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AN EDUCATIONAL EXPERIMENT.

By GEORGE E. JOHNSON, Superintendent of Schools, Andover, Mass.

Many public school teachers, within the last few years, have come to believe that the play of children has an important and practical significance in the work of the schools. Men and women interested in social reform, workers in university settlements, in boys' clubs, and among the young people of certain church communities, have drawn more or less largely upon the play and games of children as an attraction to draw them into good influences, or as a direct means of mental and moral improvement. In the vacation schools established for the children of the city poor in various cities, play has been a prominent factor, particularly in schools conducted after the plan of the Boston Play Schools, which have applied the methods of the kindergarten to older children.

It is the purpose of this paper to describe the work of a school of an experimental character, known as the Andover Play School, which for the last four years has been supported by the Andover Guild. It is a school for boys ranging from ten to fourteen years of age. Its sessions have been evening sessions in the winter and day sessions during the summer vacations of the last two years. The work of the school has been based entirely upon the play interests of the boys attending. The work has varied somewhat according to the season of the year, but the description will concern mainly the work of the summer sessions.

The school was in session for six weeks during July and August, the school day was from half past eight to twelve, and forty boys were regularly in attendance. There were three periods in the school day, the first and third being one hour and a half in length and the second one hour. A free choice of occupation was granted at the beginning of the term, very little occasion for change in the divisions occurring thereafter.

Perhaps the favorite occupation, on the whole, was the wood-work. There was a complete sloyd outfit and a trained sloyd teacher. No attempt was made to hold the boys to a formulated course. The wood-work was to serve as a sort of supply shop for the apparatus used in the school. The boys made their own butterfly nets and fish nets for the nature work. They made the mounting boards used in mounting the specimens,

the cases for the permanent collections, developing cages for the caterpillars, aquaria for the fishes, box traps for catching squirrels, etc. If a boy was interested in archery, he made his bow and arrows; if in cricket, a bat; if in kite-flying, a kite; if in making a present for a younger brother or sister, a toy table, perhaps. Mothers, too, reaped the benefits of the shop; for a boy often turned from his toy making to the making of a sleeve-board, ironing board, bread board, shelf, or something else for the house. Sometimes the boys united in making some giant affair of common interest; as, for example, a great wind-mill which supplied power for turning the grindstone, or a dam and sluiceway for the water-wheel, or a catamaran for the swimming pond.

The nature work was hardly less popular than the toy-making. Nearly every morning there might have been seen a company of ten or a dozen boys starting out with the leader in search of butterflies or fishes, and for the incidental study of birds, or frogs, or snakes, or whatever came to their notice while hunting. The older boys devoted themselves mainly to the butterflies, the younger to the fishes. Nearly every species of butterfly to be found in Andover during the season was captured, many kinds of caterpillars taken and developed into chrysalides in the cages, and nearly all the different kinds of fishes to be found in the streams and ponds of Andover were caught and studied. The work consisted largely of outdoor tramps, but there was also laboratory work, the description and drawing of the worm, chrysalis, and butterfly. Honey bees in an observation hive, and ants in nests made of school slates covered with glass were watched. Some of the ants' nests were successfully kept and watched for months, one boy keeping a colony all winter. The microscope was frequently used in the laboratory work. Note books on fishes were also kept. The interest of the boys was deepest in the gathering and general observation and naming of specimens, the watching and feeding of the fishes, and less in the minuter observation, drawing and naming of parts. The zeal in the hunting of specimens was often intense. It was no uncommon thing to see a boy, when the school was not in session, alone, with a heavy pail on his arm, a fish net in his hand, sweltering along in the dog-day sun seeking some new treasure for his aquarium. Boys who had good luck on these occasions, as for instance in catching some handsome speckled trout, would seek the leader in feverish excitement to communicate the great achievement. During the recent "kissing bug" humbug, a boy sought me in great excitement, having in his possession a cicada, saying he believed it was a kissing bug and that a man had offered him three dollars for it;

but, true to his interest in nature, he spurned the offer and brought the bug to school.

The ignorance of many boys whose environment by no means justified their lack of knowledge was sometimes surprising. A grammar school boy, visiting the school, knew the fishes simply as fishes, being unable to name with certainty a single species. Another boy, who was within one year of the high school, brought to the school, in high elation, one morning, some "speckled trout" for the aquarium, which proved to be tiny spotted salamanders whose legs presented no difficulty to him in his classification.

Allied to the nature work, was the gardening. A part of the school yard was plowed and a definite portion allotted to each boy who chose gardening. Vegetables of various kinds were planted. Last year flower plants were also a part of the care and possession of the boys, and were taken home and transplanted by the boys at the close of the school. The following spring, many of these boys were reported to me as having started gardens of their own at home.

In the winter session stamp and picture collections were substituted for the nature collections, the stamp-collecting craze spreading like wild fire among the school children last winter, some of the candy and cigarette counters suffering thereby to my certain knowledge.

The second period of the day, one hour in length, was spent in outdoor play. In one section of the playground might have been seen a group of boys engaged in a match at archery. In another section, the older boys, perhaps, divided into opposing sides by some natural grouping which lent zest to emulation, were hard at a spirited game of ball. Elsewhere some of the younger or less athletic boys were playing at tenpins on the smooth drive-way, or at bean bags. There were also at times foot-ball, basket-ball, ring-toss, tag games, boxing, wrestling, racing, jumping, vaulting, gymnastic tricks, kite-flying, boat racing at Rabbitt's Pond, swimming races at Pomp's or in the Shawsheen. Three times a week there was a division in swimming. The swimming lessons often served as a good opportunity for collecting specimens or plants for the aquaria. On rainy days there were indoor games, which partook more of the nature of social or parlor games and which were intellectual rather than physical.

The musically inclined boys were always eager for an orchestra. This took the form of the kindersymphonie. The talents and attainments of the boys made the music necessarily crude, but it was much enjoyed by them. The violinists were children who came for the orchestra alone, the play school boys being

confined mainly to time-beating instruments. There was a class also in piano playing which met twice a week.

The printing department appealed to some as real play. The press served in printing the names of the boys in the several departments, the base ball teams, headings for school exercise papers, cards, some bill heads, and, best of all, a four-paged paper issued at the close of the last school, containing compositions by the boys on the work of the various departments, names of prize-takers, cuts of drawings made in the nature work, list of specimens captured, and the like.

Besides the drawing in the nature work, there was a division in drawing for those who preferred it to any other occupation they might have during that period. The work took the form, mainly, of large free drawings from objects. This was the nearest allied to regular school work of any department, unless we except the library from which the boys eagerly drew books of stories, history or nature, for home reading.

Naturally more freedom was allowed boys than is usual in public school work, and occasions for discipline were comparatively few. Some difficulty, however, was encountered in restraining the appetite of some of the boys for apples which did not belong to them. To illustrate in a way the interest the boys had in the school, the following may be worth relating. A fee of fifty cents was collected on the first day of the school. Some boys who were known to have offended the second time in the matter of apple-stealing were denied the privilege of returning to the school, a just proportion of the tuition fee being refunded to the parents. But at the request of the parents the boys were again admitted and they returned, repaid the fee, manifesting their preference to submit to a flogging as evidence that they sincerely intended to resist temptation in the future, rather than to stay away from school.

Another boy in somewhat the same trouble, who followed the swimming class to the swimming pond and endeavored to enjoy the privileges naturally denied him in his season of disobedience, offered so tempting an opportunity for "moral suasion" that he was forthwith turned, in nature's own garb, across the leader's knee and persuaded so effectually that it was not the place where he wished to be, that instantly on his release he gathered his clothes under his arm and vanished. The next morning the superintendent was attracted by the sound of the footsteps of a running boy behind him. Johnny had been thinking of his spanking, with tears presented a letter of thanks from his parents, and besought leave to return to the school. It is needless to say what a good boy he was forever after.

The experimental character of the Andover Play School will

be more clearly understood if some explanation of the theory which prompted the experiment be given.

It has been accepted by many that the child, in his development, epitomizes the development of the race; that there are more or less clearly defined epochs, or stages of growth, in the physical, mental, and moral development of the child; that development progresses from that which is fundamental to that which is accessory, from that which is oldest in the development of the race to that which is newest, from the control of the trunk, for example, to the control of the arms and legs, and thence to the control of the finer co-ordinated movements of hands and fingers; from the fundamental mental operations, as of perception and memory, to association and reasoning; from cleanliness of person, observance of truth, and obedience, to altruistic motives and devotion.

It has been found that when young children are compared with adults, there is a greater difference in the control of fine or precise movements, than in the control of the trunk and larger movements of limbs. At the age of five or six a child is able to walk with ease and grace, but his precision of movement of hands and fingers, for example, is only about three-fifths of that of a boy of sixteen. This difference in control of fundamental and accessory movements is strikingly illustrated in feeble minded children, the control of the finer movements corresponding to a higher degree of intelligence being very deficient. Comparisons made between the lower animals and man show the same increase of disparity in the power of man over that of the lower animals as we pass from the fundamental to the accessory. The muscular arrangement of the monkey hand and that of man is very similar and offers no adequate hint of the disparity in the movements of which they are capable.

Since muscular movement is the expression of nervous activity, we should expect that a study of the development of the nervous system would show a corresponding order of development. Dr. Hughlings-Jackson, the English pathologist, made application of the evolutionary theory in the treatment of mental diseases, conceiving three levels or centers to the nervous system; the lowest level controlling the reflex and involuntary movements, the middle level the higher, more complex movements, and the highest level being the center of universal and complete co-ordinations. The three-level theory is now the accepted basis of diagnosis in the treatment of epilepsies.

Dr. Frederick Burk, in his very able study of the development of the nervous system, draws with apparent justness the following conclusions:

"The order of development of the independent parts of the physical and nervous system is, as a general principle (subject

doubtless to minor exceptions) from that which is oldest in the racial history towards that which is most recent. . . ."

"In an extremely loose sense, clearly recognizing the principle that the organism develops by parts, each of which has a different time of beginning its development, a different rate of ripening, and a different period of reaching maturity; nevertheless, we may regard the period of infancy as one of predominating nascencies of the oldest fundamental activities largely in control of the lowest level of the nervous system; the period of childhood from two years to puberty as the period of predominating nascencies of special sense and their association one with the other; the period of adolescence as the period of the predominating nascencies of the higher form of associations, *i. e.*, those which have been developed in the history of the human race."¹

The point of application to play is here. Out of these nascencies arise the instinctive tendencies of children. The experiences of the nervous and muscular systems of man in the long period of action and reaction of evolutionary development have made natural, if not irresistible, certain modes of conduct under certain conditions. These impulses to definite reaction to given stimuli re-echo the historic activities of the race, and are called instinctive. Some are intimately associated with organic functions which constitute our physical life, others with the activities which have made for the preservation and enrichment of life. It is the manifestation of these impulses which give rise to the phenomenon of play in children. Play might then be defined as the expression of awakening instincts. To understand its full significance in child development, it is necessary first to understand the significance of instinct.

Prof. James² in his admirable chapter on Instinct sets forth the law of transiency of instincts. Many instincts appear, are active for a season, and then fade away. If during the period of activity of any instinct the environment is favorable for its manifestation, a habit of acting in accordance with it is formed which remains after the instinct has faded away; but if the environment is unfavorable for the development of a habit, after the instinct has faded away there will be no reaction in accord with it, however favorable may be the external conditions. A chicken that has not heard the call of its mother until it is eight or ten days old will give no heed to it then. If a babe has been fed with a spoon during the first days of its life, it may not easily learn thereafter to suck at all. A young dog kept from the opportunity of burying its superfluous food

¹ *Pedagogical Seminary*, Vol. VI, No. 1, p. 32.

² William James: *Psychology*, Chap. XXIV.

in the soil, went through all the motions of burying articles in the house, but soon abandoned the act and never again attempted to bury anything.

"The natural conclusion to draw from this tranciency of instincts" says Prof. James, "is that most instincts are implanted for the sake of giving rise to habits, and that, this purpose once accomplished, the instincts themselves, as such, have no *raison d'être* in the physical economy and consequently fade away."

The play impulses of children then, we may affirm, have the all important office of giving rise to habits and permanent interests. There is a time when boys love, and must learn, to play ball, swim, skate, or be deficient in such sports and the particular training they give all their lives; there is a time when the zeal for collections or the impulse for construction may do their work in the development of interest in natural history, or of skill of hand; in short, there is a tide in the affairs of childhood which must be taken at its flood, or life, in some particular, be bound forever after in shallows and in miseries.

Taking this explanation of play, we should expect that the play activities of children would, in general, illustrate the order of development given by Burk. This is indeed so. Groos has mentioned in his "*Spiele der Menschen*" the play of infants with the sense apparatus, the grasping with the hand, sucking with the mouth, playing with parts of the body, experimenting with sense of taste, smell, hearing and sight. These and the motor plays, creeping, walking, running, climbing, illustrate the play activities of the lowest level of the nervous system. From the age of two to puberty there is an increasing tendency to associate sense and motor plays with the accomplishment of some purpose; the individual type of play gives place, more and more, to plays which require several players; there is a higher mental element in the play; the simple imitation as of sweeping or dusting displayed by the two year old child, becomes the imitation of house keeping, playing store, being firemen, and the like. Children unite in games in which now one and now another child comes into prominence, as in the old traditional games of Ring a Ring Rosie, and On the Green Carpet. Emulation, which calls into prominence skill, which means, really, power of co-ordination, gradually becomes more prominent. The eye becomes more alert, the ear keener, and the muscular control increases steadily. The boy eludes his pursuer in a game of tag by dodging; he gauges the amount of effort needed, and the direction of the hand, in throwing a ball, or in tossing a ring. He begins to seek prominence through skill, but as yet it is for himself alone rather than for his "side."

Mr. Croswell's¹ study of the amusements of Worcester school children shows a steady increase in interest in games like London Bridge, from six to ten or twelve, also in games like hide-and-seek, while play with toys decreases rapidly from six years on. Interest in ball games, however, steadily increases up to the eighteenth year.

At the age of twelve interest in games of skill, especially those for which there are opposing sides or teams, increases rapidly. If by this time boys do not begin to learn games of skill, the chances are that they will never be greatly interested or proficient in them. This is the period of development of the association fibres of the brain, according to Flechsig, and of the "highest level" of Jackson. It is the period of the nascencies of the highest form.

To make some practical applications of the theory that the play instincts of children re-echo the historic activities of the race in its march toward civilization, let us review in brief the essential characteristics of some of these activities. I follow the list of some special human instincts given by Prof. James :

1. Constructiveness. This includes the whole sweep of mechanical industries. It has developed from the crude hut and weapon making of the savage, to the highest we have achieved in architecture and mechanic arts.

2. Acquisitiveness. This has developed from the simple idea of possession and ownership, to love of accumulation and preservation of personal and public properties, museums, and libraries.

3. Pugnacity. This is the spirit of overcoming, subduing, whether peoples in war or the forces of nature. It has made possible the horrors of war, but it has made possible, also, the discoveries of the world, the development of new lands, and the conquest of nature, time, distance, and even death. Pugnacity is allied in many ways to the hunting instinct.

4. Sociability. This has made the home, the community, and the nation, and is even now reaching out to embrace the brotherhood of all men. It is manifested in love of kindred, of neighbor, of country, and of humanity.

5. Imitation. "The whole history of civilization depends upon this trait," says Prof. James. "What man has done man can do"—and better is the spirit of imitation coupled with emulation.

6. Emulation. "Nine-tenths of the work of the world is done by it."

To such activities and tendencies have been due, in a large measure, the achievements of the race, and these appear as in-

¹ *Pedagogical Seminary*, Vol. VI, No. 3.

instinctive in the play of children and youth. And to give scope to their expression was the object of the Andover Play School. As an educational factor the work of the Play School meets several demands.

It meets the demand of the impulse of constructiveness. Here find opportunity for expression, in miniature, the conception of ideals, the habit of execution, which in the race have made the arts what we see them to-day. This is the first great point. It conserves the basic faculty for mechanical and industrial achievement which in our modern minute differentiation of labor tends to be disseminated. Then it supplies in a measure the sense-motor training claimed by Mosso to have been an important factor in the development of the great masters of the middle ages. "Das Geheimniss des Genies ist die Beweglichkeit." Again, the culture of the will, through the conception of an ideal and its execution, as made possible in the choice and construction of models, especially those to serve some definite purpose of the maker, is of the highest value. The imagination, also, is quickened, it holds in poise a remote and worthy end for present action, a necessity in every strong character.

It meets the universal hunger of children for contact with nature, and offers a legitimate channel for the expression of the hunting and collecting instincts. If the love of money is the root of all evil, the love of nature is its great antidote, the great counter-force to sordid commercialism. God speaks through nature also, as through his written word, and he who possesses the great treasures of the hills, fields, streams, and woods, has treasures that money could not tempt him to abandon. And for the child, love of nature leads easily to higher religious emotions and love of God. He who loves God's creatures and creations must love God and see God in them.

"He prayeth best who loveth best
All things, both great and small;
For the dear Lord who loveth us,
He made and loveth all."

It meets the demands of the boy's nature for play and games. In the free play and the directed games is exercised another great force in the development of civilization, sociability. Here children recognize the needs and demands of the whole as in distinction to their own individual needs and demands. Here is the beginning of the community idea, of mutual advantage and dependence, of conformity to public opinion. This socializing influence is one of the best points of the Kindergarten. And when the time for "team" games has arrived, how prominent is the sacrifice of individualism to the general good,

the altruistic motives of conduct. Dr. Gulick¹ has well shown the moral aspects of group games and explained their significance to religious instruction. Here is the proper field for the exercise of the instinct of pugnacity. Here is a legitimate channel for the tendency to organization or banding; the "team" is the natural substitute for the "gang." These games of adolescence hold before boys one clear, definite object, for the accomplishment of which they devote the entire energy of their being. What matters danger to limb, what matters pain, fatigue, loss of self in the struggle of the whole? courage, duty, honor, success are at stake and the victory must be won. The characteristics of these games, says Dr. Gulick, are a tremendous activity, definite end or object, co-operation, and hero worship. The best moral training for Anglo-Saxon boys must involve appeal to these characteristics.

Play is not an accompaniment of child-life merely, it is a necessity, an expression of the child's intrinsic nature. Without play a child cannot come into possession of his physical, intellectual, and moral birthright, can never become a man. Under some conditions the play of children and youth may take care of itself, possibly, and serve its end, but under the conditions of modern life, definite provision must often be made. The race is differentiating so rapidly that children are often denied the environment necessary for a broad foundation, and narrow childhood develops into a top-heavy maturity. Not alone in the ordinary work of education have these facts a mighty import, but especially can no social effort for the children of the city poor do a full work without attention to them. There are numberless organizations in churches, settlements, and charitable societies designed to appeal to certain interests of growing boys and girls, but I believe that they are successful, so far as the method is concerned, to that degree and extent to which they follow the basic activities of the human race. On these may be built a physical, mental, moral and spiritual structure, stable and secure at its foundation. Such is the beginning, I do not claim it is more, the beginning of the full character, but such a beginning as is the choice of the foundation stones upon which is to be reared a noble structure.

¹*Pedagogical Seminary*, Vol. VI, No. 2.