibility among students. Flexibility is vital for injury prevention and overall physical fitness. Furthermore, regular PA can help Bhutanese students maintain a healthy body composition by promoting the burning of excess calories and reducing the risk of obesity. This is particularly important given the global rise in childhood obesity that can be tackled at the population level by education, prevention, and sustainable interventions related to healthy nutrition practices and PA promotion (Karnik & Kanekar, 2012).

In light of the escalating prevalence of sedentary lifestyles and the associated health risks, it becomes imperative to comprehend the determinants and mechanisms influencing PA behavior. Therefore, this research study specifically aims to explore the lived experiences of Bhutanese youth participating in PAP that promote HRF. Employing a Quasi-experimental Design with Pretest-Posttest assessment, integrating a PAP based on FITT principles (Frequency, Intensity, Time, and Type), this study will focus on "The Effects of Physical Activity Program on Health-Related Fitness for Seventh-Grade Students in Bhutan". The goal is to contribute valuable insights into the impact of PAP on HRF.

The exclusive blend of traditional values and modern lifestyle changes has provoked interest in understanding the effects of PAP on HRF for Bhutanese students. As the country undergoes social and economic transformation, it becomes increasingly important to assess the impact of such intervention on the well-being of its younger generation. Moreover, this research not only contributes to the academic dissertation on the effects of PAP on HRF for Bhutanese students but also greatly contributes to the educational and public health authorities in Bhutan. Findings and conclusions from this study could guide in future design and implementation of adapted PAP that resonate with Bhutanese cultural norms and preferences, ultimately promoting holistic well-being among adolescents.

Research Problems

Bhutan, a small Himalayan nation, has been experiencing increasing rates of NCDs such as obesity, diabetes, and cardiovascular diseases among its population, including students (Tamang et al., 2022). These health issues are often linked to a sedentary lifestyle, physical inactivity, and poor HRF levels. Bhutan places a strong emphasis on Gross National Happiness (GNH) and well-being, making it imperative to address these health challenges, particularly among its young population. The following are the main problems associated with HRF in Bhutan.

1. The current state of HRF among Bhutanese students is not well documented since 2014.

2. Lack of comprehensive data on the impact of PAP on HRF for Bhutanese students.
3. Lack of data on the effectiveness of the current PE curriculum in improving HRF in Bhutan.

Research Questions

1. What is the current level of HRF among Bhutanese students, including aspects like cardiovascular fitness, muscular strength, muscular endurance, flexibility, and body composition?
2. How effective are physical education classes in Bhutanese schools in improving HRF among students?

Research Objectives

1. To compare the health-related fitness (HRF) results within the same group before and after implementing a physical activity program (PAP) and physical education (PE).
2. To compare the post-test HRF results between groups following the implementation of both the PAP and PE.

Research Significance

1. To address the existing research gap in understanding if the PAP is effective in improving HRF for students in Bhutan.
2. To serve as valuable baselines and benchmarks for future research in the field of HRF level for Bhutanese students.
3. To present recommendations to educators and policymakers on the importance of PAP in the Bhutanese context to enhance HRF in students.

Research Scope

Variables:

This study involved two variables: Physical Activity Program (PAP) as an Independent Variable and Health-Related Fitness (HRF) as a Dependent Variable as indicated in Figure 1. The researchers assessed the effectiveness of an independent

variable on the dependent variable for the participants. Dependent variables consist of five components such as cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition.

Sampling:

The sample size was determined using a simple random sampling technique using Statistical Power Analysis. The sample size was estimated to be 62 students; 31 students participated in a PAP with another 31 students participating in the lessons prescribed in the Bhutanese PE curriculum.

Content:

The study was conducted to experiment with the effects of physical activity programs on health-related fitness for 8 weeks (2 periods per week and 60 minutes per period).

Research Hypothesis

1. Difference in Health-Related Fitness (HRF) Scores Within the Same Group (Pre- and Post-Test)

Null Hypothesis (H_0): There is no significant difference in Health-Related Fitness (HRF) scores within the same group before and after implementing the Physical Activity Program (PAP) or Physical Education (PE).

H_0: $\mu_{pre}=\mu_{post}$

Alternative Hypothesis (H_1): There is a significant difference in Health-Related Fitness (HRF) scores within the same group before and after implementing the Physical Activity Program (PAP) or Physical Education (PE).

H_1: $\mu_{pre}\neq\mu_{post}$

2. Difference in Post-Test Health-Related Fitness (HRF) Scores Between Groups

Null Hypothesis (H_0): There is no significant difference in post-test Health-Related Fitness (HRF) scores between the Physical Activity Program (PAP) and Physical Education (PE) groups.

H_0: $\mu_{PAP\ post}=\mu_{PE\ post}$

Alternative Hypothesis (H_1): There is a significant difference in post-test Health-Related Fitness (HRF) scores between the Physical Activity Program (PAP) and Physical Education (PE) groups.

H_1: $\mu_{\text{PAP post}} \neq \mu_{\text{PE post}}$

Definition of the terms

1. **Physical Activity Program** is a designed program grounded in the FITT principles, intended for implementation among seventh-grade students which comprises 16 physical activity lessons for 8 weeks. The program aims to enhance the five components of HRF.

2. **Health-related fitness** is theoretically defined as a multidimensional construct containing five components; 1) Cardiorespiratory Endurance (CRE), 2) Muscular Strength (MS), 3) Muscular Endurance (ME), 4) Flexibility (Flex), and 5) Body Composition (BC). Each of the health-related fitness levels was assessed using FitnessGram test batteries.

3. **Bhutanese Students** refers to an individual who is a citizen or resident of Bhutan enrolled in grade VII in one of the schools in Bhutan to pursue academic studies and acquire knowledge and skills in the academic year 2024.

Research Framework

Using the physical activity program (PAP) as an Independent Variable and health-related fitness (HRF) as a Dependent Variable, the researchers assessed the effectiveness of an independent variable on the dependent variable. Dependent variables consist of five components such as cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition. The researchers examined the effectiveness of PAP designed based on FITT principles on the HRF of the participants.

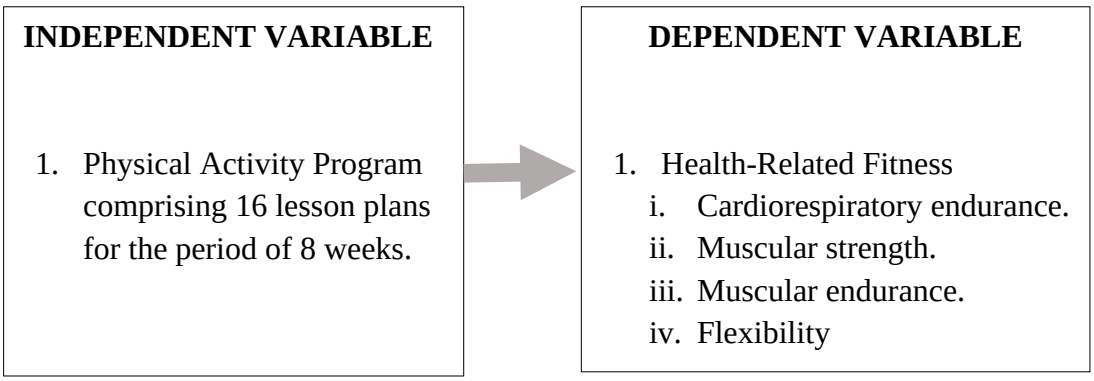

Figure 1 Conceptual Framework

CHAPTER II

LITERATURE REVIEW

This chapter provides theoretical support for the research study. Journals and books, proceedings from research meetings were used to provide a detailed representation of the relevant literature. This review of literature was divided into the following sections:

1. Physical Activity
   1.1.Definition
   1.2.Significance of Physical Activity
   1.3.Development of Physical Activity Program
2. Health-Related Fitness
   2.1.Definition
   2.2.Assessment of Health-Related Fitness
   2.3.Psychomotor properties of the methods for measuring HRF
3. Physical Fitness and Training Principles
4. Overview of Bhutan and the education system
5. Physical Education in Bhutan
   5.1.Historical context of HPE-related practices in Bhutanese schools
   5.2.Brief history of HPE curriculum in Bhutan
   5.3.Current situation of HPE in Bhutan
6. Research relevancy

Physical Activity

Definition

Physical Activity (PA) is defined as “any bodily movement produced by skeletal muscles that requires energy expenditure beyond resting expenditure” (Almnifi et al., 2023; Babic et al., 2014; Bearne, 2023; Chen et al., 2018; Fletcher et al., 2018; Kandola & Bann, 2021). It is any bodily movement generated by skeletal muscles at the expense of energy utilization: lifting, working out, playing, traveling, walking, cycling, dancing,

gardening, and housework are all examples of PA (Caldwell et al., 2019; Dhuli et al., 2022; World Health Organization, 2019). It also refers to any body movement generated by the contraction of skeletal muscles that raises energy expenditure above the resting metabolic rate and is characterized by its modality, frequency, intensity, duration, and context of practice (Thivel et al., 2018).

Significance of Physical Activity

Engaging in PA is a crucial aspect of lifestyle linked to numerous advantages in the health and development of children. As iterated by Mooses et al. (2021), these benefits encompass preventing issues like overweight, obesity, and cardiovascular diseases, while also aiding academic success and mental well-being. PA also stands as one of the most effective ways for individuals to enhance their health. It plays a crucial role in promoting healthy aging, lessening the impact of chronic diseases, and preventing premature death (Center for Disease Control, 2023). Furthermore, physical activity is crucial for maintaining overall health and well-being, and it offers a wide range of benefits for individuals of all ages. It is crucial for the healthy growth and development of adolescents. Here are some key points highlighting the importance of physical activity.

1. Strengthens Muscles and Bones:

Weight-bearing and resistance exercises strengthen muscles and bones, promoting better overall musculoskeletal health and reducing the risk of osteoporosis (Pescatello, 2014), contributing to the development and maintenance of strong and healthy bones (Weaver et al., 2016).

2. Improves Sleep Quality:

Regular physical activity is associated with longer sleep duration. Individuals who engage in sufficient physical activity are more likely to meet the recommended sleep duration guidelines since physically active individuals often report fewer symptoms of insomnia, such as difficulty falling asleep (Kredlow et al., 2015). Adolescents who engage in regular physical activity often experience improved sleep patterns, leading to better overall health and well-being (Lang et al., 2016). Engaging in physical activity is associated with a reduction in anxiety and stress levels. Lower

stress levels contribute to a more relaxed state conducive to improved sleep (Gerber et al., 2014).

3. Boosts Immune System:

Physical activity enhances the immune system, reducing the risk of infections and chronic diseases. It has been linked to increased circulation of immune cells, such as white blood cells, which play a crucial role in the body's defense against infection (Campbell & Turner, 2018). Engaging in regular PA is associated with a reduction in chronic, low-grade inflammation, contributing to a more balanced and responsive immune system (Simpson et al., 2015). It helps in reducing stress, and chronic stress has been associated with immune system suppression. By mitigating stress, physical activity positively influences immune function (Dhabhar, 2014). The temporary increase in body temperature during PA creates an environment less favorable for bacterial and viral growth, potentially supporting the immune response. Regular PA optimizes the surveillance function of the immune system, enabling a prompt and effective response to potential threats (Nieman & Wentz, 2019). PA positively impacts the gut microbiota, which plays a crucial role in immune system regulation and overall health (Monda et al., 2017).

4. Social Development:

Participation in physical activities fosters social skills. Engaging in team sports and group physical activities provides adolescents with opportunities to collaborate, communicate, and work toward common goals, promoting teamwork and cooperation (Eime et al., 2013). Success and recognition in physical activities contribute to enhanced self-esteem and peer acceptance, positively influencing an individual's social standing (Babic et al., 2014). Group physical activities provide a natural setting for adolescents to build friendships, share experiences, and develop a sense of camaraderie.

5. Disease Management and Rehabilitation:

Physical activity is a crucial component in the management and rehabilitation of various health conditions, including arthritis, cardiovascular diseases, and respiratory disorders (Kelley et al., 2018). PA plays a role in cancer rehabilitation by improving physical function, reducing fatigue, and enhancing the overall quality of life for cancer survivors (Campbell et al., 2019). It is often prescribed in the rehabilitation of

orthopedic conditions such as osteoarthritis and musculoskeletal injuries. It helps improve joint mobility, strength, and overall function (Fransen et al., 2015). Furthermore, PA is recognized as an adjunctive treatment for mental health disorders, contributing to the management of conditions like depression and anxiety (Schuch et al., 2018). Similarly, patients with respiratory conditions benefit from pulmonary rehabilitation programs that include physical activity, improving lung function, exercise tolerance, and overall respiratory health (McCarthy et al., 2015). PA including structured exercise programs, is often recommended for managing chronic pain conditions, improving physical function, and reducing pain intensity (Geneen et al., 2017).

6. Mental Health Benefits:

Engagement in regular physical activity is linked to improved mood, reduced stress, anxiety, and depression, promoting overall mental well-being (Mammen & Faulkner, 2013; Schuch et al., 2016; Stanton & Happell, 2014). Physical activity has cognitive benefits, including improved memory, attention, and overall cognitive function (Ludyga et al., 2020).

Development of Physical Activity Program

World Health Organization's guidelines on physical activity and sedentary behaviour recommend that the duration for normal physical activity for children and adolescents (5-17 years) should be an average of 60 minutes per day of moderate-to-vigorous physical activity (MVPA), mostly aerobic and vigorous-intensity physical activity (VIPA) as well as incorporating activities that strengthen muscles and bones for 8-weeks (3 periods per week and 60 minutes per period) (Okely et al., 2021). Similarly, Physical Activity Guidelines for Americans recommends that children and adolescents ages 6 through 17 need to be active for 60 minutes or more of MVPA each day. At least 3 days a week should include VIPA (Olson et al., 2023).

Nonetheless, in this study, the researchers administered the treatment over 8 weeks, consisting of two sessions per week, each lasting 60 minutes. The primary reason for deviating from the international guidelines and recommendation was the treatment focused specifically on the normal unfit target group to assess the impact of

PAP on HRF rather than encompassing the whole of regular fitness training. Other hypothetical reasons include

1. Practical Constraints

The Bhutanese school's schedule limitations made it challenging to have three sessions per week. Opting for two sessions fits better within available time slots and logistical constraints.

2. Resource Limitations

Limited resources, including funding and equipment, impact the ability to conduct three sessions. The researchers have adapted the intervention to optimize available resources.

3. Participant Availability

Schoolchildren's busy schedules with academic and extracurricular activities made a reduced session frequency more feasible for consistent attendance over the 8 weeks.

4. Minimizing Disruption

Having fewer sessions was aimed at minimizing disruption to the regular school routine, enhancing cooperation from both schools and participants in the study.

5. Gradual Adjustment

The intentional choice of two sessions per week allowed for a gradual introduction to PA, especially beneficial for participants not adapted to regular exercise, easing them into the intervention.

There are several school intervention models used as strategies to boost energy expenditure and result in improved physical fitness. In the current study, the researchers adopted the FITT Guidelines shown in Table 1 (Walton-Fisette & Wuest, 2017) to ensure the involvement of most students, with moderate to high intensity of effort, and motivation.

Table 1 FITT Guidelines for Designing Physical Activity Program

FITT Guidelines	Cardiorespiratory Endurance	Muscular Strength	Muscular Endurance	Flexibility
Frequency	5 periods	3 periods	3 periods	5 periods
Intensity	55%/65-90% maximal heart rate	High resistance, 1-8 reps	Low resistance, 8-20 reps	Stretch past the normal length until resistance is left.
Time	50-60 minutes	1-5 sets	1-5 sets	Hold the stretch for 5-10 seconds, building to 30-60 seconds.
Type	Aerobic activity	Isotonic, isometric, or progressive resistance training (PRT).		Static, dynamic, or contract-relax techniques

Note: ACSM guidelines4 state that a lower intensity value that is, 55-64% of maximal heart rate or 40-49 of heart rate reserve may be appropriate for those individuals who are unfit.

Health-Related Fitness

Definition

Health-related fitness is theoretically defined as a multidimensional construct containing five components. Specifically, these five components are 1) Cardiorespiratory Endurance (CRE), Muscular Strength (MS), Muscular Endurance (ME), Flexibility (Flex), and Body Composition (BC) (American College of Sports Medicine, 2013; Britton et al., 2020).

Cardiorespiratory Endurance (CRE) refers to the ability of the respiratory and cardiovascular systems to sustain prolonged and intense physical activity (Britton et al., 2020). It is the capacity of the circulatory and respiratory systems to deliver oxygen during sustained PA, specifically associated with the ability to engage in extended periods of substantial-muscle, dynamic, moderate-to-high-intensity exercise (American College of Sports Medicine, 2013; Stodden et al., 2017; Walton-Fisette & Wuest,

2017). CRE, also known as cardio, is vital for strengthening the heart and lungs, aiding in the efficient delivery of oxygen and nutrients throughout the body (Healthline, 2022).

Muscular Strength (MS) is the ability of the muscular system to produce force against resistance in one maximal effort (Smith et al., 2014; Walton-Fisette & Wuest, 2017). A muscle group can exert force or lift and carry weight (Healthline, 2022). Possessing physical strength facilitates the effortless handling and lifting of heavier objects, simplifying day-to-day tasks. Numerous health researchers opt for assessments of explosive strength, such as horizontal and vertical jumps, or power, to serve as indicators of muscular strength within the realm of fitness (Tomkinson et al., 2018). In this research, the researchers employed the 90^0 Push-Up test because the gauge of MS is validated by research outcomes underscoring its efficiency in evaluating upper body strength. Referenced studies indicate that the 90-degree push-up test effectively targets and activates essential muscle groups, offering a dependable measure of an individual's upper body MS. These research findings enhance the test's reliability and recommend its use as a valid metric for assessing the strength of muscles engaged in the push-up motion, making it a relevant option for overall MS evaluation.

Muscular Endurance (ME) is the ability of the muscular system to generate force consistently for an extended duration (Healthline, 2022; Smith et al., 2014). MS refers to the capability of a muscle or group of muscles to repetitively contract against resistance or to maintain a contraction over a duration of time (Walton-Fisette & Wuest, 2017). It becomes significant during prolonged exercise, enabling sustained physical activity without experiencing fatigue (Healthline, 2022). The combination of ME and MS collectively contributes to muscular fitness (MF), a concept encompassing the capability to perform work against resistance, whether it be maximal, explosive, or repetitive (Smith et al., 2014).

Flexibility is the typical joint movement allowed between two extremes: ankylosis and hypermobility (Knudson, 2018). It is the functional capacity of the joints to move through a full range of motion (American College of Sports Medicine, 2013; Stodden et al., 2017; Walton-Fisette & Wuest, 2017) without pain or difficulty (Healthline, 2022). Engaging in regular stretching exercises contributes to improved flexibility and can enhance performance in sports that demand a high degree of

flexibility. Enhanced flexibility may support in accomplishing daily tasks more easily and maintaining better balance, although additional research is necessary.

Body composition refers to the study of the components of the body and their relative proportions (American College of Sports Medicine, 2013). It is a physiological characteristic that affects an individual's ability to carry out daily tasks with vigor (Stodden et al., 2017). It describes the ratio of fat mass to fat-free mass that refers to the relative amount or percentage (Walton-Fisette & Wuest, 2017) of different types of body tissues (bone, fat, muscles) that are related to health. The most common health-related measure is body fat percentage; however, it should be noted that there are no established criterion values for this measure related. The study of BC necessitates evaluating two or more body mass compartments, encompassing anatomical-physiological, chemical, and elemental components (Healthline, 2022; Mazzoccoli, 2016).

The incorporation of five components into HRF is grounded in a thorough comprehension of diverse factors contributing to overall well-being and physical health. Research findings indicate that these five components collectively cover various facets of fitness, offering a more comprehensive viewpoint on an individual's health. The inclusion of these five components guarantees a more detailed and well-rounded strategy for evaluating and enhancing HRF, considering both cardiovascular and musculoskeletal considerations. This methodology is validated by research demonstrating that a thorough assessment of these components provides a more precise description of an individual's physical fitness and health status. In addition, variations in absolute scores for HRF based on sex are frequently documented, males consistently outscore females in all HRF components except flexibility (Santos et al., 2014). It is generally accepted that the overall HRF construct is the same for males and females. As far as the researchers are aware, there hasn't been any study that has examined the presumed sex invariance in HRF.

Assessment of Health-Related Fitness

Health-related fitness assessments play a crucial role in promoting individual and public health by identifying baseline fitness levels, assessing health risks, monitoring progress, motivating individuals, and guiding the development of personalized interventions. The ACSM guidelines provide a comprehensive framework for understanding and implementing health-related fitness assessments in a variety of settings (Ferguson, 2014);

1. Identification of Health Status:

Health-related fitness assessments help identify an individual's current health status by evaluating key components such as cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition. This information allows health professionals to establish a baseline and tailor interventions based on specific needs.

2. Risk Assessment for Chronic Diseases:

Regular fitness assessments can assist in identifying risk factors associated with chronic diseases such as cardiovascular diseases, diabetes, and obesity. Understanding these risk factors enables healthcare professionals to develop targeted prevention and intervention strategies to mitigate health risks.

3. Monitoring Progress and Effectiveness of Interventions:

Periodic health-related fitness assessments are valuable for monitoring changes in an individual's fitness levels over time. They provide objective data to assess the effectiveness of lifestyle interventions, exercise programs, or other health-promoting activities, helping individuals and healthcare providers make informed decisions about adjustments to health strategies.

4. Motivation and Goal Setting:

Fitness assessments can serve as powerful motivational tools by providing individuals with tangible evidence of their progress. Setting realistic and measurable fitness goals becomes more effective when individuals can track improvements in health-related fitness parameters.

5. Individualized Exercise Prescription:

Tailoring exercise prescriptions to an individual's specific fitness level is essential for ensuring both safety and effectiveness. Health-related fitness assessments aid in the development of personalized exercise programs that target areas requiring improvement, contributing to enhanced overall fitness.

In this study, to verify the impact of the PAP on HRF components, evaluation was performed before and after the eight-week intervention. Table 2 (Cooper Institute, 2017b) outlines the five components of HRF along with the corresponding test batteries. These assessments were conducted to evaluate a student's HRF before and after the implementation of the PAP and PE. Additionally, Appendix E provides the specific procedures for each test battery.

Table 2 Test batteries for assessing health-related fitness

Type of fitness	**Test battery**	**Assessment**
Cardiorespiratory Endurance (CRE)	Progressive Aerobic Cardiovascular Run (PACER)	Maximum aerobic fitness of students
Muscular Strength (MS)	90^0 Push up	Upper body strength and endurance
Muscular Endurance (ME)	Curl up	Abdominal muscle endurance
Flexibility (Flex)	Back-Saver Sit and Reach	Flexibility of left and right legs
Body Composition (BC)	Body Mass Index (BMI)	Body composition

Psychomotor properties of the methods for measuring HRF

Accurate measurement of HRF components such as cardiorespiratory endurance, muscular strength and muscular endurance, flexibility, and body composition is essential for both research and practice. Several well-established methods are used to assess these fitness components in children and adolescents, including the Progressive Aerobic Cardiovascular Endurance Run (PACER), 90-degree push-up, curl-up, back-saver sit and reach, and Body Mass Index (BMI). This review examines the

psychomotor properties of these methods, focusing on their reliability, validity, and practicality.

1. PACER (Progressive Aerobic Cardiovascular Endurance Run)

The PACER test is widely used to assess cardiovascular endurance in children and adolescents. It involves running back and forth across a 20-meter distance at increasing speeds until the participant can no longer maintain the pace. Studies have shown that the PACER test has high test-retest reliability (intraclass correlation coefficients [ICCs] > 0.90) and criterion-related validity when compared with maximal oxygen consumption (VO2max) (Leger et al., 1988). Recent research confirms its utility in diverse populations, supporting its validity as an indicator of aerobic fitness (Ortega et al., 2011). The PACER is practical for school settings due to its minimal equipment requirements and ease of administration. However, environmental factors like space and surface type can affect performance (Meredith & Welk, 2010).

2. 90-Degree Push-Up

The 90-degree push-up test measures upper body muscular strength. Participants perform as many push-ups as possible with proper form, ensuring a 90-degree angle at the elbow. The 90-degree push-up test has demonstrated good test-retest reliability (ICCs > 0.85) and construct validity, correlating well with other measures of upper body strength and endurance (Castro-Piñero et al., 2010). This test is straightforward to administer in schools and requires no specialized equipment, making it a practical choice for large-scale assessments (Meredith & Welk, 2010).

3. Curl-Up

The curl-up test assesses abdominal muscular endurance. Participants perform as many curl-ups as possible at a set cadence, typically following a metronome. Research indicates that the curl-up test has high test-retest reliability (ICCs > 0.80) and strong validity in assessing core strength and endurance (Morrow et al., 2015). Studies have also validated its use in children and adolescents, showing significant correlations with other measures of abdominal strength (Zhu et al., 2017). Like the push-up test, the curl-up is easy to administer and requires minimal equipment, making it feasible for school settings (Meredith & Welk, 2010).

4. Back-Saver Sit and Reach

The back-saver sit and reach test evaluates flexibility, particularly in the lower back and hamstrings. It involves reaching forward while seated with one leg extended and the other bent. This test has demonstrated good reliability (ICCs > 0.80) and validity when compared with other measures of flexibility (Welk et al., 2022). A study by Castro-Piñero et al. (2009) supports its criterion validity, showing significant correlations with more comprehensive flexibility assessments. The back-saver sit-and-reach test is simple to administer and requires only a sit-and-reach box, making it practical for large groups (Meredith & Welk, 2010).

5. Body Mass Index (BMI)

BMI is a widely used measure of body composition, calculated as weight in kilograms divided by height in meters squared. It is used to classify individuals such as underweight, normal weight, overweight, and obese. BMI is a reliable measure of body composition with high test-retest reliability (ICCs > 0.95). However, its validity as an indicator of body fatness is limited, especially in children and adolescents, as it does not distinguish between fat mass and lean mass (Freedman & Sherry, 2009; Javed et al., 2015). Despite these limitations, BMI remains a useful screening tool for population-level assessments (Fox et al., 2019). BMI is easy to calculate and requires only basic measurements of height and weight, making it highly practical for large-scale assessments (Nihiser et al., 2007).

Physical Fitness and Training Principles

Physical fitness denotes the capacity of the body's systems to operate with efficiency and effectiveness (Walton-Fisette & Wuest, 2017). It constitutes a crucial component of maintaining a healthy lifestyle, contributing to enhancements in strength, flexibility, and endurance, thereby mitigating the likelihood of injury. To optimize the efficacy of a fitness regimen, it is imperative to acquaint oneself with the fundamental principles of fitness training. These principles serve as a structured framework to maximize the efficiency of workouts and facilitate the attainment of optimal outcomes.

Principles of Fitness Training

According to Walton-Fisette and Wuest (2017), principles of training encompass ten principles as explained below;

1. Principle of specificity

Emphasizing the significance of participating in targeted exercises to enhance specific fitness components or address particular body areas. Improvement in a specific muscle group or region necessitates focused training on that specific area. Therefore, fitness programs should be thoughtfully designed with specific objectives, incorporating targeted overload. For example, activities such as stretching have a limited impact on cardiorespiratory fitness, while weight training exercises like squats and lunges primarily benefit the legs rather than the arms. Designing effective fitness programs requires professionals to understand individuals' fitness goals and the specific demands of their sports.

2. Principle of progression

The Principle of Progression emphasizes the gradual and steady increase of overload for optimal fitness results. As the body adapts, overload should be systematically raised by adjusting factors like exercise frequency, duration, or intensity. For instance, in cardiorespiratory endurance training, one might start jogging 2 miles at a moderate intensity and incrementally increase the distance each week until the desired fitness level is achieved. Careful monitoring is essential to ensure the workout challenges the individual without overwhelming them.

3. Principle of overload

To make progress in health and fitness, individuals need to incorporate exercises beyond their routine. This involves applying an increased demand or workload, known as overload, to the body. The body's response and adaptation to this heightened workload led to improvements in fitness levels. For example, to enhance muscular strength, it is essential to exercise with a heavier weight than usual to promote progress.

4. Principle of diminishing returns

The principle of diminishing returns, based on the dose-response relationship, suggests that as the amount of physical activity increases, so do the associated gains. However, as individuals become more physically fit, the benefits obtained from exercise may diminish. Beginners or sedentary individuals often experience significant improvements with minimal physical activity, but as fitness levels increase, the magnitude of gains decreases. This phenomenon occurs as individuals approach their limits of adaptability. Consequently, maintaining fitness becomes crucial when the rate of improvement diminishes or plateaus.

5. Principle of variation

The principle of variation emphasizes the importance of incorporating diverse approaches in a fitness training program to achieve desired goals. This involves adjusting the intensity, duration, or type of exercise to maintain interest, prevent boredom, and overcome plateaus. Introducing variety, such as alternating between challenging and easier workouts or changing exercise locations, is crucial for sustained progress and overall effectiveness in fitness programs.

6. Principle of reversibility

The Principle of Reversibility emphasizes the impact of inactivity on fitness gains. The saying "use it or lose it" captures this concept, highlighting those benefits acquired through overload diminish gradually during periods of inactivity. Fitness gains can decline in as little as two weeks after ceasing training, with cardiorespiratory gains deteriorating most rapidly, potentially disappearing within 5–10 weeks. Strength gains degrade more slowly, with some retention observed for six months to a year post-training cessation. To sustain current fitness levels, ongoing physical activity is necessary, although a reduced level compared to the initial achievement can be maintained through adjustments in exercise frequency, intensity, or duration.

7. Principle of individuality

People exhibit diverse responses to exercise due to factors such as heredity, age, maturation, motivation, nutrition, and initial fitness levels. Genetic influences play a significant role in determining attributes like heart and lung size, muscle fiber types, and physique. Recognizing and accommodating these individual differences, including

activity preferences, is crucial in designing exercise programs that enhance adherence and cater to unique needs.

8. Principle of recovery

Adequate time for the body to adapt to physical demands is crucial. Integrating rest periods into a fitness program facilitates this adaptation process. Common recovery practices include alternating activity types or focusing on different muscle groups on different days. Research indicates that working out every day may heighten the risk of injury, underscoring the importance of incorporating recovery time.

9. Principle of safety

Ensuring safety is a top priority in designing a fitness program. Before commencing the program, individuals must undergo a comprehensive medical screening, especially crucial under certain circumstances like initiating exercise after prolonged inactivity or for post-heart attack rehabilitation. Conditions like diabetes necessitate vigilant monitoring for individual safety. Furthermore, individuals should be educated on precautions for exercising in specific weather conditions such as intense heat, high humidity, or extreme cold. It is essential for individuals to closely monitor their responses to exercise and promptly report any unusual occurrences, such as excessive breathlessness, to the program professional or a physician

10. Principle of FITT (Frequency, Intensity, Time, and Type)

The FITT principle underscores the need to adjust the Frequency, Intensity, Time, and Type of physical activity for optimal health benefits. Regular physical activity is crucial, intending to surpass the threshold of training within the fitness target zone to achieve desired results. When professionals design an exercise program, they specify these variables in an individualized exercise prescription. Each fitness component has a minimum threshold of training for desired benefits, and the target zone sets the upper limits for optimal exercise levels, cautioning against counterproductive exercise beyond this range.

Frequency pertains to the number of weekly exercise sessions, typically ranging from three to five times, for the achievement and maintenance of health-related fitness through regular physical activity. *Intensity* is the level of effort exerted during exercise,

often considered the most crucial exercise variable. It is measured by the degree of effort, such as a percentage of maximum effort for activities like running or lifting a specific weight during strength training. *Time* signifies the duration of the activity, indicating how long an exercise needs to be performed to be effective. *Type* refers to the specific mode of exercise performed, recognizing that different activities target distinct components of fitness. The selection of exercise type should align with the desired fitness goal, with options like jogging, rowing, bicycling, stretching, and weight training offering various avenues for achieving specific fitness gains.

The FITT acronym helps in recalling prescriptive exercise variables, which are interconnected and can be adjusted to tailor an exercise program to individual needs and desired outcomes. For instance, cardiovascular enhancement can be achieved through jogging, where the type, intensity, time, and frequency are manipulated. Beginners may benefit from lower intensity and longer sessions, while individuals with obesity might find shorter, more frequent exercise sessions advantageous. These principles are based on scientific evidence and help individuals, fitness professionals, and healthcare practitioners make informed decisions about designing, implementing, and evaluating physical activity interventions.

Zheng et al. (2022) investigated that sedentary behavior should be limited, and replaced by any intensity of physical activity. Specific advice, aligned with FITT, proves more effective than vague suggestions like "move more and sit less". Applying the fitness training principles to school students aged 13-14 years involves considering their developmental stage, preferences, and the educational setting. Health guidelines recommend encouraging daily physical activity for adolescents, aiming for at least 60 minutes per day which includes a mix of moderate to vigorous-intensity activities, considering individual fitness levels and interests. During school hours, it is essential to incorporate physical education classes and encourage extracurricular activities for children. This involves promoting additional active breaks throughout the school day. To cater to different interests, a variety of activities should be provided, such as team sports, individual sports, dance, and recreational activities.

Overview of Bhutan and the education system

Bhutan is a small and landlocked country, situated between China (Tibet) and India. It has an area of 38,394 square kilometers. It has an east-west dimension (longest) stretching around 300 kilometers and 170 kilometers at its maximum north-south dimension. Bhutan is in the eastern Himalayas and is mostly mountainous and heavily forested. About 70 percent of the Kingdom is covered with forests. Bhutan has a population of about 727,145 (male 380453; female 346692) with an average life expectancy of 70.1 years (male 68.8; female 71.7) and a literacy rate of 70.5 % (National Statistics Bureau, 2023). The National Statistics Bureau of Bhutan has projected a total population growth of about 884 thousand by 2047. The projections show that the population of Bhutan will continue to rise through 2017-2047. Thus, the population will increase by 21.6 percent over 30 years (National Statistics Bureau, 2019). This projection of population growth indicates that a well-established education system may play a significant role and have a greater impact on the lives of the future Bhutanese population. Particularly, a quality physical activity program in schools can have a multiplying impact in promoting the health and well-being of both the present and future Bhutanese children and adults.

The inception of the modern education system in Bhutan can be traced back to the initiation of economic development plans in 1961. Presently, the education system in Bhutan encompasses three main forms: general education, monastic education, and non-formal education. While Monastic education was the sole form until the 1950s and continues today, the country now boasts an extensive network of schools and educational institutions across its expanse. Boarding facilities, supported by government-provided meals, are available for students residing far from school premises. The educational journey for students involves seven years in Primary education (PP-VI), followed by two years in Lower Secondary (VII-VIII), Middle Secondary (IX-X), and Higher Secondary (XI-XII). The constitution guarantees free basic education until grade X, with government-backed support extended to grade XII since 2020. Post-grade XII, students can pursue tertiary education, vocational training, or enter the labor market. As of 2020, the official school-going age for children has been revised to five years. Instruction in schools is conducted in Dzongkha (national

language) and English. In addition to the General Education Curriculum, students participate in co-curricular activities like sports, scouts, singing, dancing, painting, and arts. Traditional institutions, including Monasteries, *Drupdras*, and *Shedras*, also play a significant role in providing education (National Statistics Bureau, 2023).

Non-formal education (NFE) programs, established formally in 1992, have gained popularity for imparting basic literacy, numeracy, and functional skills among adults. Emphasizing the fundamental role of education in national progress, the Royal Government of Bhutan prioritizes the sector. Despite significant achievements, new focus areas include enhancing quality and inclusiveness, adopting adaptive and digital learning approaches, shifting the emphasis from classroom teaching to learning, aligning education with emerging jobs, improving learning facilities, and enhancing Early Childhood Care and Development (ECCD) enrollment and facilities (National Statistics Bureau, 2023).

Physical Education in Bhutan

Historical Context of Health and Physical Education Practices in Bhutanese Schools.

The exploration of the historical context of HPE practices is necessary to understand the scope of contemporary quality physical activity in schools. This is because past established programs and practices seem to influence the way HPE is taught in contemporary schools (Gyaltshen, 2023). Differing from the desired practices of a contemporary multi-dimensional HPE curriculum, games and sports are an established form of co-curricular and extracurricular activities, and the HPE curricular lessons are often focused on the preparation of students for school-wide events and sports competitions, and many teachers use traditional teaching methods such as command methods (Gyaltshen, 2023). The historical context of HPE-related practices in Bhutanese schools is explored to understand the potential implications of the past-established physical activity-related practices in Bhutanese schools. Since, the Bhutanese traditional HPE program in schools has never been investigated before, there is a lack of adequate literature concerning past practices and the significance of physical activity programs and HPE in Bhutanese schools. This lack of adequate literature on

HPE–related practices in Bhutanese schools before the introduction of the new instructional HPE curriculum in 2000 makes this study challenging in contextualizing fundamental purposes and philosophy guiding PAP and HPE in Bhutanese schools. However, some historical indications suggest miscellaneous physical activity-related practices in monasteries and Bhutanese schools before 1999. The record of the history of the culture and tradition of Bhutan indicates that HPE in the form of organized physical activities has been an important part of the Bhutanese culture and monastic education. As early as the seventeenth century, the monks were taught mask dances and other physical activities as a part of formal monastic education (Wangchhuk, 2008), because monks played a key role in the promotion of religion, culture, and security of the country. Therefore, it is reasonable to suggest that physical training in ancient Bhutanese monasteries was conducted for the development of the body and mind of monks because they were required to be physically robust and mentally sound for their spiritual practices and the nation's defense.

Until the introduction of the instructional HPE curriculum in primary schools in 2000, rudimentary physical activities and self-initiated competitive games formed a major part of students' physical activities in Bhutanese schools (Sherab, 2001). The common physical activities included morning physical training, competitive sports, and Bhutanese traditional games. Physical activities were either student-initiated or organized by their respective schools. Because there was no official requirement for HPE in schools before 2000, students' participation in physical activities was left to the discretion of individual students and concerned schools. During the early 1980s, equipment required for various games such as soccer, basketball, and volleyball was limited in supply. Many students used self-improvised balls from rug sacks and plastic bags to play games of their interest. Besides games and sports, cultural activities such as folk and modern dances were practiced as part of co-curricular activities and for intramural competitions.

As early as the 1960s, when the Bhutanese modern school system was first introduced, cultural programs and competitions were promoted in schools, which were potentially the major form of co-curricular and extracurricular activities for students in Bhutanese schools. Although the new instructional HPE curriculum was introduced in

2000, elite games and sports are still popular activities among students and constitute a major part of co-curricular and extra-curricular activities in the current Bhutanese schools (Policy and Planning Division, 2010). The elite games and sports such as soccer, basketball, and volleyball are established programs in schools, where financial and technical support are provided by mainly the Department of Youth and Sports (DYS) of the education ministry and the Bhutan Olympic Committee (BOC). Many of the sports instructors trained by these organizations teach games and sports in many schools.

A brief historical context of Bhutanese PAP and HPE-related practices presented above indicates that games and sports programs including indigenous Bhutanese sports and cultural activities have been an important part of both traditional and conventional Bhutanese schools. However, because of the lack of a Bhutanese official account of past PAP-related practices, there is a limited understanding of the initial purposes of the programs. Therefore, further exploration of past PAP-related practices in other countries is necessary to understand the initial development, the key constructs, and the rationales for physical activities in schools.

Brief history of the Health and Physical Education curriculum in Bhutan.

The historical perspective on the development of education in Bhutan indicates that health and physical education (HPE) have been a part of Bhutanese modern education since the 1960s. HPE then was taught as extra-curricular activities in the form of games and sports, gymnastics, cultural activities, marathons, and morning physical training (PT) (Sherab, 2001). While morning PT was compulsory for students, participation in sports and games was meant for only a few selected students who were genuinely interested and talented in a particular game or sport. Intramural and extramural competitions in games and sports and annual marathons were organized in schools to encourage students' participation in school physical activities. During 1960, HPE encompassed mainly elite games and sports that were borrowed from the Indian curriculum along with the Indian expatriate teachers teaching students in 11 modern schools. While past practices in HPE continued, the Japanese physical education instructors in Bhutan made significant contributions in sensitizing and introducing HPE

curricula in Bhutanese schools after 1998. However, the HPE curriculum as an instructional subject in schools was introduced only in 2000 after it was first endorsed in 1999 by the seventh CAPSD Board Meeting. The main reasons for the introduction of the curriculum were to promote wholesome education and educate on the national philosophy of GNH. Subsequently, the development of the new instructional HPE curriculum was initiated in 2006 and was completed in 2008. The implementation of the new instructional HPE curriculum was then made mandatory for all primary schools since the beginning of 2008 academic sessions. The overall aims and objectives of the new instructional HPE curriculum are outlined in the Health and Physical Education Curriculum Framework: Classes PP-XII. The goal of the new Bhutanese instructional HPE curriculum is to have learners empowered to be healthy, active, and happy citizens through active engagement in authentic learning, founded on the principles of 21st Century competency-based curriculum, pedagogies, and assessments (Ministry of Education, 2022). This goal is further translated into key competencies under three strands; 1) Movement and physical activity for active living and sports excellence, 2) Personal and interpersonal development for individual and social harmony, and 3) Health and healthy lifestyle for wellbeing. Furthermore, strands are divided into five key stages; i) Key-stage I (Pre-primary to Class III), ii) Key-stage II (Class IV to VI), iii) Key-stage III (Class VII and VIII), iv) Key-stage IV (Class IX and X), v) Key-stage V (Class XI and XII). Learning goals for five key stages are explained under key stage competencies followed by class-wise competencies with different physical activities to be taught in schools during the allocated instructional time of one period per week. For conducting instructional lessons, one teacher's activity guidebook for each grade level was supplied to all primary schools at the beginning of 2009 school sessions.

Current practices of Health and Physical Education (HPE) in Bhutan.

Under the umbrella of the education policy aimed at fostering holistic development and promoting Gross National Happiness (GNH), Bhutanese primary schools are encouraged to incorporate activities such as games, sports, and scouts alongside the recently introduced Health and Physical Education (HPE) curriculum, in addition to the core academic subjects (Gyaltshen, 2023). However, the implementation of these programs depends on the availability of trained teachers and instructors in

primary schools. Although the new instructional HPE curriculum is mandatory in all schools, the implementation is often erratic. The new instructional HPE curriculum is implemented only in some schools, mostly in urban areas, where specialist HPE teachers and HPE-trained generalist teachers are available. However, many schools organize games and sports as a part of co-curricular activities outside the school's instructional time. The schools with sports instructors who are not trained in the HPE curriculum seem to emphasize elite sports during HPE instruction time. These schools also organize intramural competitions after school hours to prepare students for regional and national sports competitions, which gained prominence ever since Bhutan became a member of international sports organizations. Currently, Bhutan is a member of 21 different international sports organizations (Ministry of Foreign Affairs, 2013). The schools with Japanese physical education instructors are reported to have different activities promoted during HPE classes. There is a diverse practice among schools representing multi-dimensional aspects of HPE, there seems to be confusion about the curriculum policy requirements of the instructional HPE curriculum among implementers.

Research relevancy

Britton et al. (2020) conducted a study on health-related fitness in youth, aiming to explore the foundational factor structure of this concept. The primary objective of the study was to investigate if the conventional five-component model effectively represented health-related fitness (HRF) in young individuals through confirmatory factor analysis. The researchers examined the relationships among these components and assessed the consistency of identified field-based tests across genders. The study endorsed a four-component model for HRF in youth, including cardiorespiratory endurance, muscular strength, muscular endurance, and flexibility. However, flexibility exhibited a weak relationship with the other components and was excluded from the overall model, suggesting its non-necessity in HRF for youth. The study identified five field-based tests representing HRF in youth, 1) the 20m shuttle run test for cardiorespiratory endurance, 2) the handgrip strength test for muscular strength, 3) the standing long jump test for muscular power, 4) the 30s sit-up test for muscular endurance, and 5) the sit-and-reach test for flexibility. These findings guide the

selection of appropriate field-based tests for assessing HRF in youth, with significant implications for health practitioners and researchers. Although the study did not implement a Physical Activity Program (PAP), its insights can inform the development of targeted interventions and health promotion strategies, offering valuable guidance for designing and implementing effective PAP for youths.

Chen et al. (2018) explored the link between health-related fitness components and physical activity in diverse settings among elementary school students. The analysis focused on four HRF components and their associations with PA during school (physical education, recess) and outside school (organized sports/dance, non-organized play). Key findings from their study revealed significant associations between fitness components and PA minutes during various activities, with cardiorespiratory endurance (CRE) showing the strongest link to total weekly PA. Gender disparities were identified, with fitness more strongly related to overall PA levels in boys and uniquely associated with girls' PA during school. Students meeting healthy fitness criteria engaged in higher rates of organized activities and total weekly PA. However, a significant portion of students failed to meet cardiovascular fitness standards, emphasizing the importance of improving fitness, especially cardiovascular fitness, for increased PA participation in both boys and girls. Therefore, researchers recommend that schools play a critical role in providing opportunities for physical activity to promote fitness and activity behaviors, contributing to higher total PA in the long term.

Gu et al. (2016) explored the interconnection among physical activity, physical fitness, and health-related quality of life (HRQOL) in school-aged children, placing particular emphasis on the crucial role of PA in promoting HRF in this age group. The study's findings highlight a positive correlation between PA and key physical fitness components, including cardiorespiratory fitness, muscular fitness, and flexibility. Moreover, the research underscores the importance of PA in fostering positive outcomes in HRQOL, contributing to enhanced physical and mental function in children. This study advocates for health promotion programs and recommendations that not only encourage increased activity participation but also stress the significance of achieving physical fitness. This emphasis aligns with the study's conclusion that

maintaining and improving cardiorespiratory and muscular fitness in elementary children holds the potential to yield both physical and mental health benefits.

Song et al. (2021) investigated how an after-school exercise program affected the health and fitness of urban youth in their study "Effects of School-Based Exercise Program on Obesity and Physical Fitness of Urban Youth: A Quasi-Experiment." They included 36 participants (18 boys, 18 girls) from grades 7 to 9 in a 16-week Health-Related Physical Fitness (HRPF) program targeting cardiovascular endurance, muscular strength, and flexibility. Results showed a notable improvement in cardiovascular endurance, as indicated by an increase in PACER after the program. However, there were no significant changes in body mass index (BMI) or body fat percentage, and no remarkable differences in muscular strength or flexibility were observed. The study's positive findings suggested that after-school exercise programs could boost cardiovascular endurance among urban youth. Yet, the researchers acknowledged limitations, such as the absence of a control group and a small sample size, which made it challenging to draw definite conclusions or generalize the results. Therefore, the study implies that after-school exercise programs might benefit the cardiovascular health of urban youth. Still, more research, especially larger randomized controlled trials, is needed to determine the ideal duration and intensity of such programs. The study's limitations emphasize the importance of robust research methods to firmly establish the effectiveness of exercise programs in improving the overall health and fitness of urban youth.

The research undertaken by Gonçalves et al. (2019) focused on examining the impact of organized physical activity on health-related physical fitness parameters in schoolchildren. Researchers investigated the influence of a four-week sports activity program on the health-related physical fitness of schoolchildren aged 8 to 11 years. The study included 73 volunteers, with 39 participants in the physical education group (GPE) and 34 in the sports activities group (GSA). Measurements were independently recorded, and health-related physical fitness was assessed using the FITNESSGRAM battery of physical tests. The study utilized a pre-post-intervention design, with assessments conducted before and after the four-week intervention period. The interventions comprised a sports activity program for GSA and regular physical

education classes for GPE. Physical fitness tests covered abdominal muscle strength and endurance, aerobic endurance, flexibility, BMI, and relative fat. Results revealed that the sports activity program led to improvements in aerobic endurance and a reduction in BMI in GSA compared to GPE. In the intragroup analysis, GSA demonstrated enhancement in all physical fitness scores, while GPE exhibited a significant decline in abdominal strength and endurance tests. The study concluded that organized sports activities positively and significantly impacted aerobic fitness and BMI reduction, suggesting their potential as alternative interventions in physical education classes and extracurricular activities to enhance children's physical fitness. Nevertheless, the authors emphasized the necessity for further research to explore diverse intervention strategies and their effects on physical fitness and other health-related outcomes in children. In summary, the study offers valuable insights into the potential benefits of structured physical activity programs on the health-related physical fitness of schoolchildren, underscoring the importance of continued research in this domain.

Ługowska et al. (2023) investigated the impact of increased physical activity (PA) incorporated into the school curriculum on the physical fitness of early adolescents. Employing a quasi-experimental design, the study compared children participating in enhanced curricular PA (intervention group) with those following the standard PA curriculum (control group) in standard primary schools in Poland. Results indicated that the intervention group showed improved physical fitness, as evidenced by better performance in various fitness tests during the final measurement compared to the initial assessment. These findings underscore the positive influence of organized PA within the school setting on the physical fitness of early adolescents. The study suggests the potential benefits of integrating increased curricular PA to enhance the overall health and well-being of students. Additionally, the study contributes valuable insights into school-based physical activity programs and policies, emphasizing the role of organized PA in promoting physical fitness and overall health among young individuals. The findings from this study inform educators, policymakers, and parents about the positive effects of increased PA at school, offering valuable guidance for future initiatives aimed at improving the physical fitness of school-aged children. The

use of standardized fitness tests and statistical analysis methods enhanced the validity and reliability of the study's findings.

Cvejic and Ostojić (2018) conducted a study to investigate the impact of the FITT program on the physical activity and health-related fitness of primary school-age children. The research aimed to assess the program's effectiveness in promoting physical activity and improving health-related fitness in this demographic. Although the sampling methods were not explicitly mentioned, it is inferred that a randomized controlled trial design was likely used. This design allows for a comparison between the intervention (FITT program) and control groups, providing valuable insights. The key findings indicated that the FITT program positively influenced the physical activity and health-related fitness of primary school-age children, specifically enhancing aerobic fitness measured by PACER laps and VO2max, and increasing daily step count. These outcomes underscore the potential of the FITT program to enhance fitness and activity levels in children. In conclusion, the study provides evidence supporting the effectiveness of the FITT program in promoting physical activity and improving health-related fitness in primary school-age children. The positive outcomes observed emphasize its potential as an intervention in educational settings, with implications for developing evidence-based physical activity programs tailored to the specific needs of this demographic.

Humphreys et al. (2014) investigated the relationship between physical activity and health outcomes in Canada. The study explored the effects of varying levels of participation and intensity of physical activity on health outcomes. The study's key findings indicated that the intensity and frequency of physical activity played crucial roles in achieving optimal health benefits. Notably, daily participation in physical activity was associated with the most significant reduction in health issues. This study concludes that regular participation in physical activity holds substantial health benefits, emphasizing the importance of both intensity and frequency in realizing these advantages. The research advocated for the promotion of physical activity as a means to enhance overall health and well-being.

Wu et al. (2017) conducted a systematic review to investigate the relationship between physical activity, sedentary behavior, and health-related quality of life

(HRQOL) among children and adolescents. The study focused on individuals aged 5-18 years old. After screening and reviewing 49 full-text articles, the final synthesis included 31 studies from 15 countries, involving a total of 79,046 participants in the statistical analysis. The key findings of the study revealed a positive association between physical activity and HRQOL, while sedentary behavior was found to have a negative association with HRQOL. The discussion underscored the significance of promoting physical activity and reducing sedentary behavior in children and adolescents to enhance their HRQOL. In conclusion, this systematic review offered valuable insights into the correlation between physical activity, sedentary behavior, and HRQOL among children and adolescents. The findings suggested that promoting physical activity and reducing sedentary behavior could yield significant benefits for the HRQOL of young individuals.

Gyaltshen (2023) conducted a study to evaluate how effective the Bhutanese instructional Health and Physical Education (HPE) curriculum is in primary schools, focusing on its impact and factors affecting successful implementation. Using a comparative case-study approach involving HPE and Non-HPE (NHPE) schools, the study collected data through a mixed-methods approach. Results showed that students in HPE schools had significantly higher scores in physical activity levels, HPE class participation, and less sedentary time. They also scored higher in nutrition-related attitudes, body flexibility, body balancing ability, and upper-body strength, and had a lower BMI, though not statistically significant. In contrast, NHPE students scored significantly higher in overall nutrition knowledge, lower-body strength, aerobic capacity (VO2), kicking and hopping skills, and self-efficacy for various physical activities. The overall impact of the instructional HPE curriculum on HPE school students was significantly greater than that reported by NHPE school students. However, the study revealed shortcomings in the Bhutanese HPE curriculum, including insufficient emphasis on specific physical activities for fitness improvements and a lack of adequately trained teachers. It recommended a collaborative effort among Bhutanese stakeholders to enhance curriculum implementation, maximize impact, and bring about positive changes in physical activities and health behaviors in schools. Therefore, building upon the insights gained from his study, it emphasizes the need for a new

research study to address the identified shortcomings like a lack of emphasis on specific physical activities for fitness improvements. The proposed study aims to design, implement, and evaluate the impact of a customized physical activity program in Bhutanese schools. This program would target the gaps in the curriculum by incorporating specific activities to enhance health-related fitness components. The study intends to investigate the effectiveness of the PAP in improving general physical activity levels, participation in structured HPE classes, reducing sedentary behavior and improving the overall well-being of students.

The reviewed studies collectively provide comprehensive insights into the relationships between physical activity, health-related fitness (HRF), and various health outcomes in children and adolescents. Humphreys et al. (2014) emphasize the importance of regular physical activity in achieving optimal health benefits. Wu et al. (2017) highlighted the positive association between physical activity and health-related quality of life in young individuals. Gyaltshen (2023) evaluates the effectiveness of the instructional Health and Physical Education (HPE) curriculum on physical activity levels and health outcomes in Bhutanese primary schools. Other studies explore the impact of organized physical activity programs Song et al. (2021), examine links between fitness components and physical activity in diverse settings (Chen et al., 2018), and investigate the influence of interventions like the FITT program on physical activity and health-related fitness (Cvejic & Ostojić, 2018). Additionally, studies by Gu et al. (2016), Gonçalves et al. (2019) and Ługowska et al. (2023) investigated the interconnections among physical activity, physical fitness, and health-related quality of life in school-aged children, emphasizing the potential benefits of structured physical activity programs in enhancing various aspects of health and fitness. These findings collectively form a robust foundation for understanding the multifaceted relationship between physical activity, health-related fitness, and overall well-being in the target population. The new research study titled "Effects of Physical Activity Program on Health-Related Fitness for Seventh-Grade Students in Bhutan" is directly related to this literature, as it aims to contribute further insights into the impact of a physical activity program specifically tailored to their health-related fitness outcomes, building upon the

existing knowledge base and addressing potential gaps in understanding the effectiveness of such interventions in this specific age group.

CHAPTER III

RESEARCH METHODOLOGY

This chapter provides an overview of the research methodology, encompassing the research methodology framework, research design, population and sample, research instrument, and the procedures for data collection and analysis. In this study, the researcher employed a quasi-experiment method with a two-group pre-test and post-test design.

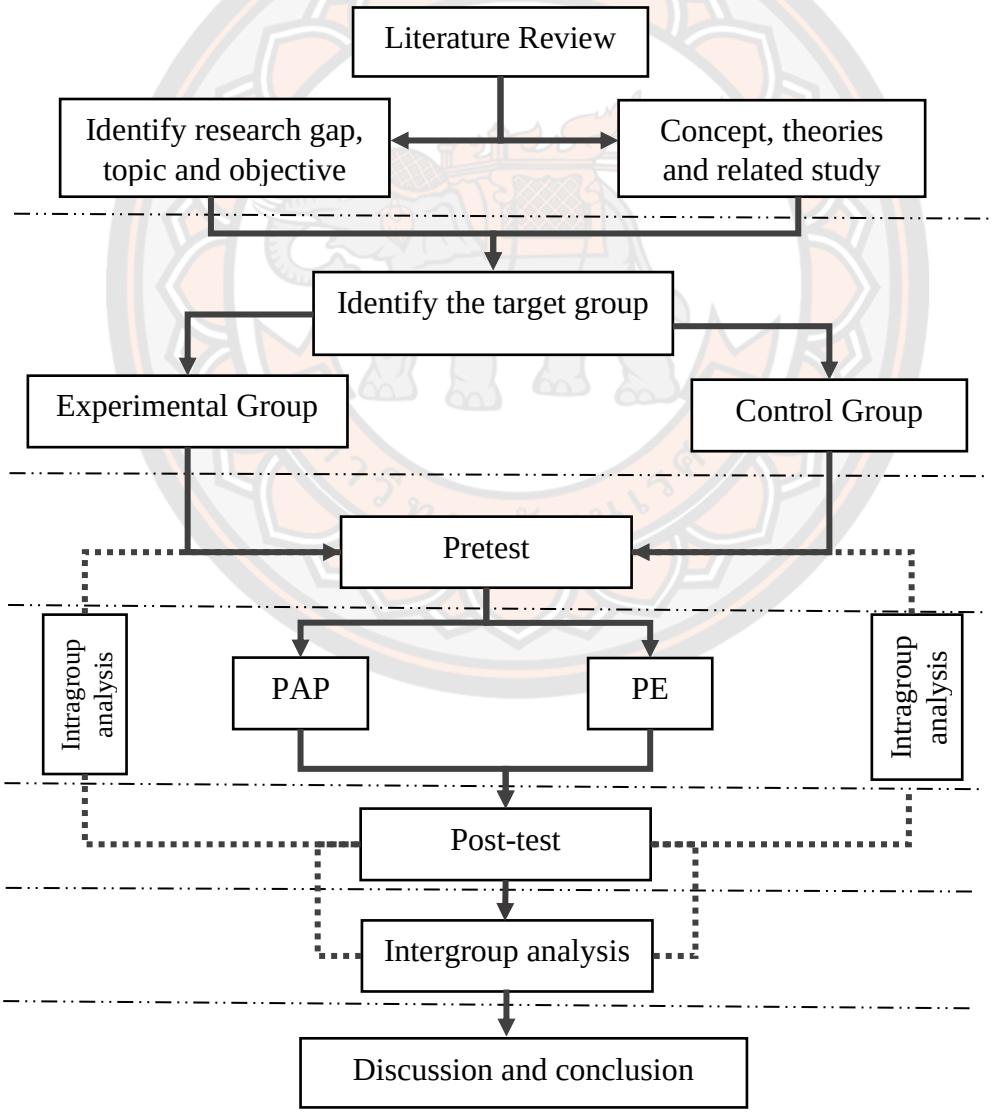

Figure 2 Research Methodology Framework

The research process involved seven key steps in the examination of the effectiveness of the physical activity program (PAP) on health-related fitness (HRF).

Step 1: The researcher carefully reviewed the literature to study the concepts, theories, and related studies. Identified research gap, selected a topic, and formulated an objective with a specific focus on PAP and HRF. Subsequently, an in-depth examination of related documents and previous research on the subject was undertaken to establish a foundation for the study.

Step 2: Once the groundwork was laid, the researcher proceeded to set the target group, a crucial decision that determined the participant's involvement and the method employed in the study. Following this, the development of the research instrument, specifically the design and construction of the PAP, became imperative. The thoroughness of this step was crucial for the success of the study, as the instrument served as a means to implement the PAP. The validity of the research instrument was then assessed through collaboration with the research adviser and experts. Their feedback and scrutiny have ensured that the instrument was reliable and aligned with the research objectives.

Step 3: Following this, the target group has undergone the HRF pre-test, establishing a baseline for their fitness levels.

Step 4: The heart of the research involved the engagement of the experimental group in an 8-week training session, incorporating physical activity lessons based on FITT principles. This structured approach, with 1 week per 2 periods and 1 period per 60 minutes, aimed to systematically introduce and familiarize the participants with the PAP.

Step 5: Upon completion of the training sessions, the target group took the post-test, and quantitative data from both the HRF pre-test and post-test was collected for analysis.

Step 6: This step encompassed a comprehensive analysis and interpretation of the gathered data, leading to the composition of a detailed research report.

Step 7: The report summarizes the findings, implications, and potential recommendations, providing a conclusive summary of the discussion and drawing the conclusion of the study's outcomes.

All procedures were performed after approval by the Thesis Committee Member of the Department of Physical Education and Exercise Science, Faculty of Education, Naresuan University, Thailand. Furthermore, the final approval for the conduct of the research study was granted by the Graduate School, Naresuan University. Full board review on Human Subject Protection was also applied and approved by the Human Research Ethics Committee (Panel 1) under the approval code COA No. 309/2024 and project number IRB No. P1-0014/2567 of Naresuan University, Department of Health Sciences, Naresuan University Institutional Review Board (NUIRB). Furthermore, obtaining approval from the Ministry of Education and Skills Development (MOESD), Thimphu, Bhutan was the subsequent step, confirming the ethical and regulatory compliance of the study. Moving forward, the researcher has acquired written consent from students and parents (Sample consent form attached in appendix F), emphasizing transparency and communication by providing an orientation to the students and explaining the purpose and significance of the PAP in improving HRF to the identified target group.

Research Design

In this study, the researcher has employed a quasi-experiment method with a two-group pre-test and post-test design. A quasi-experimental research design tests a causal hypothesis by identifying a comparison group that is as similar as possible to the treatment group in terms of baseline (pre-intervention) characteristics (White & Sabarwal, 2014). This method evaluates the effectiveness of treatment (Sullivan-Bolyai & Bova, 2014). Generally, the study had three stages of implementing treatment; 1) Administered the pre-test to measure the dependent variable (O_1 and O_3) before the treatment, 2) Implement the treatment through the physical activity program (PAP) developed based on FITT principles (X_1) and standard physical education (PE) as prescribed in PE curriculum in Bhutan (X_2), and 3) Administered the post-test to measure the dependent variable which referred to the health-related fitness (HRF) (O_2

and O_4) after the treatment. The change in the dependent variable was measured by finding the difference between pre-test results and post-test results which was done after the treatment. The target group was allocated into two groups: one that exclusively attended the PE classes; and another that in addition to the PE classes performed PAP organized in the time they did not attend school. The PAP group participated in the treatment for eight weeks (two sessions per week on alternate days, each session lasting 60 minutes).

Table 3 Research Design

Group	Pre-test	Intervention	Post-test
PAP	O_1	X_1	O_2
PE	O_3	X_2	O_4

PAP stands for Physical Activity Program Group.
PE stands for the Physical Education Group.
O_1, O_3 refers to the pre-test administered before the treatment.
X_1 refers to the physical activity program.
O_2, O_4 refers to the post-test administered after the treatment.
X_2 refers to standard physical education.

Note: All 60 participants, comprising both the experimental and control groups, were engaged in PE class during designated instructional hours. Subsequently, in post-instructional hours, only a subset of 30 participants from the experimental group participated in the treatment program.

Population and Sample

Seventh-grade students aged 13 to 17 years of Pema Gatshel Middle Secondary School (PMSS) participated in this research study. PMSS is one of the middle secondary schools located in the south-eastern region under the Pema Gatshel district in Bhutan (Pema Gatshel Dzongkhag, 2022). The school has an approximate area of 5.98 acres and is located at an altitude of 1560m above sea level. It was first established in the year 1960 (Pema Gatshel MSS, 2023). Presently, the school serves as an

educational institution for students ranging from pre-primary to grade ten. As of the academic year 2023, there were a total of 402 students, comprising 169 boys and 233 girls.

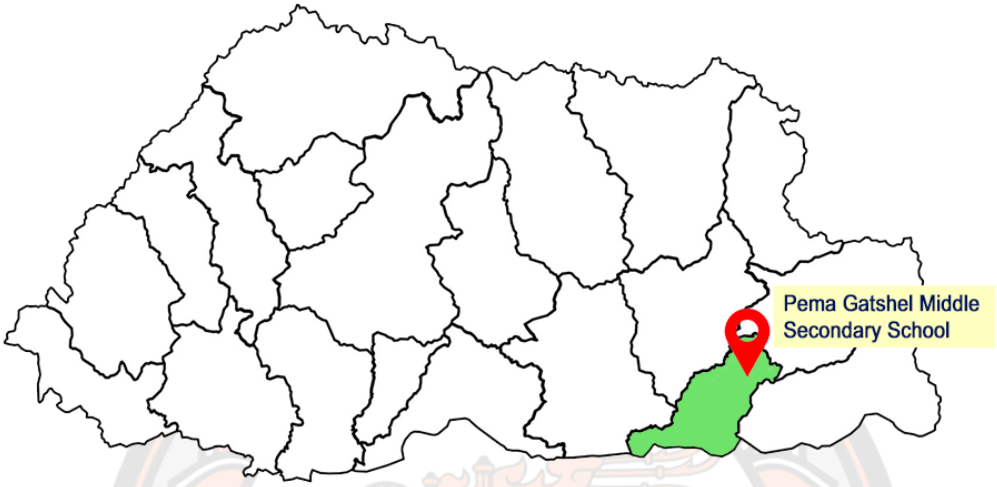

Figure 3 Location of the research area

The sample size was determined using a simple random sampling technique as detailed provided in Appendix A. The G*Power software (version 3.1.9.7) was used to calculate the sample size Appendix B. According to Cohen (2013), effect sizes can be classified as small (0.2), medium (0.5), and large (0.8). In experimental research, a small effect size might mean the results aren't statistically significant, while medium or large effect sizes often indicate significant findings. In social science research, a small effect size suggests a weak link between variables, whereas medium or large effect sizes show a strong relationship. Effect size considers data variability, meaning studies with more variability need larger effect sizes to achieve statistically significant results.

Therefore, employing a large effect size of 0.8, a significance level (α) of 5%, and a power of 90%, it was determined that a sample size of 28 participants per group is necessary. The sample size was calculated using the formula $ND = \frac{N}{1-d}$, where **N** refers to the sample size before considering dropouts, **d** refers to the expected dropout rate, and **ND** refers to the sample size considering dropouts (Kang, 2021). Considering an initial sample size of 58 and an expected dropout rate of 10% (0.1), the sample size

considering dropouts was 62, calculated as 58/ (1-0.1) = 62. The initial sample size was calculated to accommodate potential attrition, resulting in 31 participants in both the PAP group and the PE group. However, the actual number of participants in each group was reduced to 30 due to unforeseen circumstances. In the PAP group, one participant withdrew based on the pre-established withdrawal criteria, which specified that 1) participants unable to attend more than 50% of the sessions, or 2) those who withdraw their consent or whose legally authorized representative (LAR) withdraws consent, would be removed from the study. Meanwhile, in the control group, one participant was lost due to not being able to turn up for the post-test. Consequently, the final number of participants in each group was reduced to 30, resulting in a total of 60 participants overall.

Inclusion criteria

The inclusion criteria specified that 1) participants must be Bhutanese students presently enrolled in an educational institution within Bhutan (i.e. Pema Gatshel Middle Secondary School), 2) must fall within the age range of 13 to 17 years, 3) should not be currently involved in any other research studies or projects, 4) should not have a history of chronic health diseases such as cardiovascular diseases, diabetes, asthma, neurological diseases and hypertension, 5) willingness to participate in the program must be confirmed, and 6) Previously performed PE without physical limitation.

Exclusion criteria

Exclusion criteria involved the exclusion of 1) students with a history of chronic health diseases such as cardiovascular diseases, diabetes, asthma, neurological diseases, and hypertension, 2) students with disabilities that might impede their involvement in the physical activity program/physical education class, 3) students aged under 13 or over 18 years old, 4) if already engaged in other research studies or projects and 5) if Legally Authorized Representative (LAR) rejects to sign the consent.

Research Instruments

Two instruments were employed in this study: 1) Instructional Instrument and 2) Data Collection Instrument. Table 4 presents the research instruments for the study, with detailed explanations provided in the subsequent sub-sections.

Table 4 Research instruments

Goal	Instrument adapted from	Variables
Promotion of physical activity level	FITT principles guidelines (Walton-Fisette & Wuest, 2017)	General moderate to vigorous physical activity of students.
Promotion of physical fitness (Heal-related fitness)	FitnessGram test battery (Cooper Institute, 2017b)	Health-related fitness: cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition.

Instructional Instruments

Lesson plans in line with FITT guidelines.

The researcher has formulated sixteen lesson plans adhering to the FITT guidelines, as outlined in Table 1 in Chapter 2. These lesson plans were crafted after a comprehensive examination of the objectives of specific topics identified by the researcher for participation in the physical activity program aimed at enhancing health-related fitness. The following steps outline the process for developing the sixteen lesson plans.

Studied the research objectives:

The goals of each physical activity within the lesson plan were aligned and centered on attaining the research objectives. The overarching aim was to enhance health-related fitness following the implementation of the treatment.

Identified the content:

To determine the instructional content, the researcher selected sixteen physical activity topics and designed lesson plans using the FITT guidelines as specified in Table 5 below:

Table 5 HRF components, lesson topic, and target training time

HRF components	Week	Activity topic	Duration (mins)
Cardiorespiratory Endurance, Muscular Strength, Muscular Endurance, Flexibility.	I	Yoga for Flexibility	60
		Partner Stretching	60
	II	Outdoor Stretching Adventure	60
		Resistance Band Exercises	60
	III	Yoga for Strength	60
		Flexibility Circuit Training	60
	IV	Bodyweight Circuit	60
		Resistance Band Workout	60
	V	Calisthenics Routine	60
		Partner Squat	60
	VI	Circuit Training	60
		Aerobic Dance	60
	VII	Run for Distance	60
		Uphill Relay	60
	VIII	Soccer Drills	60
		Team Sports	60

Development of lesson plans based on lesson components:

The research entailed the creation of a physical activity program aimed at improving health-related fitness, grounded in the FITT principles. Consequently, each of the chosen physical activity program (PAP) lessons was structured following the guidelines of FITT principles (Walton-Fisette & Wuest, 2017). The lesson plan is

attached in Appendix C. The plans were formulated, incorporating the essential components of the lesson outlined below:

Lesson Overview: This section provides a summary of the entire lesson, outlining what activities and topics will be covered. It gives a roadmap for the class.

Learning Objectives: Learning objectives are specific, measurable goals that students should achieve by the end of the lesson. It helps guide the lesson planning process and provides clear expectations based on three learning domains; cognitive, psychomotor, and affective/social domain.

Lesson Introduction: This component sets the stage for the lesson. It includes a brief review of previous lessons, an explanation of why the current topic is important, and an overview of what students can expect to learn.

Lesson Development: This is the core part of the lesson where the main content is presented. It includes demonstrations, explanations, and discussions related to the specific physical activity or skill being taught.

Warming Up: Warming up is crucial to prepare the body for physical activity. It typically involves light exercises and stretches that increase blood flow to muscles, enhance flexibility, and reduce the risk of injury.

Main Activity: This is the primary focus of the lesson, where students engage in the core physical activity or skill. It includes drills, practice sessions, or structured activities that reinforce the learning objectives.

Variation: This component introduces variations or modifications to the main activity. It allows students to explore different aspects of the skill or adapt it to different contexts, promoting versatility and skill development.

Cooling Down: Similar to warming up, cooling down is essential for gradually bringing the heart rate and body temperature back to normal. It typically involves stretching and relaxation exercises to improve flexibility and aid recovery.

Debriefing: Debriefing sessions allow students to reflect on their performance, discuss challenges, and reinforce key takeaways. It's an opportunity for the researcher to provide feedback and address any questions.

Assessment: This component involves evaluating students' performance based on the learning objectives. Assessments are formal or informal and include observation and skill assessments.

Incorporating these components into physical activity lessons helped create a comprehensive and effective learning experience, promoting both skill development and overall well-being.

Procedures for validation of the lesson plans

Creating and executing a physical activity program (PAP) encompasses various pivotal stages. Initially, a comprehensive exploration of the principles and components of a PAP was undertaken to establish a robust foundation. This entailed gaining an in-depth understanding of the theoretical framework, objectives, and activities that contributed to the program's efficacy. Following this, the preliminary PAP was accurately developed, considering the identified principles and components. The subsequent step involved presenting the drafted program to advisors and experts for examination and validation.

Sending to the advisors: After completing the lesson planning using the necessary components, the lesson plans were sent to the advisors for review to check for any errors or gaps before being forwarded to the experts.

Sending to the experts: After the advisor reviewed the lesson plans and made the necessary corrections, they were sent to the experts for Item Objective Congruence (IOC) checking. Based on the experts' comments and suggestions, some minor changes were made to certain lesson plans.

Lesson plan IOC checking

The lesson plans were checked before the implementation by three experts. The IOC was employed for the content validation of the lesson plans. The plans were validated by scores obtained from the three experts, comprising two physical education

experts from Thailand and one evaluation education expert from Bhutan selected based on the field relevancy like expertise in curriculum and instruction, teaching strategy, and teaching physical activity with a minimum of five years' experience. The names of the experts are listed below:

1. Asst. Prof. Wanwisa Bungmark, Ph.D. Faculty of Education, Silpakorn University, Thailand.
2. Asst. Prof. Thaweesub Koeipakvaen, Ph.D. Faculty of Education, Naresuan University, Thailand.
3. Dawa Gyeltshen, Ph.D. Health and Physical Education Curriculum Developer, Ministry of Education and Skills Development, Bhutan.

This step was aimed at validating the content, ensuring that the program's elements aligned seamlessly with its intended objectives. Once submitted to the experts, the validation proceeded, and any feedback or adjustments recommended by the experts were incorporated into the program.

Developing the IOC checking form

Study the components of the lesson plan: The development of the IOC checking form for the lesson plan was grounded in its various components. It is essential that the content meets all specified requirements and ensures that the lesson is both enjoyable and engaging for students, facilitating the retention of knowledge and the development of skills. The comprehensive evaluation encompassed all facets of each lesson, including objectives, learning activities, and assessments.

Constructing the IOC form: In assessing the lesson plan's appropriateness, experts have used the IOC form as outlined in Appendix D (i), to conduct a thorough validation as per the classification of scores.

Classifying the IOC scores: The IOC form of the lesson plan was evaluated using three indicators: a score of **1** indicated the item *'aligns with the objective'*, **0** signified *'some relevance or partial alignment,'* and **-1** indicated *'does not align with the objective.'* According to Sutiporn and Teerarat (2023) for a lesson plan to be deemed

suitable for implementation based on item IOC, the recommended average score is typically ≥ 0.5 or higher. Items that receive a score of 0.5 to 1.00 are considered valid and aligned with the objectives, while those below 0.5 are deemed unsuitable and require revision before use. The expert ratings for each item were summed up and averaged. All items in the lesson plan scored ≥ 0.5 Appendix D (ii), indicating their suitability for use.

Data Collection Instruments

The quantitative data concerning the effectiveness of the PAP on HRF was collected by administering HRF pre-test and post-test before and after implementing the treatment. Each component of HRF was administered using five test batteries from the FitnessGram Copper test (Cooper Institute, 2017b). The specific procedures for conducting the HRF test protocols are outlined in Appendix E. Besides several tools available to test different components of HRF globally, a test battery in FitnessGram was used in this study as these tests 1) include a complete battery of health-related fitness items according to criterion-referenced standards associated with good health established for children and youths, 2) standards are age- and sex-specific, and 3) are established based on how fit children need to be for good health (Cooper Institute, 2017a). Five components of health-related fitness test batteries were administered to assess the HRF of a student before and after implementing PAP as indicated in Table 6.

Table 6 Components of health-related fitness and assessment test batteries

Type of fitness	Test battery	Assessment
Cardiorespiratory Endurance (CRE)	Progressive Aerobic Cardiovascular Run (PACER)	Maximum aerobic fitness of students
Muscular Strength (MS)	90^0 Push up	Upper body strength and endurance
Muscular Endurance (ME)	Curl up	Abdominal muscle endurance
Flexibility (Flex)	Back-Saver Sit and Reach	Flexibility of left and right legs

Type of fitness	Test battery	Assessment
Body Composition (BC)	Body Mass Index (BMI)	Body composition

Each component of health-related fitness (HRF) was evaluated using specific standards that considered the child's age and gender. Achieving the Healthy Fitness Zone (HFZ) means that a child has reached a level of fitness that offers significant health benefits. These standards are different for boys and girls to account for their unique physiological differences, ensuring that each child is assessed fairly and accurately. When a child reaches the HFZ, it shows they have a good level of fitness that can help them stay healthy and active (Cooper Institute, 2017b).

Table 7 FitnessGram Standards for the Healthy Fitness Zone

Age	PACER (20-meter laps)		90^0 Push-up (no. completed)		Curl-up (no. completed)		Back-saver sit and reach (inches)		Body Mass Index	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
13	≥29	≥25	≥12	≥7	≥21	≥18	8	10	15.8-22.2	15.7-22.9
14	≥36	≥27	≥14	≥7	≥24	≥18	8	10	16.4-23.0	16.2-23.6
15	≥42	≥30	≥16	≥7	≥24	≥18	8	12	16.9-23.7	16.7-24.3
16	≥47	≥32	≥18	≥7	≥24	≥18	8	12	17.5-24.5	17.1-24.8
17	≥50	≥35	≥18	≥7	≥24	≥18	8	12	18.1-24.9	17.5-24.9

Data Collection

The quantitative data was collected from 60 Bhutanese students studying in seventh grade aged 13-17 years, enrolled in Pema Gatshel Middle Secondary School, Pema Gatshel district, south-eastern part of Bhutan. The duration of the time that the student spent in the treatment program was a total of 16 hours excluding the time

spent for the HRF test. The sample was chosen based on simple random sampling. The participants in both the groups (PAP and PE group) took part in the health-related fitness pre-test which the researchers administered before implementing the treatment. Of the total 60 participants, 30 participants in the PAP group were then engaged in a treatment program for 8 weeks (2 periods per week and 60 minutes per period) and covered 16 physical activity lessons, while another 30 participants in the PE group participated in regular physical education class as prescribed in the Health and Physical Education curriculum in Bhutan. Upon completion of the treatment, the post-test was administered to assess the effects of PAP and compared the data in two ways; 1) examined and analyzed the intragroup pre-test and post-test results before and after implementing the treatment, and 2) examined and analyzed the intergroup post-test result after implementing the treatment.

Data Analysis

To examine the effectiveness of the physical activity program on health-related fitness of seventh-grade students of Pema Gatshel Middle Secondary School, the data was collected from the health-related fitness test scores in the pre-test and post-test which was administered before and after the treatment using the physical activity program as an independent variable. The program of Statistical Package for the Social Science (SPSS) for Windows was used to analyze the data in the following ways:

1. **Mean and Standard Deviation** were calculated for the HRF test scores to study the effectiveness of the PAP on the HRF level of the students.
2. **Paired sample t-tests** were conducted to compare the means of two related groups before (pre-test) and after (post-test) measurement of health-related fitness tests.
3. **Independent t-tests** were conducted to compare the means of two independent groups (comparing two different groups) after (post-test) scores of health-related fitness tests.

CHAPTER IV

RESULTS OF THE STUDY

This chapter presents the analysis of data collected from the research study on 'The Effects of Physical Activity Program (PAP) on Health-Related Fitness (HRF) among Seventh-Grade Students in Bhutan'. This chapter is organized into two sections: descriptive statistics and inferential statistics.

Descriptive Statistics

Descriptive statistics provide a summary of the data and offer insights into the general characteristics.

1. Demographic Information: The summary of demographic details of the participants, such as gender, age, and baseline fitness levels.
2. General Report on Student Fitness Performance: A report on the fitness performance of students, comparing the results of the experimental group, the control group, and the combined data from both groups.
3. Pre-test and Post-test Scores: Descriptive statistics of pre-test scores for both the experimental and control groups are presented to establish a baseline for comparison and post-test scores for both groups are provided to illustrate changes after the intervention.

Demographic Characteristics of the Participants

The study involved 60 seventh-grade students, with 30 students participating in the PAP group and 30 students in the PE group.

Table 8 Demographic Characteristics of Participants by Gender

Gender	Frequency	Percent
Male	26	43.3
Female	34	56.7
Total	**60**	**100.0**

Table 8 provides a summary of the gender distribution among the participants in the study. The demographic information was provided to offer a comprehensive overview of the study sample. A total of 60 participants were included, and they were categorized based on their gender. The study involved 26 male participants, which accounts for 43.3% of the total sample. 34 female participants were included in the study, representing 56.7% of the total sample. This indicates a higher proportion of female participants compared to male participants in the study. The gender distribution shows a relatively balanced representation, although there are slightly more female participants than male participants. This balance is important for ensuring that the findings of the study can be generalized across both genders, even though the study does not measure gender-based performance. This demographic breakdown ensures transparency in the participant selection process and provides context for interpreting the results of the study.

Table 9 Demographic Characteristics of Participants by Age

Age (in years)	Frequency	Percent
13	12	20.0
14	34	56.7
15	9	15.0
16	4	6.7
17	1	1.7
Total	**60**	**100.0**

Table 9 presents the age distribution of the 60 participants in the study, providing insights into the age demographics of the sample. The participants range in age from 13 to 17 years. The majority of participants are aged 14 years, with 34 participants (56.7%) falling into this category. This age group forms the largest proportion of the study sample. The second largest age group is 13 years, consisting of 12 participants (20.0%). Participants aged 15 years make up 15.0% of the sample, with 9 participants. A smaller number of participants are aged 16 years, accounting for 6.7% of the sample, which includes 4 participants. The least represented age group is 17 years, with just 1 participant (1.7%) in this category.

The predominant age group is 14 years, which suggests that the study primarily involves middle adolescents. This concentration might be reflective of the specific grade level targeted by the study. The age distribution indicates a focus on early to middle adolescence, with fewer participants in the older age categories of 16 and 17 years. This distribution provides a clear understanding of the sample's demographic profile, which can be important for contextualizing the study's findings. This demographic breakdown by age helps to establish a comprehensive profile of the study participants, contributing to the overall context in which the research findings are interpreted.

General Fitness Performance Report

The provided data in the subsequent three tables represents the fitness performance of students aged 13 to 17 years who participated in a research study, divided into an experimental group and a control group. The experimental group underwent an 8-week physical activity program (PAP), while the control group continued with regular physical education (PE) classes. Fitness levels were measured across five key components: cardiorespiratory endurance (CRE), muscular strength (MS), muscular endurance (ME), flexibility, and body composition (BC). The healthy fitness zone (HFZ) was assessed according to the standards of FitnessGram from the Cooper Institute as presented in Table 7, Chapter 3.

Table 10 Fitness Performance of Students in the Experimental Group

Age	Frequency	No. of students attaining HFZ in CRE		No. of students attaining HFZ in MS		No. of students attaining HFZ in ME		No. of students attaining HFZ in Flexibility		No. of students attaining HFZ in BC	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
13	12	5	7	5	10	3	3	10	10	9	10
14	14	2	4	3	12	0	1	9	12	9	10
15	3	0	1	0	2	1	1	1	2	1	1
16	0	0	0	0	0	0	0	0	0	0	0
17	1	0	0	0	1	1	1	1	1	1	1
Total	**30**	**7**	**12**	**8**	**25**	**5**	**6**	**21**	**25**	**20**	**22**

Note: HFZ = Healthy Fitness Zone, CRE=Cardiorespiratory Endurance, MS=Muscular Strength, ME=Muscular Endurance, BC=Body Composition

Table 10 shows that in the experimental group, significant improvements were observed across most fitness components, especially in Muscular Strength and Flexibility. For the 13-year-olds, there was a noticeable increase in the number of students achieving HFZ in CRE, MS, and BC, while Flexibility remained stable. Among 14-year-olds, a substantial increase was observed in MS, with more than three times the number of students reaching the HFZ in the posttest compared to the pretest. Flexibility and BC also showed marked improvements. The 15-year-olds displayed modest gains across all fitness components, while the lone 17-year-old in the group showed slight improvements. Overall, the experimental group saw a considerable increase in the total number of students achieving HFZ across all categories, particularly in muscular strength and flexibility, indicating the effectiveness of the PAP.

Table 11 Fitness Performance of Students in the Control Group

Age	Frequency	No. of students attaining HFZ in CRE		No. of students attaining HFZ in MS		No. of students attaining HFZ in ME		No. of students attaining HFZ in Flexibility		No. of students attaining HFZ in BC	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
13	0	0	0	0	0	0	0	0	0	0	0
14	20	2	2	5	10	1	2	10	13	7	9
15	6	0	0	2	2	0	1	3	5	6	6
16	4	0	1	1	2	0	0	3	4	3	4
17	0	0	0	0	0	0	0	0	0	0	0
Total	**30**	**2**	**3**	**8**	**14**	**1**	**3**	**16**	**22**	**16**	**19**

Note: HFZ = Healthy Fitness Zone, CRE=Cardiorespiratory Endurance, MS=Muscular Strength, ME=Muscular Endurance, BC=Body Composition

In contrast, Table 11 shows more modest improvements in the control group. Among 14-year-olds, the number of students achieving HFZ in muscular strength and body composition increased moderately. There was also a slight improvement in Flexibility. However, in cardiorespiratory endurance and muscular endurance, the progress was minimal. Similarly, the 15- and 16-year-olds in the control group demonstrated small gains in most fitness components, with no change in some

categories. Overall, the control group showed an increase in the number of students achieving HFZ, but the improvements were less significant compared to those seen in the experimental group.

Table 12 Consolidated Fitness Performance of students

Age	Frequency	No. of students attaining HFZ in CRE		No. of students attaining HFZ in MS		No. of students attaining HFZ in ME		No. of students attaining HFZ in Flexibility		No. of students attaining HFZ in BC	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
13	12	5	7	5	10	3	3	10	10	9	10
14	34	4	6	8	22	1	3	19	25	16	19
15	9	0	1	2	4	1	2	4	7	7	7
16	4	0	1	1	2	0	0	3	4	3	4
17	1	0	0	0	1	1	1	1	1	1	1
Total	**60**	**9**	**15**	**16**	**39**	**6**	**9**	**37**	**47**	**36**	**41**

Note: HFZ = Healthy Fitness Zone, CRE=Cardiorespiratory Endurance, MS=Muscular Strength, ME=Muscular Endurance, BC=Body Composition

Table 12 shows consolidated data from both groups; the overall trend shows a positive impact of the treatment. Significant improvements were observed, particularly in muscular strength and flexibility. The 14-year-olds showed the most substantial gains, with the number of students achieving HFZ in muscular strength increasing nearly threefold. The data suggests that structured PAPs can have a significant impact on enhancing students' fitness levels across multiple health-related components, particularly when compared to regular PE classes.

Pre-Test and Post-Test HRF mean and standard deviation scores

The HRF of participants was assessed using the FitnessGram test battery before and after the intervention.

Table 13 Descriptive Statistics of mean and standard deviation of Pre-test and Post-test

Components	Group	Pre-test		Post-test	
		$\bar{X}$	SD	$\bar{X}$	SD
CRE	PAP	23.23	10.42	30.57	13.98
	PE	21.30	9.91	23.23	10.64
MS	PAP	7.47	4.34	12.37	4.98
	PE	7.30	5.39	9.00	5.48
ME	PAP	10.10	7.48	16.40	8.48
	PE	10.00	6.03	11.47	7.11
Flexibility	PAP	27.98	5.82	29.85	5.05
	PE	24.43	5.30	25.86	5.49
BC	PAP	22.45	3.56	20.96	3.54
	PE	22.46	2.86	21.67	2.77

Note: CRE=cardiorespiratory endurance, MS=muscular strength, ME=muscular endurance, BC=body composition.

Table 13 summarizes the descriptive statistics for both the PAP and PE groups, comparing pre-test and post-test scores across five HRF components: CRE, MS, ME, Flexibility, and BC. In the PAP group, the mean pre-test score for CRE was 23.23 before the implementation of treatment. However, after the implementation of treatment for 8 weeks, this increased to a mean post-test score of 30.57, suggesting a noticeable improvement in CRE. In contrast, the PE group had a mean pre-test score of 21.30 which increased slightly to 23.23. The improvement in the PE group was less pronounced than in the PAP group, highlighting the effectiveness of the treatment as shown in Figure 4.

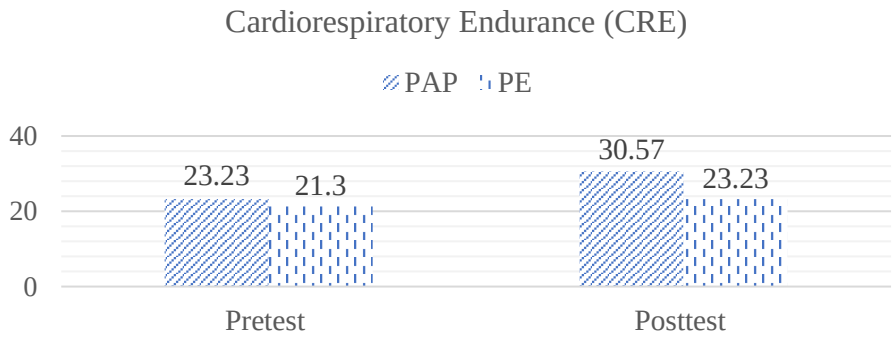

Figure 4 Pre-test and post-test mean scores in CRE before and after using treatment

From Table 13 while measuring the MS, the PAP group demonstrated a notable improvement in scores, with a mean pre-test score of 7.47 rising significantly to a mean post-test score of 12.37. In contrast, the PE group showed a more modest increase, with a mean pre-test score of 7.30 improving to a mean post-test score of 9.00. This comparison indicates that the improvement was modest compared to the PAP group indicating that treatment was effective in enhancing MS as shown in Figure 5.

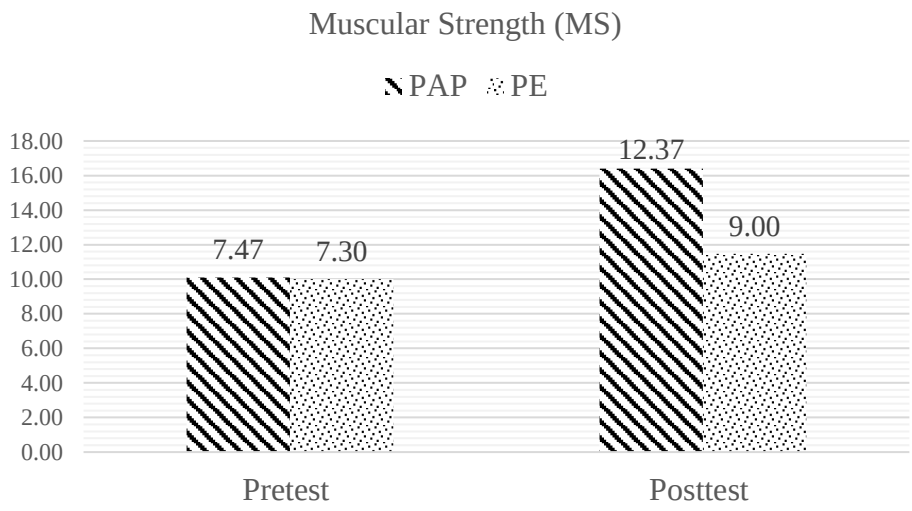

Figure 5 Pre-test and post-test mean scores in ME before and after using treatment

Similarly, from Table 13, the PAP group exhibited a substantial improvement in muscular endurance scores, with the mean pre-test score increasing from 10.10 to 16.40 in the post-test. This represents a notable gain, highlighting the effectiveness of the treatment. Conversely, the PE group showed a more modest enhancement, with the mean pre-test score rising from 10.00 to 11.47 in the post-test. The smaller improvement in the PE group suggests that the intervention had a more pronounced impact on the PAP group as shown in Figure 6.

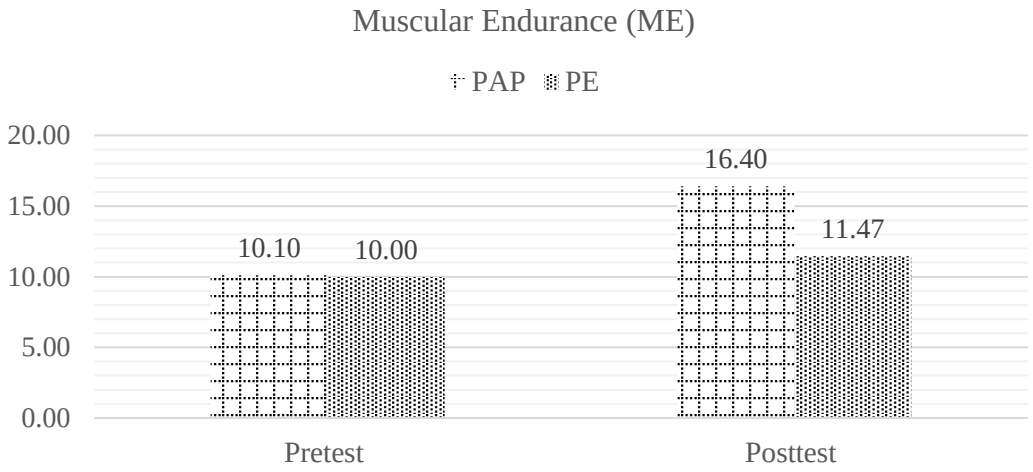

Figure 6 Pre-test and post-test mean scores in ME before and after using treatment

From Table 13, the PAP group demonstrated a slight yet notable improvement in flexibility scores, with the mean pre-test score of 27.98 rising to 29.85 in the post-test. This indicates a meaningful enhancement resulting from the treatment. In contrast, the PE group showed a more modest increase, with the mean pre-test score of 24.43 improving to 25.86 in the post-test. The comparatively smaller gain in the PE group underscores the relative effectiveness of the treatment program applied to the PAP group as shown in Figure 7.

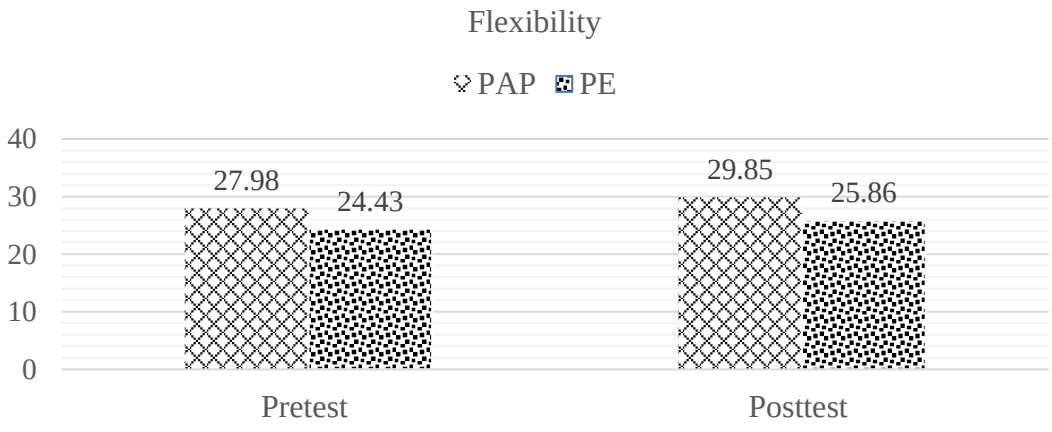

Figure 7 Pre-test and post-test mean scores in flexibility before and after using treatment

From Table 13, the PAP group experienced a notable reduction in body composition, with the mean pre-test score of 22.45 decreasing to 20.96 in the post-test. This decline reflects a significant improvement. On the other hand, the PE group also saw a reduction in body composition, with the mean pre-test score of 22.46 falling slightly to 21.67 in the post-test. However, the reduction in the PE group was less pronounced compared to the PAP group, highlighting the greater effectiveness of the treatment program applied to the PAP group as shown in Figure 8.

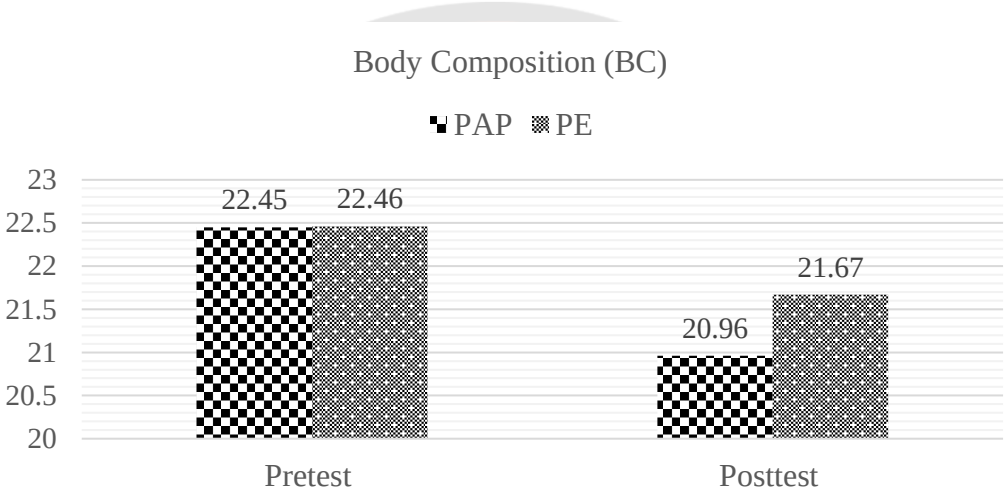

Figure 8 Pre-test and post-test mean scores in BC before and after using treatment

The analysis revealed that the PAP group exhibited significant improvements across all components from pre-test to post-test, with the most substantial gains observed in CRE, MS, and ME. While flexibility and BC also showed improvement, these were less pronounced.

In comparison, the PE demonstrated improvements in all areas as well, but these changes were notably smaller. This contrast underscores the effectiveness of the treatment program implemented for the PAP group, indicating a more substantial positive impact than regular PE class on health-related fitness among participants.

Inferential Statistics

Dependent test analysis of pre-post score within the group

The experimental group showed significant improvements in all HRF components after the treatment program.

Table 14 Paired Sample t-Test Results in PAP Group

Components	Test	$\bar{X}$	SD	t-value	Sig.
CRE	Pre	23.23	10.42	-6.23	0.00*
	Post	30.57	13.98		
MS	Pre	7.47	4.34	-17.97	0.00*
	Post	12.37	4.98		
ME	Pre	10.10	7.48	-10.10	0.00*
	Post	16.40	8.48		
Flexibility	Pre	27.98	5.82	-3.33	0.00*
	Post	29.85	5.05		
BC	Pre	22.45	3.56	14.12	0.00*
	Post	20.96	3.54		

Note: *Significance level: *p<0.05.*

The analysis in Table 14 involves a paired sample t-test to compare pre-test and post-test scores of HRF components within the PAP group. The results indicate the effectiveness of the treatment. The PAP group underwent a treatment program aimed at improving various components of HRF.

Significant improvements were observed in CRE, with a p-value less than 0.05. The negative t-value of -6.232 indicates that the post-test scores were higher than the pre-test scores. MS also showed a significant enhancement post-intervention ($p < 0.05$), as reflected by a large negative t-value of -17.968, indicating a substantial increase in strength. Similarly, ME improved significantly after the intervention ($p < 0.05$), with a negative t-value of -10.103 signifying higher post-test scores. Flexibility showed significant improvement as well ($p < 0.05$), with a negative t-value of -3.328 denoting increased flexibility. Lastly, there was a significant improvement in BC post-intervention ($p < 0.05$), indicated by a positive t-value of 14.122, suggesting a favorable change, likely a reduction in body fat percentage or a similar metric.

Table 15 Paired Sample t-Test Results in PE Group

Components	Test	$\bar{X}$	SD	t-value	Sig.
Cardiorespiratory Endurance	Pre	21.30	9.91	-8.81	0.00*
	Post	23.23	10.64		
Muscular Strength	Pre	7.30	5.39	-5.16	0.00*
	Post	9.00	5.48		
Muscular Endurance	Pre	10.00	6.03	-2.29	0.03
	Post	11.47	7.11		
Flexibility	Pre	24.43	5.30	-1.54	0.14
	Post	25.86	5.49		
Body Composition	Pre	22.46	2.86	6.48	0.00*
	Post	21.67	2.77		

Note: *Significance level: *p<0.05*

The analysis in Table 15 involves a paired sample t-test to compare pre-test and post-test scores of HRF components within the PE group. The results indicate the changes observed in the PE group that did not receive the treatment, serving as a baseline to observe natural variations or any other influences on HRF components by standard PE classes.

There was a significant improvement observed in CRE with a p-value of .00. This indicates that PE classes contributed to enhanced CRE in the PE group, although not as extensively as in the PAP group. A significant improvement in MS was also noted with a p-value of .00. While the improvement was less substantial than that observed in the PAP group, it still demonstrated some positive change. The ME showed a significant improvement with a p-value of .03, though this improvement was to a lesser degree compared to the experimental group. Flexibility, however, did not show significant improvement, as indicated by a p-value of .14, suggesting that regular PE classes did not lead to a significant change in flexibility. Finally, a significant improvement in BC was observed with a p-value of .00 ($p < 0.05$), indicating some positive changes in body composition as a result of regular PE classes.

In summary, the PAP group showed significant improvements across all HRF components due to the treatment program, indicating its effectiveness. The control group also exhibited improvements in certain HRF components (CRE, MS, ME, BC), likely due to regular PE classes, but did not show significant changes in flexibility. The

treatment program had a pronounced effect on the PAP group compared to the PE group, highlighting the importance of structured PAPs for improving HRF components.

Independent sample t-test results analysis of post-test scores

An Independent sample t-test was used to compare the means of two independent groups to determine if there was a statistically significant difference between them. The t-value indicates the size of the difference relative to the variation in the sample data, and the p-value indicates whether the difference is statistically significant. A p-value less than 0.05 typically suggests that the difference observed is statistically significant.

Table 16 Comparison of post-test score of cardiorespiratory endurance

Components	Group	$\bar{X}$	*SD*	t	p-value
Cardiorespiratory Endurance	PAP	30.57	13.98	2.29	0.03*
	PE	23.23	10.64		

Note: *Significance level: *p<0.05*

The p-value of 0.03 is less than the significance level of 0.05, indicating a statistically significant difference between the PAP and PE groups for cardiorespiratory endurance. This suggests that the PAP treatment program was significantly more effective than the PE program in improving cardiorespiratory endurance.

Table 17 Comparison of post-test score of muscular strength

Components	Group	$\bar{X}$	*SD*	t	p-value
Muscular Strength	PAP	12.37	4.98	2.49	0.02*
	PE	9.00	5.48		

Note: *Significance level: *p<0.05*

The p-value of 0.02 is less than 0.05, indicating a statistically significant difference between the groups for muscular strength. The PAP program was significantly more effective in enhancing muscular strength than the PE program.

Table 18 Comparison of post-test score of muscular endurance

Components	Group	$\bar{X}$	*SD*	t	p-value
Muscular Endurance	PAP	16.40	8.48	2.44	0.02*
	PE	11.47	7.11		

Note: *Significance level: *p<0.05*

The p-value of 0.02 indicates a statistically significant difference between the PAP and PE groups for muscular endurance. The PAP group showed a significant improvement in muscular endurance compared to the PE group.

Table 19 Comparison of post-test score of flexibility

Components	Group	$\bar{X}$	*SD*	t	p-value
Flexibility	PAP	29.85	5.05	2.93	0.01*
	PE	25.86	5.49		

Note: *Significance level: *p<0.05*

The p-value of 0.01 is much less than 0.05, indicating a statistically significant difference in flexibility between the PAP and PE groups. The PAP program was more effective in improving flexibility compared to the PE program.

Table 20 Comparison of post-test score of body composition

Components	Group	$\bar{X}$	*SD*	t	p-value
Body Composition	PAP	20.96	3.54	-0.87	0.39
	PE	21.67	2.77		

With the negative sign indicating that the PE group had a slightly higher mean than the PAP group, the p-value of 0.39 exceeds the 0.05 threshold, signifying a lack of statistical significance. The results, however, indicate a modest improvement in BC for the PAP group, as reflected in the mean difference of 0.71. Specifically, the lower mean score of 20.96 for the PAP group, compared to 21.67 for the PE group, suggests that the treatment program may have contributed to a reduction in BMI for participants. While not statistically significant, this decrease in BMI implies a positive trend towards enhanced body composition due to the PAP program. Consequently, although both programs showed similar effects on body composition, the data implies that the PAP

intervention provided a modest improvement in BMI, underscoring its potential impact relative to the PE group.

Overall, the Independent Sample t-test results indicate that the PAP group demonstrated significantly better improvements in cardiorespiratory endurance, muscular strength, muscular endurance, and flexibility compared to the PE group. However, there was no significant difference between the groups in terms of body composition, suggesting similar effectiveness for this particular fitness component. These findings support the effectiveness of the PAP treatment program in enhancing multiple aspects of health-related fitness, except for body composition.

CHAPTER V

DISCUSSION, CONCLUSION AND RECOMMENDATION

This chapter presents the discussion, conclusion, and recommendation derived in the conduct of the study which is to examine the effect of the physical activity program (PAP) on health-related fitness (HRF) for 7th grade students in Bhutan.

The study was conducted at Pema Gatshel Middle Secondary School. The respondents were the 7th-grade students. They were selected using simple random sampling. It employed quantitative research and utilized a quasi-experimental method. Pertinent data were obtained through pretest and posttest. The statistical tools used were mean, dependent, and independent t-tests.

Discussion

This study aimed to evaluate the effectiveness of a structured PAP in improving HRF among seventh-grade students in Bhutan, with comparisons made to the outcomes from the standard physical education (PE) program. The findings, discussed with the research objectives, hypotheses, and research questions, offer significant insights into the impact of structured physical activity interventions on students' fitness levels.

Objective 1: Comparing HRF results within the same group before and after implementing PAP and PE programs.

The analysis revealed significant improvements in HRF components such as cardiovascular endurance, muscular strength, and flexibility within the PAP group following the implementation of the treatment. These results confirmed the first hypothesis, which posited that there would be measurable improvements in HRF scores after the intervention. The pre-test results indicated that many students were below the recommended fitness levels, particularly in cardiovascular endurance and flexibility. However, post-test results demonstrated significant progress, with many students reaching or exceeding the recommended levels after participating in the PAP.

These findings highlight the efficacy of the PAP in addressing key fitness areas, with the improvements attributed to factors such as increased frequency and intensity of physical activities, a variety of exercises targeting multiple HRF components, and the structured nature of the program. These results align with existing literature, which emphasizes the effectiveness of well-structured PAP in improving HRF among adolescents (Humphreys et al., 2014; Wu et al., 2017).

Objective 2: Comparing post-test HRF results between groups following the implementation of PAP and PE programs.

When comparing the post-test HRF results between the PAP and PE groups, the data indicated a significant difference in favour of the PAP group, supporting the second hypothesis. The PAP group demonstrated greater improvements in cardiovascular endurance, muscular strength, and flexibility, suggesting that the structured, targeted nature of the PAP was more effective than the general PE program. These superior outcomes are consistent with the theory of progressive overload, which suggests that systematic increases in exercise intensity led to better fitness outcomes. The PAP's incorporation of specificity and overload principles likely facilitated these improvements, allowing students to build fitness more efficiently.

Research Question 1: Current level of HRF among Bhutanese students.

The pre-test results revealed that the initial HRF levels among Bhutanese students were below recommended standards in several key areas, particularly cardiovascular endurance and flexibility. This finding is consistent with global concerns about the declining physical fitness levels of school-aged children, including those in Bhutan. These low initial levels underscore the need for more focused interventions to address fitness deficiencies among students.

Research Question 2: Effectiveness of existing PE classes in improving HRF among students.

The comparison of HRF outcomes between the PAP and PE groups revealed that while existing PE classes did contribute to some improvements, they were not as effective as the PAP in significantly enhancing HRF components. Although the PE group showed modest gains, particularly in cardiovascular endurance, these

improvements were minimal compared to the substantial progress made by the PAP group. The limited effectiveness of the PE classes may be attributed to their general structure and the insufficient time allocated to physical activities (40 minutes per week). This contrasts with the PAP, which provided more targeted interventions. The results suggest that the current time allocation for PE in Bhutanese schools is insufficient to meet the World Health Organization (WHO) guideline, which recommends 60 minutes of daily physical activity for children and adolescents.

Correlation of Study Findings with Established Theories

The significant improvements observed in the PAP group, particularly in cardiovascular endurance and muscular strength, align with established theories and principles discussed in Chapter 2. These improvements are grounded in the FITT (Frequency, Intensity, Time, and Type) principle, which emphasizes progressive overload for fitness enhancement. The aerobic nature of the PAP exercises contributed to gains in cardiorespiratory endurance, as the program gradually increased in intensity over the 8-week intervention. This finding aligns with the conclusions of (Humphreys et al., 2014) who highlighted the importance of structured and progressively challenging physical activity for cardiovascular improvements.

Additionally, the integration of strength-building exercises into the PAP aligns with the principles of specificity and overload, which are critical for enhancing muscular strength (Walton-Fisette & Wuest, 2017). Such structured interventions support earlier research that underscores the effectiveness of targeted physical activity in improving specific fitness components, as discussed by (Chen et al., 2018) in their analysis of HRF components and their association with school-based physical activity.

Although modest gains in body composition were observed in both the PAP and PE groups, the lack of significant changes is consistent with the understanding that body composition improvements typically require longer durations of intervention combined with nutritional strategies (Song et al., 2021). However, the slight increase in muscle mass within the PAP group is noteworthy. Enhanced muscle mass reflects the effectiveness of resistance-based exercises included in the program, which, as

(Gonçalves et al., 2019) noted, are crucial for reducing BMI and improving lean body mass.

Theories on body composition, as outlined by (Britton et al., 2020), emphasize the importance of muscle hypertrophy in achieving favorable body composition changes. Progressive resistance training within the PAP is consistent with these theories, leading to adaptations that improve muscular density and reduce fat mass. (Ługowska et al., 2023) further suggest that interventions incorporating increased physical activity within structured settings significantly enhance muscle mass and reduce adiposity in adolescents. Thus, while the intervention's duration limited body composition changes, the observed muscle mass gains demonstrate the potential of PAP to obtain physiological improvements when paired with extended and comprehensive interventions.

The findings from this study also align with previous research that underscores the positive impact of structured physical activity programs on children's health-related fitness. The significant improvement in cardiorespiratory endurance observed in the PAP group is consistent with studies by (Humphreys et al., 2014) and (Wu et al., 2017), which highlight the benefits of regular physical activity on cardiovascular health in adolescents. The gains in muscular strength and endurance align with findings from (Song et al., 2021) and (Cvejic & Ostojić, 2018), who reported similar outcomes in students participating in organized physical activity programs. The improvement in flexibility is supported by research conducted by (Chen et al., 2018)and (Ługowska et al., 2023), emphasizing the role of targeted exercises in enhancing flexibility in school-aged children.

Conclusion

The study’s findings indicate that the physical activity program (PAP) significantly improved health-related fitness (HRF) in seventh-grade students compared to regular physical education (PE) classes. Notable improvements were observed in cardiorespiratory endurance, muscular strength, muscular endurance, and flexibility within the PAP group, while both groups demonstrated similar progress in body composition.

The pretest results showed comparable HRF levels between the PAP and PE groups. However, the posttest revealed substantial gains in the PAP group, underscoring the greater efficacy of structured physical activity interventions. In contrast, the PE group showed only modest improvements.

These findings suggest that incorporating structured PAPs in school curricula could lead to enhanced fitness outcomes for students, particularly in the development of strength and endurance, thus offering valuable insights for the future design of PE programs in Bhutan.

Recommendations

The findings of this study have important practical implications for the design of physical education programs in Bhutan.

1. The demonstrated success of the PAP suggests that schools should consider incorporating more structured and targeted physical activity programs to improve HRF outcomes.

2. Furthermore, increasing the frequency and duration of PE classes and including exercises targeting specific HRF components could lead to better fitness outcomes for students.

3. Future research should explore the long-term effects of structured physical activity programs on students' fitness and health, focusing on extended interventions that combine exercise with nutritional education.

4. Conducting research focused on HRF fitness outcomes based on gender differences would provide valuable insights into how boys and girls respond to PAPs. Such studies could help identify gender-specific needs and preferences in fitness training, ensuring that interventions are equally effective for all students.

5. Additionally, expanding the research to include larger and more diverse populations across Bhutan would provide more generalizable insights, helping policymakers design evidence-based physical activity programs tailored to the unique context of Bhutanese students.

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APPENDIX

Appendix A Procedures for Simple Random Sampling

Procedures for Simple Random Sampling

1. *Participant List Preparation:* Initially, a comprehensive list of the 62 participants who voluntarily agreed to be part of the study was created. Each participant was assigned a unique identifier or number to ensure they could be easily tracked and referenced throughout the study.

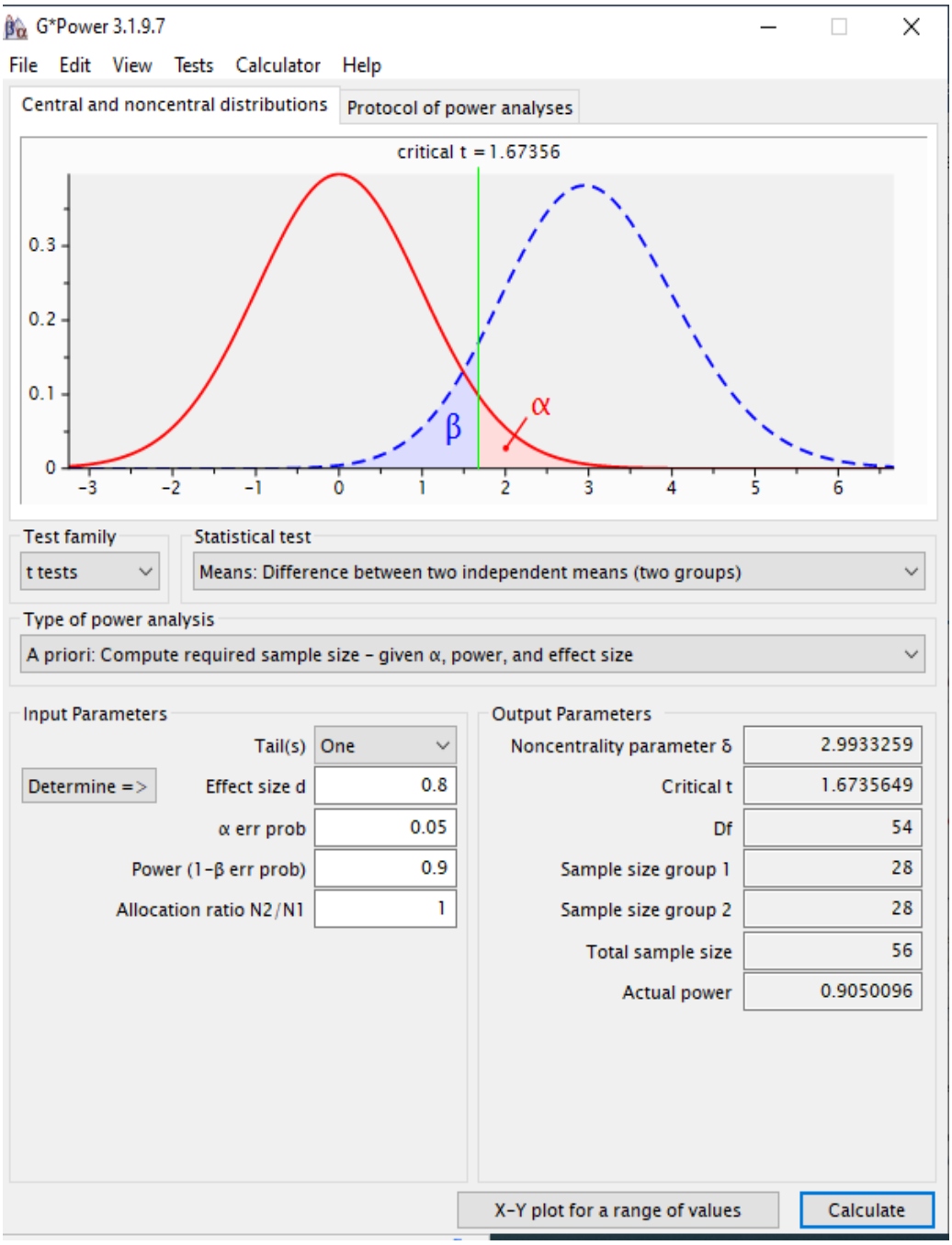
2. *Randomization Method Application:* A randomization process was employed to ensure that every participant had an equal opportunity to be assigned to either the control group or the trial group. This process was critical in maintaining the study's objectivity and reducing any potential selection bias.

3. *Drawing Lots for Group Assignment:* To assign participants to groups, a manual randomization technique was used. Each participant's unique identifier was written on a separate slip of paper. All slips were placed into a container and thoroughly mixed to ensure randomness. Thirty-one slips were drawn to assign those participants to the control group. The remaining 31 participants, whose slips were not drawn, were automatically assigned to the trial group.

4. *Documentation of Group Assignments:* After the group assignment was completed, careful documentation of the process took place. The names and corresponding group assignments of all participants were recorded systematically. This documentation was designed to provide a transparent and verifiable record, ensuring that the randomization process could be reviewed and replicated if necessary.

5. *Bias Prevention and Verification:* To maintain the integrity of the study and minimize the risk of bias, the person responsible for conducting the randomization process was not involved in subsequent phases of the research, including data collection, analysis, or interpretation. This separation of duties was implemented to uphold the objectivity and reliability of the study's outcomes.

Appendix B Determination of sample size



Appendix C PAP Lesson Plans

LESSON OVERVIEW	
Lesson number:	1 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Flexibility
Lesson topic:	Yoga for Flexibility
Teaching and Learning Materials:	Yoga mats, comfortable clothing, water bottles, timer, projector/visual aids (video/charts illustrating yoga poses), music player (optional for ambiance)
Set-up	• Arrange yoga mats in a spacious and well-ventilated area. • Ensure proper lighting. • Display visual aids where all students can easily see them.
FITT principles	*Frequency:* One session. *Intensity:* Stretch past the normal length until resistance is left. *Time:* Hold the stretch for 5-10 seconds, building to 30-60 seconds. *Type:* Static or contract-relax techniques.
LEARNING OBJECTIVES By the end of the lesson, the child will be able to: 1. Understand the importance of yoga poses that enhance flexibility. 2. Perform basic yoga poses correctly to improve flexibility. 3. Appreciate the significance of incorporating yoga into their regular physical activity routine.	
LESSON INTRODUCTION (5 minutes) The lesson introduction begins with a brief review of prior knowledge, emphasizing their relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.	
LESSON DEVELOPMENT (45 minutes) WARMING-UP (5 minutes)	

Light Jogging in Place to Increase Heart Rate:

1. Begin by standing tall with feet shoulder-width apart.
2. Gently start jogging in place, lifting your knees towards the chest.
3. Gradually increase the pace to elevate the heart rate. Focus on landing softly to minimize impact on joints.
4. Engage arms by swinging them naturally while jogging.

Neck and Shoulder Rolls:

1. Stand or sit comfortably with spine straight and shoulders relaxed.
2. Slowly roll shoulders forward in a circular motion, allowing them to rise towards ears, moving to the front, and then down and back.
3. Repeat the shoulder rolls in the opposite direction, bringing them up towards the ears, moving to the back, and then down and forward.
4. Perform gentle neck rolls by dropping chin to chest and rolling head slowly from side to side.

MAIN ACTIVITY (35 minutes)

Sun Salutations (Surya Namaskar)

Mountain Pose (Tadasana) (3 mins)

1. Stand at the front of your mat, feet together or hip-width apart.
2. Inhale, raise your arms overhead, palms facing each other.
3. Engage your core and stretch your spine, reaching towards the sky.

Forward Fold (Uttanasana) (2 mins)

1. Exhale, hinge at your hips, and fold forward, bringing your hands to the mat beside your feet.
2. Keep your spine long and straight.

Halfway Lift (Ardha Uttanasana) (2 mins)

1. Inhale, lift your torso halfway, keeping your back flat.
2. Lengthen your spine and gaze forward.

Plank Pose (2 mins)

1. Exhale, step, or jump back into a plank position.
2. Keep your body in a straight line, engaging your core and maintaining a strong plank.

Chaturanga Dandasans (2 mins)

1. Lower your body down, keeping your elbows close to your sides.
2. Hover briefly, maintaining a straight line from head to heels.

Upward-Facing Dog (Urdhva Mukha Svanasana) (1 min)

1. Inhale, straighten your arms, lift your chest, and roll over your toes.
2. Keep your thighs off the mat and open your chest.

Downward-Facing Dog (Adho Mukha Svanasana) (1 min)

1. Exhale, and lift your hips towards the ceiling, forming an inverted V shape.
2. Press your palms into the mat, keep your heels down, and lengthen your spine.

Step or Jump Forward (1 min)

1. Inhale, step, or jump your feet between your hands, returning to a halfway lift.

Forward Fold (1 min)

2. Exhale, fold forward again, releasing your head towards your shins.

Mountain Pose (Tadasana):(2 mins)

3. Inhale, rise back up to Mountain Pose, reaching your arms overhead.
4. Repeat the sequence, linking breath with movement.

Standing Poses (10 minutes)

Mountain Pose (Tadasana) (2 mins)

- Stand tall with feet together, arms by sides, and weight evenly distributed.

Triangle Pose (Trikonasana) (2 mins)

- Step feet wide apart, extend arms parallel to the floor, and reach towards one foot while keeping your torso extended.

Warrior I (Virabhadrasana I) (2 mins)

- From Mountain Pose, step one foot back, bend your front knee, and raise your arms overhead.

Warrior II (Virabhadrasana II) (2 mins)

- Open your hips and shoulders to the side, extending your arms parallel to the floor.

Seated Poses

Seated Forward Bend (Paschimottanasana) (2 mins)

- Sit with legs extended, hinge at your hips, and reach towards your toes.

Head-to-Knee Pose (Janu Sirsasana) (2 mins)

- Sit with one leg extended and the other foot against the inner thigh. Hinge forward towards the extended leg.

Balancing Poses

Tree Pose (Vrikshasana) (2 mins)

- Shift weight to one leg, place the sole of the other foot on the inner thigh or calf, and bring hands to prayer position.

Eagle Pose (Garudasana) (2 mins)

- Cross one leg over the other, wrap the foot around the calf, and bring arms into an eagle arm position.

VARIATION

- Allow students to try advanced variations of poses for those who are more experienced or flexible.

COOLING-DOWN (5 minutes)

Guided Relaxation in Savasana (Corpse Pose):

Corpse Pose (Savasana):

1. Lie on your back with legs extended and arms by sides, palms facing up.
2. Close your eyes and focus on your breath.
3. Begin to relax each part of the body, starting from the toes up to the crown of the head.

Deep Breathing:

1. Inhale deeply through the nose, allowing the abdomen to rise.
2. Exhale slowly and completely through the mouth, releasing tension with each breath.
3. Continue deep breathing, encouraging a sense of calm and relaxation.

DEBRIEFING (5 minutes)

1. How did the yoga session make you feel in terms of flexibility?
2. As we focused on performing basic yoga poses, do you feel more confident in your ability to execute them correctly? Were there any challenges you encountered?
3. Considering today's session, how do you perceive the role of yoga in your regular physical activity routine? Do you see the value of incorporating it regularly?

FORMATIVE ASSESSMENT

Formative Assessment Checklist: Yoga Poses Form and Alignment
Student Participant ID No.: _____Date: _____

Assessment Areas	**YES**	**NO**
Mountain Pose (Tadasana):		
Feet hip-width apart or together, depending on the variation.		
Weight is evenly distributed on both feet		
Engaged core and lifted chest		
Arms extended overhead with palms facing each other.		
Triangle Pose (Trikonasana)		
Feet wide apart, one foot turned out, the other slightly inwards.		
Hips open to the side		
Extended arms parallel to the floor		
Torso leaning to the side with a straight spine.		
Warrior I (Virabhadrasana I)		
Front knee bent at a 90-degree angle.		
The back leg is extended straight with the foot at a 45-degree angle.		
Hips squared to the front.		
Arms lifted overhead, palms facing each other.		
Warrior II (Virabhadrasana II)		
Front knee bent at a 90-degree angle		
Back leg extended straight; foot parallel to the back edge of the mat.		
Hips open to the side.		
Arms extended parallel to the floor; shoulders relaxed.		
Seated Forward Bend (Paschimottanasana):		
Legs extended straight with toes pointing towards the ceiling.		
Hinged at the hips with a flat back.		
Reaching towards the toes or shins while keeping the spine long.		
Head-to-Knee Pose (Janu Sirs asana)		
One leg extended straight, the other foot against the inner thigh.		
Hinged forward from the hips, maintaining a straight spine.		
Reaching towards the extended leg with hands or fingers.		
Tree Pose (Vrikshasana)		
Shifted weight onto one leg.		

	The opposite foot is placed on the inner thigh or calf, avoiding the knee.		
	Hands in a prayer position at the chest or lifted overhead.		
	Eagle Pose (Garudasana)		
	Crossed one leg over the other.		
	Wrapped the foot around the calf		
	Arms crossed at the elbows and wrists, palms touching.		

LESSON OVERVIEW	
Lesson number:	2 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Flexibility
Lesson topic:	Partner Stretching
Teaching and Learning Materials:	Yoga mats, cones or markers for designated stretching areas, stopwatch, music for warm-up and cool-down
Set-up	• Arrange the class in pairs. • Ensure a spacious and safe area for stretching activities.
FITT principles	*Frequency:* One session *Intensity:* Stretch past the normal length until resistance is left *Time:* Hold the stretch for 5-10 seconds, building to 30-60 seconds. *Type:* Static and contract-relaxing techniques.

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Demonstrate an understanding of the importance of flexibility in overall health and physical well-being.
2. Identify and explain the key muscles involved in partner stretching.
3. Demonstrate proper stretching techniques to enhance flexibility through various partner stretching exercises.
4. Develop a positive attitude towards incorporating flexibility exercises into regular physical activity.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Jogging in Place (2 minutes):

1. Start by jogging in place at a moderate pace.
2. Gradually increase the intensity to elevate the heart rate.

3. Engage arms with controlled movements.

Jumping Jacks (1 minutes):

1. Transition into jumping jacks to further boost blood circulation.
2. Maintain a steady rhythm and focus on controlled precise movements.
3. This exercise helps activate multiple muscle groups and enhances overall body awareness.

Dynamic Stretches (1 minute):

1. Perform leg swings, both forward and sideways, to loosen up the hip flexors and improve leg mobility.
2. Arm circles to warm up the shoulder joints and upper body.

Body Twists (1 minute):

1. Stand with feet shoulder-width apart.
2. Gently twist the torso from side to side, engaging the core.
3. This movement helps to awaken the spine and increase flexibility in the torso.

MAIN ACTIVITY (35 minutes)

Hamstring Stretch (1min)

1. Stand facing partner, maintaining a comfortable distance apart.
2. One partner lifts a leg, placing the heel on the other partner's hip. The partner providing support gently leans forward at the hips, keeping the back straight, until a gentle stretch is felt in the hamstrings.
3. Emphasize the importance of keeping the supporting leg slightly bent, avoiding overstretching, and communicating to find the right level of intensity.

Quad Stretch (1 min)

1. Stand side by side with your partner, holding onto each other for balance.
2. Bend one knee and bring the heel towards the buttocks, holding it with the hand on the same side. Ensure the knees stay close together.
3. Stress the need for proper alignment, keeping the bent knee close to the standing leg, and communicating any discomfort to adjust the stretch accordingly.

Shoulder Stretch (1 min)

1. Stand facing your partner, interlock arms at shoulder height, palms facing each other.
2. Gently pull your partner's arms towards you, feeling a stretch across the shoulders and upper back.

3. Highlight the importance of gentle and gradual stretching, maintaining relaxed breathing, and adjusting the stretch based on comfort levels.

Guided Practice (12 minutes)

1. Pair up with your designated partner for today's session.
2. Allocate sufficient time for each partner to practice and perfect each stretch.
3. Pay close attention to proper form, encouraging partners to communicate and adjust intensity based on their comfort levels.

Rotation (10 minutes)

1. After the initial practice, encourage students to rotate partners.
2. This promotes inclusivity, allows students to experience different body types and flexibility levels, and enhances the sense of teamwork.
3. Remind students to communicate openly with their new partners and adapt the stretches as needed.

VARIATION

- For those who feel comfortable, introduce a few advanced partner stretches or variations to challenge and further improve flexibility.

COOLING-DOWN (5 minutes)

Gentle Static Stretches (3 minutes):

1. *Neck Stretch:* Slowly tilt head to one side, bringing ear towards shoulder. Hold for 15 seconds and repeat on the other side.
2. *Triceps Stretch:* Extend one arm overhead, bending the elbow and reaching down the center of the back with the opposite hand. Hold for 15 seconds and switch sides.
3. *Calf Stretch:* Step one foot back, keep it straight, and bend the front knee. Hold for 15 seconds and switch legs.
4. *Seated Forward Bend:* Sit with legs extended and gently reach forward towards the toes, maintaining a straight back. Hold for 20 seconds.

Soothing Music (2 minute)

1. Play soft and soothing instrumental music to enhance the calming effect of the cooldown.
2. The rhythmic nature of the music can help students synchronize their breath and relax their muscles further.

DEBRIEFING (5 minutes)

1. How would partner stretching help improve flexibility?
2. In your partner stretching activities, how did proper form and communication contribute to the effectiveness of the stretches?
3. Reflect on how the flexibility gained from today's partner stretching activities could be beneficial in your daily life.

FORMATIVE ASSESSMENT

Assessment Techniques	Description
Proper Form	Are students maintaining correct body alignment during stretches? Are the limbs positioned appropriately to target the intended muscle groups? Is there evidence of proper posture and body control?
Communication	Are partners effectively communicating with each other during stretches? Are they using verbal cues or signals to adjust the intensity of the stretch? Is there a clear exchange of feedback between partners?
Safety Awareness	Are students mindful of safety guidelines, avoiding overstretching or pushing beyond their limits? Do they demonstrate an awareness of their partner's comfort level and adjust the stretch accordingly? Are there any signs of discomfort or potential risks that need attention?
Engagement and Participation	Are all students actively participating in the partner stretching activities? Do they demonstrate enthusiasm and engagement throughout the session? Are there any instances of disengagement or lack of effort?
Variety of Stretches	Are students able to perform a variety of partner stretches, including the ones demonstrated? Do they show adaptability and openness to trying different stretching exercises? Is there a progression in the difficulty of stretches attempted?

LESSON OVERVIEW	
Lesson number:	3 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Flexibility
Lesson topic:	Outdoor Stretching Adventure
Teaching and Learning Materials:	Yoga mats, cones/markers for activity areas, timer/stopwatch, and water bottles.
Set-up	• Arrange a designated outdoor area with enough space for stretching exercises. • Place cones/markers to create clear boundaries for different stretching stations.
FITT principles	*Frequency:* One session *Intensity:* Stretch past the normal length until resistance is left. *Time:* Hold the stretch for 5-10 seconds, building to 30-60 seconds. *Type:* Static or contract-relax techniques

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Explain the importance of stretching exercises in improving flexibility.
2. Perform various stretching exercises correctly and safely to enhance flexibility.
3. Foster a positive attitude towards outdoor exercise by highlighting the enjoyment and relaxation derived from stretching in natural surroundings.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Jogging in Place (2 minutes):

1. Stand with feet shoulder-width apart.
2. Lift knees, one at a time, as if jogging but in the same spot.
3. Swing arms naturally to add a rhythmic motion.

4. Gradually increases the pace as one gets more comfortable.

Jumping Jacks (2 minutes):

1. Feet together and arms at sides.
2. Jump, spreading legs shoulder-width apart, and raise arms overhead.
3. Jump back to the starting position, bringing feet together and arms to sides.
4. Continue this rhythmic jumping motion, keeping it light and controlled.

Dynamic Arm Circles (1 minute):

1. Extend arms straight to the sides.
2. Begin making circular motions with arms, gradually increasing the size of the circles.
3. After 30 seconds, reverse the direction of the circles.
4. Keep a steady pace and focus on controlled movements.

MAIN ACTIVITY (35 minutes)

Station 1: Neck Stretches (7 minutes):

1. Stand or sit comfortably.
2. Slowly tilt the head to one side, holding for 15 seconds.
3. Repeat on the other side.
4. Gently rotate the head clockwise for 15 seconds and then counterclockwise for 15 seconds.
5. Remember to breathe deeply and relax your shoulders.

Station 2: Shoulder Stretches (7 minutes):

1. Extend one arm across the chest.
2. Use the opposite hand to gently pull the arm towards your chest, holding for 15 seconds.
3. Switch arms and repeat.
4. Perform shoulder rolls, both forward and backward, for 1 minute.
5. Focus on maintaining smooth, controlled movements.

Station 3: Hamstring Stretches (7 minutes):

1. Stand with your feet hip-width apart.
2. Hinge at hips and reach towards toes, holding for 15 seconds.
3. Slowly return to an upright position.
4. Perform leg swings forward and backward for 1 minute on each leg.
5. Keep the movements controlled, and don't overstretch.

Station 4: Dynamic Partner Stretches (7 minutes):

1. Pair up with a partner.
2. Perform dynamic stretches like partner-assisted leg lifts or torso twists.
3. Switch roles after 2 minutes.
4. Emphasize communication and cooperation with your partner.

Station 5: Full Body Stretch Flow (7 minutes):

1. Combine various stretches into a fluid, full-body sequence.
2. Include movements like reaching for the sky, forward folds, and gentle twists.
3. Focus on the connection between breath and movement.
4. Flow through the sequence at a comfortable pace.

VARIATION

- Introduce partner stretches or group stretches to enhance social interaction and teamwork.

COOLING-DOWN (5 minutes)

Deep Breathing (1 minute):

1. Find a comfortable standing or seated position.
2. Inhale deeply through the nose, expanding the lungs fully.
3. Exhale slowly through the mouth, releasing tension.
4. Repeat for 1 minute, focusing on each breath.

Full-Body Stretch (2 minutes):

1. Stand with feet hip-width apart.
2. Inhale and reach arms overhead, lengthening the spine.
3. Exhale as one gently leans to one side, creating a lateral stretch.
4. Inhale back to the center and repeat on the other side.
5. Continue this flowing motion for 2 minutes, syncing with breath.

Seated Forward Fold (1 minute):

1. Sit comfortably on the ground with your legs extended.
2. Inhale, lengthen the spine, and exhale as a one-fold forward from hips.
3. Reach for toes or shins, holding the stretch for 1 minute.
4. Focus on relaxing into the stretch, letting go of any tension.

Gentle Neck and Shoulder Stretches (1 minute):

1. Gently tilt the head to one side, feeling a stretch along the side of the neck.
2. Hold for 15 seconds, then switch to the other side.

3. Roll shoulders backward in a circular motion for 30 seconds.
4. Reverse the shoulder rolls for an additional 30 seconds.

DEBRIEFING (5 minutes)

1. How did the stretching exercises contribute to improving flexibility?
2. Can you recall a stretching exercise that you feel you performed particularly well in terms of correct form and safety? What made it effective?
3. How did being outdoors impact your stretching experience? Did you find it more enjoyable or relaxing compared to indoor exercises?

FORMATIVE ASSESSMENT

Observation Checklist for Stretching Exercises

Student's Participant ID No.: _____Exercise Station: _____

Assessment Areas	**YES**	**NO**
General Observations:		
A student arrives at the station promptly.		
Demonstrates positive attitude and readiness.		
Follows instructions attentively.		
Neck Stretches:		
Maintains a neutral spine throughout the exercise.		
Moves the head slowly and within a comfortable range		
Breathe deeply and consistently during the stretch.		
Avoids any sudden or jerky movements.		
Shoulder Stretches:		
Keeps the shoulders relaxed during stretches.		
Maintains proper alignment of the arms during exercises		
Engages in smooth, controlled shoulder rolls		
Demonstrates awareness of shoulder mobility.		
Hamstring Stretches:		
Hinges at the hips while maintaining a straight spine.		
Reaches towards the toes with proper form.		
Avoids locking the knees during the stretch.		
Performs leg swings with control and balance.		
Partner Stretches:		
Communicates effectively with the partner.		
Assists partner without causing discomfort.		
Follows the dynamic stretching sequence as instructed.		
Demonstrates cooperation and teamwork.		
Full Body Stretch Flow:		

Executes the sequence with fluid movements.			
Coordinates breath with each stretch.			
Pays attention to the transitions between poses.			
Maintains a positive and focused demeanor.			
Overall Feedback:			
Consistently maintains proper form.			
Demonstrates an understanding of the importance of breathing patterns.			
Engages the correct muscle groups during each stretch.			
Overall effort and participation			

LESSON OVERVIEW	
Lesson number:	4 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Flexibility
Lesson topic:	Resistance Band Exercises
Teaching and Learning Materials:	Resistance bands of varying resistance levels, mats for each student, stopwatch, music player upbeat music, and water bottles.
Set-up	• Arrange mats in a spacious area to ensure safe movement. • Distribute resistance bands to each student. • Display visual aids and charts around the room.
FITT principles	*Frequency:* One session *Intensity:* Stretch past the normal length until resistance is left. *Time:* Hold the stretch for 5-10 seconds, building to 30-60 seconds. *Type:* Static, dynamic, or contract-relax techniques

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Demonstrate an understanding of how resistance band exercises improve flexibility.
2. Perform a variety of resistance band exercises with proper form and technique.
3. Demonstrate control and coordination during resistance band movements.
4. Develop a positive attitude towards incorporating resistance band exercises into their regular physical activity routine.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Neck Rolls:

1. Instruct students to gently roll their necks in a circular motion, first clockwise and then counterclockwise.
2. Emphasize the importance of slow, controlled movements.

Arm Circles:

1. Have students extend their arms to the sides and make circular motions with their arms.
2. Start with small circles and gradually increase the size.

Leg Swings:

1. Students can hold onto support if needed.
2. Swing one leg forward and backward, then side to side.
3. Repeat with the other leg.

MAIN ACTIVITY (35 minutes)

Introduction (2 minutes):

1. Gather students in a central area and distribute resistance bands.
2. Remind them of the importance of proper form and technique.
3. Briefly explain the circuit and the targeted muscle groups for each exercise.

Bicep Curls (5 minutes):

1. Demonstrate the correct bicep curl technique: feet shoulder-width apart, band under both feet, palms facing forward.
2. Have students practice the movement with a focus on controlled upward and downward motions.
3. Encourage them to feel the resistance in their biceps and maintain proper posture.

Shoulder Presses (5 minutes):

1. Guide students on the shoulder press technique: feet shoulder-width apart, band under both feet, palms facing forward.
2. Emphasize the importance of keeping the core engaged and elbows at a 90-degree angle.
3. Rotate students through the exercise, ensuring proper form and controlled movements.

Leg Raises (5 minutes):

1. Instruct students to place the resistance band around their ankles.

2. Demonstrate the leg raise technique: lying on the mat, hands under the hips, lift both legs while keeping them straight.
3. Supervise as students perform leg raises, focusing on engaging the core and controlling the descent.

Side Bends (3 minutes):

1. Explain the side bend technique: step on the middle of the band, grasp one end with your hand, and perform lateral bends.
2. Encourage students to maintain a straight posture and engage the obliques during the side bends.
3. Monitor and provide individual feedback to ensure proper execution.

Circuit Rotation (5 minutes):

1. Organize students into small groups, assigning a starting exercise for each group.
2. Set a timer for one minute per exercise, allowing students to rotate through the circuit.
3. During rotations, provide encouragement, correct form, and answer any questions.

VARIATION

- Emphasize the importance of controlled, slow movements for increased flexibility.

COOLING-DOWN (5 minutes)

Guided Static Stretches with Resistance Bands:

Hamstring Stretch:

1. Sit on the mat with your legs extended.
2. Loop the resistance band around the feet, gently pulling towards the chest for a hamstring stretch.
3. Keep your back straight and feel the stretch in the back of your thighs.

Shoulder Stretch:

1. Hold the resistance band with both hands behind the back.
2. Slowly lift the band, stretching the shoulders and chest.
3. Keep the shoulders down and back to maximize the stretch.

Quadriceps Stretch:

1. Stand and hold onto support if needed.
2. Loop the resistance band around one ankle, gently pulling the foot towards the glutes.
3. Keep knees close together for effective quadriceps stretch.

Chest Opener:

1. Hold the resistance band with both hands in front of them.
2. Extend arms straight out and gently pull the band apart, opening up the chest.
3. Focus on controlled breathing during the stretch.

DEBRIEFING (5 minutes)

1. Can you explain how the resistance band exercises we practiced contribute to improving flexibility?
2. Reflect on the importance of maintaining proper form and technique during resistance band exercises. How did this impact your experience?
3. How did you feel about your level of control and coordination during the resistance band movements?

FORMATIVE ASSESSMENT

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Need Improvement (2)	Poor (1)
Proper Form	Demonstrates consistently correct form and technique throughout the activity.	The form is mostly correct, with minor deviations that do not compromise safety or effectiveness	The form is generally acceptable, but there are noticeable areas for improvement.	The form is inconsistent, and there are significant deviations from the proper technique.	Form is unsafe or significantly deviates from proper technique, posing a risk of injury.
Teamwork and Cooperation	Student consistently collaborates with their partner/group, providing support and encouragement	Teamwork is evident, with occasional moments of effective collaboration and support.	Teamwork is acceptable, but there are noticeable instances where collaboration could be improved.	Limited collaboration and support; teamwork is not consistently demonstrated.	Student works independently, without consideration for their partner/group, hindering the collaborative aspect of the activity.

LESSON OVERVIEW	
Lesson number:	5 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Muscular Endurance (ME)
Lesson topic:	Yoga for Strength
Teaching and Learning Materials:	Yoga mats, projector for demonstrating poses, stopwatch
Set-up	• Arrange yoga mats in a spacious and well-ventilated area. • Ensure proper lighting and a calm atmosphere.
FITT principles	*Frequency:* One session *Intensity:* Low resistance, 8-20 repetitions. *Time:* 1-5 sets *Type:* Isotonic, isometric, or progressive resistance training (PRT).

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Define and explain the importance of key yoga poses targeting muscular endurance.
2. Demonstrate proper form and technique in yoga poses for building muscular endurance.
3. Execute a sequence of yoga poses aimed at improving muscular endurance.
4. Develop a positive attitude towards incorporating yoga into their regular physical activity routine.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Light Cardio Exercises (2.5 minutes):

Start with Jogging in Place:

1. Stand with feet shoulder-width apart.
2. Lift knees alternately, mimicking a jogging motion.
3. Engage your arms by swinging them gently.
4. Gradually increase the pace to elevate the heart rate.

Transition to Jumping Jacks:

1. Stand with feet together and arms at sides.
2. Jump your feet apart while raising your arms overhead.
3. Return to the starting position by jumping your feet back together and lowering your arms.
4. Keep a steady and controlled rhythm.

Dynamic Stretches (2.5 minutes):

Neck Rolls:

1. Slowly roll your head in a circular motion, first clockwise, then counterclockwise.
2. Keep movements smooth and controlled.

Arm Swings:

1. Extend arms to the sides.
2. Swing arms forward and backward in a circular motion.
3. This helps loosen up the shoulders and upper back.

Torso Twists:

1. Stand with feet shoulder-width apart.
2. Place hands on hips and rotate the torso to the right, then to the left.
3. Feel the stretch in the lower back and obliques.

Leg Swings:

1. Hold onto a stable surface for balance.
2. Swing one leg forward and backward, then side to side.
3. Switch to the other leg.

Ankle Rolls:

1. Lift one foot and rotate the ankle clockwise and then counterclockwise.
2. Repeat with the other foot.
3. These dynamic stretches focus on increasing joint mobility and flexibility, preparing your muscles for the yoga poses ahead.

MAIN ACTIVITY (35 minutes)

*Boat Pose (*8-20 repetitions, 1-5 sets)

1. Sit on the yoga mat with legs extended in front.
2. Lean back slightly, balancing on sitting bones, and lift your legs off the ground.

3. Extend arms forward, parallel to the ground.
4. Keep the spine straight, forming a V shape with the body.
5. Engage core muscles and breathe deeply.

*Plank Pose (*8-20 repetitions, 1-5 sets)

1. Start in a push-up position with arms straight.
2. Keep wrists aligned with shoulders.
3. Engage the core, creating a straight line from head to heels.
4. Hold the position, keeping the body parallel to the ground.
5. Maintain steady breathing throughout.

*Downward-Facing Dog (*8-20 repetitions, 1-5 sets)

1. Begin on your hands and knees in a tabletop position.
2. Lift your hips towards the ceiling, straightening your legs.
3. Keep your hands shoulder-width apart and press into the palms.
4. Aim to create an inverted V shape with your body.
5. Relax your head between your arms, and heels towards the floor.

*Cobra Pose (*8-20 repetitions, 1-5 sets)

1. Lie on the stomach with legs extended and toes pointing backward.
2. Place palms beside the chest, elbows bent.
3. Inhale and lift the chest off the ground, keeping the lower body grounded.
4. Extend arms, opening the chest and arching back.
5. Keep shoulders relaxed and gaze forward.

*Warrior III Pose (*8-20 repetitions, 1-5 sets)

1. Begin in a standing position with feet hip-width apart.
2. Shift weight onto one leg, lifting the other leg straight behind.
3. Simultaneously, lean your upper body forward, extending your arms forward.
4. Keep the body in a straight line from head to heel.
5. Engage the core for balance.

VARIATION

- Incorporate variations of each pose to challenge students at different fitness levels.

COOLING-DOWN (5 minutes)

Child's Pose:

1. Kneel on the yoga mat with big toes touching and knees hip-width apart.

2. Sit back on heels and extend your arms forward, lowering your chest towards the mat.
3. Rest your forehead on the mat and relax, feeling a gentle stretch in your lower back and shoulders.
4. Breathe deeply, inhaling through the nose and exhaling through the mouth.

Seated Forward Bend:

1. Sit with legs extended in front.
2. Hinge at hips and reach forward, aiming to touch toes.
3. Keep the spine straight and feel the stretch along the hamstrings and lower back.
4. Breathe deeply, inhale while lengthening the spine, and exhale while folding forward.

Cat-Cow Stretch:

1. Come to a tabletop position with hands under shoulders and knees under hips.
2. Inhale, arching back, and lifting the head (Cow Pose).
3. Exhale, rounding the spine and tucking the chin to the chest (Cat Pose).
4. Flow between these two poses, syncing breath with the movements.

Corpse Pose:

1. Lie on your back with legs extended and arms by sides, palms facing up.
2. Close your eyes and allow your body to completely relax.
3. Focus on breathing, inhaling, and exhaling naturally.
4. Let go of any tension, and enjoy the sense of calm and stillness.

DEBRIEFING (5 minutes)

1. Can you share your experience with today's yoga session and how you felt during the key poses targeting muscular endurance, such as Boat Pose and Plank Pose?
2. How do you think improving abdominal strength through yoga contributes to improving your health-related fitness?
3. Did today's session influence your perspective on incorporating yoga into your regular physical activity routine? If so, how?

FORMATIVE ASSESSMENT

Assessment	Focus areas	Technique
Observation of Form	Are the students maintaining a neutral spine in poses like Plank and Cobra? Are the knees, elbows, and wrists aligned correctly during weight-bearing poses? Is there proper engagement of core muscles in poses targeting abdominal strength?	Walk around the room while students are engaged in the main activity. Observe their alignment in each yoga pose, paying close attention to key points such as spinal position, limb placement, and overall body stability.
Assessment	**Focus areas**	**Technique**
Pose Duration and Transition	Are students able to sustain poses for an appropriate amount of time, considering the nature of the pose and their fitness level? How well do they transition between poses? Is there fluidity, or do they struggle with the transitions?	Time the duration for which students hold specific poses. Observe how smoothly they transition between poses in the sequence. Use a stopwatch or timer to measure the duration.
Body Awareness and Breathing	Are students breathing rhythmically, especially during challenging poses? Do they exhibit awareness of muscle engagement and any areas of tension or tightness?	Encourage students to be mindful of their breath and body throughout the session. Observe if they are maintaining a steady and controlled breath, and if they are aware of their body's sensations.
Individual Feedback and Correction	Are students receptive to feedback, and do they adjust accordingly? How well do they respond to verbal cues in terms of refining their form and technique?	Provide individualized feedback during the session. Gently correct students' forms by offering verbal cues or demonstrations. Use positive reinforcement to acknowledge proper alignment and effort.

LESSON OVERVIEW	
Lesson number:	6 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Flexibility
Lesson topic:	Flexibility Circuit Training
Teaching and Learning Materials:	Yoga mat, cones or markers for circuit setup, stopwatch, music player, water bottles
Set-up	Arrange the multi-purpose hall with enough room for students to move freely between stations in the circuit.
FITT principles	*Frequency:* One session *Intensity:* Stretch past the normal length until resistance is left. *Time:* Hold the stretch for 5-10 seconds, building to 30-60 seconds. *Type:* Static, dynamic, or contract-relax techniques

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Define flexibility and explain the different physical activities to improve flexibility.
2. Perform a variety of flexibility exercises with proper form and technique.
3. Demonstrate a positive attitude towards incorporating flexibility exercises into regular physical activity.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Jumping Jacks (1 minute):

1. Stand with feet together and arms by sides.
2. Jump, spreading legs while simultaneously raising arms overhead.
3. Jump again to bring feet back together and arms down.

4. Keep a steady pace, engaging the core and landing softly.

High Knees (1 minute):

1. Stand with feet hip-width apart.
2. Lift one knee towards the chest and quickly switch to the other.
3. Pump arms in sync with knees.
4. Aim for a brisk, rhythmic movement, lifting those knees as high as comfortable.

Arm Circles (1 minute - 30 seconds forward, 30 seconds backward):

1. Extend arms straight out to the sides.
2. Rotate arms in small circles, gradually increasing the size.
3. After one minute, reverse the direction.
4. This helps loosen up shoulder joints and upper body.

Torso Twists (1 minute):

1. Stand with feet shoulder-width apart.
2. Place hands on hips.
3. Twist the upper body to the right, then to the left, keeping hips facing forward.
4. Move in a controlled manner, feeling the gentle stretch in the torso.

Leg Swings (1 minute - 30 seconds each leg):

1. Hold onto a sturdy support (wall or bar) for balance.
2. Swing one leg forward and backward in a controlled manner.
3. After 30 seconds, switch to the other leg.
4. This warms up hip joints and improves leg flexibility.

MAIN ACTIVITY (35 minutes)

Break down the Flexibility Circuit Training into specific dynamic and static stretches for each station:

Station 1: Leg Swings (Dynamic Stretch) - 8 minutes

Front-to-Back Leg Swings (4 minutes):

1. Hold onto a support for balance.
2. Swing one leg forward and backward, focusing on controlled movements.
3. Switch to the other leg after 30 seconds.

Side-to-Side Leg Swings (4 minutes):

1. Continue holding onto support.

2. Swing one leg from side to side, targeting the inner and outer thigh muscles.
3. Switch to the other leg after 30 seconds.

Station 2: Arm Circles (Dynamic Stretch) - 8 minutes
Small Arm Circles (4 minutes):

1. Stand with feet shoulder-width apart.
2. Extend arms straight out and make small circles.
3. Gradually increase the circle size.

Big Arm Circles (4 minutes):

1. Continue with arms extended.
2. Make larger circles, engaging the shoulders and upper back.

Station 3: Hamstring Stretch (Static Stretch) - 9 minutes
Seated Hamstring Stretch (4.5 minutes):

1. Sit on the floor with your legs extended.
2. Reach forward toward your toes, keeping the back straight.
3. Hold the stretch, feeling the tension in your hamstrings.

Standing Hamstring Stretch (4.5 minutes):

1. Stand with one foot forward and the other extended back.
2. Hinge at the hips, reaching towards the toes.
3. Switch legs after 30 seconds.

Station 4: Shoulder Stretch (Static Stretch) - 10 minutes
Cross-Body Shoulder Stretch (5 minutes):

1. Bring one arm across the chest.
2. Use the opposite hand to gently pull the arm towards the chest.
3. Switch arms after 30 seconds.

Overhead Triceps Stretch (5 minutes):

1. Raise one arm overhead and bend the elbow, reaching down the back.
2. Use the opposite hand to gently push on the bent elbow.
3. Switch arms after 30 seconds.

VARIATION

- Allow students to create their flexible routine at one station, promoting creativity and self-expression. Encourage them to incorporate stretches they find enjoyable and effective.

COOLING-DOWN (5 minutes)

Forward Fold (2 minutes):

1. Stand with feet hip-width apart.
2. Slowly hinge at the hips and let the upper body hang forward.
3. Allow arms to hold opposite elbows.
4. Hold the stretch, feeling the release in the lower back and hamstrings.

Seated Forward Bend (2 minutes):

1. Sit on the floor with your legs extended.
2. Reach forward towards toes, keeping back straight.
3. Hold the stretch, feeling a gentle pull in the lower back and hamstrings.

Butterfly Stretch (1 minute):

1. Sit on the floor, bring the soles of your feet together, and let your knees drop outward.
2. Hold feet with hands and gently press knees towards the floor.
3. Feel the stretch in the inner thighs.

DEBRIEFING (5 minutes)

1. How does engaging in regular physical activity contribute to enhancing flexibility?
2. Did you encounter challenges in the flexibility exercises? How did you overcome them? Any stretches you found particularly challenging or enjoyable?
3. How do you see the importance of integrating flexibility training into your regular physical activity routine?
4. How might improving flexibility positively impact your daily life and other physical activities, including sports?

FORMATIVE ASSESSMENT

Flexibility Circuit Training Formative Assessment Checklist

Student Name: _____ Date: _____

Assessment Areas	**YES**	**NO**
Station 1: Leg Swings (Dynamic Stretch)		
Controlled leg movements		
Smooth transition between legs		
Controlled side-to-side movements		
Maintained balance		
Station 2: Arm Circles (Dynamic Stretch)		
Smooth, controlled circular motions		

	Maintained proper posture			
	Engaged shoulders and upper back			
	Coordinated arm movements.			
	Station 3: Hamstring Stretch (Static Stretch)			
	Reached towards toes with a straight back.			
	Maintained the stretch for an appropriate duration			
	No bouncing or jerking movements.			
	Station 4: Shoulder Stretch (Static Stretch)			
	Bent elbow reaching down the back			
	A gentle push on the bent elbow.			
	Smooth transition between arms.			

LESSON OVERVIEW	
Lesson number:	7 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Muscular Endurance (ME)
Lesson topic:	Bodyweight Circuit
Teaching and Learning Materials:	Exercise mats, cones/markers for circuit stations, stopwatch, music for motivation
Set-up	• Arrange exercise mats in a circuit formation with clear pathways between each station. • Set up cones or markers to indicate each exercise station. • Ensure each student has enough space to perform exercises without colliding with others.
FITT principles	*Frequency:* One session. *Intensity:* Low resistance, 8-20 repetitions *Time:* 1-5 sets. *Type:* Isotonic, isometric, or progressive resistance training (PRT)

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Demonstrate an understanding of how FITT principles contribute to effective muscular development.
2. Perform a series of bodyweight exercises with proper form and technique, showcasing proficiency in executing these movements to enhance muscular endurance.
3. Demonstrate a positive attitude toward integrating regular bodyweight exercises into their fitness routine as a means of achieving and maintaining muscular endurance for long-term health benefits.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

1. *Light Aerobic Activities (2 minutes):* Start the warm-up with light aerobic exercises to gradually elevate the heart rate.
2. *Jumping Jacks:* Perform a series of jumping jacks, ensuring full arm extension and controlled landing.
3. *Jogging in Place:* Lift knees slightly and jog in place, maintaining a steady pace.

Dynamic Stretching Focusing on Core Muscles (3 minutes):

1. Engage in dynamic stretches specifically targeting the core muscles to prepare them for the upcoming abdominal endurance exercises. Include the following dynamic stretches:

Torso Twists:

1. Stand with feet shoulder-width apart.
2. Place hands on hips and rotate torso gently from side to side.
3. Emphasize controlled movements to engage the obliques.

Leg Swings:

1. Hold onto a stable surface (wall or partner) for support.
2. Swing one leg forward and backward, then side to side.
3. Switch legs and repeat.

Hip Circles:

1. Stand with feet hip-width apart and hands on hips.
2. Rotate hips in a circular motion, both clockwise and counterclockwise.

Arm Circles:

1. Extend arms to the sides.
2. Make small circular motions, gradually increasing the size of the circles.

Cat-Cow Stretch:

1. Get into a tabletop position (on hands and knees).
2. Arch back upward (cat), then lower it, lifting your head and tailbone (cow).

MAIN ACTIVITY (35 minutes)

Station 1: Crunches (8-20 repetitions, 1-5 sets)

1. Lie on the back with knees bent and feet flat on the floor.
2. Place hands behind the head or crossed over the chest.
3. Lift upper body towards knees, engaging abdominal muscles.
4. Lower back down with control. Repeat for the duration.

Station 2: Plank (8-20 repetitions, 1-5 sets)

1. Begin in a plank position, supporting the body on forearms and toes.
2. Keep the body in a straight line from head to heels, engaging the core.

3. Hold the plank position, focusing on maintaining a stable and aligned posture throughout.

Station 3: Leg Raises (8-20 repetitions, 1-5 sets)

1. Lie on your back with your legs straight and hands under your lower back for support.
2. Lift both legs toward the ceiling, keeping them straight.
3. Lower legs back down without touching the ground. Repeat.

Station 4: Bicycle Crunches (8-20 repetitions, 1-5 sets)

1. Lie on the back with your hands behind your head.
2. Lift your legs off the ground and bring your right elbow towards your left knee while extending the right leg.
3. Switch, bringing the left elbow towards the right knee in a pedaling motion. Repeat.

Station 5: Mountain Climbers (8-20 repetitions, 1-5 sets).

1. Start in a plank position with arms straight.
2. Alternately bring knees towards the chest in a running motion.
3. Maintain a fast-paced yet controlled movement throughout.

Rest and Rotation (1 minute):

1. After completing one minute at each station, allow a one-minute rest for students to recover.
2. Instruct students to move to the next station in a clockwise direction after each rest period.

Repeat Circuit (3 rounds):

1. Emphasize maintaining proper form during each exercise.
2. Encourage students to challenge themselves, but also emphasize the importance of listening to their bodies and avoiding overexertion.

VARIATION

1. Provide modified versions of exercises for students with varying fitness levels.
2. Add resistance bands for an extra challenge.

COOLING-DOWN (5 minutes)

Static Stretching Targeting Core Muscles:

Child's Pose (1 minute):

1. Kneel on the mat with toes together and knees apart.
2. Sit back on your heels and extend your arms forward, lowering your chest towards the floor.
3. Feel the stretch along the back and engage the core. Hold and breathe deeply.

Seated Forward Bend (1 minute):

1. Sit on the mat with legs extended straight in front.
2. Hinge at hips and reach towards toes, keeping back straight.
3. Feel the stretch along the hamstrings and lower back. Hold and breathe.

Cat-Cow Stretch (1 minute):

1. Return to a tabletop position with hands under shoulders and knees under hips.
2. Inhale, arch back (cow), lifting head and tailbone.
3. Exhale, round back (cat), tucking chin to chest.
4. Repeat this flowing motion for the duration.

Deep Breathing Exercises to Help Students Relax

Diaphragmatic Breathing (2 minutes):

1. Sit or lie down comfortably.
2. Place one hand on the chest and the other on the abdomen.
3. Inhale deeply through the nose, allowing the abdomen to expand.
4. Exhale slowly through the mouth, feeling the abdomen contract.
5. Focus on deep, rhythmic breathing to promote relaxation.

Mindful Breathing (2 minutes):

1. Sit comfortably with your eyes closed.
2. Inhale slowly and count to four, then exhale counting to four.
3. Focus attention on breath, allowing thoughts to come and go without attachment.
4. Encourage students to release tension with each exhale.

DEBRIEFING (5 minutes)

1. How do the FITT principles applied in today's circuit training contribute to effective abdominal endurance and overall muscular development?
2. In the bodyweight circuit, how did maintaining proper form enhance your muscular endurance?
3. How has today's session influenced your willingness to include bodyweight exercises regularly in your fitness routine?

4. What long-term health benefits do you associate with maintaining muscular endurance, based on today's session?

FORMATIVE ASSESSMENT

Assessment Techniques	**Description**
Visual Observation	Move around circuit stations, and closely observe students' execution of exercises, focusing on proper body alignment and movement range.
Verbal Feedback	Provide instant feedback and corrections during the circuit, emphasizing the importance of maintaining proper form. Acknowledge correct execution to reinforce positive behavior.
Demonstrations	Pause the circuit briefly to demonstrate the correct form and technique for specific exercises. Clarify misconceptions and showcase proper movement patterns to the entire class.
Peer Assessment	Encourage students to watch their peers during the circuit and provide constructive feedback. Foster a collaborative learning environment, allowing students to learn from each other.
Checkpoints	Establish specific pauses during the circuit for form checks. Use these moments to correct form, answer questions, and ensure students grasp the correct techniques before moving to the next station.
Post-Circuit Discussion	Conclude the circuit with a brief discussion on form and technique. Allow students to share insights and experiences, addressing any common challenges or questions related to form and technique.

LESSON OVERVIEW	
Lesson number:	8 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Muscular Strength
Lesson topic:	Resistance Band Workout
Teaching and Learning Materials:	Resistance bands of varying resistance levels, exercise mats, cones/markers, and stopwatch.
Set-up	• Arrange the exercise area with enough space for each child, ensuring that resistance bands are properly distributed, and safety measures are in place. • Mark warm-up and exercise zones.
FITT principles	*Frequency:* One session *Intensity:* High resistance, 1-8 repetitions *Time:* 1-5 sets *Type:* Isotonic, isometric, or progressive resistance training (PRT).

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Understand the principles of resistance band exercises and their impact on upper-body muscular strength.
2. Perform a series of resistance band exercises targeting different muscle groups in the upper body.
3. Exhibit enthusiasm and motivation towards incorporating resistance band exercises into their regular physical activity routine.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Jumping Jacks (1 minute):

1. Start with feet together and arms at the sides.
2. Jump, spreading legs shoulder-width apart while raising arms overhead.

3. Jump back to the starting position and repeat.

High Knees (1 minute):

1. Stand with feet hip-width apart.
2. Lift right knee as high as one can while swinging left arm forward.
3. Quickly switch to lift the left knee with the right arm forward.
4. Continue in a jogging motion, lifting those knees nice and high.

Arm Circles (1 minute):

1. Extend your arms to the sides.
2. Make small circles in a clockwise direction for 30 seconds.
3. Switch to counterclockwise circles for the next 30 seconds.

Bodyweight Squats (1 minute):

1. Stand with feet shoulder-width apart.
2. Lower your body as if sitting back in a chair, keeping your knees over your toes.
3. Stand back up, squeezing your glutes at the top.

Torso Twists (1 minute):

1. Stand with feet hip-width apart and arms extended to the sides.
2. Twist the torso to the right, bringing the left hand towards the right side.
3. Return to the center and twist to the left, bringing the right hand towards the left side.

MAIN ACTIVITY (35 minutes)

Banded Rows (1-8 repetitions, 1-5 sets)

1. Secure the resistance band around a sturdy anchor or post at chest height.
2. Stand facing the anchor, holding one end of the band in each hand.
3. Step back to create tension and keep a slight bend in your knees.
4. Pull the bands towards the chest, squeezing the shoulder blades together.
5. Slowly release back to the starting position.

Bicep Curls (1-8 repetitions, 1-5 sets)

1. Stand on the center of the resistance band with feet hip-width apart.
2. Hold one end of the band in each hand, arms fully extended, and palms facing forward.
3. Keep elbows close to sides and curl hands towards shoulders.
4. Lower the hands back down with control.

Overhead Shoulder Press (1-8 repetitions, 1-5 sets)

1. Step on the center of the band with one foot, raising the other foot slightly off the ground.
2. Hold the ends of the band at shoulder height, elbows forming a 90-degree angle.
3. Press the band overhead, fully extending your arms.
4. Lower the band back down, maintaining control.

Triceps Extensions (1-8 repetitions, 1-5 sets)

1. Stand with feet hip-width apart, holding one end of the band in both hands overhead.
2. Keep upper arms close to ears and lower hands behind the head.
3. Extend arms back up to the starting position, engaging triceps.
4. Control the movement throughout.

VARIATION

1. Introduce a partner workout or group activity, incorporating resistance bands for added resistance.

COOLING-DOWN (5 minutes)

Chest Opener (1 minute):

2. Stand tall with feet hip-width apart.
3. Interlace fingers behind the back and straighten arms.
4. Lift arms slightly, opening up the chest. Hold and breathe.

Triceps Stretch (1 minute):

1. Raise the right arm overhead and bend the elbow, reaching a hand down the back.
2. Use your left hand to gently push on the right elbow. Hold and switch sides.

Shoulder Stretch (1 minute):

1. Bring the right arm across the chest.
2. Use the left hand to gently pull the right arm towards the chest. Hold and switch sides.

Biceps and Forearm Stretch (1 minute):

1. Extend right arm straight in front, palm facing down.
2. Use the left hand to gently press on fingers, stretching the forearm. Hold and switch sides.

Overhead Triceps Stretch (1 minute):

1. Reach your right hand down the center of the back.
2. Use your left hand to gently push on your right elbow. Hold and switch sides.

DEBRIEFING (5 minutes)

1. Can you share any specific insights into how the resistance bands targeted different muscle groups in the upper body?
2. Did you find it easier or more challenging to maintain proper form and control during the exercises compared to previous upper body workouts?
3. In what ways do you think incorporating resistance band exercises can contribute to your overall fitness goals and well-being?

FORMATIVE ASSESSMENT

Areas	**Assessment**
Banded Rows	Observe if students maintain a straight back, engage their core, and squeeze their shoulder blades during the exercise.
Bicep Curls	Check for proper elbow positioning, avoiding swinging or momentum.
Overhead Shoulder Press:	Assess if students keep a stable stance and fully extend their arms overhead.
Triceps Extension	Look for controlled movement without arching the back excessively.

LESSON OVERVIEW	
Lesson number:	9 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Muscular Strength (MS)
Lesson topic:	Calisthenic Routine
Teaching and Learning Materials:	Exercise mats, cones, or markers for setting up stations, stopwatch, music player, and upbeat music for motivation.
Set-up	Arrange exercise mats in a spacious area, and set up markers or cones for different exercise stations.
FITT principles	*Frequency:* One session *Intensity:* High resistance, 1-8 repetitions *Time:* 1-5 sets *Type:* Isotonic, isometric, or progressive resistance training (PRT).

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Identify and explain the specific callisthenic exercises targeting major muscle groups.
2. Demonstrate proper form and technique in performing callisthenic exercises.
3. Execute a complete callisthenic routine with increasing difficulty levels.
4. Develop a positive attitude towards maintaining muscular strength through consistent physical activity.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING UP (5 minutes)

Arm Circles:

1. Extend arms to the sides.
2. Make small circles with your arms, gradually increasing the size.

3. After 30 seconds, reverse the direction of the circles.

Leg Swings:

1. Find a stable support (wall or post) and hold onto it for balance.
2. Swing one leg forward and backward in a controlled manner.
3. After 30 seconds, switch to the other leg.
4. This helps loosen up your hips and improves flexibility

High Knees:

1. Stand with feet hip-width apart.
2. Lift one knee as high as possible while the opposite arm swings forward.
3. Repeat with the other knee in a brisk, running-in-place motion.
4. Engage the core and keep a steady pace.

Dynamic Lunges:

1. Step forward with your right foot into a lunge position.
2. Push off the right foot to bring it back to the starting position.
3. Repeat with your left foot.
4. Continue alternating lunges, ensuring a smooth and controlled movement.

MAIN ACTIVITY (35 minutes)

Push-ups (1-8 repetitions, 1-5 sets)

1. Start in a plank position with hands slightly wider than shoulder-width apart.
2. Lower body towards the ground by bending elbows.
3. Keep your body in a straight line and avoid letting your hips sag.
4. Push back up to the starting position. Perform as many reps as you can with good form.

Bodyweight Squats (1-8 repetitions, 1-5 sets)

1. Stand with feet shoulder-width apart.
2. Lower body by bending knees and pushing hips back.
3. Keep back straight and chest up.
4. Lower until thighs are parallel to the ground, then push through heels to return to the starting position.

Lunges (1-8 repetitions, 1-5 sets)

1. Stand with feet together.
2. Take a step forward with your right foot, and lower body until both knees are bent at a 90-degree angle.

3. Push off the right foot to return to the starting position.
4. Repeat on the left side, alternating legs with each lunge.

Plank Variations (8 minutes):
Front Plank (1-8 repetitions, 1-5 sets)

1. Start in a plank position with elbows directly beneath shoulders.
2. Keep the body in a straight line from head to heels, engaging the core.
3. Hold the position for as long as possible.

Side Plank (1-8 repetitions, 1-5 sets)

1. Lie on the side, supporting the body with one forearm.
2. Stack feet on top of each other.
3. Lift hips, forming a straight line from head to heels. Hold on one side, then switch.

VARIATION

- Introduce variations such as using equipment like resistance bands for added intensity.

COOLING-DOWN (5 minutes)
Hamstring Stretch (1 minute):

1. Sit on the floor with one leg extended straight and the other leg bent, foot against the inner thigh.
2. Reach forward toward the toes of the extended leg, keeping back straight.
3. Hold the stretch, feeling the gentle pull in the back of the thigh.

Quadriceps Stretch (1 minute):

1. Stand with feet hip-width apart.
2. Lift one foot towards the buttocks, grabbing the ankle with a hand.
3. Keep knees close together and push hips forward slightly.
4. Feel the stretch in the front of the thigh.

Chest Opener (1 minute):

1. Stand tall with feet shoulder-width apart.
2. Clasp hands behind back, straightening arms.
3. Lift arms slightly, opening the chest and squeezing shoulder blades together.

Child's Pose (1 minute):

1. Kneel on the mat with toes together and knees apart.
2. Sit back on your heels, reaching your arms forward on the floor.

3. Lower chest towards the ground, feeling a stretch in the back and shoulders.

Seated Spinal Twist (1 minute):

1. Sit on the floor with your legs extended.
2. Bend one knee and cross it over the other leg, placing the foot flat on the floor.
3. Twist towards the bent knee, placing the opposite elbow against the outside of the bent knee.
4. Feel the stretch along the spine and through the hips.

DEBRIEFING (5 minutes)

1. Can you identify and describe a callisthenic exercise we practiced targeting a major muscle group and explain its contribution to overall muscular strength?
2. Reflect on the callisthenic exercises; what key elements did you focus on for proper form and technique, and how do these contribute to the workout's effectiveness and safety?
3. Share a challenging moment during the callisthenic routine and how you adapted to it. How do variations contribute to a well-rounded fitness routine?
4. Reflect on today's lesson and share one positive aspect that motivated you to incorporate calisthenics into your routine. Consider how this positive attitude can contribute to your overall well-being.

FORMATIVE ASSESSMENT

Areas	Assessment
Proper form	1. Observe each student's body alignment during exercises such as push-ups, squats, and lunges. 2. Check if the spine is neutral, the limbs are in the correct position, and movements are controlled. 3. Look for any signs of misalignment or compensatory movements.
Execution of exercise	1. Assess the fluidity and control of movements during each callisthenic exercise. 2. Look for smooth transitions between exercises and note any instances of jerky or unsteady motions. 3. Ensure that students maintain a consistent pace throughout the routine.
Individualized Attention	1. Circulate throughout the class, paying attention to each student's performance.

	2. Provide individualized guidance based on observed strengths and areas for improvement. Acknowledge effort and improvement, fostering a positive learning environment.

LESSON OVERVIEW	
Lesson number:	10 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Muscular Strength (MS)
Lesson topic:	Partner Squat
Teaching and Learning Materials:	Cones for marking exercise areas, basketball for the variation, timer for warm-up, main activity, and cool down.
Set-up	Arrange the exercise area with sufficient space for pairs to perform squats safely.
FITT principles	*Frequency:* One session *Intensity:* High resistance, 1-8 repetitions *Time:* 1-5 sets *Type:* Isotonic, isometric, or progressive resistance training (PRT).

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Understand the importance of partner resistance exercises in improving muscular strength.
2. Demonstrate and perform partner resistance exercises with the correct form.
3. Develop coordination and body awareness through partner exercises.
4. Recognize the importance of teamwork and communication in completing partner resistance exercises.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

High Knees (1 minute):

1. Stand tall with feet hip-width apart.

2. Lift one knee as high as possible while driving the opposite arm forward.
3. Switch quickly, maintaining a brisk pace.
4. Focus on lifting those knees, engaging the core.

Arm Circles (1 minute):

1. Extend arms straight out to the sides.
2. Make small circular motions with arms, gradually increasing the size of the circles.
3. After 30 seconds, reverse the direction of the circles.
4. This exercise warms up the shoulders and improves mobility.

Dynamic Lunges (1.5 minutes):

1. Step forward with the right foot into a lunge position, ensuring the knee is directly above the ankle.
2. Push off your right foot, returning to the starting position.
3. Alternate legs and continue in a fluid motion.
4. Engage quadriceps and hamstrings while promoting hip flexibility.

Torso Twists (1.5 minute):

1. Stand with feet shoulder-width apart.
2. Place hands on hips and twist torso from side to side.
3. Keep core engaged and move in a controlled manner.
4. This helps loosen up the spine and engages the core muscles.

MAIN ACTIVITY (35 minutes)

Pairing Up and Role Assignment (3 minutes):

1. Find a partner of similar strength and fitness level.
2. One of you will be the "Performer" and the other the "Resistor."
3. The Resistor will hold the partner's hands, providing gentle resistance during the squats.

Getting into Position (2 minutes):

1. Stand facing your partner, maintaining a shoulder-width distance between your feet.
2. Grasp your partner's hands firmly, ensuring a secure grip.

Performing the Partner Squats (20 minutes):

1. Perform 1-5 sets of 1-8 squats, following these steps:
2. The Performer initiates the squat by bending their knees and lowering their hips.

3. Simultaneously, the Resistor provides gentle resistance, challenging the Performer's muscles.
4. Emphasize controlled movements, ensuring the knees don't go beyond the toes and the back remains straight.
5. As you rise back up, both partners should engage their leg and core muscles.

Role Rotation (7 minutes):

1. After completing the first set, switch roles. The Resistor becomes the Performer, and vice versa.
2. This rotation ensures that everyone experiences both providing resistance and performing the exercise.
3. Take a brief rest between sets to catch your breath and maintain good form.
4. Engage your core muscles to enhance stability and balance.
5. Encourage and support your partner to make the most out of the exercise.

VARIATION

1. Introduce a variation by adding a basketball for an additional challenge.
2. Perform 1-5 sets of 8-12 squats with the basketball, focusing on maintaining balance and coordination.

COOLING-DOWN (5 minutes)

Light Jog or March in Place (1 minute):

1. Begin with a light jog or marching in place to maintain some gentle movement.
2. This helps in gradually lowering the heart rate and allowing the body to transition from an intense workout to a more relaxed state.

Leg Stretches (1 minute):

1. Find a comfortable space and stand with feet hip-width apart.
2. Perform static stretches for the legs:
   Calf Stretch: Take a step back with one foot, keeping it straight, and bend the front knee. Hold for 30 seconds on each leg.
   Quadriceps Stretch: Bring one foot towards your buttocks, holding the ankle behind you. Hold for 30 seconds on each leg.

Back Stretches *(1 minute):*

Focus on the major muscle groups in the back:

1. *Cat-Cow Stretch:* Get into a tabletop position. Arch your back up towards the ceiling (Cat) and then lower it while lifting your head and tailbone (Cow). Repeat for 1 minute.
2. *Child's Pose:* Sit back on your heels, reaching your arms forward on the ground. Hold for 30 seconds.

Shoulder Stretches *(1 minute):*

Gently stretch the shoulders to release tension:

1. *Cross-Body Shoulder Stretch:* Bring one arm across your chest and gently pull it towards you with the opposite arm. Hold for 30 seconds on each arm.
2. *Neck Stretch:* Slowly tilt your head to one side, holding for 15 seconds, then switch sides.

Deep Breathing and Relaxation (1 minute):

1. Finish the cooldown with a few deep breaths, inhaling slowly through the nose and exhaling through the mouth.
2. Encourage relaxation and mindfulness, allowing the body to fully recover.

DEBRIEFING (5 minutes)

1. Why do you think teamwork and communication are crucial during partner resistance exercises like the Partner Squats we just did?
2. How did you feel during the Partner Squats, and did you notice any changes in your strength or coordination compared to the beginning of the lesson?
3. Why is maintaining proper form essential during partner resistance exercises, and how did focusing on form impact your performance?

FORMATIVE ASSESSMENT

Observation (Throughout the Activity):

Walk around the exercise area and observe each pair of students as they perform Partner Squats, paying close attention to the following aspects:

- *Body Alignment:* Check if the knees are aligned with the toes, ensuring they don't go beyond the toes during the squat.
- *Back Posture:* Observe if the back is straight and not excessively arched or rounded.
- *Grip and Communication:* Assess the communication between partners, ensuring a secure grip, and effective teamwork.
- *Depth of Squat:* Observe if students are achieving an appropriate depth in their squats, without compromising form.

LESSON OVERVIEW	
Lesson number:	11 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Muscular Endurance (ME)
Lesson topic:	Circuit Training
Teaching and Learning Materials:	Cones, stopwatch or timer, station cards (with exercise instructions), water bottles
Set-up	• Arrange exercise stations in a circuit format, ensuring each station is appropriately spaced. • Place station cards at each station with clear instructions on exercises.
FITT principles	*Frequency:* One session *Intensity:* Low resistance, 8-20 repetitions *Time:* 1-5 sets *Type:* Isotonic, isometric, or progressive resistance training (PRT).

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Understand the importance of different exercises targeting major muscle groups.
2. Develop and enhance muscular endurance through participation in the circuit training session with proper form and technique.
3. Recognize the importance of regular physical activity for overall health and well-being.
4. Demonstrate teamwork and cooperation during the circuit training activities.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Jogging in Place (1 minute):

1. Begin with a light jog in place, lifting knees comfortably and swinging arms.
2. Focus on gradually increasing heart rate and breathing.

Arm Circles (1 minute):

1. Extend arms to the sides and make controlled circular motions.
2. Start with small circles and gradually increase the diameter.
3. After 30 seconds, reverse the direction.

Leg Swings (2 minutes – 1 minute each leg):

1. Find a stable surface or wall to support.
2. Swing one leg forward and backward in a controlled manner, gradually increasing the range of motion.
3. After 30 seconds, switch to the other leg.

High Knees (1 minute):

1. Stand in place and lift your knees towards the chest in a marching motion.
2. Focus on maintaining an upright posture and engaging the core.

MAIN ACTIVITY (35 minutes)

Station 1: Plank Hold (8-20 repetitions, 1-5 sets)

1. Start in a forearm plank position.
2. Emphasize a straight line from head to heels.
3. Challenge students to maintain the plank for as long as possible.

Station 2: Bicycle Crunches (8-20 repetitions, 1-5 sets)

1. Lie on your back with hands behind your head and legs lifted.
2. Alternate bringing the opposite elbow towards the opposite knee in a cycling motion.
3. Perform at a controlled pace, engaging the core with each movement.

Station 3: Leg Raises (8-20 repetitions, 1-5 sets)

1. Lie on the back with legs straight and together.
2. Lift your legs towards the ceiling, keeping them straight, and slowly lower them without touching the ground.
3. Engage the lower abdominal muscles throughout the movement.

Station 4: Russian Twists (8-20 repetitions, 1-5 sets)

1. Sit on the floor with knees bent and feet flat.
2. Lean back slightly, maintaining a straight back.

3. Rotate the torso, touching the ground on either side with your hands.

Station 5: Mountain Climbers (8-20 repetitions, 1-5 sets)

1. Start in a plank position.
2. Bring one knee towards the chest, then switch rapidly in a running motion.
3. Keep a steady pace to elevate the heart rate while engaging the core.

VARIATION

1. Modify the intensity or complexity of exercises based on individual fitness levels.
2. Incorporate partners or team activities to encourage collaboration.

COOLING-DOWN (5 minutes)

Hamstring Stretch (1 minute):

1. Sit on the floor with one leg extended straight and the other leg bent so that the sole rests against the inner thigh of the extended leg.
2. Reach toward toes, keeping back straight.
3. Hold the stretch for 15-30 seconds and switch legs.

Chest Opener Stretch (1 minute):

1. Stand with feet shoulder-width apart.
2. Clasp your hands behind your back, straighten your arms, and lift them slightly.
3. Open chest, squeezing shoulder blades together.
4. Hold for 15-30 seconds.

Child's Pose (1 minute):

1. Kneel on the floor, sit back on your heels, and stretch your arms forward.
2. Lower your chest towards the floor while reaching your arms out.
3. Hold the stretch for 30 seconds, focusing on breathing deeply.

Quadriceps Stretch (1 minute):

1. Stand on one leg and bring your other heel toward your buttocks.
2. Hold your ankle with your hand, keeping your knees close together.
3. Hold the stretch for 15-30 seconds and switch legs.

Seated Forward Bend (1 minute):

1. Sit on the floor with legs extended straight.

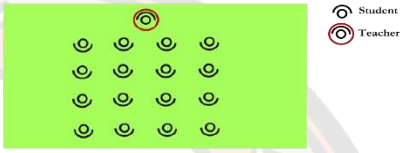
2. Hinge at hips and reach forward toward toes.
3. Hold the stretch for 30 seconds, focusing on relaxing into the stretch.

DEBRIEFING (5 minutes)

1. How do you think incorporating a variety of exercises contributes to overall muscular endurance?
2. As you participated in the circuit training session, how did you feel about your development in terms of muscular endurance?
3. Did today's session impact your perspective on the importance of staying active?

FORMATIVE ASSESSMENT

1. Observe each student's form and technique during the circuit training exercises.
2. Pay attention to body alignment, proper execution of movements, and overall adherence to correct form.
3. Provide constructive feedback immediately after the session, focusing on specific strengths and areas for improvement.
4. Encourage students to reflect on their performance and set personal goals for improvement.

LESSON OVERVIEW	
Lesson number:	12 of 16
Grade:	VII (Seven)
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Cardiorespiratory Endurance (CRE)
Lesson topic:	Aerobic Dance
Teaching and Learning Materials:	Music player and whistle
Set-up	Children stand in line keeping a safe distance 
FITT principles	*Frequency:* One session *Intensity:* 55%/65-90% maximal heart rate *Time:* 50-60 minutes *Type:* Aerobic activity

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Elaborate on the mechanisms through which aerobic exercise contributes to the enhancement of cardiorespiratory endurance.
2. Demonstrate accurate execution of aerobic exercise steps within a safe environment and with proper rhythm to promote improvement in cardiorespiratory endurance.
3. Engage in the regular practice of aerobic exercises during leisure time as a means of augmenting cardiorespiratory endurance.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP *(5 minutes)*

The teacher calls the colours of the light and the children perform the following activities.

1. Yellow light - jog.
2. Green light - run.
3. Red light - stop.

Children move to the other side of the activity area and the teacher keeps on calling the name of the different colours.

MAIN ACTIVITY *(35 minutes)*

The teacher leads the activity by demonstrating the following steps *(55%/65-90% maximal heart rate)*

1. Marching 8 steps on the spot and repeat 2. after every variation. (8 times) 3. Sidestep (8 times). 4. Butt kick (8 times). 5. Single-step touch (8 times). 6. Double-step touch (8 times). *7.* V steps forward with hand coordination (8 times)	8. V steps backward with hand coordination(8 times). 9. A step forward with hand coordination(8 times). 10. A step backward with hand coordination(8 times). 11. Grapevine (8 times). 12. Front kick (8 times). *13.* Marching slowly (8 times).

The teacher shares the following benefits of aerobic exercise.

- improves cardiovascular health.
- lowers blood pressure.
- helps regulate blood sugar.
- reduces chronic pain.
- helps in having sound sleep.
- regulates weight.
- strengthens the immune system.
- improves brain power.

VARIATION

1. Use high-tempo music.
2. Introduce basic Zumba steps.

COOLING-DOWN *(5 minutes)*

Perform the following activity with slow music.

1. Children stand in a circle holding their hands with eyes closed and take a deep breath 5 times.
2. The teacher squeezes the left hand of any child who then passes the squeezearound the circle.
3. The teacher asks students to open their eyes.
4. The teacher breaks the chain at the point where a particular child becomes the leader and goes around the activity area in the chain.

DEBRIEFING (5 minutes)

1. How would you describe the physiological benefits of aerobic exercise on cardiorespiratory endurance?
2. What safety measures should be emphasized when performing aerobic exercises to enhance cardiorespiratory fitness?
3. Reflect on what challenges and successes you would encounter while practicing aerobic exercises during leisure time to improve cardiorespiratory endurance.

FORMATIVE ASSESSMENT

1. Regular class observations while performing aerobic exercises. The teacher can provide immediate feedback on the correctness of steps, use of safe space, and maintaining proper rhythm.
2. Encourage students to maintain a fitness journal where they record their leisure-time aerobic exercise sessions. Periodic check-ins and discussions can help gauge their commitment and progress.

LESSON OVERVIEW	
Lesson number:	13 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Cardiorespiratory Endurance (CRE)
Lesson topic:	Run for Distance
Teaching and Learning Materials:	Stopwatch, comfortable sportswear.
Set-up	Outdoor natural track with measured distance.
FITT principles	*Frequency:* One session *Intensity:* 55%/65-90% maximal heart rate *Time:* 50-60 minutes *Type:* Aerobic activity (running)

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Understand the significance of pacing in long-distance running for enhancing cardiovascular fitness.
2. Execute proper running form, emphasizing the maintenance of good form for effective distance running.
3. Improve coordination and balance during extended running, showcasing refined psycho-motor skills.
4. Appreciate the importance of perseverance and self-discipline in facing the challenges of long-distance running and cultivating a positive attitude.
5. Recognize the health benefits of regular running, fostering a positive outlook on a healthy lifestyle.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Light Jogging:

1. Begin with a slow jog in place, gradually increasing the pace.

2. Encourage students to focus on smooth, controlled movements.
3. Promote steady breathing throughout the jogging session.

Dynamic Stretching:

Arm Circles:

1. Extend arms to the sides and make small circles in both clockwise and counterclockwise directions.
2. Gradually increase the size of circles to engage shoulder muscles.

Leg Swings:

1. Stand near the support and swing one leg forward and backward, then sideways.
2. Switch legs after 30 seconds, promoting flexibility in the hip and thigh muscles.

Torso Twists:

1. Stand with feet shoulder-width apart and twist the upper body from side to side.
2. Encourage students to maintain good posture during the twists.

MAIN ACTIVITY (35 minutes)

1. Divide the students into groups.
2. Explain the route and distance on the natural track.
3. Each student will complete a designated distance at their own pace.
4. Emphasize the importance of pacing and steady breathing during the run.

VARIATION

- Introduce interval running short bursts of increased speed followed by periods of slower jogging or walking to enhance cardiovascular fitness.

COOLING-DOWN (5 minutes)

Slow Jogging or Walking:

1. Transition from the main running activity to a slow jog or walk.

2. Encourage students to gradually reduce their pace to lower their heart rate.

Static Stretching for Leg Muscles:

Quadriceps Stretch:

1. Stand on one leg, bringing the other foot toward the buttocks, and gently hold the ankle.
2. Emphasize feeling the stretch in the front thigh.

Hamstring Stretch:

1. Sit on the ground with one leg extended and the other foot against the inner thigh.
2. Reach toward the toes of the extended leg, feeling the stretch in the hamstring.

Calf Stretch:

1. Stand facing a wall, placing your hands against it.
2. Step one foot back, keeping the heel on the ground to stretch the calf muscles.

DEBRIEFING (5 minutes)

1. How does maintaining a steady pace during long-distance running contribute to improving cardiovascular fitness?
2. Reflect on the importance of proper running form in enhancing endurance during distance running. How did focusing on maintaining good form impact your running experience today?
3. Discuss how practicing coordination and balance during extended running sessions can translate to improved psycho-motor skills in other physical activities or daily life tasks.

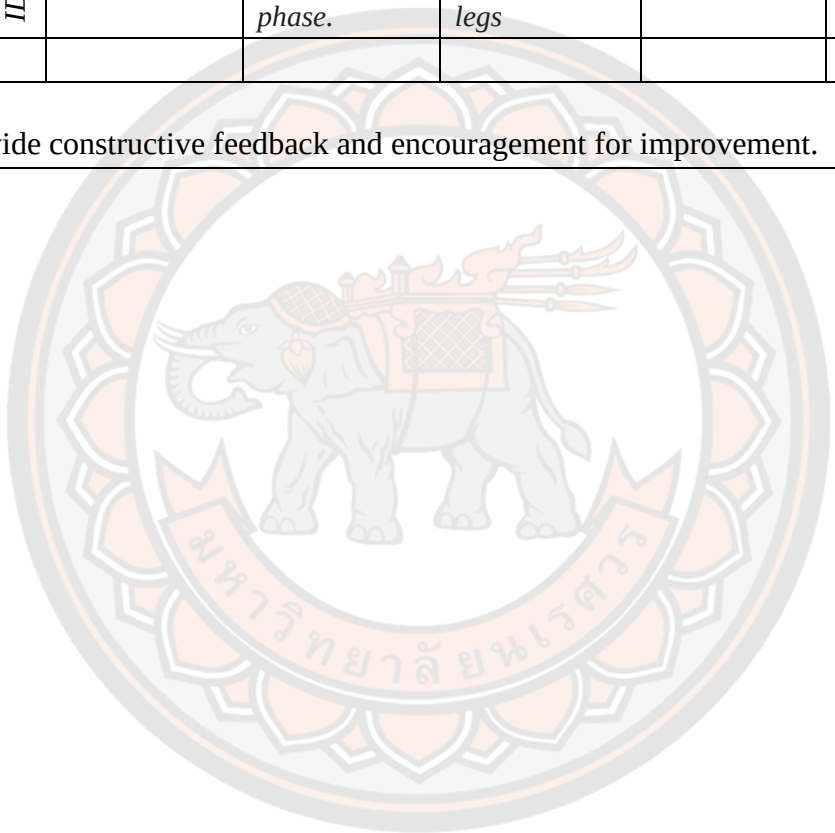
FORMATIVE ASSESSMENT

Observe students during the run, noting their pacing, running form, and overall endurance.

Checklist for assessing running skills.

Technical elements of the skill					
Participant ID No.	*Eyes focused forward throughout therun.*	*Knees bent at right angles duringthe recovery phase.*	*Arms bent at elbows and move in opposition to legs*	*Contact the ground with the front part of the foot.*	*The body leans slightly forward.*

Provide constructive feedback and encouragement for improvement.



LESSON OVERVIEW	
Lesson number:	14 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Cardiorespiratory Endurance (CRE)
Lesson topic:	Uphill Relay
Teaching and Learning Materials:	Footwear, hydration packs, First Aid Kit, Stopwatch.
Set-up	Set up a designated uphill course with a moderate incline, ensuring safety measures.
FITT principles	*Frequency:* One session *Intensity:* 55%/65-90% maximal heart rate *Time:* 50-60 minutes *Type:* Aerobic activity (Uphill running)

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Understand how uphill running improves cardiovascular health, increases lung capacity, and enhances endurance.
2. Develop efficient running form on inclines, improving body coordination and balance.
3. Appreciate perseverance and self-discipline in uphill running, fostering a positive attitude towards challenges and building resilience.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Dynamic Stretching Circuit

1. Leg Swings: Stand next to support, swing one leg forward and backward, then side to side. *Repeat for 1 minute on each leg.*
2. Arm Circles: Extend arms to the sides, make circular motions forward for 30 seconds, then backward for another 30 seconds.

3. High Knees: Jog in place, lifting knees as high as possible. *Continue for 2 minutes.*
4. Butt Kicks: Jog in place, kicking heels up towards your glutes. *Continue for 2 minutes.*
5. Torso Twists: Stand with feet shoulder-width apart, arms extended to the sides. *Twist the torso to the left and right for 1 minute.*
6. Ankle Rolls: Lift one foot and rotate the ankle clockwise, then counterclockwise. *Switch after 30 seconds on each foot.*

MAIN ACTIVITY (35 minutes)

1. Divide the students into teams of 5-6 members.
2. Each team member takes turns running uphill for a set distance (e.g., 30 meters).
3. Once a runner completes their uphill sprint, they tag the next teammate, stationed at the bottom.
4. Teams earn points based on the number of completed uphill runs within a specified time.
5. Bonus points for demonstrating proper running form and teamwork.
6. Repeat the activity 4-5 times for 30-35 minutes.

VARIATION

1. Increase the course difficulty gradually by adjusting the incline or distance as teams progress.
2. Encourage teams to strategize and allocate each member's strengths effectively.

COOLING-DOWN (5 minutes)

Yoga-Inspired Stretching

Mountain Pose:

1. Stand tall, feet together, arms by your sides.
2. Inhale, raise arms overhead, palms facing each other.
3. Engage your core and stretch your fingertips to the sky.

Seated Forward Bend:

1. Sit with your legs extended.
2. Inhale, lengthen your spine; exhale, reach for your toes.
3. Maintain a gentle stretch in the hamstrings.

Child's Pose:

1. Kneel, sit back on heels, arms extended.
2. Rest the forehead on the ground, elongating the spine.

3. Focus on deep breaths for relaxation.

Cobra Pose:

1. Lie on the stomach, hands under shoulders.
2. Inhale and lift your chest off the ground.
3. Keep hips grounded, stretching the front body.

Corpse Pose:

1. Lie on the back, legs extended, arms by sides.
2. Close your eyes, and focus on deep, rhythmic breathing.
3. Allow muscles to relax completely.

DEBRIEFING (5 minutes)

1. How does uphill running make our hearts and lungs stronger?
2. Explain how your improved coordination helps in running uphill.
3. Why is having strong endurance important in uphill running?

FORMATIVE ASSESSMENT

1. *Cardiovascular Endurance Evaluation:* Observe participants during the relay to assess their sustained effort and performance, focusing on signs of improved cardiovascular endurance, such as steady breathing and consistent pace.
2. *Behavioral Assessment:* Monitor participants' attitudes and behaviors, noting signs of perseverance, self-discipline, and a positive approach to challenges during the relay.
3. *Time and Pace Records:* Record the time taken by each participant to complete the relay, providing insights into their speed and endurance. Track changes in performance over multiple sessions.
4. *Self-Reflection:* Encourage participants to reflect on their experience, asking questions about what they learned, how they felt during the challenge, and any strategies they employed to overcome difficulties.
5. *Peer Feedback:* Incorporate peer evaluations, where participants provide constructive feedback to their teammates based on observed improvements and collaborative efforts.

LESSON OVERVIEW	
Lesson number:	15 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Cardiorespiratory Endurance (CRE)
Lesson topic:	Soccer Drill
Teaching and Learning Materials:	Soccer balls, cones or markers, stopwatch, soccer field or open space
Set-up	Create a rectangular playing area with cones to mark boundaries
FITT principles	*Frequency:* One session *Intensity:* 55%/65-90% maximal heart rate *Time:* 50-60 minutes *Type:* Aerobic activity (soccer drill)

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Analyze the importance of pacing during soccer drills to optimize cardiovascular fitness.
2. Execute soccer-specific endurance drills with precision, focusing on proper techniques and ball control.
3. Develop a positive attitude toward physical challenges, particularly those related to soccer endurance.
4. Appreciate the value of teamwork and sportsmanship in a soccer context, developing a sense of friendship.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Light Jogging Around the Field:

1. Start with an easy-paced jog, circling the soccer field.
2. Maintain a steady pace, gradually increasing heart rate.

3. Focus on light, rhythmic movements to prepare the body for more intense activity.

Dynamic Stretching for Lower Body Muscles:
Leg Swings:

- Stand next to a goalpost or any stable structure. Swing one leg forward and backward, then side to side. *Repeat for about 10 swings on each leg*.

Knee-to-Chest Stretch:

- While standing, bring one knee up towards your chest, holding it with both hands for 10-15 seconds. Switch legs and repeat.

Side Lunges:

- Take a wide step to the side, bending one knee while keeping the other leg straight. Alternate sides for 10 lunges on each leg.

Ankle Rolls:

- Lift one foot off the ground and rotate your ankle clockwise and then counterclockwise. Switch to the other ankle after several rotations.

MAIN ACTIVITY (35 minutes)

1. Divide students into teams.
2. Set up a circuit of soccer-related endurance stations (dribbling, passing, shooting).
3. Teams rotate through stations continuously running between.
4. Emphasize maintaining intensity throughout the drill.
5. Continue the activity for 4-5 rounds for 30-35 minutes.

VARIATION

- Modify the drill by incorporating quick sprints or adding complexity to the soccer-related movements.

COOLING-DOWN (5 minutes)

Slow Jogging or Walking:

1. Gradually reduce the pace from high-intensity soccer drills to a slow, comfortable jog.
2. As an alternative, transition to a brisk walk around the field.
3. This helps the heart rate return to its resting state while preventing abrupt stops.

Static Stretching with a Focus on Lower Body Muscles:

1. *Quad Stretch:* Stand on one leg and bring the heel of the other foot towards the buttocks, holding it with your hand. Hold for 15-20 seconds and switch legs.
2. *Hamstring Stretch:* While sitting on the ground, extend one leg straight and reach for the toes. Hold for 15-20 seconds and switch legs.
3. *Calf Stretch:* Find a wall or goalpost, place your hands on it, and step one foot back, keeping it straight. Bend the front knee and lean forward to feel the stretch in the calf. Hold for 15-20 seconds on each leg.
4. *Groin Stretch:* Sit on the ground, bringing the soles of your feet together. Hold your feet and gently press your knees towards the ground. Hold for 15-20 seconds.

DEBRIEFING (5 minutes)

1. How does maintaining a steady pace during soccer drills contribute to improving cardiovascular fitness?
2. Reflect on your experience executing soccer-specific endurance drills. What aspects of proper running techniques and ball control did you find most challenging or rewarding?
3. In facing the challenges of soccer endurance, how did cultivating a positive attitude impact your performance, and what strategies helped you stay motivated?

FORMATIVE ASSESSMENT

Observe students during the soccer endurance drill, noting their execution techniques as stated below.

Checklist for assessing kicking

Technical elements of the skill						
Participant ID No.	*Eyes focused on the ball throughout the kick*	*Forward and sideward swing of the arm opposite kicking leg*	*A non-kicking foot placed beside the ball*	*Hips then shoulders rotate forward*	*Contacts the ball with the inside or top (shoelaces) of the foot.*	*The kicking leg follows through toward the target area.*

Checklist for assessing dribbling with foot

Technical elements of the skill					
Participant ID No.	*Dribbles with the inside and outside of feet*	*Moves the ball from one foot to the other.*	*Maintains even balance.*	*Lifts head to look around*	*Arms move to assist action.*

LESSON OVERVIEW	
Lesson number:	16 of 16
Grade:	VII
Time	60 minutes (1 hour)
Strength:	30 students
HRF components:	Cardiorespiratory Endurance (CRE)
Lesson topic:	Team Sports
Teaching and Learning Materials:	Basketballs, Basketball court, Cones/markers, Stopwatch.
Set-up	Divide the basketball court into sections using cones.
FITT principles	*Frequency:* One session *Intensity:* 55%/65-90% maximal heart rate *Time:* 50-60 minutes *Type:* Aerobic activity (Team Sports)

LEARNING OBJECTIVES

By the end of the lesson, the child will be able to:

1. Analyze the role of cardiovascular endurance in basketball performance.
2. Demonstrate proficient basketball passing, dribbling, and shooting techniques while engaging in team sports drills.
3. Enhance cardiovascular endurance through sustained and dynamic movements inherent in the basketball drill.
4. Recognize the value of regular cardiovascular exercise for overall health.

LESSON INTRODUCTION (5 minutes)

The lesson introduction begins with a brief review of the prior topic, emphasizing its relevance and setting the stage for the current focus. The teacher highlights the importance of developing a range of skills essential for real-life activities and physical demands. The session objectives are then outlined, guiding students in understanding the practical and broader health benefits associated with the foundational skills.

LESSON DEVELOPMENT (45 minutes)

WARMING-UP (5 minutes)

Light Jogging around the Court:

1. Start with a slow jog, circling the perimeter of the basketball court.
2. Maintain a comfortable pace, allowing the body to gradually adjust to the increased heart rate.
3. Focus on light, controlled movements, emphasizing proper running form.

4. The purpose is to elevate heart rate and increase blood flow to the muscles.

Dynamic Stretching Exercises Focusing on Lower Body Muscles:

1. Perform leg swings forward and backward to target the hamstrings and quadriceps.
2. Include lateral leg swings to engage the inner and outer thighs.
3. Execute knee-to-chest stretches for the lower back and hip flexors.
4. Incorporate side lunges to stretch the inner and outer thighs simultaneously.
5. Conclude with ankle circles to improve ankle flexibility and mobility.

MAIN ACTIVITY (35 minutes)

1. Divide the students into two teams, ensuring an equal distribution of skill levels.
2. Arrange the teams on opposite sides of the court, ready for the drill.
3. Start with passing drills, focusing on chest passes, bounce passes, and overhead passes.
4. Encourage quick ball movement between teammates.
5. Emphasize proper technique, including stance, hand positioning, and follow-through.
6. Stress the importance of low, controlled dribbles to maintain ball possession.
7. Move to shooting exercises, practicing layups, mid-range shots, and three-pointers.
8. Encourage dynamic movements and quick decision-making during shooting opportunities.
9. Emphasize continuous movement throughout the drill, simulating the fast-paced nature of a basketball game.
10. Maintain a high tempo to elevate heart rate and challenge cardiovascular endurance.
11. Rotate players through different positions to ensure everyone participates in passing, dribbling, and shooting.
12. Continue the activity for 30-35 minutes.

VARIATION

- Introduce variations like timed drills and competitive scenarios to increase intensity.

COOLING-DOWN (5 minutes)

Slow Jogging and Walking:

1. Begin with a slow-paced jog around the court, allowing the heart rate to gradually decrease.
2. Transition into a brisk walk, promoting a gradual return to a resting state.

Static Stretching:

1. Perform static stretches focusing on the muscles used during the main activity.
2. Target major muscle groups, including:
   Legs: Quadriceps, hamstrings, and calf muscles.
   Upper Body: Shoulders, arms, and back.
   Core: Incorporate stretches for the abdominal muscles.

Guided Stretching Routine:

1. Lead students through a series of static stretches, holding each stretch for 15-30 seconds.
2. Emphasize proper breathing and relaxation during the stretching routine.

DEBRIEFING (5 minutes)

1. Sustained movements in the team sports drill boosted your cardiovascular endurance - how did this impact you?
2. Balancing skill proficiency and an elevated heart rate during basketball techniques - how did you manage?
3. Consider the wider health benefits of cardiovascular exercise - how does the basketball drill align with your well-being?

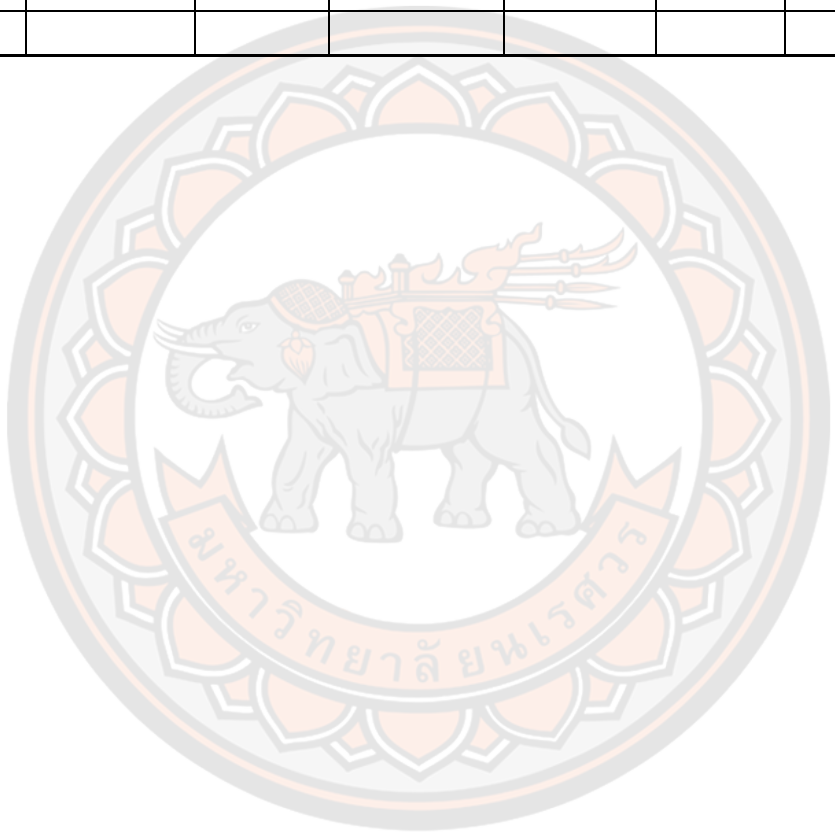
FORMATIVE ASSESSMENT

Checklist for assessing dribbling with hand

Technical elements of the skill							
Participant ID No.	*Pads of fingers contact the top of the ball.*	*Wrist firm yet flexible.*	*A hand pushes the ball to the floor.*	*Hand absorbs ball slightly on return.*	*Knees bent slightly.*	*Back straight with a slight forward lean.*	*Head up looking for open space.*

Checklist for assessing chest pass

Technical elements of the skill						
Participant ID No.	*Stands face on to the direction of the throw.*	*Eyes focused on the target.*	*Fingers spread and thumbs behind the ball*	*Steps forward with either of the feet.*	*Keeps elbows down.*	*Follow through with arms and fingers, palms turned out*



Appendix D IOC Form and Expert's Score

i. Item Objective Congruent (IOC) Form

Indicators:

1= Aligns with the objective.

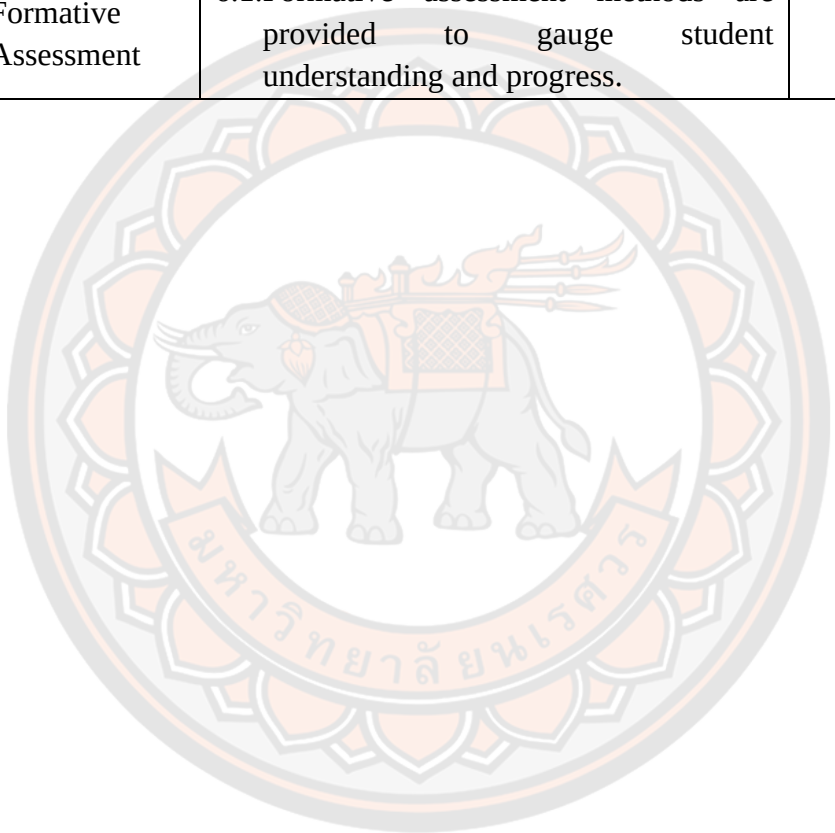
0= Some relevance or partial alignment.

-1= Does not align with the objective.

Lesson plan number:

Area	Item	IOC		
		1	0	-1
1. Lesson Overview	1.1. The lesson is suitable for the specified grade level.			
	1.2. The allocated time for the lesson is reasonable.			
	1.3. The lesson adequately addresses Health-Related Fitness components.			
	1.4. The topic aligns with learning objectives and HRF components.			
	1.5. Necessary teaching and learning materials are provided and appropriate for the lesson.			
	1.6. The lesson incorporates Frequency, Intensity, Time, and Type principles appropriately (FITT principles).			
2. Learning objectives	2.1. Learning objectives are based on three learning domains such as cognitive, psychomotor, and affective.			
3. Lesson Introduction	3.1. The introduction is engaging and effective for students and setting the context for the lesson.			
4. Lesson Development	4.1. Warm-up activities are appropriate and effective in transitioning to the main activity.			
	4.2. The main activity aligns with learning objectives and engages students effectively.			

	4.3. There are options or modifications provided for different skill levels or needs.			
	4.4. Cooling down activities are effective in transitioning students out of the main activity.			
5. Debriefing	5.1. The debriefing effectively summarizes key points and encourages reflection and discussion.			
6. Formative Assessment	6.1. Formative assessment methods are provided to gauge student understanding and progress.			



ii. Expert's IOC score for the lesson plans.

Lesson number	**Item**	**Exp-1**	**Exp-2**	**Exp-3**	**IOC** *(Average score)*
1/16	1.1	1	1	1	1.00
	1.2	0	1	1	0.67
	1.3	0	1	1	0.67
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	0	1	1	0.67
	4.3	0	1	1	0.67
	4.4	1	1	1	1.00
	5.1	1	1	1	1.00
	6.1	0	1	1	0.67
2/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	0	1	0.67
	4.1	1	1	1	1.00
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00

	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
3/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00
	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
4/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	0	1	1	0.67
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00

	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
5/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	0	1	1	0.67
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00
	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
6/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00

	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
7/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00
	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
8/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00

	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
9/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00
	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
10/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00

	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
11/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00
	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
12/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00

	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
13/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00
	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
14/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00

	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
15/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00
	5.1	1	0	1	0.67
	6.1	1	1	1	1.00
16/16	1.1	1	1	1	1.00
	1.2	1	1	1	1.00
	1.3	1	1	1	1.00
	1.4	1	1	1	1.00
	1.5	1	1	1	1.00
	1.6	0	1	1	0.67
	2.1	1	1	1	1.00
	3.1	1	1	1	1.00
	4.1	1	0	1	0.67
	4.2	1	1	1	1.00
	4.3	1	1	1	1.00
	4.4	1	1	1	1.00

	5.1	1	0	1	0.67
	6.1	1	1	1	1.00

Appendix E Health-Related Fitness Testing Protocols

1. Cardiorespiratory Endurance (CRE)

Cardiorespiratory endurance is the ability of the heart, lungs, and blood vessels to transport oxygen and nutrients to the muscles and to remove waste products during physical activity over an extended period. The body also can sustain physical activity for longer periods, often measured through activities such as running, cycling, and swimming.

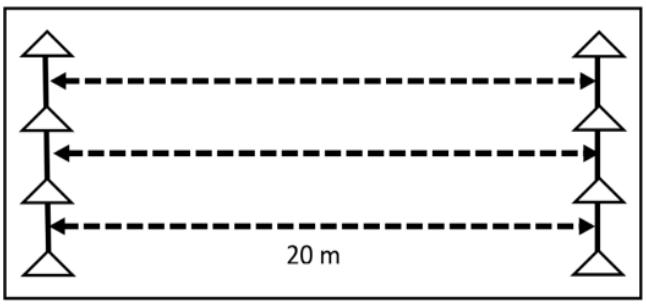
Progressive Aerobic Cardiovascular Endurance Run (PACER) was used as one of the test items to measure cardiovascular endurance. In the PACER test, a student runs as long as possible while keeping a specified pace. It also helps to learn the skills of pacing.

Equipment and materials

1. The flat non-slippery surface of at least 20 meters long.
2. PACER cadence: https://youtu.be/Y82jDHRrswc
3. Measuring tape
4. Marker cones
5. Pencil
6. Score sheet
7. PACER Test: https://youtu.be/9KPskEdeqx8

Setting

- Mark the 20-meter course with cones and tape, dividing each lane as shown in the figure below



Testing procedures

1. Reorient students on the process of the PACER test.
2. Walking is permitted as long as the student maintains the “pace”
3. Students reaching the line before the beep sounds should wait for the beep to run back.
4. Students failing to touch the line before the sound is counted as a miss. If a student misses for the second time, the student discontinues the test, and the last lap is recorded in the score sheet.
5. A triple-beep sound indicates the end of each level (1 minute) and alerts students that the pace will increase.
6. Students walk and stretch in the designated cool-down area after the activity.
7. Students stand at the starting line.
8. The tester plays the PACER cadence (music) and starts the test.
9. On the ‘Start’ command or signal, students run from the starting line to touch the end line with their foot on the beep sound.
10. Students turn around and run back to the other end.
11. Students continue the test as long as they can.

Scoring

1. Mark (tick) the lap number completed by the student in the individual score sheet throughout the test.
2. If the student fails to reach the line before the beep, circle the lap number and count it as the first miss.
3. If the student misses for the second time, circle the lap number and the student discontinues the test.
4. Record the final lap completed by each student in the final score sheet.

The PACER Individual Score Sheet

Lane: ____Participant ID No. _____Laps completed: _____

Laps (one 20-meter length)

Level	Laps												
1	1	2	3	4	5	6	7						
2	8	9	10	11	12	13	14	15					
3	16	17	18	19	20	21	22	23					
4	24	25	26	27	28	29	30	31	32				
5	33	34	35	36	37	38	39	40	41				
6	42	43	44	45	46	47	48	49	50	51			
7	52	53	54	55	56	57	58	59	60	61			
8	62	63	64	65	66	67	68	69	70	71	72		
9	73	74	75	76	77	78	79	80	81	82	83		
10	84	85	86	87	88	89	90	91	92	93	94		
11	95	96	97	98	99	100	101	102	103	104	105	106	
12	107	108	109	110	111	112	113	114	115	116	117	118	
13	119	120	121	122	123	124	125	126	127	128	129	130	131
14	132	133	134	135	136	137	138	139	140	141	142	143	144
15	145	146	147	148	149	150	151	152	153	154	155	156	157

Tester:_____Date_____

Adapted from FITNESSGRAM/ACTIVITYGRAM Test Administration Manual, Fourth Edition by the Cooper Institute, 2005, Champaign, IL: Human Kinetics.

2. Muscular Endurance (ME)

Muscular endurance is the ability to continuously carry out physical activity for an extended period without subjecting to fatigue. It is also understood as the muscle's ability to resist fatigue and maintain strength. It can be improved through regular resistance training and exercises such as push-ups, sit-ups, and weightlifting.

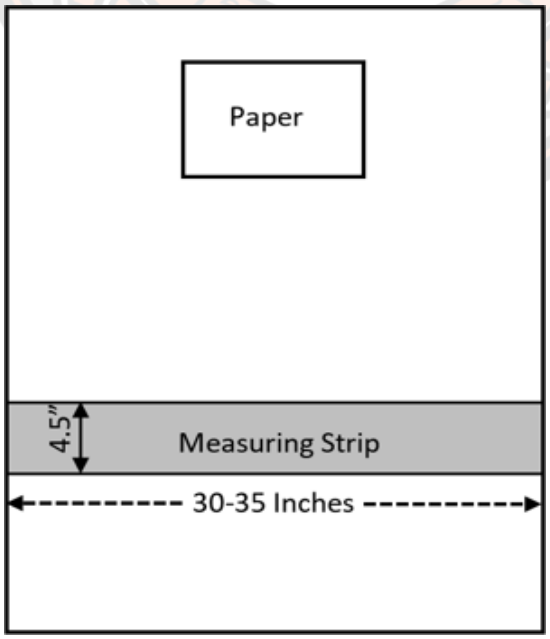
The curl-up test was used as one of the test items to measure muscular endurance. The test is to complete as many curl-ups as possible and a maximum of 75 times at a specified pace.

Equipment and materials required

1. Record sheet
2. Measuring strip
3. Curl-up cadence: https://youtu.be/RW6OssVmJBI
4. A piece of paper
5. Curl-up Test: https://youtu.be/uPQpernkK4w

Setting

1. Set up the test station as indicated in the figure bel



Test procedures

Students form pairs and student A performs the curl-up while student B counts and watches for form correction.

Student A:

1. Lie in a supine position on the mat.
2. Keeps the knees bent at an angle of approximately 140°,
3. Feet flat on the floor, and legs slightly apart.
4. Keeps the arms straight and parallel to the trunk with the palms of hands resting on the mat
5. Stretches the fingers out and keeps the head in contact with the mat.
6. Extend feet as far as possible from the buttocks.
7. Rest the fingertips on the nearest edge of the measuring strip.
8. Keep the heels in contact with the mat and curl up slowly, sliding fingers across the measuring strip until fingertips reach the other side.
9. Curls back down until the head touches the piece of paper on the mat.
10. Continues without pausing till the exhaustion or completion of 75 curl-ups or second form correction.

Student B:

1. kneels near student A's head to count curl-ups and watches for form breaks.
2. Place a piece of paper under student A's head to assist in judging if student A's head touches down on each repetition.

Scoring

Record the total number of curl-ups performed by a student in the score sheet.

SN	Participant ID No.	Gender	Curl-Up (Number completed)	Remarks

3. Muscular Strength (MS)

Muscular strength is the maximum amount of force, a muscle or muscle group can produce in a single effort. It is improved through resistance training exercises, such as weightlifting, bodyweight exercises, and resistance band exercises. It is important for daily activities, athletic performance, and injury prevention.

90^0 Push-Up was used as one of the test items to measure muscular strength. The test is to record the number of push-ups at a rhythmic pace.

Equipment and materials

1. Push-up cadence: https://youtu.be/bpfPe5OvSH4
2. Record sheet
3. Flat non-slippery surface
4. Push-up Test: https://youtu.be/5_D3bacZ7u0

Setting

1. Students form pairs and a student from each pair performs the test while the other keeps the count.

Test procedures

1. Keep the body in a prone position and place hands under or slightly wider than the shoulder, stretch the fingers out, legs straight and slightly apart, and tuck the toes under.
2. The elbows bend to 90° with the upper arm parallel to the floor.
3. Push up off the floor with the arms until the arms are straight, keeping the legs and back straight.
4. Back in a straight line from head to toe throughout the test.
5. Lower the body using the arms until the elbows bend at a 90° angle and the upper arms parallel to the floor.
6. Perform push-ups as many as possible.
7. A student discontinues the test when he/she makes the second form correction (incorrect push-up)

Scoring

Record the total number of push-ups performed by a student in the final score sheet.

SN	Participant ID No.	Gender	90^0 Push-up (Numbers completed)	Remarks

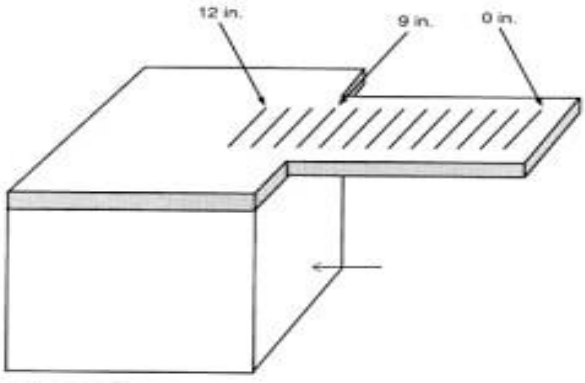
4. Body Flexibility

Body flexibility is the range of motion and flexibility of the joints and muscles in the body. The body can move and bend freely without pain or restriction. Good body flexibility is important for physical activities and daily movements which can also improve overall health and reduce the risk of bodily injury.

The Back-Saver Sit and Reach test was used as one of the test items to measure body flexibility. This test is to measure the flexibility of the hamstring muscles and the reach of the right and left sides of the body.

Equipment and materials required

1. Back-Saver Sit and Reach Box
2. Record sheet
3. Back-Saver Sit and Reach https://youtu.be/d_NL2PkeM



Setting

- Place the Back-Saver Sit and Reach box on a flat surface against firm support.

Testing procedures

1. Sit next to the box firmly placed against a wall.
2. Keep one leg fully extended with the sole placed flat against the face of the box.
3. Bends the other leg at the knee, placed at 2 to 3 inches away in line with the straight leg
4. Place one hand on top of the other and extend the arms forward over the measuring scale of the box.
5. With palms together facing down, reach forward to the scale four times, keeping the back straight, head up, and breath exhaled.
6. Maintains the fourth reach for at least one second before the distance reached by the tip of the finger is recorded in centimeters to two decimal points in the record sheet
7. Repeat the same procedure with the other leg.

Scoring

Record the average score of the right and left legs in the score sheet.

SN	Participant ID No.	Gender	Back-Saver Sit & Reach (cm)			Remarks
			Right leg	Left leg	Average	

5. Body Composition (BC)

Body composition is the measurement of the different components that make up a person's body weight, including muscle mass, bone density, water content, and body fat. It provides a comprehensive depiction of a person's health than weight or body mass index (BMI) alone, as it considers the differences in weight between fat mass and lean mass (muscle, bones, and organs).

Body Mass Index (BMI) was used as one of the test items to administer the body composition. This test assesses a person's weight status concerning their height.

Equipment and materials required

1. Weighing scale
2. Measuring tape
3. A calculator.
4. Body Mass Index: https://youtu.be/na0NDBjFFQs

Setting

- Place a measuring tape against a wall with a flat base.
- Set a zero mark on the tape at a base level.
- Set the weighing scale at the zero mark.
- Remove shoes and heavy clothing.

Testing procedures

Weight

1. Place the scale on a hard and firm surface
2. Stand in the center of the scale with both feet, hands at the side, and head straight.
3. The tester records the readings on the scale in kilograms to two decimal points (0.00).

Height

1. Remove shoes and hair ornaments.
2. Stand on a flat surface with heels, buttocks, upper back, and head against the wall.
3. Keep legs straight, arms at sides, shoulders leveled, and look straight ahead.
4. Use a ruler to form a right angle with the wall and lower the ruler till it firmly touches the crown of the head.
5. Record the readings in centimeters to two decimal points (0.00)

Scoring

- Calculates BMI using the equation: BMI = Weight (kg) / Height * Height (meter)

Score sheet

SN	Participant ID No.	Gender	Weight	Height	BMI	Remarks

Consolidated Record Sheet for Health-Related Fitness Test

SN	Participant ID No.	Age/ Gender	**CRE**				**MS**		**ME**		**Flexibility**		**BC**		Remarks
			PACER				90^0 Push-Up		Curl-Up		Back-Saver Sit & Reach		BMI		
			Level		Laps		Number Completed		Number Completed		(in cm)				
			Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	

Appendix F Consent Form

Consent Form

(For Participants Aged 13 - 17 years for PA group)

Naresuan University Institutional Review Board

Protocol Title: The Effects of Physical Activity Program on Health-Related Fitness for Seventh-Grade Students in a Middle Secondary School in Bhutan.

Consent Date: Day.....Month.....Year.....

I, Mr./Mrs./Miss.....

Address.....

I have read the details from the participant information sheet attached on ..... (Date).....

I voluntarily consent to participate in this research study.

I have received a copy of the signed consent form for my participation in the research project study along with the participant information sheet.

Before signing the consent form for this research, I have been explained by the investigator about:

- The research objectives
- The duration of the research
- The research methods
- The potential risks or symptoms that may arise from the research
- The benefits that may arise from the research

I have had sufficient time and opportunity to inquire about any concerns until I fully understand. The investigator has willingly and openly answered various questions, leaving me satisfied.

I acknowledge from the investigator that if any harm arises from the research study, I will receive medical treatment at no cost (in case of any medical emergency, investigators will meet all the necessary expenses)

I have the right to withdraw from participating in the research at any time without providing a reason. The decision to withdraw from this research will not affect my medical care or any other rights I may have in the future.

The investigator certifies that my data will be kept confidential and will only be disclosed with my explicit consent. Other individuals on behalf of Faculty of Education, Naresuan University, and Institutional Review Board (IRB) members, Naresuan University, may be granted permission to inspect and process my data.

NU IRB# P1 0014/2567 IF 04/6.0

This will be done solely for the purpose of verifying the accuracy of the information. By agreeing to participate in this study, I provide consent for inspection of personal information to be conducted on my data.

The investigator certifies that no additional data will be collected after I request to withdraw from the research, and I want any documents related to my health-related fitness test to be destroyed entirely, and no traceable information about me should be retained.

I understand that I have the right to review or amend my personal information, and I can revoke authorization for the use of my data by notifying the investigator.

I am aware that research data, including undisclosed medical information about me, will undergo various processes such as data collection, recording in forms and computers, verification, analysis, and reporting for academic purposes only.

I have read and fully understood the above statement, and I willingly join the research with full consent. Therefore, I have signed this document, indicating my agreement.

..... Participant Signature

(.....) Name of Participant

Date.....

..... Legal Guardians/Parent Signature

(.....) Name of Legal Guardians/Parent

Relationship of the Legal Guardians/ Parent to the Research Participant

.....

Date.....

I have explained the purpose of the research, research methods, potential risks, adverse effects, or risks that may arise from the research, as well as the detailed benefits that may result from the research. The participants in the research, as mentioned above, are informed, have a clear understanding, and have willingly signed the consent form.

..... Investigator Signature

(.....) Name of Investigator

Date.....

Consent Form

(For Participants Aged 13 - 17 years PE group)

Naresuan University Institutional Review Board

Protocol Title: The Effects of Physical Activity Program on Health-Related Fitness for Seventh-Grade Students in a Middle Secondary School in Bhutan.

Consent Date: Day.....Month.....Year.....

I, Mr./Mrs./Miss.....

Address.....

I have read the details from the participant information sheet attached on ..... (Date).....

I voluntarily consent to participate in this research study.

I have received a copy of the signed consent form for my participation in the research project study along with the participant information sheet.

Before signing the consent form for this research, I have been explained by the investigator about:

- The research objectives
- The duration of the research
- The research methods
- The potential risks or symptoms that may arise from the research
- The benefits that may arise from the research

I have had sufficient time and opportunity to inquire about any concerns until I fully understand. The investigator has willingly and openly answered various questions, leaving me satisfied.

I acknowledge from the investigator that if any harm arises from the research study, I will receive medical treatment at no cost (in case of any medical emergency, investigators will meet all the necessary expenses)

I have the right to withdraw from participating in the research at any time without providing a reason. The decision to withdraw from this research will not affect my medical care or any other rights I may have in the future.

The investigator certifies that my data will be kept confidential and will only be disclosed with my explicit consent. Other individuals on behalf of Faculty of Education, Naresuan University, and Institutional Review Board (IRB) members, Naresuan University, may be granted permission to inspect and process my data.

Page 1 of 2 Version 2 Date 02.08.2024

NU IRB# P1 0014/2567 IF 04/6.0

This will be done solely for the purpose of verifying the accuracy of the information. By agreeing to participate in this study, I provide consent for inspection of personal information to be conducted on my data.

The investigator certifies that no additional data will be collected after I request to withdraw from the research, and I want any documents related to my health-related fitness test to be destroyed entirely, and no traceable information about me should be retained.

I understand that I have the right to review or amend my personal information, and I can revoke authorization for the use of my data by notifying the investigator.

I am aware that research data, including undisclosed medical information about me, will undergo various processes such as data collection, recording in forms and computers, verification, analysis, and reporting for academic purposes only.

I have read and fully understood the above statement, and I willingly join the research with full consent. Therefore, I have signed this document, indicating my agreement.

..... Participant Signature

(.....) Name of Participant

Date.....

..... Legal Guardians/Parent Signature

(.....) Name of Legal Guardians/Parent

Relationship of the Legal Guardians/ Parent to the Research Participant

.....

Date.....

I have explained the purpose of the research, research methods, potential risks, adverse effects, or risks that may arise from the research, as well as the detailed benefits that may result from the research. The participants in the research, as mentioned above, are informed, have a clear understanding, and have willingly signed the consent form.

..... Investigator Signature

(.....) Name of Investigator

Date.....

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Appendix G Photo Gallery

i) Equipment

Measuring Tape

Stadiometer

Digital weighing scale

Back-Saver Sit and Reach Box

Loudspeaker

ii) Participants

Experimental Group (PAP)

Control Group (PE)

iii) PAP sessions

iv) Health-Related Fitness Tests


PACER Test


Curl-Up Tests


Back-Saver Sit and Reach Test


Body Mass Index