

AN ASSESSMENT OF THE EFFECTS OF A COLLEGE AIDE PROGRAM ON  
SELECTED MOTOR SKILLS OF SECOND AND FIFTH GRADERS,

by

Margery Kuhn Robertson,

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APPROVED:

-----  
Margaret Driscoll, Chairman

-----  
Richard Stratton

-----  
William McCubbin

-----  
Shirley Farrier

-----  
Dennis Hinkle

-----  
Paul Gunsten

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Blacksburg, Virginia

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## Chapter I

### INTRODUCTION AND PURPOSE OF STUDY

The West Virginia Department of Education in 1975 began to encourage professors in college classes to include field experiences as part of course requirements. A program, initiated in 1973 at Concord College, began to provide a teacher aide field experience for college students who were enrolled in Physical Education Methods and Materials for the Elementary School. To date, little research has been reported nationally that has assessed the motor skills of children in classroom situations where teacher aides have been involved in the teaching of physical education activities. No research in this subject area has been reported to the West Virginia State Department of Education. Therefore, the purpose of this study was to assess selected motor skills of second and fifth grade students and to determine whether the motor skills of students in classes with college aides differed significantly from the motor skills of students in classes without college aides.

Specifically, the objectives of the study were to assess the second and fifth grade children's motor skills of catching, throwing, kicking and striking over a fourteen week period of time. One group of second and fifth grade classes were scheduled to have physical education activities for a ten week period of time, four days a week, thirty minutes each day, with an assigned college aide helping the classroom teacher. Another group of second and fifth grade classes.



were scheduled to have physical education activities for a ten week period of time, four days a week, thirty minutes each day, with the regular classroom teacher. All of the children involved in the study were scheduled to have instruction one day a week for thirty minutes, during the ten week period, with an Elementary Physical Education Specialist who was assigned by the local school system. Pretests and posttests were administered to all of the students who were involved in the study during the first two and last two weeks of the fourteen week block.

#### NULL HYPOTHESES

1. There will be no interaction between the grade in which the student is enrolled and the treatment group to which the student was assigned for the motor skill of throwing.

2. There will be no interaction between the grade in which the student is enrolled and the treatment group to which the student was assigned for the motor skill of catching.

3. There will be no interaction between the grade in which the student is enrolled and the treatment group to which the student was assigned for the motor skill of kicking.

4. There will be no interaction between the grade in which the student is enrolled and the treatment group to which the student was assigned for the motor skill of striking.

5. The experimental groups in the second and fifth grades would not differ significantly in the motor skill of throwing from the control groups in the second and fifth grade classes.

6. The experimental groups in the second and fifth grades would not differ significantly in the motor skill of catching from the control groups in the second and fifth grade classes.

7. The experimental groups in the second and fifth grades would not differ significantly in the motor skill of kicking from the control groups in the second and fifth grade classes.

8. The experimental groups in the second and fifth grades would not differ significantly in the motor skill of striking from the control groups in the second and fifth grade classes.

9. The second grade classes would not differ significantly in the motor skill of throwing from the fifth grade classes.

10. The second grade classes would not differ significantly in the motor skill of catching from the fifth grade classes.

11. The second grade classes would not differ significantly in the motor skill of kicking from the fifth grade classes.

12. The second grade classes would not differ significantly in the motor skill of striking from the fifth grade classes.

#### SIGNIFICANCE OF STUDY

Researchers, since 1930, have expressed concern over the inadequacy of the classroom teacher to instruct children in organized physical education activities. For example, Behrensmeyer (1931) stated that even though the classroom teacher should be responsible for teaching physical education, they often neglected this aspect of the child's training. Behrensmeyer concluded that the teachers were often overburdened with other responsibilities and frequently did not

adequately teach physical education activities. And Davis (1931) reported that physical education was considered a special subject and that elementary school teachers had little training in this subject area.

Rice (1948) and other writers stressed that even though the classroom teachers were usually expected to teach physical education activities, often it was impossible for the teacher to be adequately prepared. Curtiss and Curtiss (1949) stated that the classroom teacher was the person who should teach physical education activities. They also stressed that in service programs should be provided for the classroom teacher in order to better prepare them to teach physical education.

A summary of the elementary physical education teaching situation in the United States during the decade of the fifties was compiled by Beale (1975). She found that the classroom teachers were teaching the majority of physical education classes found at the elementary level. Beale added that during this decade major conferences were held to generate new interest, information, and impetus for elementary physical education and the instruction thereof.

Advantages and disadvantages of having the classroom teacher being responsible for the physical education program continued to be explored during the 1960's. Kistler (1967) in his study of elementary schools in thirty-six states, found that eighty-two percent of the states studied had the classroom teacher teaching physical education. He also reported that there was a lack of qualified help to assist with inservice for the classroom teachers. Espenschade (1968) stated that

researchers continued to find classroom teachers lacking skill and knowledge in the subject area of physical education.

Kurowski (1970) stated that during the early 1970's classroom teachers expressed interest in having a specialist teach the physical education activities. Kurowski further stated that this interest was expressed because of gaps which existed in preparation, interest, and skill on the part of the classroom teacher. Beale (1975) stated that in most United States elementary schools the classroom teacher continued to be responsible for teaching physical education. Beale added that this teaching responsibility for the classroom teacher was in addition to teaching units in art, music, language arts, science, mathematics, and social studies. She further stated that researchers had expressed doubt with regard to the classroom teacher's competencies and skills in teaching physical education activities, although historically they had been responsible for teaching the physical education program.

Researchers have agreed that the elementary classroom teacher usually has the responsibility of teaching physical education activities. They also have discovered that the elementary classroom teacher often had only minimal preparation and little help from their school systems in continuing their knowledge and expertise in the subject area of physical education. However, since 1950, a variety of approaches have been investigated which would provide assistance for the classroom teacher in teaching physical education activities. Jones and Sauborn (1950) emphasized the use of paraprofessionals in the elementary schools for this purpose. Lippett (1965) described how

aides could be used to achieve the following, which would be advantageous for both the classroom teacher and the elementary child:

(1) student teacher ratios could be reduced since the classroom teacher and the college aide would both be available to work with the class; and (2) the classroom teachers and college aides would have more time to devote to students who needed individual attention in developing skills.

College aides could likewise prove to be valuable assistants to the classroom teacher while conducting physical education activities. The student in the college class would be specifically trained in the knowledge and skills of physical education as they relate to the elementary school child. In addition, the college student would be instructed in areas of specific information on child growth and development during the elementary school years. Through this experience, classroom teachers would have the opportunity to update and learn new skills and techniques from working with the college aide. Elementary students would be exposed to innovative ideas and activities in the area of physical education as a result of having the college work with their teacher and class.

At the time of this study, school administrators were only suggesting to their classroom teachers the availability of college aides in certain subject areas. The Mercer County Board of Education (1975) provided the teachers the opportunity to volunteer to work with an aide. Administrators and teachers may begin to support vigorously such a program if research begins to demonstrate the values of such a program to both the elementary student and classroom teacher.

## DEFINITION OF TERMS

The following terms were used throughout this study:

1. College Aides: college students enrolled in Methods and Materials for Elementary Physical Education and who were assigned to classroom teachers to help plan, conduct, and evaluate physical education activities on the elementary level.
2. Throwing: a movement sequence that involved thrusting an object into space by the use of one or two arms (Wickstrom, 1977). A twist of the upper body backwards to the side of the throwing arm during the backswing, and then forward to the side opposite the throwing arm, with or without a shift of weight may also have been a part of the throwing sequence (Wild, 1938).
3. Catching: a fundamental skill that involved the use of the hand(s) and/or other parts of the body to stop and control an aerial ball or object (Wickstrom, 1977).
4. Kicking: a unique form of striking in which the action of the legs and feet imparted force to an object (McClenaghan, 1978 and Wickstrom, 1977).
5. Striking: a movement sequence that involved the use of overarm and sidearm patterns while attempting to hit a suspended object with an instrument held in the hand. This pattern sometimes included a body twist and shift of weight (Wickstrom, 1977).

## LIMITATIONS

This study was limited to the following.

1. The study was limited to selected second and fifth grade classes located in southern West Virginia in Mercer County, within a ten mile radius of Concord College, a state supported institution located in Athens, West Virginia. According to Mercer County statistics (1976) the sample was comprised of children from rural communities and medium sized town populations. All children in the study were enrolled in second or fifth grade classes. The participation of the students and teachers in the study was voluntary.

2. All of the college aides used in this study were enrolled in Methods and Materials in Elementary Physical Education at Concord College during the Spring semester, 1979. The college aides were enrolled in one of two curricula: K-12 physical education or K-6 elementary program. College aides from each curriculum represented were equally assigned to second and fifth grade classes.

3. The study was limited to a time period of fourteen weeks. Pretest and posttest assessments were conducted during the first two and last two weeks respectively. An instructional period for the experimental group prevailed during the middle ten weeks.

4. The test items used were limited to the skills of throwing, catching, kicking and striking.

## ASSUMPTIONS

1. It was assumed that the classroom teachers and college aides who were involved in the study would follow the regular physical education program, planned by the specialist, who was assigned to their school.

2. It was assumed that since the college aides and classroom teachers were not involved in the pretest and posttest phases of the study, that they would not direct their teaching towards the motor skills tested.

3. It was assumed that this was the first time that the college student was enrolled in Methods and Materials for Elementary Physical Education.



## Chapter II

### REVIEW OF LITERATURE

The review of literature in this chapter has been divided into two sections. Investigations reviewed in the first section examine research which has determined the effects of a tutor or an aide upon elementary children. Section two reports studies which have been conducted for the purpose of evaluating the motor skills of throwing, catching, kicking, and striking with young children.

#### THE EFFECTS ON ELEMENTARY CHILDREN OF HAVING AN AIDE OR TUTOR

This section reviews literature which describes the value for elementary school children of having an aide or tutor. The studies reported how the aide affected the elementary children in academic performance, physical performance, and social performance or acceptance.

Aides, paid or unpaid, may be parents, college students, high school students, or children. Some programs were conducted during the school day, others were taught during after school hours, and still others were held during the summer months. Limited research indicated how the use of aides to the classroom situation affected pupil achievement. Of the studies available, the majority dealt with the subject areas of language arts and mathematics. Very few studies were found that described the effects of an aide or tutor

program for elementary children in physical education. Literature describing the value of such programs for the elementary school child was limited to a few research studies, reviews found in textbooks, and articles.

Boyles (1967) conducted a study to ascertain if there were significant differences in arithmetic, language, social studies and reading between students taught by instructional teams and those taught in self-contained classrooms. The study was also designed to compare the personal and social adjustment, attitude, and school attendance of the two groups. The sample for the study included 918 students drawn from Title I schools of the Atlanta Public School System. The control groups were taught for one school term by individual teachers in self-contained classrooms, while the experimental groups were taught by instructional teams, composed of lead teachers, regular teachers, teacher assistants, and teacher aides. Pretests and posttests were administered to all subjects. Information about teachers in the study was gathered from personnel data made available by the school system and from personal data sheets filled out by the teachers. An analysis of covariance and an analysis of variance were the statistical procedures used in the study since it was not possible to equate the experimental and control groups in the beginning.

The following conclusions were drawn from these data.

1. In twenty-two comparisons in achievement on three grade levels, the control groups showed significantly higher means than did the experimental groups. Also, in these twenty-two comparisons boys

achieved significantly higher than girls only in that category of arithmetic concepts and problem solving at the first grade level.

2. Kindergarten experience made a significant difference in the total adjustment of first graders.

3. The majority of significant differences in the areas of student adjustment, self concept, and attitude favored the control groups (self-contained classrooms).

4. School attendance was slightly higher for the control group on all three grade levels.

Frager (1969) evaluated the effect of tutoring on the achievement of elementary school children. The investigation examined the following major questions.

1. Will younger children who are tutored profit more from a set of programmed instructional materials than children who are read to or are tutored?

2. Will high achieving tutors be more effective in producing increased performance of their tutees than low achieving tutors?

3. Is there an interaction between the training given the tutor and the achievement gains of the tutee?

The sample was comprised of forty-eight children in fifth and sixth grades who were stratified on the basis of their scores on the California Achievement Test and teacher evaluations. They were then randomly assigned, within their own schools, to a kindergartner who had been identified by the McNeil Prereading Test as being in need of special help.

The results indicated that all kindergarten children who received tutoring showed significant achievement gains from pretesting to posttesting under both Modes I and II ( $t = 6.3$  and  $8.0$ ,  $p < .001$  respectively). No measurable differences could be attributed to the particular counseling mode employed. Frager stated that the poor achievers were as effective in increasing performance of their tutees, showed a great deal of patience and perserverance with their kindergartners, and themselves benefited from the tutoring experience.

Rogers (1970) developed and evaluated a student tutoring program designed to improve the reading skills of both the tutor and the tutee. Forty third grade children who were experiencing difficulty in reading were utilized as the tutees and the control subjects for the third grade. The third grade tutees improved significantly more on reading skills, from pretest to posttest, than did the nontutored students in the regular third grade classroom. Sixth grade students, diagnosed by their teachers as underachievers, were selected as the tutors for the third grade students. They also were the sixth grade control subjects in the study. The underachieving sixth grade tutors improved in reading skills at a rate comparable to that of other students in the sixth grade reading groups.

Miller (1970) compared the utilization of instructional time of first grade classroom teachers with and without full time teacher aides. He compared the academic performance of children in these two groups and examined the relationship between teacher and aide activity. Pupil achievement was measured by the Lee Clark Reading Readiness Test administered at the beginning of the school year and the Metropolitan

Achievement Test administered at the end of the school year. Miller found that the ten teachers with aides spent more time in clerical activities than the ten teachers without aides. They also spent more time in the total group instruction category. The teachers with aides were more successful than the other teachers in helping the lower level pupils improve their reading ability.

Herman and Slautterback (1970) described a program which utilized college students as pupil leader unit guides in teaching a daily physical education program in an elementary school situation. This was a method of resolving many of the problems associated with the implementation of a daily physical education program in the elementary school. Students, under the supervision of the classroom teacher, lead the class in physical education activities. Joint efforts were made by the specialists, the classroom teacher, and the college student. Herman and Slautterback stated that although the program was an asset, it was not considered to be an adequate substitute for a qualified specialist teaching the activities on a daily basis.

Kulaga (1971) sought to analyze the relationship between the teacher and an aide and the effects of such a pairing upon achievement in reading and arithmetic, and attitudes toward school. The aides were children in the fifth and sixth grades. Children, 647 in number, in grades two through six, were given a pretest and posttest in reading and arithmetic using the Stanford Achievement Test. The fifth and sixth grade children were also given a pretest and posttest using the Attitude Toward School section of the Morse Pupil Attitude Questionnaire. The thirty-three teacher aide teams selected for this study

were asked to respond to two questionnaires: the Assumed Similarity Scale and the Opinion Questionnaire. The children were grouped on the basis of the teacher aide responses which were defined as an index of cohesiveness. The results of the achievement test and attitude questionnaire were analyzed. There were 114 separate tests of significance performed on the achievement scores of the children. Twenty-three percent of these covariances were found to be significant. However, closer examination revealed that no conclusive patterns emerged because the significant differences did not favor either the cohesive or less cohesive team.

Sixty tests of significance were performed on the Attitudes Toward School responses. The results revealed that the motivation of the students and their perception of the teacher were positive ingredients in the learning process when the teacher aide teams perceived themselves to be similar, while the scores of the other groups regressed significantly. The Assumed Similarity Scale indicated that there existed a high correlation between the responses of the teachers and the aides. There was no evidence to support the hypothesis that the cohesive teacher aide team had any significant influence on the achievement of the children in reading and arithmetic.

The results of the Attitudes Toward School questionnaire indicated that a cohesive teacher aide team had a stabilizing effect on the motivation of the children. The results of this instrument also indicated that pupils considered the teacher as one who was willing to give individual attention to their educational needs.

Thompson (1971) conducted a study to determine the effects of a six week tutoring program in remedial reading at the University of Kansas. The study dealt with seventeen children, eleven of whom attended the program during the summer of 1963 and six the summer of 1965. The research was specifically concerned with the students' attitudes, social acceptance, and academic achievement. The investigator concluded that the program had a positive value to forty-one percent of the subjects in the development of attitude toward self. There was a positive value for eighteen percent of the subjects in the development of attitude toward others. Twenty-four percent of the subjects improved in social behavior and acceptance. Forty-seven percent of the subjects advanced in academic achievement. Thompson concluded that the program was successful for those children who were involved. It offered the children avenues for learning which were not available to them during the regular school day and term. The personality of the tutor and the rapport established with the child and the parents was determined to contribute greatly to the effectiveness of the tutoring.

Erickson (1971) investigated the benefits of tutoring to both the tutor and tutee using unpaid school age tutors who had behavior and/or achievement problems in reading. The study also sought to develop the mechanics of a simple and effective tutoring program that could be used in the schools.

Erickson's tutoring program was carried on for five months using twelve seventh grade boys as tutors and twelve third grade boys as tutees. Preservice and inservice sessions were held for the tutors.

The actual tutoring took place twice a week during half hour periods. The study determined the effect of the independent variable of tutoring on the dependent variables of reading scores, overall grades, behavior, interests and attitudes, social acceptance, and attendance. The results indicated that tutoring improved the reading scores of both tutors and tutees. With regard to the other dependent variables, the tutoring program did not result in significant change. The minor objectives of the study dealing with behavior problems, social acceptance, attendance, and overall grades were not achieved.

Teitelbaum (1973) reported an experimental program which was voluntary on the part of Lehman College physical education majors. The physical education majors worked with youngsters from a nearby elementary school. The college students were enrolled in a class called Elementary Movement Experience. The teachers at the elementary schools had identified clumsy children in their classes. The objective of the study was to have the majors work with the clumsy children who could benefit from individualized instruction. This article emphasized the following values for the elementary children.

1. The pupils in the program became enthusiastic performers.
2. They looked forward to having physical education and they also built favorable attitudes toward activities.
3. The children learned specific skills, which they might have not otherwise had the opportunity to learn. Teitelbaum concluded that the experience was also successful and rewarding for the college students who had volunteered to take part in the teaching experience.



Duff (1974) used third and fourth grade tutors as instructors in language arts of first and second grade tutees. Sixty children were involved in the study. The first and second grade tutees had significantly higher gains in their language arts skills when compared to students who had not been tutored.

Epstein (1975) studied the effects of different types of instructors on the vocabulary development of twenty primary grade level subjects. The subjects were divided into one of the four following groups:

1. a peer tutor/tutee group in which each member was instructed by a classmate in reading skills;
2. a self instructional group in which the student was given materials for self teaching in reading skills;
3. a teacher instructed group; and
4. a blind control group.

When comparing the results in vocabulary development of his peer tutor tutee group to those students of the other three groups, Epstein found that the peer taught group was found to have covered significantly more words than the other groups.

Grimes (1977) investigated the effects of four factors, tutee sex, tutor sex, tutor grade level, and tutor tumbling ability on a cross age tumbling teaching program for first grade students in physical education. He also compared the skill gains of those subjects taught by an upper grade tutor, fourth and sixth, to the gains of those taught by a physical education specialist. Seventy-two first grade subjects participated in the study. Eight upper grade tutors

were selected for the study according to the eight various combinations of the three tutor factors studied for effect; male/female, fourth/sixth grade, and low/high tumbling ability.

The subjects in Grimes' study were pretested in tumbling skills using the Jarvis Tumbling Test. An instructional period then prevailed for a period of six weeks. The subjects were then posttested for the same skills. The six week cross age instructional program in tumbling skills was found to increase the children's proficiency in performing the skills.

The analysis of data revealed that of the four factors considered, the only factor to have a significant effect was tutor grade level. Those subjects with a sixth grade tutor scored significantly higher on the tests than those with a fourth grade tutor. A one way ANOVA was used to analyze data for any significant group differences in test score gains between the eight tutor groups and one specialist's group. No significant difference was found between the tutors' group performances and those of the specialist's group. Grimes emphasized the scarcity of reported literature dealing with the effects of tutor aide experiences upon elementary school children in physical education.

Pangrazi (1979) reported a plan which was of mutual benefit to school districts and children and also to teacher training institutions in physical education. Upper level college students, after sufficient preparation, were assigned blocks of time two or three days per week and functioned as specialist teachers of physical education. The classroom teacher was present to fulfill the school's legal responsibilities and they also assisted with difficult problems.

The experience ran for a full term and was under the direction of the school supervisor of physical education who supplied the college students with the local curriculum guide and sets of lesson plans. Both participating school personnel and university staff were represented at bimonthly inservice meetings. The public schools were very receptive to the plan. The plan supplied teachers of reasonable quality who were very enthusiastic and knowledgeable about the new trends and activities. The elementary students benefited from the additional instruction, both in skill level and attitudes toward physical education. The experience for the college student was also deemed invaluable.

#### THE ASSESSMENT OF ELEMENTARY CHILDREN'S MOTOR SKILLS

The review of literature in this section reports studies which have been conducted to evaluate the motor skills of throwing, catching, kicking, and striking with elementary children. Halverson (1969) stated that diverse educational fields were beginning to agree on the importance of early motor activities in the life of the child, and that physical educators were improving the programs for young children. More recently, Herkowitz (1978) states that researchers have begun to develop assessment devices based on developmental bio mechanical information which places children along developmental continua in the fundamental categories of striking, throwing, catching and kicking without denoting age appropriate expectations.

Herkowitz stated that previously many assumptions about child development had been based upon research of the 1930's, very little of which had been contributed by physical educators. She further stated

that from 1930 to 1960 much of the research in the motor development area was game and activity oriented. Methods of skill development were neglected and often teaching suggestions were inaccurate or misleading.

McClenaghan and Gallahue (1978) state that the ability to perform mature skill patterns in throwing, catching and kicking is necessary for successful participation in complex sport and recreational activities such as baseball, softball, tennis, golf and soccer.

Wickstrom (1977) supports this premise and adds that striking skills are also important in these activities. He also adds volleyball to the list.

Studies which have been conducted to evaluate the motor skills of throwing, catching, kicking and striking with elementary children follow. Jenkins (1930) made a comparison of motor achievements of five, six, and seven year old children. The children, 300 in number, were divided according to sex and asked to participate in the following tests: (1) thirty-five yard dash, (2) beanbag toss for accuracy, (3) baseball throw for distance, (4) soccer kick for distance, (5) baseball throw for accuracy, (6) standing broad jump, (7) running broad jump, (8) jump and reach, and (9) fifty foot hop. In all events the child was encouraged to do his best and only the best score was recorded. The subjects were scored for discrimination rather than pass or fail, in order to give the children an opportunity to succeed without undue pressure. All of the children tested by Jenkins recorded successively better mean scores on the soccer kick for distance. This was not true for the other activities.

Halverson et al. (1931) concluded, as a result of her study, that before forty four weeks of age children cannot voluntarily release objects. It was also concluded that children pass through a period in which they can grasp an object but can release it only with the aid of a resisting surface. The rudimentary manipulative abilities were refined as muscle strength, coordination and perception began to improve during infancy. By the time the children entered early childhood, they had developed sufficient motor control to begin to explore and refine the fundamental manipulative patterns.

Wild (1938) conducted a study of the throwing pattern and its course of development in thirty two children. They were grouped according to sex and age. There was a boy and girl at each year level from seven to twelve years of age. It was concluded that certain patterns for arm, body, and whole throw components are typical of age. The results indicated that in developing the overhand throwing pattern, the children passed through four progressive stages.

Webster (1939) conducted a study to compare the accuracy of throwing of third, fourth, and fifth grade boys. The 232 boys threw a baseball, softball, and a volleyball at a target from distances of twenty, thirty and forty feet. Webster found a progression in mean total scores from grade three to grade four, and from grade four to grade five. Moreover, the subjects were more accurate from the shorter distances than the longer ones. The subjects were also more accurate with the two smaller balls than with the larger ones.

Hoadley (1941) studied the catching ability of 250 elementary children in grades one through four. She used a throwing machine which

was capable of projecting a ball sixteen feet. Using balls of three different sizes in her study, Hoadley found that boys and girls improved in the ability to catch large and small balls at successive grade levels, with the most significant increases coming between grades two and three for both sexes. At the first grade level there was no sex difference in catching balls of any size and at grades two and three there was no sex superiority in catching the large ball. However, the boys in this study were able to catch a small ball better than the girls in grades two, three and four.

Seils (1951) studied the motor performances of 510 primary grade children. In his battery of gross motor performance tests, striking was measured by the use of a pendulum controlled ball that was to be struck by a bat. The average performances on the test showed a constant increase for both boys and girls at successive grade levels. However, when all of the children were classified according to three month age intervals, rather than grade, there was no evidence of constant improvement.

Warner (1952) studied the motor ability of 841 third, fourth, and fifth grade boys. Volleyballs and tennis balls were used to measure the boys' catching ability from a distance of twenty feet. Five trials were given with each ball. With the volleyball, perfect scores were recorded from 70.1 percent of the third grade boys, 84.6 percent of the fourth grade boys and 92.5 percent of the fifth grade boys. Perfect scores with the tennis ball were made respectively by 57.5 percent, 78.5 percent and 87.2 percent of the third, fourth, and fifth graders.

Sheehan (1954) developed a baseball achievement scale for two groups of elementary school boys. One group of boys were primary students, ages seven, eight, and nine. The other were intermediate students, ages ten, eleven, and twelve. The subjects batted in a situation that was considered realistic, but not completely controlled. Each was given ten hits during a baseball batting practice. The balls were thrown from the regulation pitching distance by another player. As a result of the program an improvement in batting ability was reported for both groups.

Johnson (1962) used a procedure for testing striking skills with 624 elementary school children in grades one through six. The children were asked to strike a ball that was swung over the plate. The average scores on the striking tests were increasingly better at successive grade levels. Boys were considerably better performers on the striking test at grades one and two but thereafter retained only a slight advantage over the girls. Johnson also measured the kicking accuracy of his subjects. The children improved in this test at each grade level and the boys were significantly more accurate than the girls in grades three, four, and five.

Dohrman (1964) tested eight year old boys on the soccer kick for distance in the fall and spring of the same school year. He found that the boys and girls improved significantly in performance between the test periods. The boys in this study kicked farther than the girls.

Keogh (1965) assessed the motor ability of young children. In his comprehensive study, the target throw for accuracy was limited to

children ages seven, eight, and nine. He found an improvement in performance and a superiority of boys over girls at each of the three age levels. Hanson (1965) utilized the volleyball serve for distance to measure striking in her study which tested the motor performance of elementary school children. An underarm pattern using the hand as the striking implement was the technique employed by 2,840 elementary children. According to the scores registered, the boys and girls improved regularly in this form of striking. The average distance the volleyball was served was significantly greater at successive grade levels with the boys serving farther than the girls in each grade. Hanson also measured the boys and girls in this study in a soccer punt for distance. The boys' kicking performances exceeded those of the girls while both sexes improved at successive grade levels.

Bruce (1966) studied the catching performance of 480 children equally divided between boys and girls among grades two, four, and six. His findings verified the improvement of performance with advancing grade level and the superiority of the catching ability of boys. Bruce included adjustive movements, the height of ball trajectory and ball velocity factors in the study. It was found that these factors were related to comprehensive catching skill.

Van Slooten (1973) conducted a study for throwing accuracy with 960 boys and girls ages six, seven, eight, and nine. His results were similar to those of Webster's study, mentioned previously. Among the boys and girls, there was annual improvement in a throwing for accuracy test and the boys were significantly better than the girls at each



age level. The boys also were superior to the girls in the kicking for distance and in the kicking for accuracy tests at each age level.

Pederson (1973) studied the ball catching abilities of 600 first, third and fifth grade children on twelve selected ball catching tasks. Catching ability improved significantly for the children in each of the successive grades. Boys were more successful than girls in grades one and three, but there was no difference in performance at grade five.

### SUMMARY

The review of literature in this chapter was divided into two sections. The investigations reported in the first section examined research which had been conducted to determine how having an aide or tutor affected the elementary child in academic performance, physical performance and social performance or acceptance.

More research was found in the disciplines of language arts and mathematics than in physical education. Literature describing the value of such programs for the elementary school child was not extensive. In the majority of studies reviewed, achievement or success of some type was noted as a result of having an aide or tutor.

Section Two of the review reported studies which had been conducted to evaluate the motor skills of throwing, catching, kicking, and striking with elementary children. Within the last two decades researchers have begun to agree about the importance of early motor activities with children. Researchers also have begun to emphasize the

role of the mature skill pattern in determining successful participation in complex sport and recreational activities.

In the reported studies boys tended to be superior to girls in their skill levels. As the chronological age increased with both boys and girls, their performances also tended to improve.

## Chapter III

### PROCEDURES

The purpose of this chapter is to describe the methods and procedures which have been employed in the study. Specific topics include: (1) site selection, (2) sample, (3) classroom teacher selection, (4) college aide selection and assignment, (5) test administrators, (6) physical education specialist selection, (7) length of study, (8) evaluation instrument, (9) administration procedures for the evaluation instrument, (10) research design and data analysis.

### SITE SELECTION

The following Mercer County elementary schools were selected as sites for the study: Athens, Knob, Melrose, Mercer, Oakvale, Thorn, Sun Valley, Silver Springs. All were located within a ten mile radius of Concord College and were either on or near a mass transit route. Interviews were conducted with the appropriate personnel from the Mercer County School System and permission to conduct the study was secured from them prior to the commencement of the study (Appendix A, B, C).

### SAMPLE

The sample for the study included twenty sections of elementary students, ten of which were enrolled in the second grade level and ten

of which were enrolled in the fifth grade level. The sample consisted of 449 children.

The study was conducted over a fourteen week period. The first two and last two weeks respectively were spent in pretest and posttest phases. An interim ten week instructional period was included for those sections of students in the experimental group. The control group students participated in only the pretest and posttest phases of the study.

The students located at Athens, Melrose, Mercer, Silver Springs, Sun Valley and Thorn elementary schools comprised the experimental group. These classes were considered representative of the rural and medium sized town populations. They participated in all phases of the study.

Students in second and fifth grade class sections located at Knob, Mercer, Oakvale, Thorn and Silver Springs elementary schools comprised the control group for the study. They likewise were considered to be representative of the rural and medium sized town populations. All of the students who volunteered to participate in the study had their parent or guardian complete a parental permission form prior to the beginning of the study. The permission forms were kept on file throughout the study in the principal's office of the respective school. A sample of the permission form is included in Appendix D.

## CLASSROOM TEACHER SELECTION

The classroom teachers in the Mercer County Elementary Schools, teaching on the second and fifth grade levels, had the opportunity to volunteer to participate in the research study. This procedure was suggested by an Administrator of the Mercer County School System. All those interested had the opportunity to review an abstract which briefly described the study (Appendix E). The Coordinator of the Teacher Education Center in the Mercer County School System acted as the liaison person between the classroom teachers who volunteered to participate and the researcher. The coordinator completed all of the necessary arrangements with the individual schools, principals, and the classroom teachers. Letters were sent to all principals and classroom teachers who volunteered to participate (Appendix F, G).

## COLLEGE AIDE SELECTION AND ASSIGNMENT

College students, enrolled in Methods and Materials of Physical Education for the Elementary School, at Concord College during the Spring Semester 1979, were utilized as the college aides for the study. The course enrollment reflected students pursuing either a K-12 Physical Education Curriculum or a K-6 Elementary Education Curriculum. The Methods course was a required course for students enrolled in either curricula. All students were either third or fourth year college students. Random assignments (Ary, Jacobs, Razavich (1972)) of the college students, as aides, in the K-6 curriculum and the K-12 Physical Education curriculum were made to the experimental

sections of children in the primary and intermediate classes. Sex and academic year or standing were not considered when making the assignments.

#### TEST ADMINISTRATORS

The major Administrator for the study was the college professor who taught the Methods and Materials in Physical Education for the Elementary School course. The Assistant for the study was a senior level physical education student who was completing his student teaching at the time of the study.

#### PHYSICAL EDUCATION SPECIALIST SELECTION

The Physical Education Specialists employed in Mercer County were all traveling employees. All of the specialists were assigned to travel to a minimum of two and a maximum of four schools per week to conduct physical education activities. Each class period was thirty minutes. The Physical Education Specialists volunteered to participate in this study. The Supervisor of Physical Education in the Mercer County School system acted as liaison between the researcher and the specialist. Arrangements for cooperation were made with the Supervisor prior to the beginning of the study (Appendix H).

Each specialist was responsible for planning the physical education program at his/her assigned schools. Mercer County provided a guide which helped the specialist in planning, but did not restrict the specialist to teaching specific activities at a specific time during the school year. Consequently, at any given time during the school year,

the program at one school could vary when compared to another. The specialists designed their instructional plans at the beginning of the school year without knowledge that a research study was being proposed. Throughout the time period of study the specialists and classroom teachers followed the plans which were established at the beginning of the school year. Therefore, any teaching that may have taken place involving any of the motor skills tested was considered coincidental.

#### LENGTH OF STUDY

The study was conducted over a time period of fourteen weeks. The first two weeks were allotted for the pretest phase. The researcher and an assistant conducted the pretests during the regularly scheduled physical education class when the specialist was at the respective school. The specialist helped the administrator and assistant with class organization and control during the testing. Since all of the students were not tested simultaneously, the specialist, while conducting the regularly scheduled activities, released students for testing purposes. This procedure was suggested by the Mercer County physical education supervisor.

The last two weeks were allotted for the posttest phase of the study. The researcher and the same assistant conducted the posttests, following the same procedure described for the pretest situation. During the interim ten weeks an instructional period prevailed for the experimental group utilizing the college aide program.

## EVALUATION INSTRUMENT

The Ohio State University Scale of Intra-Gross Motor Assessment, (OSU SIGMA), designed by Edwin Michael Loovis (1975) was selected as the evaluation instrument in the study (Appendix I). Herkowitz (1978) described this instrument as a promising new assessment device, based on developmental bio-mechanical information without denoting "age appropriate expectations". In the past, Herkowitz stated, most researchers had utilized traditional methods when evaluating motor skills. She also stated that most of the traditional instruments which have measured such skills had been structured around the concept of age appropriate behavior. Herkowitz also recommended the appropriateness of this instrument for school settings where complex, time consuming and contrived instruments were either difficult to use or inappropriate.

Minor adaptations were made to the original instrument for use in the study. The original instrument attempted to assess the child's efficiency of performance in eleven gross motor skills: walking, catching, ladder climbing, stair climbing, throwing, striking, skipping, running, hopping, jumping and kicking. The motor skills which were assessed in this study were limited to throwing, catching, kicking, and striking.

The original instrument was designed to assess the motor skills of preschool children through age fourteen. In this study the instrument was administered to children in the second and fifth grades. Loovis' instrument had been administered to both normal and exceptional populations, however, in this study the sample was described as normal.



The scoring procedures for the instrument were revised to accommodate the adaptations mentioned. In addition, numerical values were assigned to the various levels of performance, in order to statistically analyze the resulting data for this study.

Previously the statistical analyses for this instrument dealt with interjudge and intrajudge reliability. Herkowitz (1978) stated that because of being a relatively new instrument, only limited reliability data existed for the test. Loovis (1975) reported that a test retest reliability study had been conducted. Data were analyzed with Scott's Pi. Walking, catching, ladder climbing and stair climbing were listed in one group of skills which was classified as having high reliability (0.83 or higher). The group with medium reliability coefficients (0.54 to 0.82) included throwing, striking and skipping. The group with low reliability coefficients (0.53 or lower) included running, hopping, jumping and kicking. The percentage of agreement among judges on the first administration of the test indicated that walking, catching, ladder climbing and stair climbing had 0.91 or higher agreement. Throwing, striking and skipping had 0.75 agreement. All other items were scored with between 0.50 and 0.67 agreement. Michael Loovis, in a personal interview, on October 20, 1979, indicated that he had been improving his instructions and test equipment in order to increase the interjudge and intrajudge reliability of the OSU SIGMA Test.

## ADMINISTRATION PROCEDURES FOR SIGMA

General Directions for Administering the OSU SIGMA (1975)

The OSU SIGMA is a test which was used to assess eleven motor skills that children demonstrate during physical activity. The selected skills assessed in this study were throwing, catching, striking and kicking. Each skill test had the following three elements: Test Equipment, Test Condition and Test Performance. Each of these elements will be explained in detail.

Test Equipment. This element described the equipment needs required for each skill. Recommendations were made regarding the dimension of balls, the type of bats, and other equipment, as well as the structural requirements for some pieces of equipment.

Test Condition. This element defined the child's position prior to executing the prescribed movement. It also provided the test administrator with information about the uses of equipment during the test, the kinds of physical assistance which were permissible, if any, and the use of specific verbal directions.

Test Performance. This element represented any of four observable behaviors which a child could demonstrate during the skill test. It consisted of two main components. The first component was a description of the behavioral criterion(s). The behavior criterions were detailed outlines of the movements. See specifically levels two, three, and four of the skill tests.

Each skill was divided into four levels. Each level was a description of a behavior which could be seen as the administrator observed the child performing a skill. The levels, as defined in the test, have been described in a manner to permit ease of observation and measurement.

The second component was described as the trials criterion. This could also be described as a performance statement. Each child was given three trials. The performance statement indicated successful completion of two out of three trials. Both of these components are discussed in the section which follows, Specific Instructions.

### Specific Instructions

Loovis (1975) suggested the following guidelines for administering the selected portions of the SIGMA:

1. Request the child to perform the skill
  - 1.1 Use simple instructions, for example, "Throw the ball as 'hard' as you can".
  - 1.2 If the child does not understand the instructions, demonstrate the skill and then repeat the instructions once again.
2. Observe the child's performance a sufficient number of times as described in the trials criterion component of the Test Performance. If you are unable to decide upon a consistent pattern of movement within the number of trials suggested, then you are encouraged to have the child perform additional trials.

3. Score the child's performance. The scoring procedure was adapted to the experimental design of this study. Based upon his/her performance, each child had a numerical score recorded which correlated with an incomplete or complete performance on a particular level. A sample scoring sheet is in Appendix J. Under each level column, two categories exist for each skill: incomplete and complete. Refer to Figure 1. Two spaces were available for checking the child's performance in the incomplete category. The spaces were marked "T" and "B". "T" referred to a performance in which the trials criterion had not been totally met. "B" indicated a performance in which the behavioral criterion(s) was not completely accomplished. The complete category only had one space which the administrator could use to record the child's performance. Checking this space indicated that the child's performance was complete on the level indicated. The numbers in these categories indicated the child's score in each skill. At the far right of the scoring sheet, space was provided to record the child's score for each skill performed. Based upon the child's performance, the administrator recorded the score using the following method: (in the example which follows, level four of throwing was used).

3.1 When a child demonstrated all of the behavioral criteria for a skill and accomplished the trial criterion, the performance was marked as complete.

When a child demonstrated all of the behavioral criteria for a skill on level 4 and accomplished the trials criterion, then the performance was complete. On the SIGMA scoring sheet the administrator marked an (X) through the space marked "C<sub>12</sub>" (Fig. 1).

Figure 1

SIGMA Scoring Procedure for Complete Performance

		LEVEL IV	
		Incomplete	Complete
THROWING	T	10	C 12
	B	11	

- 3.2 When a child demonstrated all of the behavioral criteria for a skill but failed to accomplish the trials criterion, then the performance was marked incomplete. On the SIGMA scoring sheet the administrator marked an (X) through the space marked "T<sub>10</sub>" (Fig. 2).

Figure 2

SIGMA Scoring Procedure for Incomplete Performance  
in Trials Criterion

		LEVEL IV	
		Incomplete	Complete
THROWING	T	<del>10</del>	C
	B	11	

- 3.3 When a child failed to demonstrate all of the behavioral criteria for a skill but accomplished the trials criterion, then the performance was incomplete. On the SIGMA scoring sheet the administrator marked an (X) through the space marked "B<sub>11</sub>" (Fig. 3).

Figure 3

SIGMA Scoring Procedure for Incomplete Performance  
in Behavioral Criterion

		LEVEL IV	
		Incomplete	Complete
THROWING	T	10	C
	B	<del>11</del>	

- 3.4 If a child refused to participate in the assessment procedure or failed to respond in any manner to the instructions the administrator left the scoring sheet blank and recorded a zero (0) in the TOTAL column (Fig. 4).

Figure 4

SIGMA Scoring Procedure for Failure to Complete Test

		LEVEL IV		Total
		Incomplete	Complete	
THROWING	T	10	C	0
	B	11		

- 3.5 After checking the appropriate category for the student's performance, the administrator recorded the corresponding numerical value in the Total space provided at the far right of each skill (Fig. 5).

Figure 5

SIGMA Scoring Procedure to Indicate "TOTAL" Score  
of Each Skill

		LEVEL IV		TOTAL
		Incomplete	Complete	
THROWING	T	10	C	12
	B	11		

### Suggestions for Observing Motor Performance

Since the successful analysis of motor skills in SIGMA depended upon the Administrator's critical observation skills, Loovis (1975) offered the following suggestions to assist the Administrator:

1. Watch parts of the student's body during the movement and not the total body (this may require you to request additional trials).
2. Concentrate primarily on the student's movement and only secondarily on the product of the movement, e.g., catching the ball or throwing to a specific target.
3. To assure a true representation of the child's performance, the Administrator is encouraged to be sensitive to certain situations which are present in the Test Condition element of most skills. These situations are generally as follows:
  - a. Some skills have a general notation which is applicable across three or more levels.



b. Some skills have statements specific to two levels or to only one level. More specifically, the situations are as follows:

1. Throwing (Levels 2, 3, 4) -- Ask child to throw the ball as "hard" as he/she can!
2. Catching (Levels 2, 3, 4) -- Ball should reach the child between the shoulders and the waist! Ball should travel in an arc, not in a straight line!
3. Kicking (Levels 2, 3, 4) -- Ask the child to kick the ball as "hard" as he/she can!
4. Striking (Levels 2, 3, 4) -- Ask the child to hit the ball as "hard" as he/she can!

Loovis added that it is extremely important that the Administrator of the test is familiar with the previously mentioned statements in order to elicit not only the most realistic behavior from the child, but also to produce the most reliable assessment of the behavior(s).

#### RESEARCH DESIGN AND DATA ANALYSIS

The research design for this study was a two (grade) by two (group) by two (pretest, posttest) factorial with repeated measures on the third factor. In order to establish reliability of the test instrument for the study, a test retest procedure utilizing the Pearson correlation coefficients was used. A multivariate analysis of covariance was conducted in order to determine statistically significant differences on the motor skills with respect to experimental

versus control group, grade, and the interaction between groups and grade.

#### SUMMARY

This chapter described the methods and procedures which were employed in the study. The study was conducted over a period of fourteen weeks. The first two weeks and last two weeks were used for pretesting and posttesting purposes. The researcher and an assistant administered the pretests and the posttests. An instructional period prevailed during the middle ten weeks of the study for the experimental group utilizing a college aide program in physical education from Concord College.

The sample was comprised of ten sections of second grade students and ten sections of fifth grade students in Mercer County, West Virginia. Students from both the control and experimental groups were representative from rural and medium size town populations.

Participation in the study, on the part of the elementary classroom teachers, the children, and the physical education specialists was voluntary. The college aides were enrolled in Methods and Materials of Physical Education for the Elementary School during the Spring 1979 semester at Concord College. The aides were assigned to assist a classroom teacher in the experimental sections.

The evaluation instrument used in the study was the Ohio State University Scale of Intra-Gross Motor Assessment (OSU SIGMA). Minor adaptations were made in procedures and scoring for use in the study.

The research design for this study was a two (grade) by two (group) by two (pretest, posttest) factorial with repeated measures on the third factor. Reliability was established for the instrument used in the study by using a test retest procedure. A multivariate analysis of covariance was conducted to determine statistically significant results with respect to the null hypotheses.

## Chapter IV

### ANALYSIS AND DISCUSSION OF THE RESULTS

The purpose of the investigation was to assess selected motor skills of second and fifth grade students and to determine whether the motor skills of students in classes with college aides differed significantly from the motor skills of students in classes without college aides. The motor skills, of which the children were tested, were throwing, catching, kicking and striking. A copy of the instrument and scoring procedures is available in Appendix I.

Chapter IV contains the statistical analyses of the results of the study. The chapter is divided into two sections. The first section defines the statistical technique which was utilized in determining the reliability of the instrument for the study. The results of the reliability study are reported in this section. Section Two presents the analyses from the two way multivariate analysis of covariance as related to the hypotheses stated in Chapter I. The data collected during the experimental period are presented in Appendix J.

#### RELIABILITY

At the time of this study only limited reliability data existed for the OSU SIGMA test. Loovis (1975) reported a test retest reliability study. The data, obtained from Loovis' study, were based upon interjudge and intrajudge results.

Since the instrument, Loovis' OSU SIGMA test, was adapted to meet the experimental design of the study, a test retest procedure was conducted to establish the reliability of the instrument for this study. The test retest procedure was administered to the 201 control subjects in the study. The data utilized were the scores obtained from the pretest and posttest application of the OSU SIGMA test measuring the skills of throwing, catching, kicking and striking.

A computerized program, SPSS (1975), utilizing the Pearson correlation technique was used to give indication of the reliability (Table 1). The resulting correlation coefficients for the motor skills tested were as follows: throwing .4834, catching .3901, kicking .4125, and striking .3487. According to Hinkle, Wiersma and Jurs (1979) the correlation coefficients which resulted from this procedure in this study would be described as low positive correlations (.30 to .50).

#### TWO WAY MULTIVARIATE ANALYSIS OF COVARIANCE OF THE DATA RELATED TO HYPOTHESES

This section of Chapter IV is a presentation of the findings dealing with the hypotheses of the study. A multivariate analysis of covariance was performed using the pretest and posttest scores of two grade levels (second and fifth) in two groups (experimental and control) on four motor skills (throwing, catching, kicking, striking). The computer program MANOVA (Multivariate Analysis of Variance, Clyde, 1969) was used. Pretest and posttest means, mean differences and adjusted posttest means for the two grade levels according to experimental and control group are reported in Table 2.

Table 1

Reliability Coefficients for the Four Subscales  
of the Motor Skill Tests

	N	Pearson Correlation Coefficients
Throwing	201	.4834
Catching	201	.3901
Kicking	201	.4125
Striking	201	.3487

Table 2

Data Collected During Experimental Period Including Pretest Means,  
Posttest Means, Mean Differences and Adjusted Posttest Means

		Pretest	Posttest	Mean Diff.	Adj. Post Means
Grade 2 N=112 Experimental	Throwing	4.741	6.223	1.482	6.964
	Catching	3.821	5.304	1.483	5.700
	Kicking	3.839	5.866	2.027	6.342
	Striking	4.777	7.277	2.500	7.819
Grade 2 N=88 Control	Throwing	4.818	6.932	2.114	7.241
	Catching	4.864	5.295	0.431	5.467
	Kicking	4.523	5.557	1.034	5.777
	Striking	4.807	7.045	2.238	7.296
Grade 5 N=136 Experimental	Throwing	5.728	7.471	1.743	7.073
	Catching	5.493	7.397	1.904	7.190
	Kicking	4.934	7.103	2.169	6.831
	Striking	5.721	7.753	2.032	7.603
Grade 5 N=113 Control	Throwing	5.150	7.336	2.186	6.840
	Catching	6.027	7.142	1.115	6.865
	Kicking	5.664	7.009	1.345	6.693
	Striking	5.823	7.381	1.558	6.949

A multivariate test of significance using Wilks Lambda Criterion was analyzed in order to determine the interaction between grades and experimental versus control groups. The result of this test indicated that there was a nonsignificant interaction ( $F = 1.281$ ,  $p = 0.277$ ). These data indicate that the differences between the adjusted posttest means on the four skills of throwing, catching, kicking and striking for the two groups were relatively constant across the two grades (see Table 2). Thus null hypotheses one through four were retained.

A multivariate test of significance using Wilks Lambda Criterion was used to determine if there were significant differences between the experimental and control groups on the four skills of throwing, catching, kicking and striking. The pretest means, posttest means, mean differences and adjusted posttest means for the experimental and control groups combined over the two grade levels are found in Table 3. The results of this analysis indicated that there was a significant difference between the experimental and control group ( $F = 3.198$ ,  $p = 0.013$ ). In order to determine the specific skills on which the two groups differed, the univariate analyses of covariance for each of the four skills were examined. The results of these analyses indicated that the differences between the two groups were attributed to the skills of catching, kicking, and striking. Examination of the adjusted posttest means (see Table 3) indicated that for each of these skills, the experimental group had the greater adjusted posttest mean. Thus, based upon these analyses, null hypotheses six, seven and eight were rejected while null hypothesis five was retained.



Table 3

Pretest Means, Posttest Means, Mean Differences and Adjusted Posttest Means  
for Experimental and Control Groups when Combined Over Two Grades

		Pretest	Posttest	Mean Diff.	Adj. Post Means
Experimental	Throwing	5.2823	6.9073	1.6250	7.024
	Catching	4.7379	6.4516	1.7137	6.517
	Kicking	4.4395	6.5444	2.1049	6.610
	Striking	5.2944	7.5927	2.2983	7.701
Control	Throwing	5.0050	7.1592	2.1542	7.016
	Catching	5.5174	6.3333	0.8159	6.253
	Kicking	5.1642	6.3731	1.2089	6.292
	Striking	5.3781	7.2338	1.8557	7.101

The findings of this study regarding the motor skills of catching, kicking and striking in physical education agree with studies conducted by Rogers (1970), Miller (1970) and Erikson (1971). These researchers stated that in the subject area of reading, significant results for groups of children who had the opportunity to work with an aide or tutor for an experimental period of time were evident. Studies by Duff (1974) in language arts and by Epstein (1975) in vocabulary development also agree with the findings of this study in the aforementioned skills. Grimes (1977) also found that the six week cross age instructional program in tumbling skills was effective in increasing the children's proficiency in performing selected tumbling skills.

The nonsignificant finding regarding the motor skill of throwing in physical education in this study concurs with the findings of Boyles (1967) and Kulaga (1971) in the academic areas of reading and arithmetic. The children in these studies did not show any significant gain or achievement because of the treatment involving an aide or tutor.

A multivariate test of significance using Wilks Lambda Criterion was used to determine differences between the older children (fifth grade) and the younger children (second grade) on the four skills of throwing, catching, kicking and striking. The pretest means, posttest means, mean differences and adjusted posttest means for the two grades are found in Table 4. The results of this analysis indicated that there was a significant difference between the second and fifth graders ( $F = 31.613, p = 0.001$ ). In order to determine the specific skills on which the grade levels differed, the univariate analyses of covariance for each of the four skills were examined.

Table 4

Pretest Means, Posttest Means, Mean Differences and Adjusted Posttest Means  
Comparing Grade Two with Grade Five

		Pretest	Posttest	Mean Diff.	Adj. Post Means
Grade 2	Throwing	4.7750	6.5350	1.7600	7.086
	Catching	4.2800	5.3000	1.0200	5.598
	Kicking	4.1400	5.7300	1.5900	6.093
	Striking	4.7900	7.1750	2.3850	7.589
Grade 5	Throwing	5.4659	7.4096	1.9437	6.967
	Catching	5.7349	7.2811	1.5462	7.042
	Kicking	5.2651	7.0602	1.7951	6.769
	Striking	5.7671	7.6386	1.8715	7.306

The results of these analyses indicated that the differences between the two grades were attributed to the skills of catching and kicking. Examination of the adjusted posttest means (see Table 4) indicated that for these two skills, the older children (fifth graders) had the greater adjusted posttest mean. Thus, based upon these analyses, null hypotheses ten and eleven were rejected and null hypotheses nine and twelve were retained.

The findings of this study concur with the findings of studies reported by Hoadley (1941), Warner (1952), Bruce (1966) and Pederson (1973) involving the skill of catching. The children in all of these studies demonstrated greater proficiency with successive grade levels. Hanson's (1965) study also revealed that a youngster's proficiency in kicking was increased at successive grade levels during the elementary years.

The findings in this study did not concur with those reported by Webster (1939) and Van Slooten (1973) involving the motor skill of throwing. In this skill, Webster and Van Slooten found that children were more proficient at successive grade levels, however in this study no significant differences were found between the younger children and older children with regard to the skill of throwing. Seils (1951), Johnson (1962) and Hanson (1965) reported that children improved in their striking abilities as they progressed through the elementary grades. However, the findings of this study indicated that there was no significant difference in the improvement, pretest and posttest, between the younger and older children, with reference to the skill of striking.

## SUMMARY

The two way multivariate analysis of covariance of the data indicated that there was a nonsignificant interaction between grades and experimental versus control groups. Therefore hypotheses one through four were retained.

There was a significant difference between the experimental and control group when combined over the two grade levels in the skills of catching, kicking and striking. Therefore hypotheses six, seven, and eight were rejected while hypothesis five, which stated that there would be no difference in the motor skill of throwing, was retained.

There was a significant difference between the second and fifth graders on the skills of catching and kicking, with the older children demonstrating greater proficiency than the younger children. Therefore hypotheses ten and eleven were rejected while hypotheses nine and twelve were retained.

The findings in this study showed agreement and disagreement with many of the studies reviewed in Chapter II. In three of the four skills assessed the children in the experimental groups scored significantly better than the children in the control groups. In two of the four skills, the findings of this study concurred with the related literature in finding that children demonstrated more proficiency at successive grade levels. However, in two other skills, there was no significant difference between the two grade levels during the time span of this study.

## Chapter V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Little research had been reported which had assessed the motor skills of children in classroom situations where teacher aides had been involved in the teaching of physical education activities. Therefore the purpose of this study was to assess selected motor skills of second and fifth grade students and to determine whether the motor skills of students in classes with college aides differed significantly from the motor skills of students in classes without college aides. The children were tested on the motor skills of throwing, catching, kicking, and striking over a fourteen week period of time.

Four hundred forty nine children from Mercer County, West Virginia comprised the sample for the study. All of the children in the study were pretested with the OSU SIGMA test (1975) on the four motor skills during the first two weeks of the study. A ten week instructional period then followed for the experimental group utilizing an assigned college aide to help conduct physical education activities with the class four days each week. The control group experienced their regular instructional period for the interim ten week period, having their classroom teacher being solely responsible for conducting the physical education activities four days each week. Both groups received their usual instruction from a physical education specialist one class period each week. After the ten week period, all

of the subjects were posttested utilizing the same instrument which was used in the pretest.

A two way multivariate analysis of covariance (MANOVA, 1969) was conducted in order to determine statistically significant differences on the motor skills with respect to experimental versus control group, second and fifth grade, and the interaction between them. The covariates were the four pretest scores on the motor skills of throwing, catching, kicking, and striking with the four posttest scores on the above mentioned motor skills being the criteria.

Using the Wilks Lambda Criterion to determine the interaction between grades and experimental versus control group, the results indicated that there was a nonsignificant interaction ( $F = 1.281$ ,  $p = 0.277$ ). Thus, on the four skills of throwing, catching, kicking and striking, the two groups were relatively constant across the two grades. The Wilks Lambda Criterion was also used to determine if there were significant differences between the experimental and control groups on the four skills of throwing, catching, kicking, and striking. The results indicated that there was a significant difference between the experimental and control groups ( $F = 3.198$ ,  $p = 0.013$ ). Using an univariate analyses of covariance for each of the four skills it was determined that the differences between the two groups were attributed to the skills of catching, kicking and striking. The Wilks Lambda Criterion was used to determine differences between the older children (fifth graders) and the younger children (second graders) on the four skills of throwing, catching, kicking and striking. The results indicated that there was significant differences between the second

and fifth graders ( $F = 31.613$ ,  $p = 0.001$ ). After examining the univariate analyses of covariance the differences between the two grades were attributed to the skills of catching and kicking.

### CONCLUSIONS

The test retest procedure employed in this study to determine the reliability of the test instrument, revealed that the reliability of Loovis' SIGMA test for use in this particular study was relatively low.

The following conclusions are stated in relation to the twelve pre-established research hypotheses with due consideration to the evidence provided by this study.

1. The differences between the adjusted posttest means on the four skills of throwing, catching, kicking and striking for the two (experimental and control) groups were relatively constant across the two grades.

2. The classes of students who had college aides scored significantly higher on the three skills of catching, kicking and striking while there was no significant difference on the skill of throwing from pretest to posttest.

3. The older children (fifth graders) scored significantly higher on the two skills of catching and kicking than the younger children (second graders). There was no significant difference from pretest to posttest with respect to the grades on the motor skills of throwing and striking.



## IMPLICATIONS AND RECOMMENDATIONS FOR FURTHER STUDY

As a result of this study, the investigator recommends consideration of the following suggestions for further research:

1. Further study should be done to measure the effects of an aide program in physical education. Other grade levels could be included in such research. Differences in sex should be taken into account. The multivariate approach could be expanded to cross the psychological and social domains in addition to the psychomotor domain as they relate to an aide program in physical education.

2. Further study should be conducted in order to develop appropriate and reliable instruments for use in measuring physical skills in an experimental design situation such as this one.

3. The time span of such studies should be expanded in order to investigate the effects of any specific type of program or assistance, upon the children involved.

4. Similar studies should be conducted nationally in a variety of geographical settings involving a variety of college and/or university programs.

5. The effects of aide programs could be expanded in order to study not only the effect upon the children but also to study the effects upon the college personnel involved as well as the local school personnel.

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APPENDIX A

LETTER TO SUPERINTENDENT FOR ELEMENTARY PROGRAMS

MERCER COUNTY SCHOOLS





CONCORD COLLEGE  
ATHENS, WEST VIRGINIA

DEPARTMENT OF HEALTH AND  
PHYSICAL EDUCATION

November 29, 1978

Assistant Superintendent - Elementary Programs  
Mercer County Schools  
Princeton, West Virginia 24740

Dear

This letter is being written to confirm our recent telephone conversations and personal visits concerning permission to work with selected second and fifth grade classes in Mercer County in a research project involving Physical Education. The purpose of the study is to determine the effects of a college-aide program on selected motor skills of the children. The results of the study should be beneficial in furthering our knowledge about motor development aspects of the children. Also, the study may contribute insight to all of us involved in college classes who are requiring students to participate in a field experience in the local school system.

, Coordinator of Mercer County Teacher Education Center and , Mercer County Supervisor in Physical Education are willing to sponsor this study. The study is being carried on as part of my doctoral program in the College of Education at Virginia Polytechnic Institute and State University.

Concord College Students, enrolled in Methods and Materials of Physical Education for Elementary Schools, under my supervision, will be assisting the classroom teachers in teaching physical education activities for a period of ten weeks beginning February 19 and ending May 4 (excluding week of March 19). Pre and post test measures will be conducted in January and May respectively by the Physical Education Specialist and myself.

Page Two

has agreed to serve as the liaison person between the school principals and the second and fifth grade teachers and myself. has agreed to serve as the liaison person between the Physical Education Specialist and myself. Permission forms for parental approval will be distributed via the classroom teacher and kept on file during the study.

I wish to thank you for your cooperation. If there are any questions please feel free to call me at this number or

Sincerely yours,

Margery K. Robertson  
Assistant Professor  
in Physical Education

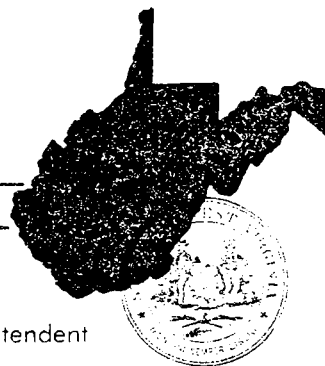
Dr. Margaret Driscoll, Advisor

MKR:mc

APPENDIX B

ACCEPTANCE LETTER FROM SUPERINTENDENT FOR ELEMENTARY PROGRAMS

MERCER COUNTY SCHOOLS



# MERCER COUNTY SCHOOLS

PRINCETON, WEST VIRGINIA 24740

Board of Education

Jr., President  
Vice-President

C. D. Lilly, Superintendent

December 1, 1978

Ms. Margery K. Robertson

Dear Ms. Robertson:

Permission is granted for you to conduct your physical education study in select elementary classrooms in Mercer County during 1979.

and have assured me of their cooperation with you during this study. I would request that you coordinate all the activities with these two employees of Mercer County Schools.

The school principals must give approval for the study in their schools, and the participation of a class must be a voluntary thing on the part of the teacher.

No remuneration, either monetary or inservice, will be granted to Mercer County School personnel by the Mercer County School System for participation in this study.

Results should not be identified with individual pupils names in your report. Use some method that will not label or identify individuals.

If we can be of further help, please call on us.

Our hope is you will have a successful and rewarding study.

Sincerely,

Assistant Superintendent

HO:mmc

cc:

APPENDIX C

LETTER TO COORDINATOR--TEACHER EDUCATION CENTER  
MERCER COUNTY SCHOOLS



CONCORD COLLEGE  
ATHENS, WEST VIRGINIA

DEPARTMENT OF HEALTH AND  
PHYSICAL EDUCATION

December 5, 1978

Coordinator, Teacher Education Center  
Mercer County Schools  
Princeton, West Virginia 24740

Dear :

Thank you for your cooperation and support of my study which will be implemented during January to May 1979.

It is anticipated that the results will prove beneficial for all of us in a number of ways. First, we will be evaluating selected motor skills of the second and fifth graders. Secondly, we may gain insight into the role of the college-aide in assisting the classroom teacher in teaching physical education activities.

As we discussed during our recent visit, you will act as the liaison person between the principals and second and fifth grade teachers and myself. Attached you will find a letter which could be sent to the principals involved if you wish. Also attached is a sample Parental Approval Letter which will have to be distributed to all children involved in the study. I suggest that the Parental Approval forms remain on file throughout the study.

It is my understanding that I will present a brief proposal of the study to the Teacher Education Advisory Board on Thursday, December 14 for their approval. Please review the attached manuscript to see if it is adequate for that purpose.

Again, I thank you for your cooperation and assistance in the study. If you have any questions please feel free to call me at . I will be in touch.

Sincerely,

Margery K. Robertson  
Assistant Professor  
in Physical Education

MKR:mc

Attachment

APPENDIX D

PARENTAL PERMISSION FORMS



CONCORD COLLEGE  
ATHENS, WEST VIRGINIA

DEPARTMENT OF HEALTH AND  
PHYSICAL EDUCATION

January 16, 1979

Dear Parents:

I am a graduate student at Virginia Polytechnic Institute and State University, Blacksburg, Virginia and I have been given permission by \_\_\_\_\_, Assistant Superintendent, \_\_\_\_\_, Coordinator of Mercer County Teacher Education Center, \_\_\_\_\_, Mercer County Physical Education Supervisor, and \_\_\_\_\_, Principal of Knob Elementary School to conduct a study in physical education involving second and fifth graders.

The purpose of this study is to evaluate the elementary child's motor skills of throwing, kicking, catching, and striking as a result of a structured college-aide field experience in elementary physical education.

The children will be instructed by competent teachers and will always be under supervision. This study will be a part of the normal daily thirty minute physical education program. I feel that all persons involved in the study will enjoy and benefit from the project.

If you will permit your child to take part in this project, please fill out the form below and return to your child's homeroom teacher.

Thank you.

Margery K. Robertson  
Assistant Professor  
in Physical Education  
Researcher

\_\_\_\_\_  
Homeroom Teacher

-----  
This is to state that \_\_\_\_\_ has permission  
(name of child)  
to participate in the research project in physical education at the  
Elementary School during the months of January through May 1979.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Parent's Signature



APPENDIX E

ABSTRACT OF PROPOSED STUDY FOR MERCER COUNTY  
CLASSROOM TEACHERS

ABSTRACT OF PROPOSED STUDY IN MERCER COUNTY  
ELEMENTARY SCHOOLS IN  
PHYSICAL EDUCATION 1979

TITLE: The Assessment of Selected Motor Skills in Elementary  
School Children as Related to the College-Aide Program  
in Physical Education

Submitted by Margery K. Robertson  
Assistant Professor in Physical Education  
Concord College

For: Partial requirement in completion of Doctoral Program at  
Virginia Polytechnic Institute and State University  
Blacksburg, Virginia

Since 1975, the State Department of Education in the state of West Virginia has been strongly encouraging professors in college classes to include field experiences as part of course requirements. (State Department of Education, 1975). A field experience was initiated in 1973 at Concord College in the class, Methods and Materials in Physical Education for the Elementary Schools. This experience assigned the college student as a physical education Aide to a full-time elementary Educator within the local school system. The experience was arranged for a period of six to ten weeks each semester.

Very little research has been reported nationally to determine the effects of such programs on elementary students. No research has been reported in the State of West Virginia. Therefore, the purpose of this study is to assess selected motor skills of elementary children, specifically, throwing, catching, kicking and striking, and to investigate the relationship which may exist between the child's skills and the availability of college-aides to assist the classroom teacher in conducting elementary physical education activities. Many of us involved in these programs would like to have research to support our practices.

The study will include sixteen sections of elementary school classes equally divided between second and fifth grade levels. All children involved will participate in the pre- and post-test phases of the study. The study will extend for a period of fourteen weeks during the months of January through May, 1979. Pre- and post-test measures will be conducted by the researcher and the Mercer County Physical Education Specialist during the first two and last two weeks of

the study. During the intervening ten week period Concord College Aides from Methods and Materials for Physical Education in the Elementary Schools, under the supervision of Mrs. Robertson, will assist half of the classroom teachers in conducting physical education activities to the elementary children during their daily regular physical education period.

Mrs. Gayle Wise has agreed to act as liaison between the elementary principals, classroom teachers and myself. Mr. Bill Norton has agreed to act as liaison between the Mercer County Physical Education Specialists and myself.

The value of the study should benefit all of us involved. Elementary Classroom Teachers will have an aide to help conduct physical education activities. This will reduce student-teacher ratios in a highly active subject area. It will also allow more time for the teachers to work with students who are in need of individual attention. The College-Aide will be specifically trained in physical education activities appropriate for the elementary age child. Through the process of working together, the classroom teacher may be able to update and learn new techniques being currently used in this subject area. The structured program will be planned by combining the efforts and wishes of the Classroom Teacher, the Physical Education Specialist, and the Researcher. Therefore, continuity should become evident in the Elementary Physical Education program in Mercer County. The children should also benefit from a structured physical education program. (Approved, of course, by Mr. Norton's office). The motor skills studied and assessed are those which are basic to all

participation in sports or life-time activities. Literature supports the fact that the earlier the children are introduced to these motor aspects, the more skillful children will become.

The study will be valuable in the sense that Mercer County will have begun to develop research to substantiate practice in the educational concerns of Aide placements in physical education.

APPENDIX F

LETTER TO ELEMENTARY PRINCIPALS



CONCORD COLLEGE  
ATHENS, WEST VIRGINIA

DEPARTMENT OF HEALTH AND  
PHYSICAL EDUCATION

December 20, 1978

, Principal  
Elementary School  
, West Virginia 24712

Dear

This letter is being written to verify my permission to work with the children at the Elementary School in a research project involving Physical Education. The purpose of the study is to evaluate the elementary child's motor skills of throwing, kicking, catching and striking as a result of a structured college-aide field experience in elementary physical education. The results of the study should be beneficial in furthering our knowledge of the motor skills of our children. Secondly, we may gain insight into the role of the college-aide in assisting the classroom teacher in teaching physical education activities.

Concord College students enrolled in Methods and Materials for Physical Education in Elementary Schools, under my supervision will be assisting the classroom teachers in conducting physical education activities for a period of ten weeks beginning February 19 and ending May 4 (excluding the week of March 19). The pre and post phase of the study will be conducted in January and May respectively by the Physical Education Specialist and myself.

will be serving as the liaison person between you, your second and fifth grade teachers and myself. will be serving as liaison person between the physical education Specialist and myself. Permission forms for parental approval will be sent via your office and will remain on file during the study.

I wish to thank you for your cooperation and if there are any questions please call me at

Sincerely,

Margery K. Robertson  
Assistant Professor  
in Physical Education

MKR:mc

Margaret Driscoll, Advisor

cc:

APPENDIX G

LETTER TO CLASSROOM TEACHERS





CONCORD COLLEGE  
ATHENS, WEST VIRGINIA

DEPARTMENT OF HEALTH AND  
PHYSICAL EDUCATION

February 12, 1979

Classroom Teacher  
Elementary School  
, West Virginia

Dear

Thank you for volunteering to work with the research project involving Physical Education with second and fifth graders at your school. The purpose of the study is to evaluate the elementary child's motor skills of throwing, kicking, catching and striking as a result of a structured college-aide field experience in elementary physical education. The results of the study should be beneficial in furthering our knowledge of the motor skills of our children. Secondly, we may gain insight into the role of the college-aide in assisting the classroom teacher in teaching physical education activities.

The study will extend for fourteen weeks. Some of you have volunteered to have a college-aide, who will be assisting in your classes for a ten week period of time extending from the week of February 19 through May 4 (excluding the week of March 19). You will be receiving specific information about this phase of the program in the near future. The pre and post phase of the study will be conducted prior to February 19 and after May 4 respectively.

will be serving as the liaison person between you, your principal, and myself.

Thank you for collecting the parental approval forms. These will be kept on file during the study.

If you have any questions, please call me at  
or

Sincerely,

Margery K. Robertson  
Assistant Professor  
in Physical Education

Margaret Driscoll, Advisor

MKR/MD:mc

APPENDIX H

LETTER TO PHYSICAL EDUCATION SUPERVISOR

MERCER COUNTY SCHOOLS



CONCORD COLLEGE  
ATHENS, WEST VIRGINIA

DEPARTMENT OF HEALTH AND  
PHYSICAL EDUCATION

December 20, 1978

Supervisor of Physical Education  
Mercer County Schools  
Princeton, West Virginia 24740

Dear \_\_\_\_\_ :

Thank you for your cooperation and support of my study which will be implemented during January to May 1979.

It is anticipated that the results will prove beneficial for all of us in a number of ways. First, we will be evaluating selected motor skills of the second and fifth graders. Secondly, we may gain insight into the role of the college-aide in assisting the classroom teacher in teaching physical education activities.

I will be working with \_\_\_\_\_ in determining which elementary schools and teachers will be involved. I will then be in touch with your office in order to work cooperatively with the physical education Specialists in the selected schools.

Again I think you and your staff for your cooperation. If you have any questions please feel free to call me at \_\_\_\_\_ or \_\_\_\_\_

Sincerely yours,

Margery K. Robertson  
Assistant Professor  
in Physical Education

Dr. Margaret Driscoll, Advisor

MKR:mc

APPENDIX I

THE OHIO STATE UNIVERSITY  
SCALE OF INTRA-GROSS MOTOR ASSESSMENT

THE OHIO STATE UNIVERSITY  
SCALE OF INTRA-GROSS MOTOR ASSESSMENT

DIVISION OF PHYSICAL EDUCATION  
THE NISONGER CENTER  
THE OHIO STATE UNIVERSITY

COPYRIGHT  
BY  
EDWIN MICHAEL LOOVIS  
1975

O.S.U. SIGMA Scoring Sheet

Name \_\_\_\_\_ Age \_\_\_\_\_ Sex \_\_\_\_\_ Class \_\_\_\_\_

Examiner \_\_\_\_\_ Date \_\_\_\_\_ School \_\_\_\_\_

LEVELS SKILLS	LEVEL I		LEVEL II		LEVEL III		LEVEL IV		TOTAL
	Incomplete	Complete	Incomplete	Complete	Incomplete	Complete	Incomplete	Complete	
Throwing	T 1	C 3	T 4	C 6	T 7	C 9	T 10	C 12	
	B 2		B 5		B 8		B 11		
Catching	T 1	C 3	T 4	C 6	T 7	C 9	T 10	C 12	
	B 2		B 5		B 8		B 11		
Kicking	T 1	C 3	T 4	C 6	T 7	C 9	T 10	C 12	
	B 2		B 5		B 8		B 11		
Striking	T 1	C 3	T 4	C 6	T 7	C 9	T 10	C 12	
	B 2		B 5		B 8		B 11		

(2 sheets per student pre and post-test)

**SKILL OF Throwing**

**TEST EQUIPMENT: 4" Foam Ball**

TEST CONDITIONS	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
	Standing in front of and ten feet from the examiner.	Same	Standing in front of and ten feet from the examiner.	Standing in front of and ten feet from the examiner.
	NOTE: Ask child to throw the ball as "hard" as he can!			
PERFORMANCE	<p>The child throws the 4" ball in the direction of the examiner and demonstrates the following behaviors in two out of three trials:</p> <p>a. uses a two-handed push or throw with both arms in unison, b. no twisting of the upper body.</p>	<p>The child throws the 4" ball in the direction of the examiner and demonstrates the following behaviors in two out of three trials:</p> <p>a. uses a single-handed throw with the arm swinging to a sidearm (right to left or vice versa) motion, and the direction of swing is either downward or flat. b. twists upper body backwards to side of throwing arm during backswing then forward to side opposite throwing arm during throw, c. no movement of feet.</p>	<p>The child throws the 4" ball to the direction of the examiner and demonstrates the following behaviors in two out of three trials:</p> <p>a. uses a single-handed throw with the arm swinging in a sidearm (right to left or vice versa) motion, and the direction of swing is downward, b. twists upper body backwards to side of throwing arm during backswing then forward to side opposite throwing arm during throw, c. faces target and steps with leg on the same as throwing arm.</p>	<p>The child throws the 4" ball in the direction of the examiner and demonstrates the following behaviors in two out of three trials:</p> <p>a. uses a single-handed throw with the arm swinging in a sidearm (right to left or vice versa) motion, and the direction of swing is downward. b. twists upper body backwards and shifts weight to foot on side of throwing arm during backswing, c. steps with leg on side opposite throwing arm, d. twists upper body forward after shifting weight to foot opposite throwing arm, e. snaps wrist in process of releasing ball.</p>
	Cutteridge, 1939	Wild, 1938	Wild, 1938	Wild, 1938

SKILL OF Catching

TEST EQUIPMENT: 6" Rubber Playground Ball

		LEVEL I	LEVEL II	LEVEL III	LEVEL IV
TEST CONDITIONS		When the examiner stands ten feet in front of the child and throws the ball underhand,	Same	Same	Same
			NOTE: Ball should reach the child between the shoulders and the waist! Ball should travel in an arc - not a straight line!		
PERFORMANCE		The child <u>attempts</u> to catch the ball twice in three trials by extending his outstretched arms in a stiff manner in front of his body thereby causing the ball to rebound off the arms.	The child, using the hands and arms (bent at the elbows) to scoop or bring the ball into the body, catches the ball twice in three trials.	The child catches the ball and demonstrates the following behaviors in two out of three trials: a. holds arms bent at the elbows in front of the body, b. uses hands in opposition to one another, i.e., a "clapping" motion, and attempts to trap ball.	The child catches the ball and demonstrates the following behaviors in two out of three trials: a. holds arms bent at the elbows at the sides of body, b. uses hands in a cupped fashion such that: 1. on throws above the waist the thumbs are nearly touching and 2. on throws below the waist the little fingers are close together.
		Wickstrom, 1970	Gutteridge, 1939 McCaskill and Wellman, 1938 Seefeldt et al., 1972 Wellman, 1937 Wickstrom, 1970	Gutteridge, 1939 McCaskill and Wellman, 1938 Seefeldt et al., 1972 Wellman, 1937 Wickstrom, 1970	McCaskill and Wellman, 1938 Wellman, 1937 Wickstrom, 1970



**SKILL OF Kicking**

TEST EQUIPMENT: 7" Foam Ball

	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
<b>TEST CONDITIONS</b>	When in a standing, position with a ball approximately 7" in diameter placed in front of but not more than 10 feet away from him.	Same	Same	Same
		NOTE: Ask child to kick the ball as "hard" as he can!		
<b>PERFORMANCE</b>	<p>The child walks up to the ball, makes contact with a stiff-leg and continues with the walking/running pattern in two out of three trials.</p> <p>Kick appears as part of walking/running pattern and shows <u>no</u> attempt to swing the kicking leg.</p>	<p>The child walks up to and kicks the ball forward in the direction of the examiner and demonstrates the following behaviors in two out of three trials:</p> <p>a. uses a stiff-leg swinging primarily from the hip with <u>little or no</u> bending of the knee,                      b. moves the arms and trunk only slightly, if at all.</p>	<p>The child runs up to and kicks the ball forward in the direction of the examiner and demonstrates the following behaviors in two out of three trials:</p> <p>a. swings the bent kicking leg backwards and then forward with a simultaneous straightening of the leg,                      b. holds arm opposite from kicking leg out to the side approximately shoulder level,                      c. returns kicking leg to a position next to the support leg after executing kick.</p>	<p>The child runs up to and kicks the ball forward in the direction of the examiner and demonstrates the following behaviors in two out of three trials:</p> <p>a. swings the bent kicking leg backwards and then forward with a simultaneous straightening of the leg,                      b. uses <u>both</u> arms held out to the sides of the body to maintain balance.                      c. leans slightly backward as kick is performed,                      d. maintains balance on non-kicking leg during kicking action and follow through,                      e. steps forward onto kicking leg <u>only</u> after kicking action and follow through are completed.</p>
	Gesell, 1940 Wickstrom, 1970	Wickstrom, 1970	Wickstrom, 1970	Wickstrom, 1970

**SKILL OF Striking**

**TEST EQUIPMENT:** Plastic Bat 20" to 36" long depending on size of child and 7" Foam Ball suspended by a string approx. 4' long which is attached to a stick

LEVEL I	LEVEL II	LEVEL III	LEVEL IV
<p>When in a standing position, holding a plastic bat 20" to 36" long, and facing a ball 7" in diameter suspended by a string to waist level.</p>	<p align="center">Same</p> <p align="center">NOTE: Ask child</p>	<p align="center">Same</p> <p align="center">to hit the ball as "hard"</p>	<p align="center">Same</p> <p align="center">as he can!</p>
<p>The child strikes the ball and demonstrates the following behaviors in two out of three trials:                      a. uses <u>only one</u> arm, the bat being positioned on or near the shoulder,                      b. swings in either an overhand (chopping) motion or a sidearm motion. (right to left or vice versa).</p>	<p>The child strikes the ball and demonstrates the following behaviors in two out of three trials:                      a. uses <u>both</u> arms, the bat being positioned on or near the shoulder,                      b. swings in an overhand manner with a downward (chopping) motion,                      c. bends forward at the waist (the feet do not move).</p>	<p>The child strikes the ball and demonstrates the following behaviors in two out of three trials:                      a. uses <u>both</u> arms, the bat being positioned in front of and adjacent to the shoulder,                      b. shifts body weight in direction of swing (this is a rocking motion; it is <u>not</u> a step),                      c. swings to a sidearm motion (right to left or vice versa), but arc of swing is flat (horizontal) or downward.</p>	<p>The child strikes the ball and demonstrates the following behaviors in two out of three trials:                      a. uses <u>both</u> arms, the bat being positioned in front of and adjacent to the shoulder,                      b. shifts body weight by stepping in direction of swing - "STEP",                      c. twists hips and upper body during and following the shifting motion - "TURN".                      d. swings in a sidearm motion (right to left or vice versa), but arc of swing is flat (horizontal) or slightly upward - "SWING".</p> <p>NOTE: Items "b"- "c"- "d" are swiftly merging movements which can be observed as STEP-TURN-SWING.</p>
<p>Halverson and Robertson, 1966</p>	<p align="center">Wickstrom, 1970</p>	<p align="center">Wickstrom, 1970</p>	<p align="center">Sinclair, 1973 Wickstrom, 1970</p>

APPENDIX J

DATA COLLECTED DURING EXPERIMENTAL PERIOD

## APPENDIX J

Data Collected During the Experimental Period

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
001	12	1	5	01	1	06	06	06	08	11	11	09	11
002	12	1	5	01	1	06	04	04	06	08	08	04	06
003	11	2	5	01	1	03	04	04	06	05	06	06	06
004	11	1	5	01	1	06	03	04	06	08	08	07	09
005	10	2	5	01	1	06	05	04	08	06	07	08	06
006	11	1	5	01	1	08	06	06	09	09	06	06	06
007	11	1	5	01	1	06	06	06	08	06	09	08	09
008	10	2	5	01	1	06	05	05	05	08	09	06	04
009	11	1	5	01	1	08	06	05	08	03	08	05	05
010	11	1	5	01	1	08	06	06	09	11	11	10	11
011	10	1	5	01	1	09	06	04	09	08	11	08	06
012	11	2	5	01	1	05	05	05	05	08	09	04	08
013	11	1	5	01	1	03	03	01	06	04	08	06	09
014	10	2	5	01	1	08	06	04	05	05	08	07	05
015	10	1	5	01	1	07	06	08	06	11	09	11	08
016	11	2	5	01	1	06	05	05	06	06	06	07	05
017	11	1	5	01	1	06	06	05	06	06	09	09	11
018	11	1	5	01	1	06	06	06	09	08	09	08	11
019	11	2	5	01	1	03	05	05	05	06	06	07	06
020	12	2	5	01	1	06	04	05	06	08	07	04	06
021	12	1	5	01	1	06	06	05	08	06	07	05	11
022	10	2	5	01	1	06	03	04	05	06	09	08	05
023	10	2	5	01	1	06	03	06	04	08	08	07	07
024	10	1	5	02	1	05	04	03	06	09	07	08	08
025	10	2	5	02	1	06	03	01	06	06	08	08	08
026	10	2	5	02	1	05	06	03	08	06	06	08	09
027	10	2	5	02	1	04	05	03	05	06	09	08	09
028	10	1	5	02	1	05	04	06	08	06	08	09	08
029	10	2	5	02	1	05	05	01	04	03	08	08	06
030	10	1	5	02	1	06	09	04	07	06	09	09	08
031	10	1	5	02	1	05	05	03	04	09	07	07	08
032	10	2	5	02	1	04	05	08	08	06	08	06	09
033	10	2	5	02	1	06	05	07	09	09	09	07	09
034	10	2	5	02	1	05	05	09	09	06	06	08	06
035	10	1	5	02	1	08	06	04	08	09	09	11	09

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
036	10	1	5	02	1	06	08	04	05	08	12	11	11
037	10	1	5	02	1	05	06	05	05	08	08	08	08
038	10	1	5	02	1	05	05	04	05	08	08	07	05
039	11	2	5	02	1	05	06	06	06	06	06	06	05
040	10	1	5	02	1	05	05	04	05	08	09	06	08
041	10	1	5	02	1	08	08	03	06	09	11	06	11
042	10	1	5	02	1	06	04	04	05	08	08	07	08
043	11	1	5	02	1	06	06	06	06	09	08	06	11
044	11	2	5	02	1	06	05	04	08	09	04	08	06
045	10	1	5	03	1	06	04	08	06	12	06	08	11
046	10	1	5	03	1	06	08	06	06	06	06	08	07
047	11	1	5	03	1	09	06	06	09	08	06	08	11
048	10	2	5	03	1	05	09	03	05	06	08	07	09
049	10	1	5	03	1	06	08	05	09	09	09	06	12
050	10	1	5	03	1	08	05	06	06	11	09	08	09
051	10	1	5	03	1	09	06	05	06	08	08	08	09
052	10	1	5	03	1	03	06	06	03	03	05	05	06
053	11	1	5	03	1	08	06	06	08	12	11	09	12
054	10	2	5	03	1	11	04	06	08	09	09	07	09
055	10	1	5	03	1	08	09	08	03	09	08	09	09
056	11	2	5	03	1	05	06	06	03	08	08	08	06
057	10	2	5	03	1	06	06	05	05	05	08	09	05
058	10	2	5	03	1	06	06	05	02	06	06	09	08
059	11	1	5	03	1	06	05	06	03	08	06	06	12
060	10	2	5	03	1	05	03	05	06	06	08	06	09
061	10	2	5	03	1	06	05	06	05	08	08	07	08
062	10	1	5	03	1	06	05	05	08	08	06	06	03
063	10	2	5	03	1	06	04	08	06	06	06	06	08
064	11	2	5	03	1	03	06	04	02	08	06	04	06
065	10	2	5	04	1	03	05	03	04	06	08	06	06
066	10	1	5	04	1	08	05	06	06	09	09	11	09
067	11	1	5	04	1	06	05	05	03	08	08	07	09
068	10	1	5	04	1	08	06	08	06	11	09	08	09
069	10	2	5	04	1	06	04	04	04	06	06	05	08
070	12	2	5	04	1	06	05	05	06	06	06	06	06
071	10	1	5	04	1	09	06	05	07	08	06	11	08
072	11	2	5	04	1	05	06	04	01	09	08	04	06
073	11	2	5	04	1	05	03	05	05	06	06	07	08
074	12	1	5	04	1	06	05	04	08	09	08	08	09

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
075	11	1	5	04	1	06	04	08	06	09	09	09	11
076	10	1	5	04	1	05	05	03	03	06	08	06	03
077	12	1	5	04	1	06	06	05	01	08	06	08	08
078	11	2	5	04	1	02	04	05	01	03	06	06	06
079	10	1	5	04	1	05	04	05	04	11	09	06	09
080	10	1	5	04	1	05	03	05	03	06	06	08	07
081	11	1	5	04	1	05	05	04	01	08	06	06	09
082	10	2	5	04	1	05	06	05	03	06	07	04	03
083	11	1	5	04	1	05	05	05	03	08	06	06	06
084	12	1	5	04	1	06	06	05	04	06	06	06	09
085	10	2	5	04	1	05	05	05	03	08	06	07	08
086	10	2	5	04	1	05	06	03	07	06	06	06	06
087	11	1	5	04	1	09	07	08	09	11	09	11	11
088	10	1	5	04	1	05	08	03	09	06	08	06	06
089	10	2	5	04	1	05	06	03	07	08	06	06	09
090	11	2	5	04	1	06	08	03	01	09	08	06	08
091	11	2	5	04	1	05	05	01	04	06	06	06	08
092	10	1	5	04	1	08	06	07	09	12	11	11	11
093	10	2	5	04	1	05	05	04	06	08	06	05	06
094	11	2	5	04	1	05	06	02	04	05	06	05	05
095	11	1	5	04	1	06	05	05	05	08	07	07	08
096	11	2	5	04	1	08	06	05	04	08	06	08	08
097	11	2	5	04	1	05	06	01	06	06	05	05	08
098	11	1	5	04	1	09	08	09	11	12	09	09	11
099	10	2	5	04	1	05	05	04	08	08	06	06	06
100	11	2	5	04	1	05	04	02	04	06	08	07	06
101	11	2	5	04	1	06	03	02	04	06	06	06	05
102	10	2	5	04	1	08	06	06	06	08	08	06	05
103	11	2	5	04	1	05	05	03	06	08	08	06	08
104	11	2	5	04	1	05	06	01	05	05	06	06	06
105	11	2	5	04	1	03	05	05	02	08	06	05	06
106	11	2	5	04	1	06	06	03	06	08	05	05	08
107	10	1	5	04	1	05	08	04	08	09	07	08	05
108	11	2	5	04	1	03	04	05	04	05	08	06	06
109	10	2	5	04	1	05	06	03	06	05	05	05	06
110	11	2	5	04	1	05	08	05	07	08	06	07	08
111	10	2	5	04	1	05	05	05	04	05	05	04	06
112	11	2	5	05	1	05	06	09	04	08	07	08	09
113	10	2	5	05	1	06	05	04	06	09	07	07	06

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
114	11	2	5	05	1	03	05	01	06	08	08	06	12
115	11	1	5	05	1	05	08	08	04	12	11	11	12
116	11	1	5	05	1	06	09	09	11	12	09	07	11
117	10	2	5	05	1	05	03	04	05	05	08	08	11
118	10	2	5	05	1	03	04	06	06	03	05	08	08
119	10	1	5	05	1	06	08	06	04	05	08	07	09
120	10	1	5	05	1	09	04	06	04	06	04	09	08
121	10	1	5	05	1	08	06	08	04	12	09	09	09
122	10	1	5	05	1	05	08	08	08	09	09	07	12
123	11	2	5	05	1	05	06	03	05	09	06	06	07
124	11	1	5	05	1	05	05	06	08	06	04	09	09
125	10	1	5	05	1	06	08	06	08	11	09	09	11
126	11	1	5	05	1	06	03	04	08	06	06	07	06
127	10	2	5	05	1	05	06	04	05	06	06	05	05
128	10	2	5	05	1	05	06	06	06	09	07	04	08
129	11	1	5	05	1	05	08	08	09	09	09	08	03
130	10	2	5	05	1	05	03	05	05	08	06	08	08
131	10	2	5	05	1	08	05	04	08	09	04	06	08
132	12	1	5	05	1	03	08	07	04	12	07	09	09
133	10	2	5	05	1	03	05	07	06	03	06	06	06
134	09	2	2	06	1	03	01	04	04	08	05	05	06
135	08	2	2	06	1	03	05	03	06	06	05	05	08
136	09	1	2	06	1	03	05	03	06	09	06	08	11
137	08	1	2	06	1	06	06	03	06	05	05	06	05
138	07	2	2	06	1	05	05	02	04	03	06	03	07
139	08	1	2	06	1	09	06	04	06	09	05	06	09
140	07	1	2	06	1	05	01	05	04	06	03	05	06
141	08	1	2	06	1	05	06	04	04	06	05	05	03
142	07	2	2	06	1	05	06	04	01	03	05	05	03
143	07	1	2	06	1	06	04	01	05	06	01	03	06
144	08	2	2	06	1	05	03	01	05	06	05	03	04
145	09	2	2	06	1	03	03	02	06	08	06	06	08
146	08	2	2	06	1	05	06	02	05	03	05	03	06
147	08	2	2	06	1	05	06	06	06	06	06	06	06
148	09	1	2	06	1	05	05	06	05	03	06	06	09
149	08	1	2	06	1	03	01	04	05	05	05	05	05
150	08	1	2	06	1	05	08	05	08	06	06	03	09
151	07	1	2	06	1	06	08	07	07	08	06	09	08
152	08	1	2	07	1	08	06	04	06	09	06	06	06

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
153	08	2	2	07	1	04	01	05	01	01	04	02	06
154	08	2	2	07	1	03	03	03	03	08	04	06	07
155	07	2	2	07	1	05	01	01	05	05	05	05	04
156	08	2	2	07	1	03	04	01	06	03	03	03	06
157	08	1	2	07	1	06	03	06	04	08	06	07	09
158	08	2	2	07	1	01	03	04	04	05	04	05	04
159	08	1	2	07	1	08	08	08	07	08	08	08	09
160	07	2	2	07	1	04	05	05	04	05	04	06	08
161	07	2	2	07	1	02	05	04	05	08	06	08	08
162	07	2	2	07	1	05	03	04	04	03	05	05	05
163	07	2	2	07	1	05	01	01	02	03	05	06	04
164	08	2	2	07	1	06	01	01	04	03	05	03	06
165	07	2	2	07	1	04	01	05	05	05	02	03	04
166	08	2	2	07	1	04	05	04	05	03	04	08	08
167	08	1	2	07	1	06	06	07	06	09	07	07	11
168	08	2	2	07	1	04	01	04	01	06	04	03	08
169	07	2	2	07	1	05	01	06	09	05	05	05	08
170	08	2	2	07	1	04	06	03	04	03	03	03	08
171	07	2	2	07	1	05	05	06	06	06	03	03	04
172	08	2	2	07	1	05	03	05	04	08	03	06	04
173	07	2	2	07	1	05	03	01	06	06	03	05	01
174	09	1	2	07	1	06	06	07	05	11	07	05	11
175	08	1	2	08	1	08	05	04	05	09	06	08	08
176	07	1	2	08	1	05	06	05	01	09	06	07	09
177	07	1	2	08	1	06	04	05	06	08	06	06	09
178	09	1	2	08	1	05	06	06	05	06	08	06	08
179	08	1	2	08	1	05	03	05	05	08	05	05	06
180	08	1	2	08	1	05	05	05	06	09	08	08	08
181	07	1	2	08	1	04	06	03	05	06	05	06	06
182	07	1	2	08	1	06	04	06	05	09	06	08	11
183	07	2	2	08	1	03	04	05	05	03	06	05	05
184	08	2	2	08	1	05	05	04	06	06	06	06	08
185	08	2	2	08	1	05	01	05	04	02	01	05	05
186	07	2	2	08	1	03	04	03	03	06	06	06	09
187	08	1	2	08	1	04	04	05	06	06	06	04	08
188	07	1	2	08	1	05	05	05	05	06	06	06	09
189	08	1	2	08	1	05	05	05	06	08	05	08	08
190	08	1	2	08	1	06	02	03	05	09	06	09	09
191	08	2	2	08	1	04	05	05	05	06	06	06	08



## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
192	08	2	2	08	1	05	03	05	06	09	08	08	08
193	07	1	2	08	1	04	01	03	07	08	08	09	09
194	08	1	2	08	1	05	01	02	05	05	06	07	08
195	07	1	2	08	1	05	01	05	05	09	05	09	09
196	07	1	2	08	1	05	04	05	05	06	06	06	06
197	08	1	2	08	1	06	05	05	05	11	08	09	09
198	08	2	2	08	1	05	05	05	06	08	06	07	08
199	08	1	2	08	1	06	01	06	05	09	09	09	11
200	07	2	2	08	1	05	05	05	04	06	03	05	05
201	08	1	2	08	1	02	05	04	04	09	05	06	09
202	07	2	2	08	1	02	01	04	04	05	05	05	06
203	07	2	2	09	1	05	03	05	0]	08	05	04	06
204	08	1	2	09	1	04	03	01	05	08	06	08	09
205	09	1	2	09	1	06	04	04	06	09	06	06	06
206	08	1	2	09	1	06	05	06	09	09	06	06	09
207	08	1	2	09	1	05	06	04	05	06	06	05	09
208	07	2	2	09	1	05	01	01	02	03	04	05	06
209	07	1	2	09	1	05	03	01	05	03	03	05	09
210	07	2	2	09	1	05	04	01	06	06	04	05	08
211	09	1	2	09	1	05	05	04	06	08	05	09	11
212	07	1	2	09	1	02	02	01	01	03	03	03	08
213	08	2	2	09	1	03	05	01	01	03	03	05	03
214	08	2	2	09	1	05	05	01	06	03	03	05	06
215	07	2	2	09	1	03	03	01	06	03	03	03	06
216	07	2	2	09	1	03	06	07	05	02	02	03	06
217	08	2	2	09	1	06	05	04	05	05	06	03	05
218	07	1	2	09	1	05	02	05	09	03	06	05	08
219	08	1	2	09	1	06	05	05	06	09	06	05	08
220	08	1	2	09	1	06	05	04	06	06	04	05	08
221	08	2	2	09	1	08	01	01	06	08	04	06	05
222	08	2	2	09	1	05	01	05	04	05	05	05	06
223	08	2	2	09	1	03	01	02	04	03	05	06	06
224	08	1	2	10	1	05	03	01	04	06	08	06	09
225	08	1	2	10	1	06	05	01	04	11	04	09	11
226	07	1	2	10	1	06	01	04	05	06	04	05	09
227	08	1	2	10	1	01	01	01	04	06	05	05	08
228	07	2	2	10	1	05	03	05	01	05	05	05	06
229	08	1	2	10	1	04	05	05	05	09	08	08	03
230	07	2	2	10	1	03	03	06	03	06	05	05	08

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
231	08	2	2	10	1	06	03	01	06	05	05	04	08
232	08	2	2	10	1	05	03	05	03	07	06	05	08
233	07	1	2	10	1	05	05	04	04	06	06	07	11
234	08	1	2	10	1	06	01	04	05	04	07	08	09
235	08	1	2	10	1	02	03	05	05	11	08	08	09
236	07	2	2	10	1	03	04	01	01	06	06	06	09
237	08	2	2	10	1	02	05	03	03	03	06	03	08
238	07	2	2	10	1	02	06	03	06	03	06	05	06
239	08	2	2	10	1	03	04	04	05	06	04	06	09
240	08	1	2	10	1	06	01	02	04	05	06	06	09
241	08	1	2	10	1	09	05	05	09	11	08	12	12
242	07	2	2	10	1	06	03	02	01	09	06	09	06
243	08	1	2	10	1	05	08	07	02	12	06	12	04
244	08	2	2	10	1	05	03	01	04	06	06	05	03
245	07	1	2	10	1	06	06	06	06	06	07	12	12
246	11	1	5	11	2	06	04	06	03	06	06	05	06
247	11	1	5	11	2	09	08	08	06	09	08	09	10
248	10	2	5	11	2	05	03	05	01	05	06	08	06
249	10	1	5	11	2	09	06	08	06	11	08	07	09
250	10	2	5	11	2	05	06	04	09	06	08	08	09
251	11	2	5	11	2	02	03	04	04	06	06	06	06
252	10	1	5	11	2	06	05	08	01	06	06	08	06
253	11	2	5	11	2	05	06	07	05	08	06	06	05
254	11	2	5	11	2	04	04	05	06	08	06	06	05
255	11	1	5	11	2	02	06	05	04	05	06	07	06
256	10	2	5	11	2	03	05	04	06	06	08	08	09
257	10	1	5	11	2	06	08	07	09	08	08	09	08
258	11	1	5	11	2	06	08	07	06	09	08	08	08
259	11	1	5	11	2	06	05	08	06	08	06	06	05
260	10	1	5	11	2	06	08	06	05	08	07	08	09
261	12	2	5	11	2	06	06	06	06	06	08	08	08
262	10	2	5	11	2	08	06	06	03	06	06	08	03
263	10	2	5	11	2	05	06	06	06	06	08	07	08
264	10	1	5	11	2	08	06	06	08	08	08	08	09
265	10	1	5	11	2	11	06	09	09	09	06	11	03
266	11	1	5	11	2	05	08	08	08	11	08	11	11
267	10	1	5	11	2	06	06	01	05	08	08	08	07
268	11	2	5	12	2	03	06	05	06	08	07	07	09
269	10	2	5	12	2	03	03	03	05	08	08	08	08

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
270	10	1	5	12	2	09	09	09	09	11	11	09	11
271	11	2	5	12	2	04	05	06	07	04	05	07	06
272	10	2	5	12	2	05	05	09	03	08	08	08	08
273	10	1	5	12	2	05	05	08	06	09	11	08	11
274	11	1	5	12	2	05	06	09	09	09	11	09	11
275	10	1	5	12	2	04	06	09	03	09	08	09	09
276	10	2	5	12	2	03	05	06	06	03	08	07	09
277	11	2	5	12	2	02	03	03	06	03	08	08	06
278	10	2	5	12	2	02	04	06	04	03	06	06	06
279	11	1	5	12	2	05	04	05	06	11	06	05	06
280	10	1	5	12	2	08	05	09	08	09	08	09	11
281	10	2	5	12	2	03	05	06	03	06	08	06	09
282	10	1	5	12	2	05	06	06	08	11	09	10	11
283	10	2	5	12	2	05	08	06	04	06	06	04	04
284	10	1	5	12	2	06	08	08	04	09	06	09	07
285	11	2	5	12	2	05	09	07	04	08	08	08	06
286	10	2	5	12	2	04	09	05	08	06	08	06	06
287	10	2	5	12	2	05	05	08	04	08	08	08	09
288	11	1	5	12	2	05	04	04	04	08	08	06	09
289	11	1	5	12	2	09	06	06	09	06	06	11	11
290	09	1	5	12	2	03	09	05	06	08	06	07	07
291	11	1	5	12	2	08	09	06	08	11	08	11	11
292	11	1	5	12	2	03	06	04	08	06	08	11	07
293	11	1	5	13	2	05	05	06	08	08	09	08	06
294	11	1	5	13	2	05	08	07	09	08	08	07	08
295	10	1	5	13	2	05	06	04	05	06	07	04	06
296	12	1	5	13	2	06	09	05	05	08	09	11	09
297	10	1	5	13	2	05	08	08	09	11	08	07	08
298	10	2	5	13	2	03	06	05	05	03	06	07	04
299	10	1	5	13	2	05	08	05	08	08	06	07	09
300	11	2	5	13	2	03	05	01	03	03	05	04	06
301	11	1	5	13	2	03	08	06	04	06	06	07	05
302	10	2	5	13	2	05	06	06	05	09	08	06	06
303	10	2	5	13	2	03	07	04	04	06	04	06	04
304	10	1	5	13	2	05	05	08	06	05	06	07	08
305	11	2	5	13	2	05	06	04	04	06	06	06	05
306	11	2	5	13	2	05	09	03	06	09	08	07	06
307	11	1	5	13	2	05	08	08	09	11	08	09	07
308	10	1	5	13	2	06	06	06	06	08	08	09	09

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
309	12	1	5	13	2	06	08	04	05	09	08	09	09
310	11	1	5	13	2	05	06	04	06	06	08	07	08
311	10	2	5	13	2	05	03	04	05	03	06	07	05
312	11	2	5	13	2	05	05	04	05	09	06	04	04
313	11	1	5	13	2	04	04	06	04	08	08	04	07
314	11	1	5	14	2	06	08	05	05	06	06	08	09
315	10	1	5	14	2	06	08	08	09	06	06	09	11
316	11	2	5	14	2	05	05	04	05	03	06	08	05
317	11	2	5	14	2	06	04	05	04	06	06	06	08
318	10	2	5	14	2	05	06	05	06	06	08	06	04
319	10	2	5	14	2	05	05	04	06	06	08	06	06
320	12	2	5	14	2	06	06	05	06	05	08	06	06
321	10	2	5	14	2	06	06	06	08	09	08	08	08
322	10	2	5	14	2	06	06	04	06	06	05	06	06
323	11	1	5	14	2	06	06	06	08	11	06	08	06
324	12	1	5	14	2	05	06	05	06	09	07	08	06
325	10	2	5	14	2	06	05	05	06	08	06	04	08
326	11	1	5	14	2	08	08	08	09	09	09	11	09
327	11	2	5	14	2	05	06	06	08	05	04	08	07
328	11	2	5	14	2	03	06	05	04	06	06	08	06
329	10	2	5	14	2	05	05	06	06	08	06	06	06
330	10	1	5	14	2	06	06	06	09	11	09	09	09
331	10	1	5	14	2	06	06	06	05	06	08	08	06
332	10	1	5	14	2	08	06	07	06	05	08	08	08
333	11	1	5	14	2	03	04	04	04	03	06	03	08
334	10	2	5	14	2	05	05	04	06	06	06	05	04
335	10	2	5	14	2	06	05	06	06	11	08	06	09
336	10	2	5	15	2	03	06	05	06	06	05	04	06
337	12	2	5	15	2	02	06	03	05	06	06	04	05
338	11	1	5	15	2	05	06	03	06	08	08	04	09
339	12	2	5	15	2	05	06	05	05	06	04	05	06
340	11	2	5	15	2	05	06	05	06	09	08	04	09
341	12	1	5	15	2	08	07	06	07	09	06	04	09
342	13	1	5	15	2	06	09	06	04	06	06	05	11
343	12	2	5	15	2	03	05	05	06	06	07	07	06
344	13	1	5	15	2	06	06	08	05	11	06	05	09
345	12	2	5	15	2	02	06	03	03	05	06	01	03
346	10	2	5	15	2	02	05	03	04	03	06	05	06
347	10	1	5	15	2	09	06	06	07	11	09	07	09

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
348	13	2	5	15	2	05	04	03	06	05	06	06	08
349	10	1	5	15	2	05	05	06	06	11	06	06	08
350	11	2	5	15	2	04	06	03	04	09	08	05	03
351	11	2	5	15	2	03	06	03	05	06	06	04	06
352	13	2	5	15	2	06	06	08	06	09	08	09	10
353	11	1	5	15	2	05	08	08	05	08	08	08	08
354	10	1	5	15	2	06	06	07	05	06	08	06	09
355	12	1	5	15	2	05	04	06	06	08	08	08	09
356	14	1	5	15	2	05	06	07	09	09	07	07	09
357	13	2	5	15	2	06	07	06	07	12	09	05	09
358	12	1	5	15	2	06	06	05	06	08	09	08	09
359	10	1	2	16	2	06	06	06	06	12	06	06	09
360	06	2	2	16	2	05	04	04	04	06	04	03	06
361	08	2	2	16	2	05	06	07	05	11	06	06	11
362	08	1	2	16	2	06	06	08	06	11	08	06	09
363	07	2	2	16	2	03	04	03	04	05	02	05	05
364	08	2	2	16	2	05	05	05	05	09	04	05	11
365	08	1	2	16	2	06	06	05	04	09	06	06	09
366	08	1	2	16	2	06	04	05	06	09	06	06	08
367	07	1	2	16	2	05	01	05	06	09	05	06	11
368	07	2	2	16	2	03	05	05	05	06	05	05	06
369	08	1	2	16	2	05	05	03	04	06	07	07	05
370	07	1	2	16	2	05	05	05	05	03	06	06	08
371	07	2	2	16	2	05	04	04	04	06	03	05	06
372	10	2	2	16	2	05	05	07	06	08	06	08	09
373	08	2	2	16	2	05	03	03	06	06	05	05	06
374	07	1	2	17	2	06	03	04	06	09	08	03	06
375	07	2	2	17	2	04	06	05	06	06	04	03	06
376	07	1	2	17	2	05	03	05	04	09	07	04	09
377	07	2	2	17	2	03	04	02	05	05	04	05	02
378	08	2	2	17	2	01	03	02	05	03	03	02	05
379	07	1	2	17	2	08	09	08	08	11	09	09	09
380	07	2	2	17	2	05	03	06	04	09	04	08	06
381	07	1	2	17	2	06	03	02	04	09	08	09	07
382	07	1	2	17	2	05	05	03	05	06	04	05	06
383	07	1	2	17	2	08	05	02	05	08	05	06	08
384	07	1	2	17	2	06	09	03	03	09	06	09	04
385	07	2	2	17	2	05	03	02	02	06	06	06	06
386	07	1	2	17	2	05	08	08	02	09	08	07	08

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
387	07	2	2	17	2	02	03	03	06	06	05	05	06
388	07	2	2	17	2	03	02	03	04	03	05	06	03
389	07	1	2	17	2	03	02	02	06	03	04	06	05
390	07	2	2	17	2	03	03	02	05	03	05	04	05
391	08	2	2	17	2	03	05	02	04	06	07	08	06
392	07	1	2	17	2	08	08	06	04	09	06	08	09
393	07	1	2	18	2	02	05	06	04	06	01	03	08
394	08	2	2	18	2	02	08	01	06	06	06	05	06
395	07	1	2	18	2	03	05	05	02	09	04	06	06
396	07	1	2	18	2	05	06	05	04	06	06	07	08
397	08	2	2	18	2	06	06	04	03	06	05	05	06
398	08	1	2	18	2	08	06	08	08	08	07	05	08
399	07	1	2	18	2	08	08	09	04	09	06	07	11
400	07	1	2	18	2	05	06	06	04	06	06	05	09
401	07	1	2	18	2	05	06	01	03	06	06	07	09
402	08	1	2	18	2	05	06	04	03	05	06	06	06
403	07	1	2	18	2	03	04	02	01	03	01	03	05
404	08	1	2	18	2	05	06	05	04	06	06	06	07
405	08	1	2	18	2	06	08	08	06	08	08	08	11
406	07	1	2	18	2	02	06	05	09	06	06	08	09
407	07	1	2	18	2	06	06	01	05	08	06	08	06
408	07	2	2	18	2	02	06	04	05	05	05	05	06
409	08	1	2	18	2	08	06	01	06	09	04	07	05
410	08	2	2	18	2	03	05	02	04	03	05	04	05
411	07	1	2	18	2	08	06	06	06	06	04	05	08
412	08	1	2	18	2	02	06	03	08	08	06	04	09
413	08	2	2	19	2	02	01	03	04	09	05	05	09
414	08	2	2	19	2	05	05	06	05	06	04	05	04
415	08	2	2	19	2	06	05	06	07	06	06	05	09
416	07	2	2	19	2	02	03	03	06	05	04	05	04
417	08	1	2	19	2	06	03	03	06	08	06	05	09
418	08	2	2	19	2	03	05	03	06	06	05	05	09
419	08	1	2	19	2	05	06	05	01	08	08	04	09
420	08	1	2	19	2	05	06	05	04	09	04	05	04
421	09	1	2	19	2	06	03	05	06	05	06	06	09
422	09	1	2	19	2	06	04	06	03	11	07	07	06
423	07	2	2	19	2	03	01	03	04	02	04	03	04
424	08	1	2	19	2	06	05	06	02	09	06	07	04
425	07	2	2	19	2	03	04	03	06	05	06	05	08

## APPENDIX (continued)

SS	Age	Sex	Grade	School	Exp. or con- trol group	Pretest				Posttest			
						Throwing	Catching	Kicking	Striking	Throwing	Catching	Kicking	Striking
426	10	1	2	19	2	05	06	03	05	08	07	06	09
427	08	2	2	19	2	06	03	03	06	06	06	05	06
428	08	1	2	19	2	05	06	06	06	09	06	06	11
429	07	1	2	19	2	05	06	03	06	08	04	04	06
430	08	2	2	19	2	05	08	03	06	08	06	06	09
431	08	2	2	20	2	05	01	05	05	06	04	04	06
432	07	2	2	20	2	05	05	06	03	03	05	04	03
433	07	2	2	20	2	05	05	05	05	05	05	05	08
434	07	1	2	20	2	05	06	06	05	08	04	04	03
435	07	2	2	20	2	06	05	06	08	08	06	07	09
436	07	2	2	20	2	02	05	01	05	03	04	04	01
437	07	1	2	20	2	05	01	06	05	09	05	04	08
438	07	1	2	20	2	05	05	08	06	11	06	07	11
439	08	1	2	20	2	05	03	06	02	05	05	06	08
440	08	2	2	20	2	05	01	07	02	08	01	08	08
441	08	1	2	20	2	05	08	06	04	08	04	04	09
442	07	1	2	20	2	06	05	08	06	09	04	04	06
443	08	2	2	20	2	05	05	04	02	03	05	05	05
444	09	1	2	20	2	05	06	06	06	11	06	06	09
445	07	2	2	20	2	05	04	05	05	05	06	05	08
446	07	2	2	20	2	08	06	07	06	06	05	06	06
447	10	2	5	05	1	05	03	04	05	05	08	08	11
448	10	2	5	05	1	03	04	06	06	03	05	08	08
449	10	1	5	05	1	06	08	06	04	05	08	07	09

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AN ASSESSMENT OF THE EFFECTS OF A COLLEGE AIDE PROGRAM ON  
SELECTED MOTOR SKILLS OF SECOND AND FIFTH GRADERS

by

Margery Kuhn Robertson

(ABSTRACT)

Little research has been reported which has assessed the motor skills of children in elementary classroom situations where teacher aides have been involved in the teaching of physical education activities. The purpose of this study was to assess selected motor skills of second and fifth grade students and to determine whether the motor skills of students in classes with college aides differed significantly from the motor skills of students in classes without college aides. The children were tested on the motor skills of throwing, catching, kicking, and striking.

The study was conducted over a fourteen week period of time in elementary schools located in Mercer County, West Virginia. Four hundred forty nine children participated in the study. All of the children were pretested using an adapted form of the Ohio State University Scale of Intra-Gross Motor Assessment (1975) on the four motor skills during the first two weeks of the study. A ten week instructional period then followed for the experimental groups on each grade level, utilizing aides from an elementary physical education methods class at Concord College, located in Athens, West Virginia.

The assigned college aide assisted the classroom teachers in conducting physical education activities with the experimental classes four days each week for the ten week period. The control group experienced their regular instructional period for the interim ten week period, having the classroom teacher being solely responsible for conducting the physical education activities four days each week. Both groups received their regularly scheduled instruction from a physical education specialist one class period each week. At the completion of the ten week instructional period, all of the subjects were posttested utilizing the same instrument which was used in the pretest.

A two way factorial MANOVA was applied in order to determine statistically significant differences in motor skill with respect to experimental versus control group, second and fifth grades and the interaction between them. The results indicated that there was a nonsignificant interaction between grades and experimental versus control group. Therefore, the two groups were relatively constant across the two grades. The results indicated that the classes of students with college aides scored significantly higher on the motor skills of catching, kicking, and striking, while there was no significant difference on the skill of throwing from pretest to posttest. The older children (fifth graders) scored significantly higher on the two skills of catching and kicking than did the younger children (second graders). There was no significant difference from pretest to posttest with respect to the grades on the motor skills of throwing and striking.