1.1 Physical Education Today

In modern education, physical education and its training forms part of the curriculum and schools had been an important medium for spreading the need for fitness to society through physical education programs.

Physical education is emerging as one of the important stream of education system. Physical education (PE) is the interdisciplinary study of all areas of science relating to the transmission of physical knowledge and skills to an individual or a group, the application of these skills, and their results.

In most educational systems, physical education (PE), though has different connotation, is a course in the curriculum which utilizes learning in the cognitive, affective and psychomotor domains in a play or movement exploring the setting. The term physical education is most commonly used in this way (Anderson D, 1989).¹

Physical education plays an important role in the development of an individual just as a school room education does. Hence, it is important that physical education be incorporated along with a student’s curriculum. Physical education is considered a supplement to the learner’s growing value system. One of its aims is to expand options for wise use of leisure time. Taking up a regular physical activity is a health-enhancing move. The physical education schedule must be developed in accordance with a variety of factors. The age of

the individual is a very crucial consideration when chalking out such a schedule. The physical educator must be responsible enough to help the learner develop the ability to choose wisely when it comes to making decisions about physical activity be it in the present or in the future. The objectives of physical education include getting the individual to achieve his or her highest competency in movement skills.

Individual and team sports, dance, aquatics, gymnastics, athletics and fitness activities designed to develop beginning and intermediate skills are all part of physical education curriculum. Most schools have comprehensive physical education programs. One advantage of such programs is that it instills at a very young age the need for exercise and fitness in life. Young children such as pre-schoolers and first graders can be made to participate in healthy outdoor activities with an element of fun added to the schedule. This makes the experience interesting for both the students and the teacher.

The primary aims of physical education vary historically, based on the needs of the time and place. Often, many different types of physical education occur simultaneously, some intentionally and others not. Most modern school systems claim their intent is to equip students with the knowledge, skills, capacities, and values along with the enthusiasm to maintain a healthy lifestyle into adulthood. Some schools also require physical education as a way to promote weight loss in students. Activities included in the program are designed to promote physical fitness, to develop motor skills, to imbibe knowledge and understanding of rules, concepts, and strategies, and to teach students to work as part of a team, or as individuals, in a wide variety of competitive activities. Although there is a strong evidence that indicates that todays children are below healthy levels in a number of areas. (Gortmaker et al., 1987)

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Thus, the main aim of physical education training program is to prepare qualified and potential and knowledgeable physical education teachers, who work as a leader to enhance the culture of physical activities and sports in the society for the purpose of enriched youth fitness and to prepare healthy citizens.

1.2 Historical base of Physical Education

The history of physical education reflects people's attitudes about physical activity. From prehistoric times, because survival was related to physical stamina and to people's ability to find food, no separate physical fitness programs were needed. Gradually, ancient societies in China, Egypt, Greece, and Rome adopted physical education as part of military training. As the more developed societies came to value the scholarly life, physical education lost favor. Many developed countries have had to strike a balance between physical and intellectual interests.

The history of physical education frequently shows a pattern of military, social, and political influence. In one high point of ancient history, Athenian Greeks came to the forefront in the era 700 to 600 B.C. with their quest for physical and intellectual perfection. In numerous festivals, Athenians celebrated the beauty of the human form in dance, art, religious rites, and athletics. Athenians honored the gods of Olympus, especially Zeus, with the first Olympic Games. The Olympic Games offered a civilizing influence, with social class disregarded and all citizens judged on athletic competition. If a war was being fought, it was halted during the Olympic Games. Many historians regard Athenian culture as the height of early physical education, but like their Chinese predecessors, the Athenians felt the competing influence of intellectualism.

The Middle Ages saw the fall of the Roman Empire and the rise of Christianity, and the Christian influence brought about a denial of physical activity.

³ http://www.bookrags.com/research/physical-education-woh/
for anything other than manual labor. Christians saw sports and physical play as immoral, and in 394 they halted the Olympic Games. This trend was not reversed until the medieval societies grew and sought power through military expansion.

During the Renaissance, the pendulum swung once again as artists showed the human body as an object of admiration. The humanist faction, centered in Italy, valued education in sports such as fencing, archery, swimming, running, and ball games. The moralist faction, influenced by the Protestant Reformation, saw physical activity only as a way for carrying out work. During this period, much of Europe was still Catholic, and Catholics favored recreational physical activity with the view that care should be taken of the body as the vessel that held the soul. The other major Renaissance faction was realism, which favored physical education as part of a sound mind in a sound body.

In 19th-century Europe, Sweden and Germany developed systems of gymnastics that were adopted internationally with Germany building the first indoor gymnasium. In Finland, which also built a gymnasium, exercise was for the first time seen as a way to achieve physical rehabilitation. Scholars began to study anatomy and physiology in relation to exercise. Denmark was among the first countries to require physical education in schools.

Physical education fulfilled a political role in early-20th-century Russia after the rise of communism. Physical fitness helped insure military strength, productivity, and nationalism. Sports were viewed as a way of achieving international fame.

The United States followed other countries in its approach to physical education. During the Colonial period, the sheer physical demands of survival made physical education unnecessary. War required physical training as a part of military preparation. Between the Revolution War and the Civil War, Americans followed some recreational activities such as riding, hunting, dancing, swimming, and early forms of golf and tennis. By the 1820s, some American
schools offered gymnasia and physical education. Instruction included the development and care of the body, and training in hygiene. Students learned callisthenic exercises, gymnastics, and the performance and management of athletic games. Women's colleges offered exercise and dance classes. The Young Men's Christian Association (YMCA) opened its first American chapter in 1851. Many sports gained in popularity around this time, including baseball.

After the American Civil War, large school systems began to adopt physical education programs and many states passed laws requiring that physical education programs be taught. For the first time, specialized training was offered for physical education instructors. In another first, colleges offered intercollegiate sports such as rowing, football, and track and field. In keeping with this wave of interest in physical education, the Olympic Games were restored in 1896, after a 1,400-year interlude.

Surprisingly, many Americans were not physically fit for military service during World War I, and there were many postwar efforts to add physical education at all levels of schooling. During World War II, physical fitness was again required of soldiers—but it was also required of many others, particularly women, since the war effort required manual labor. Soldiers once again came up short in physical fitness requirements, so after the war, schools instituted more rigorous physical education requirements, and there was greater interest in the teaching of physical education.

By 1950, there were over 400 United States colleges and universities offering majors in physical education and there was increasing recognition of the scientific foundation of physical education. The fitness of the military in the Korean War again fell short of expectations, and the federal government set up the President's Council on Physical Fitness, which helped to raise fitness standards in schools across the country. A series of 1970s and 1980s recessions brought about cutbacks in many school programs, including physical education. By the 1970s, interest in the President's Council had waned and physical
education courses began to emphasize lifetime sports such as golf, badminton, tennis, and bowling. In another swing of the pendulum, the American public spontaneously developed an intense interest in fitness in the late 1970s.

Since ancient times, people in India believed that the human body is indeed an instrument of dharma (shareeramevādya hi khalu dharmādhanam). Hence, the body is to be properly nourished, and maintained. In medieval Karnataka people gave as much importance to physical exercise as to literary education. The principle of “a sound mind in a sound body” was not only accepted but also faithfully practiced. Village schools were usually situated in the temple premises or in the courtyard of mathas, where children played after daytime lessons. Besides this, every village had one or two playgrounds, where sporting events and games were held during the annual fair of the village deity (Joytsna Kamat, 2009).

Physical Education in Modern Era

The Physical Education is made to be an ongoing continuous process without a break with participation by the greater number. “This is what is required in a Country. A mass fitness movement, a spread of sports culture”. With all what is said and done, sports management is primarily a questions of raising over young people by means of appropriate education and judicious measures.

For the promotion of Physical Education, following steps were taken by the Government and other Organizations during the Pre Independence Period. For the first time, it was the “Indian Education Organization” that recommended “Physical Training be promoted in the interest of youth in each class of School” in 1883. In 1884 the question of making Physical Education as a compulsory subject has considered. What even the Program of Physical Education existed in Pre Independence days, it was carried on by the ex-service men – men

4 http://www.kamat.com/database/books/kareducation/physical_education.htm
5 http://www.napess.org/articles.php
employed by school / college authorities. Vidya Borthers founded Sir Hanuman Vyayam Prasarak Mandal, Amaravathi, in 1914 basically to serve the course of Physical Education in India. The outstanding development of scientific Physical Education in India in Pre-Independence days goes to the Y.M.C.A. College of Physical Education, Madras founded in 1920 by H. C. Buck. However, history reveals that the first attempt to conceptualize and spread Physical Education in India was started at Kankurgachi at Calcutta and even today it is existed at Banipur (West Bengal). However, since its inception this YMCA College has been working tirelessly and selflessly to promote and systematize Physical Education in India. Hanuman Vyayam Prasarak Mandal, Amaravathi, started a five week summer course in 1924 for young men and women in Indigenous activities. A youth completing course was rounded “Vyayam Visharad” In 1927 Indian Olympic Association (I.O.A) was formed with the efforts of Dr. A. G. Noehren and Mr. H. C. Buck. Mr. Sorabti Tata was its first President with Dr. D. G. Noehren it secretary. Since Indian Olympic Association has been functioning in India and is affiliated with International Olympic Committee (I.O.A). This Association started to promote and encourage Physical, Manual and Cultural Educations of youth of the Nation for the development of Character, good health and good citizenship, also to enforce all rules and regulations of International Olympic Committee and to educate the Public of the Country as to the value of amatensism in sports. In 1931 Government College of Physical Education, Hyderabad was founded. And in 1938 Training Institute of Physical Education, Kandivali (Bombay) was founded. The three Institutions were established to promote systematic, scientific Physical Education courses in India.

After independence in 1947 i.e. in the post independence era the Central Government retained the vital affairs of Education, by coordinating and formulating the directives to the states keeping in view the national objective to be achieved. It is out of these phenomenal charges that physical education has been considered part and parcel of school education program. A considerable number of institutions for training teachers for physical education have come up ever since independence. New schemes have been put into operation to boost
up the slandered of Sports and Health standards of people. In 1948, National Credit Corps (NCC) and Auxiliary Credit Corps (ACC) at school and college levels were introduced. And the Asian Games Committee was constituted.

The Central Advisory Board of Physical Education and Recreation was setup (CABPER) in 1950: In the light of the recommendations of the Board the Union Ministry of Education has taken a number of steps in the field such as development training of leaders in Physical Education, Institution of Scholarship for research in Physical Education, conduct of National Physical Efficiency Drive, conduct of seminar on Physical Education, giving financial assistance to the colleges of Physical Education, giving directions to the state governments for affecting organization of Physical Education in their respective states. In 1953 Government of India introduced the Rajkumari Coaching Scheme for Games and Sports with the object of training good athletes and sportsmen. The scheme received wide popularity since famous players like Major. Dhayan Chand, Dr. Ram Singh were working under this scheme. In 1954, all India Council of Sports, School Games Federation of India, National Discipline Scheme (NDS) were established with the aim to regularize the promotions of the sports and working of sports bodies. To make the youth healthy in mind and body and instill in them a sense of patriotism, self reliance, tolerance and self-sacrifice. To develop human values and to build in them a desire to serve the country and humanity. In 1956 a National syllabus of Physical Activities was formed. With the recommendation of CABPER, in 1957 Laxmi Bai National college of Physical Education at Gwalior (M.P.) was established. This is the only Physical Education College being sum by Central Government. This institute apart Research Programmes, training and teaching for Physical Education personals. Government of India set up on Adhoc enquiry Committee on Games and sports in 1958 to suggest ways and means to improve the standards of Indian competitions in all games and sport. In 1959, Government of India appointed a Co-ordination Committee, under the chairmanship of Dr. Hirdya Math Kunzuru, to examining the various schemes for Physical Education, recreation, character building and discipline operating in Educational Institutions, and to recommend measure for the proper coordination. The national Physical Efficiency Drive was launched by the Union Ministry of
Education in 1959-69. The plan consisted of certain items of Physical Efficiency tests which prescribed standards for achievement. It was hoped that drive would arouse the interest of young and old men and women to check their performance abilities and thus stimulate their keenness for Physical Fitness. As a follow up action to the recommendations of the Adhoc-Enquiry Committee of 1958 the Netaji Subhash National Institute of Sports was established by the Government of India in 1961 at state Bagh, Palance, Patiala stressing to produce Coaches of high caliber in various games.

Kaul Kapoor Committee: This committee submitted recommendation on 1961 starting that Physical Education should be considered as a part of general education in schools and colleges. It should be one of the subjects in the Universities for the graduates. The Raj Kumari Coaching Scheme ceased to function on 18th October 1961. It has been merged after comes like (MS) in the NIS. The Kunzur Committee in 1963, studied the prevailing conditions in other countries, consulted experts including vice-chancellors of convenities, Educational administrations, Physical Educationists etc. and submitted report. The report is probably first even authoritative assessment of Physical Education in this country. The committee admitted that Physical Education is one of the important basis on which should rest school and colleges for improving the nations’ physique.

The state education secretaries and direction of public instruction met in New Delhi in February and April 1965, and decided unanimously to introduce the National Fitness Corps (NFC) on a compulsory basis in all Universities, college and high and higher secondary schools in the country. With this ACC has managed with NCC & MDS has ended with the function of HFC. NFC- Time table allotment has drawn up and inculcated throughout all the educational institutions in the country. The colleges of Physical Education in the country were asked to reformulate their syllabus for various training classes, so that teachers who could handle NFC programme could be produced.
Sports authority of India has been established at Delhi in 1984. SAI comes forward to establish sports hostel in each state to encourage the players by generating scholarship and coaching. The University Education Commission (1948-49) felt that the all round development of the individual is facilitated through a Various Commissions balance programme of education which shall necessarily include Physical Education and Physical Education are complementary to each other and must be integrated in such a may as to form an organic whole. After Independence in India, much emphasis has been given on Physical Education. Recognizing the importance of Physical Education in schools, colleges and universities, the secondary education commission (1952 – 53) (Mandalir Commission) said: Unless Physical Education is accepted as an integral part of Education and the Educational authorities recognize its need in all schools, the youth of the country which form its most valuable assets will never be able to pull their weight in national welfare."

The Indian Education Commission (1964 – 66) (Kothari Commission) emphasized the importance of Physical Education in the following words: “It must be emphasized that such education contributes not only to Physical fitness but also to Physical Efficiency, mental alertness and the development of certain qualities like perseverance, team spirit, leadership, and obedience, to rules, moderation in victory and balance in defeat. A bill was passed in the parliament which was known as “National Policy of Education” – 1986. It emphasized the importance of Physical Education in following ways: “Sports and Physical Educations are an integral part of the learning process, and will be included in the evaluation of performance. A nationwide infrastructure for Physical Education, Sports and games will be built into the educational edifice. The infrastructure will consists of play fields, equipment, coaches and teachers of Physical Education as part of the school improvement programme. Available open spaces in urban areas will be reserved for play grounds, if necessary by legislation, effects will be made to established sports Institution and hostels where specialized attention will be given to sports activities and sports related studies, along with normal education. Appropriate encouragement will be given to those talented in games and sports. The stress will be laid on indigenous
traditional games. As a system which promotes an integrated duo of body and mind. Yoga will revive special authentic effects will be made to introduce Yoga in all schools, and to this and, it will be introduce in teacher training courses. The MPE has recommended for a minimum of 10 periods per week for Physical Education activities in low primary and upper primary stages, and 7 periods per week at the second stage.

The NCERT developed the national curriculum for elementary and secondary educations in 1988 to reflect the postulates of the NPE and the program of Action, 1986. The main thrust of this exercise was to provide for the national core–curriculum in the school syllabi as postulated in the national policy and to integrate Physical Education with the academic program of the schools. The core curriculum states that “Health and Physical Education and sports should be integral part of learning process and be included as the evaluation of performance”. The above policy has been reiterated in the National Policy of Education in 1992. NCERT put formed a revised curriculum for school education and in 1992, and its revised edition is Nov. 2000. under the title “National Curriculum Frame work for School Education”. In this curriculum include Health and Physical Education as one of the core subjects in all levels of school educations”. This curriculum was to be revived by NCERT, every five years; therefore, a new edition was made available in the year 2005 and today total teacher training programme is in the hand of NCTE (National Council for Teacher Education) – a statutory body of Ministry of HRD, Govt. of India.

1.3 Base of this Study

*Physical fitness – a need of the society*

Physical fitness is a popular topic today and its popularity has been a major factor in motivating college students to pursue careers in physical education, physiology of exercise, health education, physical therapy and medicine. In 1980, the public health service listed “physical fitness and exercise” as one of the fifteen areas of concern related to improve the countries overall
health (Powell and Paffenbarger, 1985). Dr. Dudley Sargent in 1879 set up a physical training program with individual exercise prescriptions to improve a person’s structure and function to achieve “that prime physical condition called fitness” (Sargent, 1906).

The history of fitness starts from the very early man, but during the 1st millennium B.C. the importance of physical exercise for fitness was understood. Herodicus teacher of Hippocrates also recommended exercise for physical fitness and rehabilitation. Olympics added knowledge about fitness, exercise, sports medicine in 18th and 19th Century. In the middle of 20th century in America, a boom in exercise for physical fitness occurred. July 16, 1956 President’s Council on youth fitness was established by president Dwight D. Eisenhower. May 1983 declared as National Physical fitness month.

Our ancient history also narrates the source of almost all human potential belongs to physically active lifestyle which is recently identified as “Physical Education”. Since ancient times, people in India believed that the human body is indeed an instrument of dharma (shareeramevādy āhi khalu dharmāsādhanam). Hence the body is to be properly nourished, and maintained. In medieval Karnataka people gave as much importance to physical exercise as to literary education. The principle of “a sound mind in a sound body” was not only accepted but also faithfully practiced. The system of yoga was the first step in spiritual training. Yoga comprises full-fledged toning of the body and mind. It includes the use of various body postures to control breathing and muscle movements, and to help gain control over human passions as well. It was the general belief that this balancing of the body and mind led to intellectual strength. Village schools were usually situated in the temple premises or in the courtyard of mathas, where children played after daytime lessons. Besides this, every village had one or two playgrounds, where sporting events and games were held.

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during the annual fair of the village deity. These involved wrestling, boxing, mallakhambha (pillar acrobatics), the shooting of arrows, and demonstrations of strength such as weight lifting. Bigger grounds were reserved for ram-fights, buffalo fights, fencing and dueling. Various ball games, and the indigenous sports of kho-kho and kabaddi were common. Most children’s sports in medieval India ensured body-development. The economy and variety of indigenous games were greatly admired by visiting foreign travelers. (Jyotsna Kamat, 2009).

Physical well-being is necessary for mental well-being, with the need for a strong, healthy body to harbor a sound mind. If a sensible man is asked to answer the question as to what he does prefer, health or wealth, naturally he will answer without much hesitation ‘Health’ because wealth without a good health becomes useless. Physical fitness is a must to both the young and old. Experiments have proved that this exercise enables the man to get the required movements of the inner as well as outer organs and the result is man is also made mentally alert. People who do not take regular physical exercise are the ones who easily fall ill. The diseases such as diabetes and rheumatism can be prevented if we take regular physical exercises. A body without exercise can be compared to a machine that is kept inactive. Inactivity will lead to the machine getting rusty and in the long run becoming useless, so also is it the case with human body.

Regular activity, fitness and exercise, are critical for the health and well being of people of all ages. Research shows that everyone, young or old can benefit from regular exercise, either vigorous or moderate. Even very old adults can improve mobility and function through physical activity. It should be a priority for everyone. Millions of people suffer from chronic illnesses, which can significantly improve through activity. Exercise reduces the risk of heart disease, diabetes, colon cancer, and high blood pressure. People who are active outlive those who are inactive.
Despite the well known benefits, most adults and children lead relatively sedentary lifestyles. They are not active enough. A sedentary lifestyle is defined as engaging in no leisure-time physical activity (exercises, sports, physically active hobbies) in a two-week period. Typically a lot of older people lead sedentary lifestyles. More than one-third of young people in grades 9-12 do not exercise regularly. They tend to watch too much television.

Obesity has become a nationwide epidemic. Regular activity, along with a nutritious diet, that incorporates portion control is the key to maintaining a healthy weight. Public and private sectors need to band together to encourage more activity. Walking programs for schools, worksites and the local community are some examples. The most important change has to come from the individual and families. Every person must realize the benefits of physical activity for the mind and body. Then commit to a lifestyle that is active for the whole family.

According to experts, the problems associated with youth fitness levels are varied, many children and youth are not getting the moderate to vigorous exercise they need to develop, maintain or improve fitness level (Durant et al., 1992). According to American College of Sports Medicine Physical fitness is a state characterized by an ability to perform daily activities with vigor and a demonstration of Traits and capacities that is associated with low risk of premature development of hypo kinetic diseases. In other terms physical fitness is more than ‘not being sick’ or merely being well. It is a positive quality. It is minimal in severely ill and supra maximal in highly trained athletes.

*Physiology a vital discipline*

Physiology is the science of the functioning of living systems. It is a subcategory of biology. In physiology, the scientific method is applied to determine how organisms, organ systems, organs, cells and biomolecules carry

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out the chemical or physical function that they have in a living system. Physiology is the branch of biology that deals with the functions of living organisms and the parts of which they are made. This scientific discipline covers a wide variety of functions, ranging from the cellular and below to the interaction of organ systems that keep the most complex biological machines running.

Human physiology dates back to at least 420 B.C. and the time of Hippocrates, the father of medicine. The critical thinking of Aristotle and his emphasis on the relationship between structure and function marked the beginning of physiology in Ancient Greece, while Claudius Galenus (c. 126-199 A.D.), known as Galen, was the first to use experiments to probe the function of the body. Galen was the founder of experimental physiology. The ancient Indian books of Ayurveda, the Sushruta Samhita and Charaka Samhita, also had descriptions on human anatomy and physiology. The medical world moved on from Galvanism only with the appearance of Andreas Vesalius and William Harvey.

During the Middle Ages, the ancient Greek and Indian medical traditions were further developed by Muslim physician, most notably Avicenna (980-1037), who introduced experimentation and qualification into the study of physiology in The Canon of Medicine.

Many of the ancient physiological doctrines were eventually discredited by Ibn al-Nafis (1213-1288), who was the first physician to correctly describe the anatomy of the heart, the coronary circulation, the structure of the lungs, and the pulmonary circulation, for which he is considered the father of circulatory physiology. He was also the first to describe the relationship between the lungs and the aeration of the blood, the cause of pulsation, and an early concept of capillary circulation.

Following from the Middle Ages, the Renaissance brought an increase of physiological research in the Western world that triggered the modern study of
anatomy and physiology. Andreas Vesalius was an author of one of the most influential books on human anatomy, *De humani corporis fabrica*. Vesalius is often referred to as the founder of modern human anatomy. Anatomist William Harvey described the circulatory system in the 17th century, demonstrating the fruitful combination of close observations and careful experiments to learn about the functions of the body, which was fundamental to the development of experimental physiology. Herman Boerhaave is sometimes referred to as a father of physiology due to his exemplary teaching in Leiden and textbook *Institutiones medicae* (1708).

In the 18th century, important works in this field were by Pierre Cabanis, a French doctor and physiologist. In the 19th century, physiological knowledge began to accumulate at a rapid rate, most notably in 1838 with the Cell theory of Matthias Schleiden and Theodor Schwann, which radically stated that organisms are made up of units called cells. Claude Bernard's (1813-1878) further discoveries ultimately led to his concept of *milieu interieur* (internal environment), which would later be taken up and championed as “homeostasis” by American physiologist Walter Cannon (1871-1945).

In the 20th century, biologists also became interested in how organisms other than human beings function, eventually spawning the fields of comparative physiology and ecophysiology. Major figures in these fields include Knut Schmidt-Nielsen and George Bartholomew. Most recently, evolutionary physiology has become a distinct sub discipline.

Human (or mammalian) physiology is the oldest branch of this science. It dates back to at least 420 B.C. and the time of Hippocrates, the father of medicine. Modern physiology first appeared in the seventeenth century when scientific methods of observation and experimentation were used to study the movement of blood in the body. In 1929, American physiologist W. B. Cannon coined the term homeostasis to describe one of the most basic concerns of
physiology: how the varied components of living things adjust to maintain a constant internal environment that makes possible optimal functioning.

A number of technological advances, ranging from the simple microscope to ultra-high-technology computerized scanning devices, contributed to the growth of physiology.

Physiologists also observe and analyze how certain body systems, like the circulatory, respiratory, and nervous systems, work independently and together to maintain life. This branch of physiology is known as comparative physiology. Ecological physiology, on the other hand, studies how animals developed or evolved specific biological mechanisms to cope with a particular environment. An example is the trait of dark skin, which provides protection against harmful rays of the Sun for humans who live in tropical climates. Cellular physiology, or cell biology, focuses on the structures and functions of the cell. Like cell biology, many branches of physiology are better known by other names, including biochemistry, biophysics, and endocrinology (the study of secreting tissues).

A fundamental principle of physiology is homeostasis. Homeostasis is the tendency of an organism to maintain constant internal conditions despite large changes in the external environment. Most organisms can survive only if certain vital functions are maintained within a relatively narrow range. Such functions include blood pressure, body temperature, respiration rate, and blood glucose (sugar) levels. The normal range of values for any one of these functions is called a set point. Homeostasis insures that vital functions remain close to their set point in spite of any changes in external conditions.

**Physiological base in Physical Education and Sports**

A branch of physiology concerned with how the body adapts physiologically to the acute (short-term) stress of exercise or physical activity, and the chronic (long-term) stress of physical training. Exercise physiologists, for
example, study how our bodies obtain energy from the food we eat and use the energy to initiate and sustain muscle activity. A sound knowledge of exercise physiology enables coaches and athletes to optimize the amount and type of training.

Exercise physiology is the study of the function of the human body during various acute and chronic exercise conditions. These effects are significant during both short, high-intensity exercises, as well as with prolonged strenuous exercise such as done in endurance sports like marathons, ultra marathons, and road bicycle racing.

In exercise, the liver generates extra glucose, while increased cardiovascular activity by the heart, and respiration by the lungs, provides an increased supply of oxygen. When exercise is very prolonged and strenuous, a decline, however, can occur in blood levels of glucose. In some individuals, this might even cause hypoglycemia and hypoxemia. There can also be cognitive and physical impairments due to dehydration. Another risk is low plasma sodium blood levels. Prolonged exercise is made possible by the human thermoregulation capacity to remove exercise waste heat by sweat evaporation. This capacity evolved to enable early humans after many hours of persistence hunting to exhaust game animals that cannot remove so effectively exercise heat from their body.

1.4 Statement of the Problem

Physical education is an inseparable part of whole system of education in today’s life. Physical education encourages the activities of sports and games in an organized way for enjoyment and simultaneously prevents the society from unhealthy sufferings. It also prepares qualitative physical educators for school education.
In Physical education training colleges the programs are provided to create professionally qualified physical educators, the quality of physical educators depends on the curriculum of the course provided. For this profession teaching quality as well as fitness is important. In fact, a course in Exercise Physiology is a common requirement among undergraduate students preparing for a career in physical education. Often, such courses are taught to an assortment of students from a variety of disciplines (Van Donselaar & Leslie, 1990)\textsuperscript{9} with an emphasis on physiological principles applied to adults. One of the primary goals of physical education is to foster the development and maintenance of a physically active lifestyle (NASPE, 2004a)\textsuperscript{10}. Knowledge of exercise physiology, particularly as it applies to exercise programming and physical fitness, is essential for students preparing for a career in physical education. Specifically, a course in exercise physiology should provide teacher educators with: a) an understanding of the relationship between physical activity and indices of health and health-related fitness, b) a basic knowledge of acute and chronic responses to various forms of physical activity, exercise and sports, c) the skills for assessment and analysis of physical fitness, and d) the ability to design safe activities and/or exercise programs to enhance health, fitness, or performance. Although well-designed physical education programs have produced significant health benefits, further the theoretical knowledge and skills of various physical activities are judged by various scientific examinations but the effect of the given teachers’ training program in physical education has not been examined so far. Moreover, the population of teacher-trainees of such training colleges belongs to a mix population composing of sports-background and non-sports-background. Till now, no research has so far been done to see the health status of these upcoming physical educators of different sports background. Therefore, the scholar has selected the topic entitled, “\textit{Analysis of the Effect of Physical education training program on selected physical fitness and physiological parameters of teacher trainees}”.


1.5 Problem and its Relevance

Schools and Colleges are the ideal place to enhance health, fitness and wellness, because, virtually all students can participate in physical activities, games and sports through a constructive program of physical education. The United States of America recommended by “Healthy People 2010” that indicates all children should be engaged in moderate to vigorous physical activity for at least 50% of the Physical Education (PE) class time. Further, it is recommended that schools should provide daily PE lessons for children of all ages. Unfortunately, increasing the frequency or duration of physical education classes is difficult because the time allocated to PE is often limited within the existing school programs. Therefore, it is important to use the scheduled time for physical education optimally and efficiently if the levels of the physical fitness components are to be improved. According to Kahn et al., (1997) health-related PE programs are evaluated as effective in enhancing students’ moderate to vigorous physical activity levels during PE classes. In this context, Kann et al., (1996) showed that adolescence appears to be a period characterized by marked declines in physical activity. Changes occurring during adolescence include positive and negative habits regarding health, which are acquired before adulthood (Trudeau et al., 1999). In subsequent studies, numerous researchers have shown that the rate of children and adolescents developing physical activity has decreased over the last few years due to the increasing influence of sedentary activities such as television viewing, internet surfing and video games (Berkey et al., 2000; Boreham and Riddoch, 2001; Hassan and Al-Kharusy, 2000).


2000; Telama and Yang, 2000; Van Mechelen et al., 2000)\textsuperscript{14,15,16,17,18}. In support of this trend, Gordon-Larsen et al., (2000)\textsuperscript{19} found that adolescents spend less time in PE sessions than younger children. These findings reinforce the need for physical activity intervention programs for children and adolescents. PE is the primary source of physical activity and fitness instruction. It highlights the importance of physical activity as a physical component of a healthy lifestyle. A well-designed physical education program can motivate students to maintain healthy habits and regular physical activity (Beets and Pitetti, 2005)\textsuperscript{20}. It is also effective in enhancing students’ physical activity-related knowledge (Hayman et al., 2004)\textsuperscript{21}, attitude, behaviours, and physical fitness (Kohl, 2001)\textsuperscript{22}.

The research studies stated above show that there is need of implementing physical education program at school level. Nevertheless, there are physical education teachers training colleges established all over the world.


But there are very few studies which investigated the effect of these training program on physical fitness and physiological parameters of teacher trainees. Perceiving this aspect, researcher of present study sought to determine the effect of Physical education training program on selected physical fitness and physiological parameters of teacher trainees.

### 1.6 Objectives of the Study

This study was conducted with the following objectives in perspective:

- To track one year teachers training program in physical education as per the syllabus of the University of Pune.

- To assess the morphological variables and selected physical fitness as well as physiological parameters of physical education teacher trainees.

- To find out the possible difference in the selected parameters before and after the physical education teachers’ training program on teacher trainees.

- To see if the physical education teachers’ training program is useful to improve the teacher trainees overall status of physical fitness and physiological parameters.

### 1.7 Hypotheses

The study was conducted with the following hypotheses:

H₁: Physical education teachers’ training program for one year duration may help to maintain a normal range of morphological variables of the male and female teacher trainees.

H₂: Physical education teachers’ training program for one year will help to improve and maintain the physical fitness parameters of male and female teacher trainees during the course of study.
H₃: Physical education teachers’ training program for one year will improve physiological parameters of the male and female teacher trainees.

1.8 Delimitations of the Study

Looking towards the dearth of time and financial restriction, the investigator has delimited this study as follows:

- The study was conducted on the teacher trainees of physical education studying in Maharashtra Mandal’s Chandrasekhar Agashe College of Physical Education (Pune), Maharashtra.
- The study was delimited for the selected major variables of morphological, physical fitness and physiological parameters.
- The study was restricted to teacher trainees aged between 21 to 30 years.
- The study was delimited for the selected parameters such as, height, weight, BMI, body fat percentage, lung function (SVC, FVC, ERV, IRV, TV, FEV₁, PEF), pulse rate, blood pressure, cardiac function (HR, RR, PR, QRS, QT, QTC), 12 min run and walk, hand grip dynamometry, Push up, sit and reach, 4x10 meter run, standing broad jump and 50 m dash.

1.9 Limitations of the Study

While conducting the experiment, the present investigator has recorded some drawbacks/limitations as follows:

- As the teacher trainees participating in this study belong to various districts, therefore regional factors such as geographical condition were not possible to control.
• Since the test items are many, the researcher could not control the entire measurements single handedly. The researcher, therefore, depended upon some professionally qualified assistants.

• The effect of co-curricular activities and trainings for other competitions on the teacher trainees could not be controlled.

• It was not possible to monitor their diet and lifestyle during the course.

1.10 Significance of the Study

This study was found significant in following ways:

• The study will help teacher trainees to train their future students in a better manner.

• The study will also enhance the knowledge base and help players for better understanding of fitness and the effect of training in physical education colleges.

• The study will help players for better understanding of the effect of training on physiological profiles.

• The study will contribute to the literature of physical education and will help scholars and researchers.

• The physical education training program that is conducted in this college, if found effective can be adapted by other colleges of physical education.

• The results provided by the study will help the faculty of Maharashtra Mandal's Chandrasekhar Agashe College to get information about their students' fitness and physiological parameters.

• It will also help in understanding the strengths and weaknesses of the training program.
• The faculty can also suggest some modification on the training procedure.

1.11 Definitions of Terms Used

**Effect**- It is the significant difference between the group means of pre-test, mid test and post-test variables.

**Physical education teachers training program**- The physical education practical training curriculum (2007-2008) approved by University of Pune and conducted by Maharashtra Mandal’s Chandrasekhar Agashe College of Physical Education (Pune), Maharashtra.

**Physiological parameters**- In this study physiological parameters are lung function (SVC, FVC, ERV, IRV, TV, FEV\(_1\), PEF), pulse rate, blood pressure and cardiac function (HR, RR, PR, QRS, QT, QTC).

**Physical fitness parameters**- Physical fitness parameters, here in this study are Speed, agility, strength, power, flexibility, body fat percentage and endurance.

**Teacher trainees**- Students undergoing course in B. Ed physical education from Maharashtra Mandal’s, Chandrashekhar Agashe College of Physical Education, Gultekdi, Pune of the year 2007-2008.