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ABSTRACT

This booklet, one in a series titled "What Research Says to the Teacher," deals with physical education in the elementary schools. Two major sections detail a) the objectives of elementary physical education, and b) the feasibility of achieving those objectives. A selected research bibliography is included as are suggested topics for further study. (JB)

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Physical Education in the Elementary Schools

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EXPLANATION

The author of this pamphlet, Anna S. Espenschade, is professor of physical education, University of California, Berkeley. She has drawn upon research material that offered possibilities of being most helpful to classroom teachers. It is not a complete summary of research. In some instances, opinion has been given which is believed to represent the views of most experts. The interpretation and recommendations are those which the author believes to be soundly supported by research. The original manuscript was reviewed by Fred V. Hein, director, Department of Health Education, American Medical Association; Elsa Schneider, specialist, Health, Physical Education, Recreation, and Safety, Office of Education, U.S. Department of Health, Education, and Welfare; G. Lawrence Rarick, professor, Department of Physical Education for Men, University of Wisconsin; and Lolas E. Halverson, associate professor, Department of Physical Education for Women, University of Wisconsin. Changes were made by the author on the basis of the suggestions of the reviewers and of the staff of the NEA Information Services.

PHYSICAL EDUCATION IN THE ELEMENTARY SCHOOLS

IN THE EARLY days of America, schools were established to teach children skills necessary to enable them to become responsible members of society. The over-all concept of our schools today is still the same, but the skills considered necessary have changed and are changing in relation to the world in which we live. It would have seemed patently absurd to our pioneer ancestors to include physical education among the subjects taught in school. Yet as early as 1853 in Boston, special physical training programs were introduced for health reasons. Physicians believed that the health of children was suffering from long periods of enforced sitting, often in cramped positions. Exercises copied from similar programs in Europe, especially in Sweden and Germany, were given daily—usually in the school room. Systematic "days orders" exercised all parts of the body with special emphasis on chest expansion and deep breathing to expand the lungs and correct poor posture.

Changing concepts of education toward recognition of the "wholeness" of the child brought many kinds of physical activity into the school as children were given opportunities to learn by doing. It has been recognized that all learning of young children is largely sensorimotor in nature. The importance of movement in neural development and in perceptual formation has been reemphasized by recent investigators in this field who stress that its role cannot be overestimated.

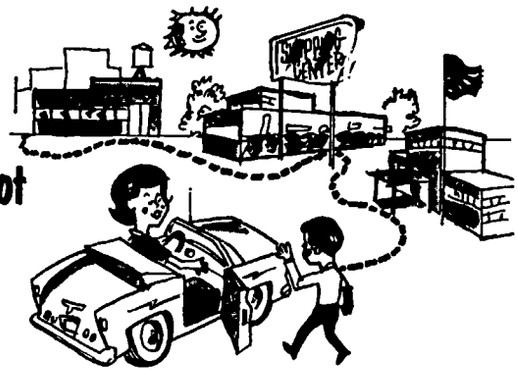
SHOULD IT BE TAUGHT IN SCHOOLS TODAY?

Education in the United States today has again been undergoing a series of reappraisals, stemming largely from Sputnik. Politicians, scientists, educators, and a number of prominent private citizens have been outspoken about what is wrong with the schools and what should be done about it. Physical education has been supported by some, ignored by others, and condemned

by still others. In the midst of these discussions, several surveys of physical performance of children and youth in this and in other countries were reported. All results indicated that present achievement levels of young people in this country were low. First President Eisenhower, and more recently, President Kennedy expressed concern for the physical condition and physical development of our children and have attempted to do something about it. President Kennedy believes that this should be done through the schools in order to reach every child. He has urged every school administrator to take steps to assure the physical fitness of children and youth. He stated that every American child should be given the opportunity "to make and keep himself physically fit—fit to learn, fit to understand, to grow in grace and stature, to fully live."

A brief look at the world in which we live today will show some of the reasons why investigators have found our children weak and underdeveloped. For the first time in the history of our country, and indeed of the world, society is steadily and rapidly removing both the need and the opportunity for physical activity from the lives of children as well as of adults. Automation has given us a push-button civilization. The automobile provides transportation everywhere. Although young children do not yet drive cars, in these days of busy streets and heavy traffic, bicycling, roller skating, and even walking to and from school may not be considered safe. Often, distances are too great for walking in any case, and buses may be routed to pick up most children. Bus schedules usually preclude staying after school, so the playground space and equipment are available only to the few who live close at hand. Urban living, with its crowded conditions and apartment housing, allows little space for active play. Suburban areas leave few open spaces. Public parks are often accessible only by freeways or expressways and are too distant and too dangerous for children to reach. There are few trees to climb and often not even stairs. Parents welcome television to keep children indoors and quiet. In the higher socioeconomic brackets, restriction of activity is greater than in those supposedly less favored. Music lessons, dancing, dental appointments, and the like are scheduled daily. The child not only has little space in which to play, he has little free time.

The need for physical activities is not met by riding everywhere



Neighborhood playgrounds and recreation centers, where these exist, provide planned activities for children, especially for those 10 years of age and older, and most frequently for boys. Volunteer agencies, such as Boy and Girl Scouts, Boys Clubs, and Y's, make contributions to the recreational (including the physical activity) needs of some children. But literally thousands of youngsters are not reached by these agencies. The schools must assist in guiding the physical development of children by providing regular vigorous physical activity programs, by teaching the basic skills necessary for group and individual participation, and by helping the child develop knowledge of and attitudes toward himself and others that will stand him in good stead throughout his lifetime. Parents and teachers together must learn to understand the activity needs of individual children and the relationship of these to every aspect of their development.

WHAT ARE THE OBJECTIVES?

The objectives of physical education may be grouped under the headings of physical fitness, skills, attitudes, and knowledge. Research findings from the medical sciences, from psychology and child development, from education and physical education all contribute to our understanding in these areas.

The Physical Fitness Goal

For children physical fitness means good health, optimum growth and development, and the strength, energy, stamina, and endurance to do the ordinary daily tasks with ease.

Medical knowledge has advanced and is advancing rapidly. Our children are healthier than ever before. The so-called childhood diseases, such as whooping cough and chicken-pox, have been brought under control. The recent breakthrough in polio vaccines dramatically demonstrated another victory over infection. At the same time, newer knowledge in nutrition and widespread dissemination of this information together with adequate food supplies and vitamin supplements have eliminated dietary deficiency diseases in present generations. Indeed, children are growing taller and heavier than ever before. Studies continue to show, however, that strength and other physical abilities are not well developed.

Physical growth. A clear understanding of physical growth and of the changes which may be expected with age is important to every elementary school teacher. A brief review of research findings will be included here because of special importance for physical education. Physical size and physical abilities in the years of middle childhood show very similar patterns of development. The longitudinal studies of the 1930's, together with some continuing investigations, have given a clear picture of the curve of growth of various body segments. Standing height, probably the most easily obtained measure of all, has been found to be one of the most significant means of interpreting individual growth. The rapid growth of infancy and early childhood slows to a steady, rather even pace for a few years in middle childhood. The great majority of our children in grades 2 and 3 are found to be in this growth phase. From the standpoint of physical development, these are probably the most homogeneous groups in our schools today. Even sex differences in size and growth are not great at this time.

The growth spurt which immediately precedes puberty occurs earlier in girls than in boys. Recent findings indicate that children are growing faster and maturing earlier than ever before. It is no longer uncommon to find girls of 8.5 and boys of 9.5 years

who have already entered this preadolescent period of accelerated growth. At the same time, however, there are wide individual differences. Some children will not reach this same stage in development for four or five years. Hereditary factors are known to be important in determining both size and maturity, but the steadily increasing average size of our children is attributed largely to good health and nutrition and possibly to climatic conditions. A recent survey, for example, showed that eighth grade girls were on the average one inch taller and four pounds heavier than girls of the same age and grade in the same school 25 years ago. For boys the increases were 1.8 inches and 10 pounds. Statistics do show that the average height and weight of American adults is gradually increasing, but the rate of change is below that noted in this particular sample. Today's children have grown up in a period of relative economic prosperity. An optimum combination of factors has evidently stimulated the rate of growth so that a greater percentage of mature height and weight has been attained by these eighth graders today than was true 25 years ago.

Body weight in relation to age and height has long been used as an indication of nutritional status. Today's children have outgrown our norms. The Baldwin-Wood tables, still printed and posted on many scales, are now obsolete. Growth charts where successive measurements are recorded are valuable for noting trends. It must be recognized that charts in use are based upon data collected from relatively homogeneous groups of white American children and cannot be expected to yield accurate assessments of children from such distinct ethnic or racial groups as Puerto Rican, Mexican, Negro, or Oriental. Records of height and weight taken at regular intervals indicate for all children the amount and direction of their growth, however. Measurements made every six months, for example, make possible the comparison of the child's present status in the light of his own past record. Failure to grow during the elementary school years is a danger sign, and any child with such a record should be referred to a physician for examination.

Pediatricians have recently expressed concern over a new problem in children—new at least in its extent—that of overnutrition or obesity. There is an increasing number of such children in

our schools today, and they usually come from families in the higher socioeconomic brackets. Studies show that fat children grow faster and tend to mature earlier than their thinner peers. It has been shown that many early maturing girls experience serious emotional and social problems in our society. Moreover, overweight children have been found to become overweight adults with associated cardiovascular and renal disease problems and a reduced life expectancy. Overweight is undesirable in children and should be combated by reducing caloric intake and by increasing caloric output—in other words, through controlled diet and increased exercise. There has been some tendency to dismiss exercise as a means of weight reduction, since a substantial amount of activity is required to lose even one pound of weight. However, a moderate increase in daily activity without any change in caloric intake will, over a period of time, result in significant weight loss. Investigators who compared the daily habits of nonobese with obese boys and girls in special summer programs concluded that inactivity is of greater importance than overeating in the development of obesity.

Changes in height and weight are probably the most obvious indications of growth. Concurrent changes take place in every part of the body. Bones and muscles, heart and lungs, indeed all organs of the body, increase in size throughout the growing years. At one time it was believed that the heart did not grow as rapidly as body size and that just before puberty the relatively smaller heart size would limit capacity to perform physical work. If this were the case, fatigue would be expected to set in rapidly and the heart might be damaged by severe exertion. This finding has not been substantiated. All available evidence at present indicates that the healthy heart is not damaged by reasonable amounts of exercise.

It is true that growth proceeds at different rates in different parts and systems of the body. Different rates of growth in different skeletal parts can readily be observed. Elementary school children become increasingly long-legged, for example. Hip width increases rapidly just before puberty and relatively more in girls than in boys. Shoulder width of boys continues to increase after puberty until the typical masculine build of broad shoulders and

narrow hips is attained. Subcutaneous tissue increases in girls and decreases in boys after puberty.

Each of these growth changes is accompanied by changes in physical abilities. Increases in ability of children to run and jump come with longer legs. Maximum increases in throwing ability of boys come after puberty when greatest shoulder girdle development occurs. Broad jump records of girls 12 to 16 years of age are more closely related to subcutaneous tissue changes than to any other growth measure.

Since all aspects of growth of school age children are timed in relation to puberty, it is obvious that they will occur at very different age and grade levels for individual children. It would be very helpful in studying children if a good measure of rate of growth or of relative maturity attained were readily available. Some indication can be obtained from repeated measures of standing height. This and other skeletal measurements are not reliable predictors, however. By far the best measure is skeletal age, which is obtained by assessment of X rays of hand and wrist. Several studies using this measure have shown that development of physical abilities is much more closely related to skeletal than to chronological age The majority of these investigations to date have been made on children of 12 years of age and over. An increasing number is being reported on children in grades 1 through 6, however. These confirm the fact that a wide range of maturity is found among children of each sex at each grade level. They also seem to indicate that our athletically gifted children are very advanced skeletally. A recent report (see Selected Research Reference No. 10) on Little League baseball players demonstrated this fact quite dramatically. This League is organized for boys 8 to 12 years of age. Teams play local schedules, and the winners enter regional and national championships. Fifty-five boys from championship teams were studied. Twenty of these boys were found to be advanced two years; and three of them, three or more years. Only five were retarded one or more years.

Longitudinal studies have given the best over-all picture of the development of strength and other physical abilities, especially for the adolescent period, for both boys and girls. The development of strength has been studied most extensively. Measurement of grip strength, of arm and shoulder girdle "push" and

"pull" strength, and of back and leg strength has been made on dynamometers devised for that purpose. Results show a similar pattern of growth in these measures for prepubescent boys and girls, but there is a slight sex difference at all ages in favor of boys. This difference increases enormously at puberty. In both boys and girls, pubescent children are stronger than prepubescent children of the same chronological age. Postpubescent children are still stronger than pubescent ones. The relationship between increasing strength in boys and physiological maturing is so close that one investigator has referred to strength as a secondary sex characteristic.

Strength, stamina, and endurance. Muscular strength has been shown to increase with growth and maturity. The extent of the increase is far more subject to environmental influences than is skeletal growth, however. Strength grows with use, and the musculature of various parts of the body does not necessarily increase proportionally. Until recently, it was assumed that adequate development in children would occur through their natural activities. Biologically, activity is essential to the healthy growth of all animals, including man. Younger organisms have more available energy than older ones and tend to convert it into activity at a more rapid rate. This normal urge to activity, given opportunity and encouragement, should result in all of the use or exercise required for good development.

Since conditions for many, if not most, children today are not "natural," the question may well be raised as to just how much activity is really needed. How much strength should be developed by children who do not seem to need it to perform the tasks of daily life? How different in strength are our children today from those of earlier generations? Although no national norms on dynamometric strength measures have ever been developed, a substantial number of studies have been made through the years. Direct comparisons of results must be made with caution, however. If age is used as a base, it must be remembered that children today are from one to two years advanced in height and in weight over children of one generation ago, and strength correlates substantially with weight. From the few studies in this area, grip strength of children today is not different from 25 years ago.

Recently considerable interest has been evidenced in performance tests of muscular strength and endurance. The Kraus-Weber test, a "minimum" measure of muscular fitness yielding a pass or fail score, has been widely used. Every investigation reported on American children shows results well below the European level, and these differences are greatest for the younger children—those of grades 1 through 4. Other types of tests, including such events as chinning or pull-up, various forms of push-ups and sit-ups which test arm and shoulder girdle strength and endurance and abdominal and hip flexor strength, currently see wide usage. Results from a nationwide sample were low in comparison with older standards; these too are especially low at the younger ages, 10 to 12 years. A few experimenters are showing that children of today who participate regularly in good physical education programs equal or surpass previous standards and are far superior to the national norms recently established.

The question concerning optimum levels of strength development for children cannot be answered by any test or battery of tests yet devised. It is obvious that in this as in everything there are wide individual differences. What is best for one child may be too much or too little for others. The judgment of the pediatrician based upon clinical experience is still without doubt the best evaluation of optimum development of the individual child.

An indication of the development of the heart and respiratory muscles can be obtained from examination of the skeletal muscles, since all muscles grow strong through use. If skeletal muscles are weak and flabby, this suggests that the cardiorespiratory system may be underdeveloped. It has long been known that in adults the exercised heart is stronger, slower in rhythm, and steadier than the untrained one and is capable of greater sustained effort. The chest muscles and the diaphragm strengthen and lung capacity increases with use. In growing children, heart rate, blood pressure, lung capacity, and other measures of cardiorespiratory response show age changes and small sex differences. Heart rate of girls is slightly higher and blood pressure slightly lower than that of boys. Heart rate in both sexes tends to decrease with age, while blood pressure rises. These functions reach the adult level shortly after puberty. Although these same developmental trends are observed in all children, individual differences

are very great, and marked changes can be brought about through increased exercise.

As in adults, the child's heart rate slows when vigorous activity is regularly scheduled over a period of time, and the volume per beat rises so that the blood is supplied to the tissues more efficiently. A few studies of responses to graded exercise have been reported for children 4 years and older, but much more information is needed. How much endurance should children be expected to have, for example? One recent study showed that young children are no more fatigable than older ones if performance is considered in relation to strength. With this same limitation, no sex differences were evident. There is no agreement at present, however, concerning how far children should be "pushed" in activity. Case studies of children specially trained for some strenuous physical performance show remarkable physical and cardiorespiratory development. However, any level of development attained through exercise can be maintained only so long as this amount of exercise is continued. The mounting evidence concerning the beneficial effects of moderate exercise for people of both sexes at all ages supports the position that children should be given every encouragement to participate regularly in some form of physical activity and to develop habits and interests that will remain with them throughout life.

Skill Goals

Motor development. Most gross motor performances are dependent to some degree upon strength. Other qualities, such as balance, speed, coordination, and accuracy, increase with age, also. Postural-locomotor development is especially striking in infancy as new movements become possible through maturation of the nervous system. Progression from creeping to standing to walking can be readily observed. All movement patterns necessary for survival of the species are built into the nervous system. At the appropriate time in development, structure has advanced to the point where function becomes possible. There are apparently optimum periods for the exercise of certain functions. Given opportunity, the urge to use growing powers results in the development of appropriate responses.

During the preschool years, children explore many ways of moving. They run, jump, throw, climb, balance on boards, ride tricycles, and indeed explore their own growing powers in relation to many things in their environments. By the time they enter first grade, body proportions are no longer changing rapidly, and the repertoire of basic motor performances is quite extensive. It is probable that by this time the child has made every movement of which the human body is capable. Great changes continue to take place in motor development, however, throughout the elementary school years. These changes are in the quality of movement and in the variety and complexity of movement patterns which are acquired.

Elementary school children are still learning to manage their own bodies. Balance has developed to the extent that most children can stand steadily or hop on one foot for an appreciable amount of time. These skills improve rapidly until 7 or 8 years of age. After that, static balance with the eyes shut can be demonstrated by most children. Balance in moving situations improves also. Practice helps this development markedly. This increasing control means fewer falls in play or elsewhere from quick changes of direction or unexpected situations.

Speed of reaction and of movement changes with age, also. Older children can respond more rapidly and move more quickly. This developing ability is one essential factor in running and jumping performances, for example.

When a child moves easily and the sequence and timing of his acts are well controlled, he is said to have good coordination. Quite probably, coordination in complex motor performances is more than neuromuscular control. It may actually be this plus optimum combinations of strength, physique, speed, balance, and possibly other factors not clearly identified. It may be more accurate, also, to speak of coordinations, since quite evidently there are many different ones. As noted above, certain basic movement patterns are built into the nervous system. All of the various combinations so important in the many activities of childhood and later must be acquired through practice.

Running, jumping, throwing, and climbing are common elements in many active games. Special ways of throwing accurately and all methods of striking balls or other objects are dependent

upon sensorimotor coordination. Changes in vision which take place through both growth and use are factors in these performances. Studies in this area suggest that most children are not "ready" to learn to bat before the age of 8. As in all developmental aspects, however, there are wide individual differences.

Measurement of gross motor development is usually done through use of such activities as running, jumping, and throwing. Speed or distance increases with age in each of these events. Because these events can be improved considerably by practice and because all children do not have equal opportunity or interest in practicing, variability in any random group is large and developmental patterns emerge less clearly than is the case with strength. Since running, jumping, and throwing for distance are all related to size and strength, they appear to be more closely related to maturity than to chronological age. In events where strength does not play a major role, the pattern of development is somewhat different. In selected stunts and tumbling events, for example, boys and girls show similar patterns of growth and practically no sex differences before 12 years of age. There is some evidence to suggest that pubescent boys perform somewhat less well in these events than do pre- or postpubescent boys of the same chronological age.

Recently a study designed to establish national norms in a battery of tests including running, jumping, throwing, and climbing events was carried out. Norms for boys and girls ages 10 to 17 are now available (see General Reference No. 1). The results indicate a very low level of performance in relation to older studies or to those reported by other investigators on smaller groups. Boys' scores exceed those of girls at all ages and in all events. Boys are especially superior in throwing for distance. Although some sex differences should be expected, the extent of those obtained is almost certainly due in part to the real differences in cultural expectations for boys and for girls. These seem to be extending downward increasingly into the lower elementary grades and tend to increase differences in play patterns. From the standpoint of good physical development for girls, this early separation does not seem desirable.

Motor learning. Common game skills are often taught to children by each other. Batting and catching, for example, are very

complex activities and must be practiced over and over again to be mastered. The extended practice periods which children, when given opportunity, carry out on their own are remarkable. This behavior may appear to be in conflict with the facts concerning limited attention span and short periods of concentration known to be characteristic of these same children. Close observation will reveal, however, that children vary their tasks, increase the complexity, and change their goals in ways that sustain interest and present new challenges. Teachers might well learn from their pupils about lesson planning.

Children often have little opportunity to learn regular game skills, except at school. Some who do not learn them easily need instruction and supervised practice in order to perform creditably. The child must do his own learning in motor skills, as elsewhere. He needs a good model and then opportunity to practice. He should be permitted to make errors. Instruction facilitates learning if it is not too detailed and if too rigid limits are not set. For example, a high degree of accuracy should not be stressed in the early stages of learning. If speed and accuracy are both important, they should be acquired together. As skills develop, specific help can be given and is usually welcomed.

There is a large number of different skills to be learned, and research on motor skills indicates that most are highly specific in nature. There are a few common features in the learning situation, however. Individuals who have learned a number of skills appear to have "learned how to learn." That is, they know how to approach the task, they are familiar with the situation as a whole, and they have acquired certain basic concepts of direction, distance, and force. They have an idea, for example, how hard to hit the ball to make it travel a certain distance, how fast to run to reach the goal on time. They have some knowledge of their own capacities and certain expectancies concerning effort and concentration demands. They have some insight into the learning process.

Motivation is rarely a problem in the physical activity program. Almost all children of elementary school ages want to be active, to try various ways of moving, and to learn new skills. At the same time, they like to be challenged, to test and to develop their growing powers. If the tasks set are too difficult,

however, they will withdraw and refuse to participate. The jumping rope must not be turned too fast at first; the games must not be too complex too soon. In physical activities as in all learning, progress is gradual and sequential, dependent both upon growth and experience.

The interests of young children are especially wide in range. This variety tends to decrease gradually from about 8 or 9 years to the adult level. The games of young children tend to be simple in design, to demand intermittent rather than sustained periods of strenuous activity, and to be of such nature that they can be terminated at any time. Interests of older children gradually increase in span, and games of greater complexity and length are preferred.

There is some indication that interests of children in sports and games have shown an increase in the last two decades, especially among girls. These interests are relatively more mature today, also. Seventh graders now are comparable to ninth graders of 25 years ago. Readiness for various types of games and sports is not only physical but emotional, social, and intellectual as well. All of these factors must be taken into consideration in program planning.

Attitudes

Children find their places in the peer group to a great extent through play. They move from the adult-managed world of preschool and first grade into a peer-centered world which becomes increasingly important with each elementary school grade. The child soon learns that he will be judged by what his body accomplishes. Boys and girls with highly developed motor skills are more acceptable to the group than those who have few such skills. Being good at games in the eyes of the others means favored status for both sexes in middle childhood. But sex-appropriate behavior is instilled early in children. Being a leader is approved for all, but fighting is strictly a male prerogative by the fourth grade. Play provides opportunity for the child to experiment with a wide variety of social and practical situations, and in so doing the child develops social skills and personal experience. He begins to appreciate the importance of rules or law, to

participate in constructive group action, and to develop codes of conduct. He acquires a great reservoir of responses upon which he can call later when specific situations are met.

Motor skills promote social skills

Nowhere do children face reality more clearly than on the playground. Here children learn to accept limitations in themselves and in others. The child's self-image is related, to some extent, to his body—to how it looks and to what it can do. Tallness or shortness, fatness or thinness may be sources of pride or despair. Reference was made above to the special adjustment problems experienced by the early maturing girl. Among boys it is the late maturer who is most apt to be a misfit. Both of these groups of children are physically unlike their peers. Children must be helped to develop wholesome attitudes and habits concerning their bodies and to know that they can improve them. Movement experiences provide opportunity for this growth in understanding.

Real or fancied weakness or lack of proficiency may lead to self-conscious awkwardness. Body posture can reflect timidity and tension or, on the other hand, alertness, decisiveness, and self-confidence. Postures and movements are forms of self-expression, a means of communication. Through appropriate movement experiences of a relatively free nature, often those found in rhythms and dance, children learn to use their bodies to express ideas, to interpret feelings. Creativity is encouraged and given opportunity to develop.

Conditions under which some children live today are conducive to fears and tensions, and a number of young people suffer marked anxieties. These may stem from such things as failure to meet parental expectations or from imminent stress situations, such as contests or examinations. Vigorous, integrated, whole-body activity often proves to be the most effective release in these situations. The physical education period in the school day can contribute to the emotional equilibrium of the pupils.

Knowledge

The role of play in transmitting the culture has been widely recognized. In play we develop the concepts of "fair play," of taking turns, of abiding by rules. Patterns of behavior demanded by "good sportsmanship" are gradually established. In addition, a vast amount of information is acquired. Rules and strategy of games and sports enjoyed by millions of people every year either as participants or as spectators are learned. Our language and literature are full of expressions which originated in sports and which should be understood by everyone. These are readily learned by children when they are given experience in the games themselves.

The facts concerning the functioning of the body, the role of exercise in health, and growth and sexual development should be taught at appropriate grade levels. Safety must be stressed at all times on the playground, as there are many chances for accidents. Safe practices should not only be enforced, but children should learn why they are necessary and what general principles govern them.

Physical activities provide an unequaled laboratory for many kinds of learning. Mechanical principles are constantly demonstrated on the playground, for example. The body itself is a system of levers. Balls are a form of projectile. Friction of the ball on the strings of the tennis racket creates spins which change the trajectory and the bounce of the ball. Children learn to do many things without being able to state the principle or to generalize about them. With assistance they can be expected to develop these and other concepts in the later elementary grades.

HOW CAN THE OBJECTIVES BE ACHIEVED?

Physical education uses many forms of human movement as its subject matter—games and sports, rhythms and dance, and such exercises as gymnastics, apparatus, stunts, and tumbling. Through planned sequential programs, adjusted to the developmental level and physical condition of the pupils, the stated objectives can be realized.

Curriculum

Studies in the field of curriculum have been empirical rather than experimental. In recent years considerable attention has been given to physical education in the elementary school through special conferences and study groups which have brought together educators, administrators, physicians, and scientists. There has been general agreement that there should be a daily period of physical education for elementary school pupils. An evaluation of health status must be made so that only those qualified for vigorous activity participate in the regular program. A restricted or modified program should be provided for those with various types of limitations or handicaps. (Specific curriculum activities are given in publications of state departments of education and the American Association for Health, Physical Education, and Recreation [AAHPER], NEA.)

It should be noted that the physical education period is expected to provide systematic learning experiences adapted to the developmental level, needs, and interests of the pupils. It differs from recess and after-school play in that both content and the way it is presented are designed to contribute to each of the objectives. After-school and week-end recreation programs can and do contribute to some of these same objectives and are extremely important in the lives of children. It is obviously impossible to give boys and girls all of the activity they should have in one period a day since most children need from three to five hours of vigorous physical exercise each day. This need of children for vigorous activity has been stressed by the President's Council on Youth Fitness. The physical education period, then, serves to assure all-around development, possibly to correct

weaknesses, to introduce many and varied activities, to teach special skills, and to take advantage of the many opportunities inherent in this program to help children develop desirable interests, attitudes, and codes of behavior.

Leadership

The importance of physical activity of all kinds in the life of the child is continually pointed out in the PCYF report. The classroom teacher who knows each child's interests and abilities, strengths and limitations, needs and desires is in the optimum position to integrate physical education into the entire school program. But the classroom teacher has again and again been found to lack knowledge and skill in this area—in fact, to be so ill at ease on the playground that the physical education "lesson" loses all spontaneity. With children of the fourth grade and up, the typical physical education class activities are vigorous and can be expected to spread out over a considerable area. The inexperienced teacher has a feeling of loss of control, becomes anxious and authoritarian. The teacher trained for physical education in this latter situation organizes the group for constructive action and feels free to teach or lead, to support or arbitrate. The expert teacher can involve every child in the activity, should be aware of strengths and weaknesses, and should work with the children to accomplish ends or goals which they help set. Studies and observations to date suggest that a trained teacher of physical education in the fifth and sixth grades should be provided at least part time. Where this plan is followed, the special teacher should work with the regular classroom teacher who will be responsible for the remainder of the program. If special teachers are not available, a program may be worked out to permit one qualified classroom teacher to provide a consulting service within a school. City or county physical education supervisors can be expected to assume major responsibility for curriculum and for in-service training.

It must be emphasized that the teacher, whatever his training, has the sole responsibility for the recognition of individual differences among the pupils and for adapting the program to meet them. Each class will include children of high and of low energy levels, of vigorous health and of restricted capacity, and of vary-

ing degrees of social and emotional as well as physical maturity. No set of tests can possibly group children appropriately for all aspects of the program. So far as possible, activities presented to the entire group should be the types that permit each individual to progress at his own rate. In the early grades, where it is especially difficult for one teacher to divide the group, rhythms, stunts, activities on bars or other apparatus, rope jumping, ball bouncing, and the like, do provide for individual differences and permit the teacher to assist each child at his own level of performance. As children grow older it is imperative that subgroups be formed so that the slow learner or less mature child not be discouraged and the more able be challenged. At the same time, sometimes sex division may be desirable so that boys or girls may specialize in activities which they consider especially appropriate or interesting to them.

Physical education period calls for systematic instruction

The learning process in the acquisition of motor skills is facilitated if children are given a good model or demonstration of what they are expected to do. It is highly desirable that the teacher himself be able to perform well at least a few of the skills he is teaching so that he will be able to give repeated demonstrations. (It is not amiss to note that pupils admire the ability of the teacher to do things.) If the teacher cannot demonstrate, a pupil may be able to do so. The many excellent moving pictures now available can serve this purpose admirably and have been shown to speed the initial stages of learning.

A few studies have recently been published comparing skills of children taught by regular teachers with those taught by special physical education teachers. They have evaluated skills of pupils only and tend to show that the special teacher develops pupils' skills to a greater degree than does the typical classroom teacher. No evidence relative to other objectives of the programs has been presented.

Space and Facilities

Many studies have been made of the problems of space and facilities for elementary schools. Professional organizations, state departments of education, and others have proposed standards. Physical education classes in elementary schools are usually assigned to the playground in good weather. Few elementary schools have gymnasiums or swimming pools, although it is universally agreed that these would be desirable. These latter facilities are frequently put into junior and senior high schools and are used jointly by schools and community. Some type of all-purpose room which can be used for physical activity as well as special events should be provided in every elementary school, however. At least part of the playground area should be properly surfaced for all-weather use. In many climates a shelter over part of this play space will greatly extend its usefulness. Fortunate are the children in the elementary school which has good facilities!

Certain minimum types of equipment are very important in physical education. Every elementary school playground should have such fixed equipment as bars, rings, horizontal ladders, and such other pieces of apparatus as children can use for hanging and climbing activities. Mats should be provided for safety and comfort in a number of activities. A record player and records, possibly a drum for rhythmic activities, miscellaneous balls, bats, paddles, nets, and similar equipment are needed in varying amounts. Efforts have been made by educators to estimate what might be considered minimum needs for such materials. These standards may be obtained from the AAHPER.

Evaluation

Of the individual child. Evaluation of any program should be made in terms of its objectives. Since physical education is con-

cerned with guiding the development of children, evaluation must be in terms of changes which occur in these children. Because there are such vast individual differences among children in any phase of development, on entering school or at the beginning of a term it is necessary to compare each individual with himself and to evaluate changes or progress according to best estimates of the child's capacities and opportunities.

In the primary grades, few actual tests of performance need be used. Evaluation can be done satisfactorily through systematic observation, guided by check lists, ratings, and anecdotal records. The judgment of the teacher, for example, as to whether a given child is full of energy, recovers quickly from strenuous activity, enjoys many different activities, shows good coordination in movement, is growing in self control, and other similar capacities, can be recorded at regular intervals. When possible, teachers and parents should consider the child's record together.

Some informal testing of the child's ability to manage his own body in a variety of ways can be used. The Kraus test referred to above has been shown to be appropriate for young children. This battery requires the child to sit up when his feet are held, to touch finger tips to the floor without bending the knees, and other movements designed to show body strength. Simple tests of jumping and climbing can be made to aid teacher and pupil in noting achievements.

In the third and fourth grades, records of specific achievements should be kept. Children and parents both like to have objective evidence of achievement. Formal testing and recording at these levels is extremely time-consuming and should be minimal, however, unless assistance is available. Children will be better served through a continuation of check lists or rating forms.

For fifth and sixth grades and up, various tests are available to measure strength, endurance, speed, agility, flexibility, balance, and coordination. Some of these require expensive equipment and trained testers. Others have been devised to use little equipment and can be given by anyone willing to take the time and trouble to read directions carefully. The Youth Fitness Test developed by the AAHPER (see General Reference No. 1) and recommended by the President's Council on Youth Fitness is of this latter type. In the last few years, this and similar test batteries

have been used widely in the United States, and national norms are available.

In the 1930's two physical educators developed classification plans that were designed to group children in height, weight, and age classes so that the advantages of size in physical performances could be nullified. Norms were reported for these various classes rather than by ages. Both boys and girls of elementary school years were found at that time to be grouped more appropriately when all three factors were taken into account rather than by age alone. Studies of many thousands of children today do not confirm these findings. Our heterogeneous school population includes short and tall, broad and narrow races. The child who is taller and heavier than others of the same age cannot always be expected to perform better. So present norms are given according to age and sex only. Whether an individual child can ever be "average" or "superior" will depend upon factors peculiar to him, and norms must be so interpreted. He can be expected to improve with age, however. If he is at the 25th percentile at age 10, he should ordinarily attain this level at 11. If he improves his position, this is gain over and above what is to be expected from growth. Children, as well as parents and teachers, should understand the meaning of norms.

Teachers should evaluate progress in each of the objectives of physical education. Considerable insight into children's personal-social development can be obtained from self-report "guess who" tests, sociometric techniques, rating scales, and others. All of these have been used for evaluation in physical education situations, although they are not unique to physical education. It must be recognized that there are no standardized tests or scales available for evaluating status or change in attitude and values. Recognition of growth in these can come only through observation by the teacher and through spoken and written statements of the child himself. Many situations in physical education are, for the child, emotionally tinged, and this increased intensity of experience is directly reflected in his behavior. Recording of specific anecdotes will provide invaluable material for evaluation. A cumulative folder for each individual should be kept so that all pertinent material will be collected or recorded as soon as it becomes available.

Of the programs. Several rating forms or score cards designed to evaluate physical education in the elementary school have been developed by professional organizations together with elementary school principals and state departments of education. These can be used for self-rating or for evaluation by others. The program itself, the teacher and administrator, space, time, and facilities are considered.

A cooperative study using the LaPorte score card (see Selected Research Reference No. 2) evaluated programs in 25 states between 1950 and 1954. Findings indicate that almost all items in this score card are discriminatory in regard to quality of program. Accreditation, school size, and town size are associated in that order with improved programs of physical education. There is evidence that survey scores are positively associated with pupil achievement of objectives.

EXTRACLASS PROGRAMS IN PHYSICAL ACTIVITIES

In the six-grade elementary school, few school systems provide supervised after-school programs of a voluntary nature. In eight-grade elementary schools, however, it is not uncommon for schools to sponsor athletic programs, especially for boys. The prevalence of these and similar programs out of school, often of a highly competitive nature, with the ever-increasing tendency to involve younger and younger children, has focused the attention of educators, psychologists, and physicians upon them. Research in this field is very limited and almost nonexistent at the elementary school level. Opinions of experts still guide practice.

There can be no question but that the planning of extraclass programs for children must be based upon what is considered best for their health, safety, and level of maturity. The first competitive game experiences usually come very early in the school years between groups of children informally organized on the playground or in class. Unless the school is very small, a variety of intramural games can be played between classes of the same grade or between adjacent grades. These games come naturally as an outcome of the instructional program. The activity changes frequently with seasons or instructional units so that many dif-

ferent games are learned and a wide range of interests encouraged. Under skilled leadership, children learn to play together on a team, to coordinate their efforts, to honor the rules, and to respect their opponents. They should play to win, but they must be helped to realize that losing a match is no disgrace.

It is highly desirable that every child be given the opportunity to participate in an intramural program of the informal nature described above. Parents and teachers should be aware of the developmental values in this type of play. The shy, timid, or lazy child without medical restriction should not be allowed to withdraw. It may be possible to extend this experience for many children through "play days" or "sports days" with neighboring schools where the social aspects of the day are stressed over and above the competitive.

Emphasis throughout the elementary and junior high school years should be placed upon the instructional and intramural programs. If time, space, and leadership permit an expansion of this program, then and only then should more highly organized interschool competition be planned. This program should continue to involve as many children as possible. A team from each grade for each sex can be selected rather than *the school team*, for example. It is inevitable and appropriate, however, that those children more gifted in physical abilities will be the participants in this more intensive program.

In the absence of research findings in this area, it is recommended that all elementary school programs, including sports, be conducted for the benefit of the participants and that they be developmental in nature. Where these considerations are paramount, sports programs both for girls and for boys are seen to be very beneficial. Competition in many things will be experienced in our culture. All games are competitive—even those played in the lower grades in school. Every child should have the opportunity, under controlled conditions, to experience competition in many different games of varying degrees of intensity.

ARE THERE CARRY-OVER VALUES?

The emphasis throughout this pamphlet has been placed upon the immediate values and outcomes of physical education for the

elementary school child. It would be a serious omission if some long-term implications were not pointed out.

It is becoming increasingly apparent that regular exercise throughout life is essential to the health and well-being of man. As long as young people remain in school, many and varied opportunities, and often some compulsion, exist for them to participate in physical activities. When the individual leaves school, however, he can be expected to continue only if he is motivated to do so. Most people do not do things—even those they think may be good for them—if they dislike them. The youth or adult, man or woman, who has learned to like activity and who has interests and skills which make participation fun will undoubtedly find ways to continue. Psychiatrists tell us that enjoyment of any form of activity, including sports and dance, in which an individual participates voluntarily in his leisure time makes positive contributions to mental health. Thus physical recreation serves multiple purposes for the adult. The interests, attitudes, and basic skills so important later in life are being developed in the elementary school. Those who teach physical education, by looking to the future as well as the present, will try to help each child develop his capacities, broaden his interests, and find joy in play.

TOPICS FOR FURTHER STUDY

This review has been based upon research findings and may appear to place greater importance upon some aspects of physical education than upon others. This was not the intent; the text reflects the available studies. Education through physical education is an art as well as a science, and outcomes depend to a great extent upon interaction between teacher and pupil.

1. Almost all studies of child growth and development have implications for physical education. It would be desirable, of course, to have studies that focus upon play, for example, and its real meaning in the life of the individual. What can or should be its role in personality development? in socialization? in adjustment?

2. The importance of play and recreation in mental health has been pointed out many times by physicians and psychiatrists, but experimentation or controlled observations are almost non-existent.

3. The whole problem of athletic competition, especially for children and for girls as well as boys, has been studied scarcely at all. An interdisciplinary approach is needed here.

4. In the areas of physical fitness and health, where research appears to be more extensive, there is a considerable body of evidence which shows the need for and value of physical activity in man's life. Very few *studies* relate to the efficacy of physical education in meeting these needs or contributing to these values.

5. Curriculum studies in physical education are greatly needed. Although there are some excellent materials in this area, many questions remain unanswered.

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