

PSYCHOMOTOR LEARNING AND RETENTION
RELATIVE TO THE PRESENCE OR ABSENCE OF A
BEHAVIORAL OBJECTIVE

by

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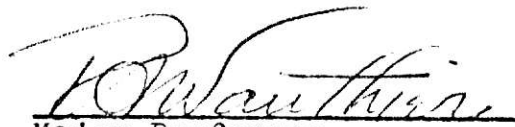
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DEDICATION

This paper is gratefully dedicated to Mrs. Barbara Howard, former instructor and longtime friend. Without her encouragement my master's degree program, of which this thesis is a part, might never have been undertaken.

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Chapter 1

INTRODUCTION

A recently published methods book for prospective teachers suggested that the primary purpose of teaching is "to facilitate student learning."^(10:4) When slightly altered, this statement could describe the functioning teacher as one who aids student learning. Learning has been defined as a relatively constant modification of student behavior.^(19:8) Evidence of this change can be seen in the overt behavior of the learner.^(10:83) The principal function of the teacher, therefore, is to first determine how student behavior should be modified (what should be learned) and second, to select activities which help the student learn to perform accordingly. Once the teacher has decided what is to be learned, it is entirely possible that since not all students react to the same stimuli the teacher will need to use a variety of activities to induce a specific behavioral change in students.^(18:1) The selection of activities can best be accomplished when teachers have a clearly defined statement of the outcomes they hope to achieve.^(23:104) Educators have generally referred to these statements as behavioral objectives.

The uses of behaviorally-stated objectives have been divided into two categories: benefits to the teacher and benefits to the student. Benefits to the teacher include:

(1) providing a public record of what is to be learned, (2) aiding in the selection of activities, and (3) aiding in the selection of evaluation techniques.^(1:46) These factors appear likely to benefit any teacher, regardless of the subject matter being taught. The need to be able to explain what is to be learned, to select teaching activities, and to select evaluative techniques are essential steps in any teaching process.

As an aid to the student, behavioral objectives have been described as a method to inform the learner of what is expected of him.^(1:46) While this appears to be an important function of the behavioral objective, many educators have not agreed. Numerous arguments have been advanced against the practice of providing learners with behavioral objectives. Most of the arguments concerning the use of behavioral objectives as a teaching aid have been centered on their use with subject matter which generally have required cognitive processes. In addition to the theoretical and philosophical arguments, research has been conducted to determine the effects of behavioral objectives. Most of these studies have, however, also been confined to cognitive subject matter. This research has not proven conclusive. Questions still remain concerning the value of providing students with specific behavioral objectives. Do students necessarily learn better when they receive behavioral objectives which describe the exact behavior they are expected to demonstrate? Can the type of activity

affect the value of behavioral objectives to the learner? Will behavioral objectives aid the student in learning a psychomotor skill? Does the intelligence of the student influence the effect of the behavioral objective? Can retention be facilitated by the use of behavioral objectives?

PURPOSE OF THE STUDY

No doubt many similar questions have prompted the study of the effects of behavioral objectives on students. A variety of subject matter areas have been used in studies with students of all ages. Unfortunately, the results of these studies were not conclusive. In some cases behavioral objectives appeared effective as an aid to learning; in others they appeared to merely be an ineffective device. A few researchers even concluded that the use of behavioral objectives may possibly have been a hindrance to learning. Further, most studies were based on cognitive learning. Only limited research has been found which studied the effects of behavioral objectives in the area of psychomotor learning.

This study was conducted to compare skill development in students who had been given prior knowledge of specific behavioral information with skill development in students who had not received this information. Students were divided into three mental ability levels; high, middle, and low to discover if there was an interaction between mental ability and the effectiveness of the behavioral objective. Finally, the effect

of the behavioral objective was assessed by both an immediate and a delayed post-test of psychomotor performance.

IDENTIFICATION OF THE PROBLEM

This study examined the effect of behavioral objectives in physical education. Specifically, students were evaluated on their footwork while performing a tennis backboard test. Of the students evaluated, one-half received a behavioral objective which described the expected performance while the other half received a placebo statement. Data obtained for this study was analyzed in an attempt to answer the following questions: (1) did the use of a behavioral objective aid in learning a motor skill? (2) did the mental ability of the student influence the effectiveness of the behavioral objective? (3) did knowledge of the behavioral objective aid in the retention of that skill? and (4) did mental ability interact with the behavioral objective to influence retention?

THE HYPOTHESES

In an attempt to answer the preceding questions, four hypotheses were developed: (1) students who receive a behavioral objective defining a psychomotor skill will perform better on a test of that skill than will students who do not receive the behavioral objective, (2) within each of three mental ability groups; high, middle, and low, students receiving the behavioral objective will perform better than students not

receiving the behavioral objective, (3) students who receive a behavioral objective defining a psychomotor skill will perform better on a delayed retest of that skill than will students who do not receive the behavioral objective, and (4) within each of three ability groupings; high, middle, and low, students receiving the behavioral objective will perform better on a delayed retest of that skill than will students who do not receive the behavioral objective.

DEFINITION OF TERMS

The definitions which follow were used throughout the remainder of the paper.

Behavioral Objective

The term behavioral objective was defined as a written statement including the identification, by name, of the type of behavior accepted as proof that the learner had achieved the objective, and the conditions under which that behavior is expected to occur. Since evaluation was not a factor of the study, no provision was made for the behavioral objective to include the minimum performance acceptable, even though this is often listed as one part of a behavioral objective.

For this study, the acceptable behavior was placement of the feet parallel to the backboard as each hit or attempted hit was made. This behavior was expected to occur on all hits which were attempted by the student while she was being tested.

Skilled Motor Performance

The term skilled motor performance was defined as student practice and execution of a psychomotor skill as it was described in the behavioral objective and as it was presented in a lecture-demonstration by the instructor. In this case, the psychomotor performance was footwork in backboard tennis play.

Mental Ability Level

The term mental ability level was defined as one of three levels to which students were assigned based on results of the Otis-Lennon Test of Intelligence. The range of average mental ability in this study was 109 to 119. High mental ability was considered as 120 or above, while low mental ability was considered 108 or below.

Skill Retention

The term skill retention was defined as performance on a retest of the original skilled motor performance. In this case, the retest was a second test of the students' execution of footwork in backboard tennis play.

Chapter 2

REVIEW OF LITERATURE

In the past few years much has been written, both in favor of and in opposition to the use of behaviorally-stated objectives as a means of identifying for the learner what he should be able to do after exposure to an educational program. Opponents of the behavioral objective approach have advanced many sound arguments against their use. But, for each of these arguments proponents of the behavioral approach have advanced what are probably equally sound counter-arguments. These arguments, however, did little toward providing a satisfactory solution to the question of whether or not behavioral objectives were an aid to learning. Some educators, instead of merely joining the debate, have conducted research into the effectiveness of behavioral objectives. These studies have provided fuel for both sides of the argument. Both theoretical arguments and research evidence concerning the effects of behavioral objectives have been included in the following discussion.

THEORETICAL CONSIDERATIONS

About five years ago James MacDonald and Bernice J. Wolfson published an article which exposed what they felt were the major shortcomings of behavioral objectives as they were

generally being used. By their own admission, MacDonald and Wolfson's position was not entirely "anti-behavior." (17:119) Indeed, they agreed with the theory of using pupil behavior as a significant basis for decision making. They did disagree, however, with the idea of providing students with behavioral objectives as a means to improve learning. In their disagreement they question whether performance itself was an acceptable criterion of learning. In expressing this point of view they stated that "when hoped-for behavior occurs, it is often assumed that learning has taken place. But one must ask whether the effects are lasting and under the control of the learner or whether the teacher must continue to be present to control the consequences." (17:120) In short, did students learn the teacher instead of learning the material? A second major limitation of behavioral objectives noted by MacDonald and Wolfson was the fact that behavioral objectives may place so much emphasis on the parts that the whole is lost. (17:121) They used reading as an example of the whole being more than the sum of its parts. To them it seemed obvious that "the ability to read is not simply the sum of word-recognition skills." (17:121) MacDonald and Wolfson also contend that "individual differences are ignored by attempting to obtain the desired behavior from all." (17:122) This they felt occurred because behavioral objectives specified only what the teacher expected the students to be able to do, leaving no room for individuality. Further, according to

these writers, behavioral objectives may stifle incidental and unplanned learning that may have occurred as a result of the interaction of students and teachers within the assigned activity. (17:124) MacDonald and Wolfson conclude that behavioral objectives may be "inadequate and restrictive to the educational function of schools." (17:127)

An article authored by Richard H. Hersh and Stuart J. Cohen appeared shortly after the MacDonald and Wolfson article which attempted to refute the arguments previously advanced against the use of behavioral objectives. In contrast to the idea that overt behavior is not necessarily indicative of learning, Hersh and Cohen suggested that the sampling of pupil behavior in different settings would eliminate the possibility of artificial responses. Further, they contended that when teachers provided behavioral objectives, students could devote less time to "learning the teacher" and more time to attaining the stated goals. (9:434) Hersh and Cohen addressed themselves only indirectly to the problem of student individuality and the part-whole questions when they included a model of a behavioral objective which they felt required more than a simple, rote-stated response. (9:437) Their response to the MacDonald-Wolfson inference that objectives may spring from interaction of students and teachers within the activity is simply labeled as "hocus-pocus." (9:436) They considered students generally incapable of selecting or generating appropriate instructional objectives. In closing,

Hersh and Cohen use an old cliché to argue that although preparing behavioral objectives is a time-consuming venture, it is a worthwhile one. They stated "that the effort to clearly define and assess our instructional goals is not only worth doing, but worth doing well!"(9:437)

In a February 1968 presentation to the Annual American Educational Research Association, W. James Popham discussed eleven arguments which have been advanced against the use of behavioral objectives. Several of the arguments he presented were similar to those advanced by MacDonald and Wolfson. One argument advanced at the symposium was that "measurability implies behavior which can be objectively, mechanistically measured; hence there must be something dehumanizing about the approach."(25:68) To this Popham replied that when evaluative techniques more sophisticated than the quantitative result of a multiple-choice exam are developed the learner will no longer be reduced to merely "quantifiable bits of data."(25:68) The use of behavioral objectives should make the identification of alternate methods of evaluation possible. Popham also cited the argument advanced in 1964 by Arnstine that "it is somehow undemocratic to plan in advance precisely how the learner should behave after instruction."(25:69) He then turned to Komisar and McClellan, 1965, for refutation of this argument. These writers pointed out that instruction is, by its very nature, an undemocratic process. The teacher almost always selects goals and activities for the class. They also pointed

out that this is merely an extension of a society which constantly decides what its young are to do. A third argument discussed by Popham was the fact that behavioral objectives seem much harder to generate for some subject areas than for others. Although he agreed that this was probably a valid argument, Popham told educators in these areas that "the difficulty of the task should not preclude its accomplishment." (25:71) He pointed out that there was no excuse for avoiding the task. Essentially the same argument was used to refute the suggestion that precise behavioral objectives are harder to generate than the vague objectives often prepared by teachers. In closing his presentation, Popham conceded that most arguments against the use of behavioral objectives did contain some truth. But he insisted that these objections were not of sufficient strength to prevent the careful preparation of behavioral objectives in all curricular areas. He concluded that "any risks we run by moving to behavioral goals are miniscule in contrast with our current state of confusion regarding instructional intentions." (25:72)

Writing on another occasion Popham concluded an article with the suggestion that the decision to use behavioral objectives was not a radical choice. In his words, "all it suggests is that you want to be clear about your instructional intents." (23:110) Clarity of instructional intents is an aid to both teacher and student. As Richard K. Means stated "learning is most effective when the learning objectives and

philosophy of the program are planned and clearly understood by both the teacher and the student."(19:9) Popham strongly believed that behavioral objectives were the key to better understanding.

A 1971 article by Larry Frase and E. Gene Talbot was devoted to a discussion of the levels of response required by most teacher-prepared behavioral objectives. They noted that far too many teachers tended to generate objectives which required students to identify, list, name, label, or otherwise rote reproduce bits of factual information. Their resistance to this type of objective is that it does not demand any reasoning on the part of the student. Frase and Talbot included a model objective which they felt required the student to think. Their model objective directed the student to "generate a hypothesis."(7:85) They felt this type of activity would help students learn to make decisions, whereas rote responses would push students toward becoming "members of adult society [with] their minds ... molded like clay, never having been stimulated to judge and weigh."(7:85)

Very little has been written, either pro or con, on the use of behavioral objectives in the physical education setting. A statement in a recently published textbook on supervision noted that the evidence of learning can be measured by observation of student behavior. Learning was further suggested to be a relatively permanent change in behavior. Both of these statements seemed to be echoes of

statements made in general educational methods textbooks. In the case of physical education, learning can be observed by changes in the student's movement patterns, rather than in written test scores. (12:60-61) Because of the observability of movement, physical education may be a logical place to incorporate the use of behavioral objectives.

In an April, 1973 article Joe M. Shockley, Jr. advocated the use of behavioral objectives in physical education. One of his major arguments seemed to be that the use of behavioral objectives would "help the teacher and student focus in on the learning process." (27:44) This clarifying effect would supposedly make measurement more objective and thus reduce much of the ambiguity of evaluation in physical education. Although the Shockley article seemed to be open to most of the arguments which have been advanced against the use of behavioral objectives in cognitive areas, the article is not written from a defensive posture. In general, the article discussed advantages to the teacher from the use of behavioral objectives. It dealt with behavioral objectives as a tool to be used in up-grading the image of physical education programs. Shockly briefly mentioned one advantage to the student. According to Shockley, when behavioral objectives are provided students would know exactly what is expected of them. They would also be in a position to evaluate their own progress. Aside from this short discussion Shockley made no mention of benefits to the student. The

question of whether students would learn better or faster when provided with behavioral objectives was left untouched.

The arguments presented thus far have been rooted in educational philosophy and learning theory. They are discussions for educators, by educators. But what about the student? Surely before finally accepting or rejecting any technique there should be some student input into the question. An informal survey conducted recently by David Hayes and Amber Steinmetz uncovered the facts that students felt that behavioral objectives were (1) useful as a study aid, (2) helpful in understanding course material, and (3) an aid to attaining higher grades.^(8:8) A similar, though more detailed, study by Tom E. Lawson revealed that students generally felt that behavioral objectives were (1) an aid to relevant learning, (2) an indication that the instructor was able to define what he expected, and (3) an aid to student attainment of instructional outcomes.^(15:66)

Unfortunately neither of these studies gave any insight into the types of activities described by the objectives or why students seemed to approve of the use of behavioral objectives. Could it be as MacDonald and Wolfson suggested that students can "learn the teacher" more easily or that the behavioral objectives merely pinpointed facts to be parroted back without thought? Or, were objectives actually an efficient instrument in helping the student to learn? Whatever their reasons, students in these studies did

seem to favor the use of behavioral objectives.

While student opinion should be one consideration in an instructor's decision to use behaviorally-stated objectives, the final choice must depend on whether or not they facilitate learning. Results of empirical research should aid teachers in making the decision to, or not to, use behavioral objectives.

EMPIRICAL IMPLICATIONS

The effects of behavioral objectives on learning of cognitive materials has been studied in a variety of situations. The results of these studies did not, however, indicate either support or rejection for the use of behavioral objectives in the classroom. Rather, the inconsistency of findings indicated that further research in the area of behavioral objectives was needed.

Studies Which Supported the Use of Behavioral Objectives

In 1973, Schuyler W. Huck and James D. Long studied the effect of the use of behavioral objectives in the college setting. (11:40-41) They divided a class of basic educational research students into two sections. One group received behaviorally-stated objectives for the day's lesson, while the remaining group met briefly in an adjacent room to discuss a previously completed examination. The two groups were then reunited and all students heard the same lecture. At the

close of the session, all students were given a twelve-item quiz over the day's lesson. The group which received the behavioral objectives produced significantly higher test results.

Another investigation into the effects of behavioral objectives on college-age students was conducted by Peter A. Schmidt. (26:1477A) In 1974, Schmidt provided one-half of the students in a beginning level class in Tungsten Inert Gas welding with behavioral objectives for each unit to be covered. At the conclusion of six weeks of instruction those students who had received behavioral objectives scored significantly higher on a 60-item multiple-choice test covering theoretical knowledge of the processes involved in Tungsten Inert Gas welding.

A third study of the effects of behavioral objectives on college-age students was completed in 1968 by R. S. Engel. (6:57) For his study, Engel provided half of the students in a class of elementary education majors with behavioral objectives for a partially programmed unit on mathematics. After completing twelve lessons, students who had received behavioral objectives produced better test results than students who had not received behavioral objectives.

Studies have also been completed which indicated that behavioral objectives were effective at high school level. In 1969, Gus T. Dalis examined the effect of behaviorally stated objectives on tenth grade students enrolled in five

health and safety classes. (3:262) For his study, Dalis devised behavioral objectives in two levels of specificity, plus a set of placebo statements. At the conclusion of a three week unit on growth and development, students were tested over material covered in the course. Those students who had received precisely worded behavioral information scored better on the unit achievement test than those who had received vaguely worded goal statements. Further analysis revealed the fact that students who had received vague statements were able to perform better than students who received the placebo statements. This led Dalis to conclude that more precision in instructional objectives produced higher student achievement.

Another study examined the effect of behavioral objectives on ninth grade students in physical science. For this study Robert C. Olsen provided behavioral objectives dealing with phases of matter, heat energy and light energy to eight classes, while no such information was provided to six other classes. (21:224A) The classes then received the same instruction for eight consecutive days. At the close of the unit Olsen evaluated student progress with an achievement test. He concluded that behavioral objectives had been a significant aid to student achievement.

Two studies similar to those already cited were conducted to assess the effects of behavioral objectives on junior high age students. Working with 190 seventh grade

industrial arts students, Charles R. Doty found that learning was facilitated in a unit on reading and calculating the value and tolerance of carbon axial resistors. (4:3035-3036A) In this study students who had received behavioral objectives prior to the unit scored sufficiently higher on a post-unit written test to allow Doty to conclude that the use of behavioral objectives had been influential.

In 1970, Roger A. Kueter conducted a similar study to determine the influence of behavioral objectives on sixth, seventh, and eighth grade students. (14:5939-5940A) For his study Kueter provided behavioral objectives to one-half of the students, then showed a film to the entire group. Following viewing of the film all students were given a recognition test over material contained in the film. Those students who had received behavioral objectives prior to viewing the film scored higher on the test than did students who had not received the objectives.

Articles reviewed thus far tend to present an affirmative case for the use of behavioral objectives. However, this does not provide an entirely accurate picture. Other researchers have concluded that behavioral objectives did not help the student. Studies reported in this section which supported the use of behavioral objectives were spread over learners from junior high through college ages. Studies which reported no benefits from the use of behavioral objectives were spread over the same age range of learners.

Studies Which Did Not Support
the Use of Behavioral Objectives

A doctoral study conducted in 1974 at Kansas State University by Bruce A. Petty studied the effects of behavioral objectives on students enrolled in an Instructional Media course.⁽²⁴⁾ Petty assessed the effects of behavioral objectives by analyzing the final examination scores of students enrolled in the course. One-half of these students had received behavioral objectives while one-half had not received objectives. Petty found no significant difference in scores between students who had and had not received behavioral objectives.

In another study based on college level students, Herman Weinberg provided either no objectives, general objectives, terminal behavioral objectives, or a combination of intermediate and terminal behavioral objectives to beginning bowling students.^(29:5951A) Scores on the final written examination for that course, however, failed to reveal significant differences among the groups.

A variety of studies were found which indicated that behavioral objectives failed to help high school age students to learn. In 1972, David B. Moody studied the effects of behavioral objectives on high school juniors during a unit of independent study in social studies.^(20:1179A) A written test administered at the close of the unit failed to reveal any differences between students who had received behavioral objectives and students who had not received behavioral objectives.

Another study which failed to support the use of behavioral objectives at the high school level was conducted by Elwood L. Loh. (16:145A) This study involved two classes of first year algebra students.

A similar study involving ninth grade students enrolled in vocational agriculture was undertaken in 1969 by Douglas D. Bishop. (2:4345A) Bishop also concluded that behavioral objectives made no significant contribution to student learning.

Still another study based on the effects of behavioral objectives on high school students involved ninth grade students enrolled in basic electricity. This study, conducted by William E. Jowell in 1973, covered fifteen fifty-five minute class periods. Results of achievement scores for 78 students in the course led to the conclusion that behavioral objectives were of no value in helping students learn. (13:969A)

At the junior high level, Philippe C. Duchastel and Paul F. Merrill cited a study conducted by S. A. Smith which studied the effectiveness of behavioral objectives when used in a unit on elementary probability. (5:57) In this study, one-half of a group of 162 slow learners were provided with behavioral objectives. Again, students who received the behavioral objectives performed no better than did students who had not received behavioral objectives.

Studies cited in the last two sections have dealt only with the general question of whether or not behavioral

objectives have been an aid to learning. Several of these studies have also examined the effects of behavioral objectives not only on immediate learning, but also on retention. Just as results of studies dealing with behavioral objectives and immediate learning did not prove conclusive, neither did studies dealing with retention. In each of the following studies, (some of which have been previously mentioned) one or more retests were administered to determine the role of behavioral objectives in facilitating retention.

Studies in Which Behavioral Objectives Facilitated Retention

In the Olsen study, results of a written test of physical science achievement indicated that behavioral objectives were an effective aid to retention. The Kueter study included a retest delayed one week after the original testing. Students who had been given behavioral objectives during the learning phase of the study achieved higher retention scores than did students who had not received the behavioral objectives. The Engel study also indicated a positive influence on retention from the use of behavioral objectives. The retention test in the Engel study was administered three weeks after the close of the unit. On the retention test, students who had studied with the aid of behavioral objectives obtained higher scores than did students who were not aided by behavioral objectives.

Studies in Which Behavioral
Objectives Did Not Facilitate Retention

The Bishop and Loh studies contained delayed retests to determine the role of behavioral objectives in aiding retention. In the Loh study, retesting was administered after intervals of seven, fourteen, and twenty-one calendar days. The group which had received behavioral objectives showed no significant difference in algebra retention for any of the intervals. The Bishop investigation employed a 30-day delayed retest of vocational agricultural materials. The group of students who had originally received behavioral objectives for the unit failed to produce retention scores which were higher than those produced by the group which had not received behavioral objectives.

A study completed in 1971 by G. H. Olson utilized a two-week delayed retest to assess retention of textual information covered in an interior design course at the college level. (22:58) In analyzing results obtained on the retention test, Olson concluded that the use of behavioral objectives during initial learning did not contribute to retention.

In addition to studying the effects of behavioral objectives on retention, several researchers have attempted to further clarify the role of behavioral objectives by studying the interaction of selected student traits with the use of behavioral objectives. One trait commonly selected for investigation was the level of student intelligence.

Interaction of Behavioral Objectives With Student Intelligence

Just as research was divided on the immediate and the long-range effects of behavioral objectives, so it was also divided over whether or not student intelligence influenced the effectiveness of behavioral objectives. No clear-cut case could be drawn for the use of behavioral objectives with any particular group of students when they were blocked according to intelligence.

Doty included grade-point-average, standardized test scores and I.Q. scores among several individual traits which were examined separately in relation to the effectiveness of behavioral objectives. His conclusion, based on research in the industrial arts setting, was that none of these three traits had any influence on the effects of the behavioral objectives. It should be noted, however, that the Doty study did support the use of behavioral objectives. In his study, Petty analyzed the results of students in the upper and lower quartiles of the class to determine if one group gained more from the use of behavioral objectives. Although the over-all results of Petty's research lent no support to the use of behavioral objectives, it was interesting to note that those students in the lower quartile of the group who had received behavioral objectives scored considerably better than those students in the lower quartile who had not received behavioral objectives. The use of behavioral objectives, however, was not

supported in the upper quartile. At this level no significant difference was reported between scores for students who had received behavioral objectives and scores for students who had not received behavioral objectives.

In the Olson study, subjects were divided into three ability levels; high, medium, and low. Separate analyses were undertaken at each level to determine the effectiveness of behavioral objectives. In general, results of this study supported the use of behavioral objectives as an aid in immediate and delayed achievement performance. However, when analyses by ability were completed, the use of behavioral objectives for immediate achievement was supported only at the high and medium levels. At the low ability level, students who had received behavioral objectives scored no better than did students who had not received behavioral objectives. Retention scores in this study were also subjected to analysis by ability. The results of these tests supported the use of behavioral objectives as an aid to retention for all three ability levels.

These studies raised a third question and left it also unresolved. Did the intelligence of the student influence the effect of behavioral objectives? Again, no firm conclusion can be drawn, even though a number of studies have been consulted. The role of intelligence in the effectiveness of behavioral objectives remained unclear.

Behavioral Objectives and Psychomotor Learning

As the major emphasis of this paper was assessment of the role of behavioral objectives in psychomotor learning, the final series of studies cited included analysis of psychomotor learning. Three of the studies already cited contained analysis of psychomotor learning as well as analysis of cognitive learning. In the Jowell study, students who had received behavioral objectives performed no better on skill tasks in basic electricity than did students who had not received behavioral objectives.

The Schmidt study included analysis of the effects of behavioral objectives on student performance of four welding exercises. In these exercises, Schmidt found no performance differences between the group of students who had received behavioral objectives and the group who had not received behavioral objectives.

One of the studies located dealt with psychomotor performance in the field of physical education. Herman Weinberg utilized a beginning college level course in bowling to assess the effects of behavioral objectives on skill performance. At the conclusion of ten weeks of instruction, bowling ability was evaluated by performance in representative game situations. The results of this evaluation revealed that students who had received behavioral objectives were unable to outperform students who had not received behavioral objectives.

Results of research which investigated the effects of behavioral objectives on psychomotor learning seemed to point to the same conclusion. Jowell, Schmidt, and Weinberg all concluded that the use of behavioral objectives did not facilitate motor learning. In each of these studies there were no significant performance differences between groups of students who had received behavioral objectives and groups of students who had not received behavioral objectives.

Summary

Material referenced for this paper was drawn from two basic sources; theoretical arguments and empirical evidence. Arguments and counter-arguments relative to the use of behavioral objectives as an aid to cognitive learning were exposed. In addition, reference was made to the Joe M. Shockley, Jr. article in the "Journal of Health, Physical Education and Recreation" which advocated the use of behavioral objectives in physical education. Research evidence cited has revealed the complexity involved in the attempt to determine the effectiveness of the use of behavioral objectives. Studies included have analyzed students from junior high through college ages, in a variety of subject matter area, from all ability levels, and for both cognitive and psychomotor learning. Diversity of the results reported in these studies has been the major cause for continued research designed to determine the role of behavioral objectives as an aid to student learning.

Chapter 3

PROCEDURES

The data for this study was collected during the first quarter of the 1975-76 school year at Marysville Junior High School, Marysville, Kansas. This school is located in Marysville, Kansas, a town of approximately 4,300 residents located in northeastern Kansas. It is the largest town and county seat of Marshall county.

Marysville Junior High School is part of Unified School District #364 which operates on a three-three, junior-senior high system. There are three years of junior high, grades seven through nine, followed by three years of senior high, grades ten through twelve. There are 366 students enrolled in grades seven through nine. Of these students, 130 are classified as seventh graders with 67 boys and 63 girls.

Approval for this study was granted by the Committee for Rights and Welfare of Human Subjects, Department of Health, Physical Education and Recreation, Kansas State University.

LIMITATIONS AND DELIMITATIONS OF THE STUDY

Subjects for the study were all seventh grade girls aged 12 and 13 years who were enrolled in required physical education courses. Students in four separate class periods were involved. These courses met for 53 minutes daily, five days per week. Of these 53 minutes, students were allotted a

total of 18 minutes to dress, leaving 45 minutes for activity. Although both seventh and eighth grade girls were enrolled in each class period, only the seventh grade girls were used as subjects for the study.

The decision to use only seventh graders as subjects was based on three factors. First, these students had not been in a physical education class previously and would, therefore, be less likely to have had instruction in tennis. Second, these students would not have been in a course previously taught by the instructor and would thus presumably react more to the instruction than to the instructor. Finally, these students provided the largest group of subjects of approximately the same age.

Data was not included in the analysis for one student who was not in the appropriate grade for her age. No subject in the study was classified as a special education or physically handicapped student. Based on scores from the Otis-Lennon Intelligence Test, the I.Q. range for students was from a low of 85 to a high of 135. An I.Q. score for each student was obtained from the permanent record card in the student's file. Scores were not available for two students who had recently transferred into the district. This eliminated two additional potential subjects. The remaining 60 students served as subjects for the study.

This study deals only with learners of approximately 12-13 years of age. Learners who are either younger or older

than these subjects may react differently to the use of behavioral objectives. Further, this was the first time any of the subjects had been exposed to the use of behavioral objectives in physical education.

Only one of the several functions of the behavioral objective was to be investigated by this study. The function under scrutiny was that of the behavioral objective as an agent to focus the student's attention on what is to be learned. The remaining functions of behavioral objectives which have been identified in Chapter 1 were not covered by this study.

In addition, this study dealt only with skill learning in an individual activity. The possibility exists that behavioral objectives would function differently in other types of activities.

DESIGN OF THE EXPERIMENT

This study utilized a 3 x 2 factorial, post-test only design modified to include a test of retention as illustrated in Figure 1. The independent variable (X) was teaching method with two levels (X_1 and X_2) included. Students at the X_1 level received a behavioral objective prior to a lecture-demonstration of the technique of backboard tennis play. This objective, as shown in Appendix A-1 was duplicated so that all subjects could be given a copy. Students at the X_2 level did not receive a behavioral objective prior to the lecture-

R	X ₁	Y ₁	O ₁	O ₇
R	X ₁	Y ₂	O ₂	O ₈
R	X ₁	Y ₃	O ₃	O ₉
R	X ₂	Y ₁	O ₄	O ₁₀
R	X ₂	Y ₂	O ₅	O ₁₁
R	X ₂	Y ₃	O ₆	O ₁₂

- R - Random assignment of subjects
 X₁ - Students who received behavioral objective
 X₂ - Students who did not receive behavioral objective
 Y₁ - High mental ability group
 Y₂ - Middle mental ability group
 Y₃ - Low mental ability group
 O - Measurements of the dependent variable

Figure 1
Design of the Experiment

demonstration. Instead, this group received a short placebo statement as shown in Appendix A-2. The statement for this group was also duplicated so that each student could have a copy.

After each group had read the appropriate statement, the instructor also read the statement to the group. The groups were then reunited and given a lecture-demonstration. Following this, subjects were allowed to practice and were then tested (O_1 through O_6). One week later the retest was administered (O_7 through O_{12}).

The moderator variable for this study was mental ability of the student based on Otis-Lennon Intelligence scores obtained from the permanent record file for each student. Three groupings were established and designated Y_1 , Y_2 , and Y_3 . Students who scored in the upper one-third of their class were classified as the high mental ability group and were designated as Y_1 . Students who scored in the lower one-third of their class were classified as the low mental ability group and were designated as Y_3 . The remaining group, Y_2 , were those students of middle ability.

The dependent variable for this test was footwork on a backboard tennis test. Correct footwork, as described by the behavioral objective and in the lecture-demonstration, was tested by an instructor devised instrument. This test was administered to a pilot group to establish reliability. The same instrument was also used to measure retention.

PILOT STUDY OF THE MEASUREMENT INSTRUMENT

Because the instrument used to measure the dependent variable was devised by the instructor, it was necessary to determine test reliability. Test-retest reliability was established by administering the test on consecutive days to the same students. Because all of the seventh grade students were used in the study, ninth grade girls were used for the pilot study.

For this test students were provided with a tennis racket and tennis balls. They were required to rally against a backboard from a distance of fifteen feet. The test was administered indoors using one wall of a gymnasium as a backboard. This wall was constructed of glazed brick. A two-inch wide restraining line was taped on the floor fifteen feet from the wall. Students were to remain behind this line for each hit. Any hit made from the area between the line and the wall was scored as an incorrect hit. To be scored as a correct, both of the player's feet must have been positioned parallel to the wall at the instant she hit the ball. Each girl was allowed twenty hits or attempted hits. One hit was counted each time the student attempted to hit the ball, whether contact was made or not. This was the only scoring system used during the test.

Students were allowed approximately ten minutes to practice before they were tested. This was accomplished through a rotation system. Five practice stations and one

testing station were established as illustrated in Figure 2 which appears on the following page. Students were arranged in alphabetical order and then rotated through the sequence of practice stations. Each student spent two minutes at each station before moving to the next station. At each practice station students were permitted the use of one tennis ball and were responsible for retrieving the ball should it be hit out of control.

At the testing station students were given one ball with which to start their test. Subjects were to rally that ball until they lost control of it. If, at this point, the ball was in a quickly retrievable spot the testee was to retrieve it herself and continue her performance. If, however, the ball was beyond the immediate reach of the testee another ball was provided and the original ball was retrieved by another student.

While the student was rallying at the testing station two raters were counting the number of correctly executed hits, based on foot position. The two raters for the pilot test were the instructor and the student leader for the class. These raters were positioned as illustrated in Figure 3 which appears on page 43. A third person was present to count the total number of attempted hits and to inform the testee when her twenty hits were completed.

This same testing procedure was used on the following day. In an effort to offset any practice effect, no provisions

**THIS BOOK
CONTAINS
NUMEROUS PAGES
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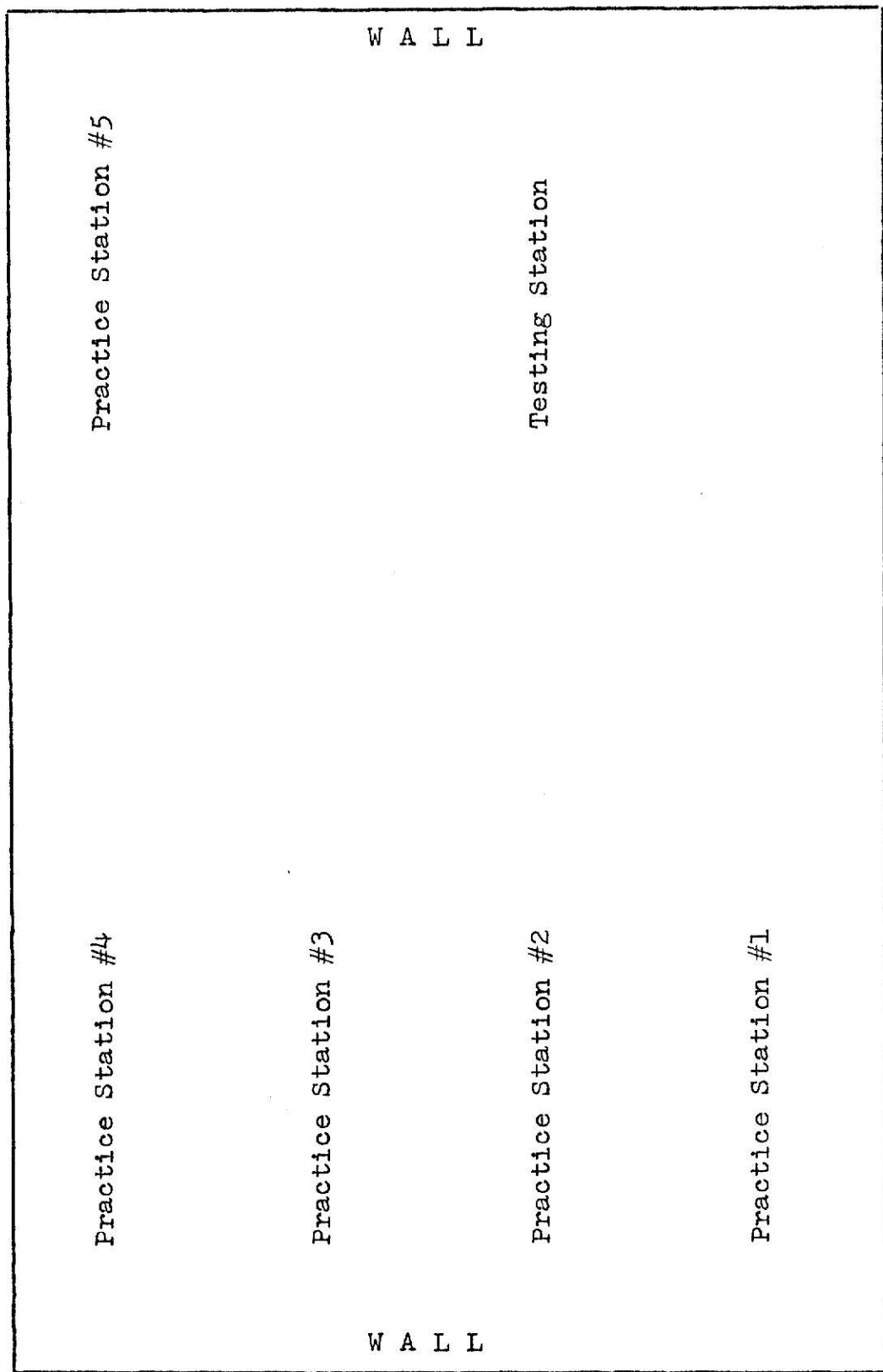


Figure 2
Rotation Sequence for Practice and Testing

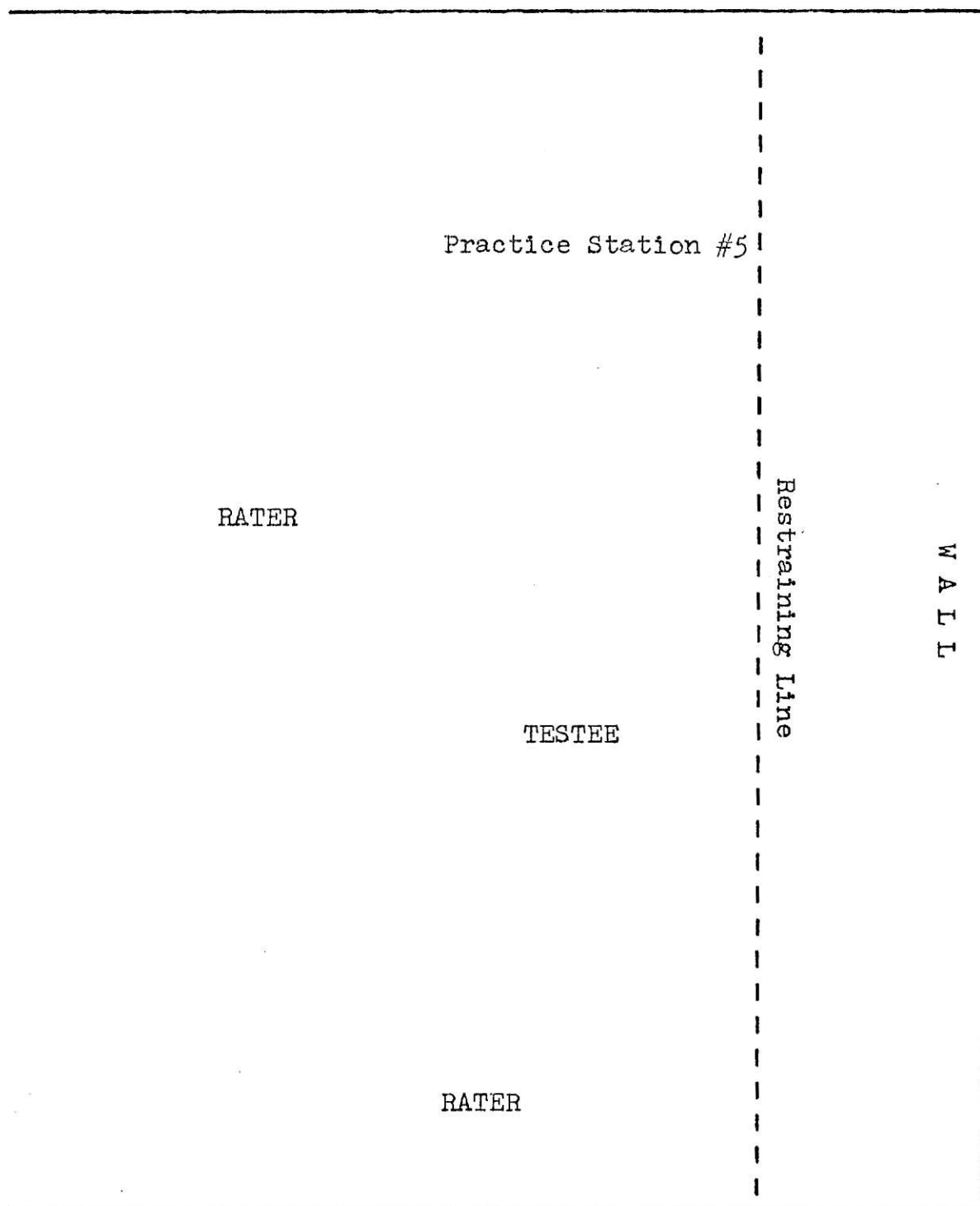


Figure 3
Position of Raters

were made for practice during this testing. The same scorers and counter was utilized for the second testing.

At the conclusion of the first testing session, scores from the instructor and student leader were combined to yield a total score. Scores from the second testing were treated in the same manner. These two sets of scores were then used to establish test-retest reliability. This was accomplished through the use of a Pearson-product-moment correlation. The results of this analysis indicated a test-retest reliability of .75.

As previously described, raters were to rate each hit or attempted hit only by the presence or absence of correct footwork. Since no rating was made on any aspect of the test other than footwork, the test of the dependent variable was assumed to have face validity.

SEQUENCE OF EVENTS DURING THE STUDY

This section of the paper documents the sequence of events as they occurred during the study. In addition, details of the procedures used during the actual investigation are also included.

Preliminary Preparation

Approximately two weeks prior to any student involvement in this project the principal of the junior high was consulted. The nature of the project was discussed with him and permission was obtained for the classes indicated to participate. It was

decided that since no physical risks were involved other than those normally present in the physical education setting it would be unnecessary to contact parents to gain further permission. An informed consent letter as illustrated in Appendix A-3 was then prepared for each student who was to participate in the study.

Approximately one week prior to student participation, two persons were contacted and asked to serve as raters for the testing. Both raters were female; one held a degree in physical education and the other was involved in recreation for the town of Marysville. An explanation of the nature of the study was given to these ladies along with a description of the responsibilities of the raters. Both persons agreed to serve as raters and to arrive early on the first day of testing in order to practice the rating procedure they would be using.

Shortly before the testing was to be carried out students were surveyed to determine how much tennis they normally played. This was done as a part of the daily class with no mention being made of the study. Students were asked to indicate which of these five categories best reflected their previous tennis experience: (1) played more than twice a week, (2) played once or twice a week, (3) played twice a month, (4) played once a month, or (5) played hardly ever or never. The results of this survey indicated that most students who would be involved in the study were quite inexperienced as tennis players. As indicated in Table 1, only twenty percent of the

Table 1
Previous Tennis Experience

Class Period	Over twice per week	Once or twice per week	Twice a month	Once a month	Hardly ever or never
2	0	0	0	4	8
4	0	1	1	0	19
5	1	1	1	1	7
7	1	2	4	0	9
Total	2	4	6	5	43
Percent of Total	03	07	10	08	72

potential subjects indicated that they played tennis more than twice a month. By combining those who hardly ever or never played with those who played only once a month, fully eighty percent could be classified as essentially non-players.

On the day prior to the first testing all seventh grade girls received a copy of the informed consent letter. At this time students were not told the nature of the activity in which they would be participating, but were merely informed that they were being asked to help with a research study. They were, however, also informed that the activity would be completed during the class period and that it should cause no physical discomfort. Students who agreed to participate in the study were then arranged in alphabetical seating order in the bleachers of the gymnasium. Following this they were walked through the practice and testing rotation sequence that would be used on the following day. This was done so that there would be sufficient time on the following day to complete testing of all subjects during the class period.

Assignment of Subjects

Once I.Q. scores were obtained for each subject, the group was divided into three ability levels. Subjects whose I.Q. scores fell in the upper one-third of the range were classified as high mental ability. Subjects whose I.Q. scores fell in the lower one-third of the range were classified as low mental ability. The remainder of the subjects were classified as middle ability. There were twenty subjects at

each level. Following the initial division by mental ability, an alphabetical listing of subjects was prepared for each level.

Each of the three alphabetical listings were then divided into two groups which were to be the two treatment levels. This was accomplished by the use of a random numbers table. The first ten students selected from each level were assigned to receive the behavioral objective. The remaining ten students were assigned to receive the placebo statement. Following this, lists were drawn up for each class period which revealed the treatment level for each student. Examination of these lists indicated that each class in the study was fairly evenly divided relative to the number of students in each treatment level. Table 2 on the following page shows the division of subjects in each class period by treatment and mental ability.

Class Procedure

The following procedure was repeated for each of the four class periods involved. Students arrived in class, dressed, and roll was taken as usual. Eighth grade students were assigned to another teacher and room and were to use the period as a study hall. Once the eighth grade students had left the gymnasium, seventh grade students were separated into the two treatment groups.

These groups were sent to opposite corners of the gym. Once the groups were in place, each student received a copy of

Table 2

Number of Subjects in Each Period
Assigned to Treatment Levels
According to Mental Ability

Period	Treatment	Y_1	Y_2	Y_3	Total
2	X_1	2	2	3	7
	X_2	2	2	1	5
4	X_1	3	3	4	10
	X_2	4	5	2	11
5	X_1	0	2	2	4
	X_2	1	2	4	7
7	X_1	5	3	1	9
	X_2	3	1	3	7
Total		20	20	20	60

X_1 - Behavioral Objective

Y_1 - High Mental Ability

X_2 - No Behavioral Objective

Y_2 - Middle Mental Ability

Y_3 - Low Mental Ability

the statement appropriate for her treatment level. The instructor asked each girl to read the statement she had received. In addition, the instructor read the statement to the groups. Sufficient distance separated the groups to eliminate the possibility of one group overhearing the statement being read to the other group. In addition, neither group was given reason to believe that their statement was different from the statement given to the other group. The order in which statements were read to the groups was alternated each class period. No student questions were permitted while the statements were being read. Following the reading of the statements, the handouts were collected to avoid the possibility of subjects becoming aware of the contents of both statements. Following this, the groups were reunited.

Once the group had been reunited, all students heard a lecture-demonstration presented by the instructor. An outline of the points to be covered in the lecture-demonstration was prepared prior to the presentation and followed carefully so that each class period would receive the same instruction. This lecture-demonstration followed the outline which appears in Appendix B-1. During the presentation students were not permitted to ask questions. Again, this was done to assure that instruction would be as nearly identical for all class periods as possible.

When the lecture-demonstration was completed, subjects

were seated in alphabetical order in the bleachers. They had received instruction in this procedure on the previous day. After selecting a ball and racket, subject number one started to practice at the first station in the practice-testing rotation as illustrated in Figure 1, page 42. The remainder of the subjects followed one at a time at two-minute intervals. The testing procedure was started when the first subject reached the testing station.

For this testing, raters were provided with prepared lists of subjects. These lists were on twenty-space rating sheets as illustrated in Appendix B-2. For each hit or attempted hit the raters were to record either a plus (+) or a minus (-), depending on the presence or absence of correct footwork as described in the behavioral objective. Raters had previously been instructed in this process.

During the testing, both raters were operating blind as to the treatment condition of the subjects. This was done to prevent any bias on the part of the raters. As on the pilot test, raters alternated observation locations for each class period. The instructor was present to count hits and provide additional tennis balls to the testee as necessary. One other student was also present to shag balls as necessary.

At the close of the initial testing period no mention was made to the subjects of the retest to take place one week later. The same counter and raters were available for the retest. Raters were asked not to mention that they would be

returning to the class at a later date.

For the retest, a second set of rating sheets were provided and the same rating procedure was utilized. Students were not provided with practice time prior to the retest. This was done in an effort to eliminate any practice effect which might have influenced scores on the retest. All students who had been present for the original testing were also present for the retest, thus subject mortality was not a problem.

Chapter 4

ANALYSIS AND INTERPRETATION OF DATA

The first step in the analysis of data for this study was to determine raw scores for each subject. This was accomplished by counting the number of pluses entered on the rating sheet for each subject. Two scores were derived for each subject, one from each rater. These two scores were then averaged to yield each subject's score. This procedure was used to determine scores for both the post-test and the retest.

ANALYSIS OF POST-TEST DATA

Since scores reflected subjective observations made by raters, two raters were used throughout the study. The results of their individual judgments were compared to establish an index of inter-rater agreement. This was accomplished through the use of a Pearson-product-moment correlation.

The results of this correlation yielded a .74 index of agreement. This corresponds roughly to a 55% overlap between the ratings given by each of the two raters. The .74 index of agreement was then examined with 59 degrees of freedom in a critical value table and found to be significant well beyond the .05 level at which it was tested. This indicated that a satisfactory inter-rater reliability had been achieved on the test.

The second step in the analysis of data was undertaken

to provide the statistical basis for accepting or rejecting Hypotheses One and Two. Before this analysis was undertaken, each subject was first assigned a number and then scores were separated into six blocks: (1) subjects of high mental ability who had received the behavioral objective, (2) subjects of middle mental ability who had received the behavioral objective, (3) subjects of low mental ability who had received the behavioral objective, (4) subjects of high mental ability who had not received the behavioral objective, (5) subjects of middle ability who had not received the behavioral objective and (6) subjects of low mental ability who had not received the behavioral objective. This information was recorded on the form illustrated in Appendix B-3.

Mean scores for each of these blocks were calculated and are presented in Table 3. Results of the analysis of variance based on this information can be seen in Table 4. Although mean scores for the group which had received the behavioral objective appeared higher, the F ratio of 2.465 for the independent variable obtained from the analysis of variance was not significant when tested with one and 54 degrees of freedom at the .05 level.

Based on these findings, the null hypothesis associated with Hypothesis One was accepted. In accepting the null hypothesis it was concluded that no differences existed between groups which had and had not received behavioral objectives. This conclusion resulted in the rejection of Hypothesis One.

Table 3
Mean Post-test Scores for the Dependent Variable

Level	Group Receiving Behavioral Objective	Group Not Receiving Behavioral Objective
High	16.70	15.3
Middle	15.40	13.6
Low	15.15	12.4

Table 4
Analysis of Variance of Dependent Variable by
Independent Variable (A) and
Moderator Variable (B)

Source	df	MS	F
A	1	62.30	2.4650
B	2	25.75	1.0189
AB	2	.75	.0296
error	54	24.27	

The F ratio of .0296 obtained for the interaction of the independent and moderator variables was found not to be significant when tested with two and 54 degrees of freedom at the .05 level. This information also appears in Table 4.

Based on this analysis, the null hypothesis associated with Hypothesis Two was also accepted. The acceptance of this null hypothesis indicated that no interaction existed between the mental ability level of the student and the effectiveness of the behavioral objective. The acceptance of this null hypothesis necessitated the rejection of Hypothesis Two. The mental ability level of the student did not seem to affect her reaction to the behavioral objective.

ANALYSIS OF RETEST DATA

The same statistical analyses were performed on the data obtained from the retest. The Pearson-product-moment correlation was again used to establish an index of inter-rater agreement. The result of this correlation indicated an agreement index of .78 for the retest. This corresponds roughly to a 60% overlap between the ratings of the two raters. Again, when tested with 59 degrees of freedom in a critical value table the agreement index was found to be significant well beyond the .05 level. This indicated that a satisfactory inter-rater reliability was also achieved on the retest. A possible explanation of this increase over the agreement index for the post-test scores was the increased efficiency of the

ratars due to a practice effect which would have resulted from scoring the first test.

The final step in the data analysis for this paper was undertaken to provide the statistical basis for the acceptance or rejection of Hypotheses Three and Four. For this analysis, all data was again blocked into the categories mentioned earlier in this chapter.

Once this blocking was completed, mean scores for each block were calculated and are shown in Table 5. Table 6 summarizes the results of the analysis of variance performed on this information. The F ratio of 3.320 for the independent variable obtained from the analysis of variance was not significant when tested at the .05 level with one and 54 degrees of freedom.

Based on this finding, the null hypothesis associated with Hypothesis Three was accepted. The acceptance of this null Hypothesis predicated the conclusion that no differences in retention existed between groups which had and which had not received a behavioral objective. This conclusion led to the rejection of Hypothesis Three.

Table 6 also shows an F ratio of .002 for the interaction between mental ability and treatment condition. When tested with two and 54 degrees of freedom, this failed to be significant at the .05 level. The null hypothesis associated with Hypothesis Four was therefore accepted. The acceptance of this null hypothesis led to the conclusion that the mental

Table 5
Mean Retest Scores for the Dependent Variable

Level	Group Receiving Behavioral Objective	Group Not Receiving Behavioral Objective
High	17.0	14.80
Middle	16.1	13.15
Low	13.5	11.70

Table 6
Analysis of Variance of Dependent Variable on Retest
by Independent Variable (A) and
Moderator Variable (B)

Source	df	MS	67
A	1	67.100	3.320
B	2	57.450	2.840
AB	2	.045	.002
error	54	20.210	

ability of a student did not influence her retention in the presence of a behavioral objective. Hypothesis Four which stated that there would be a significant difference at all mental ability levels was therefore also rejected.

These findings seemed to indicate that there may actually be no difference in the learning of psychomotor skills regardless of the presence or absence of behavioral objectives. While the mean scores did appear slightly higher at all mental ability levels for the groups which had received the behavioral objective, this difference was not found significant at the .05 level. In addition, retest data revealed that, in this study, the use of a behavioral objective was not an aid to retention of psychomotor skill.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In recent years, numerous authors including Hersh and Cohen, Popham, and Shockley have stressed the benefits of the use of behavioral objectives as a valuable teaching tool. They have, however, been challenged by MacDonald and Wolfson, Arnstine, and Frase and Talbot who seemed to present equally feasible arguments against the value of behavioral objectives.

Research studies in a wide variety of subject-matter areas have been cited which have indicated that behavioral objectives are an effective teaching tool. These studies include: Huck and Long, 1973, Schmidt, 1974; Olsen, 1972; Kueter, 1970; Dalis, 1969; Engel, 1968; and Doty, 1968. Studies have also been conducted in which the use of behavioral objectives failed to produce any significant improvement in learning over the non-use of behavioral objectives. These studies include: Petty, 1974; Jowell, 1973; Moody, 1972; Loh, 1972; Weinberg, 1970; Bishop, 1969; and Smith, 1967.

In light of conflicting evidence on the effectiveness of behavioral objectives in general and in physical education in specific, this study attempted to determine the function of behavioral objectives during psychomotor learning. Further, an analysis was undertaken to determine if this function was greater at any one of three mental ability levels; high, middle, or low.

Subjects for the study were seventh grade girls enrolled in a required physical education course. They were blocked into the three mental ability levels which have already been mentioned and then randomly assigned to receive either a behavioral objective or a placebo statement. After reading the appropriate statement for their treatment group, all subjects heard the same lecture-demonstration which covered the technique of backboard rallying with a racket and tennis ball.

Following this, all subjects were allowed approximately ten minutes to practice before they were tested on the performance which had been outlined in the behavioral objective. Two independent raters scored plus or minus for each of 20 consecutively attempted hits made by each subject. Only hits which conformed to the behavioral objective, i.e. with both feet parallel to the wall at the moment the ball was hit, were scored as a plus. The total score for each subject was equal to the average of the total pluses she received from both raters. This same test was given one week later to evaluate retention under both treatment conditions. Results of the data collected from both testings were subjected to analysis of variance.

CONCLUSIONS

As a result of the data collected, each of the four hypotheses established for this study were rejected. These

hypotheses were stated as follows: (1) students who receive a behavioral objective defining a psychomotor skill will perform better on a test of that skill than will students who do not receive the behavioral objective, (2) within each of three mental ability groups; high, middle, and low, students receiving the behavioral objective will perform better than students not receiving the behavioral objective, (3) students who receive a behavioral objective defining a psychomotor skill will perform better on a delayed retest of that skill than will students who do not receive the behavioral objective, and (4) within each of three mental ability groups; high, middle, and low, students receiving the behavioral objective will perform better on a delayed retest of that skill than will students who do not receive the behavioral objective.

It should be recalled that during the lecture-demonstration phase of the lesson all subjects received identical instruction regarding the performance which was expected of them. The behavioral objective which was supplied to one-half of each class was intended to help focus the student's attention on a specific aspect of the performance which would later be evaluated. During the lecture-demonstration, two points of style were described. Only those students who had been provided with the behavioral objective knew specifically the point on which they were to be evaluated. This information, however, did not seem to aid students in the correct execution of the skilled motor performance. During the actual

evaluation, neither group demonstrated a significantly higher number of correct performances. Evidently the specific information included in the behavioral objective was no more effective than the general information included in the lecture-demonstration for focusing student attention on what was to be learned.

Since the behavioral objective used in this study failed to influence the quality of student performance, it would seem advisable for teachers to exercise caution in relying totally on behavioral objectives to facilitate learning and retention of motor skills. However, this does not preclude the possibility that behavioral objectives can play an important role in defining the total physical education program or in the selection of activities for that program. Further, although seemingly ineffective in the individual activity utilized in this study, perhaps the use of behavioral objectives would prove more valuable if examined in relation to other types of activities or with other groups of learners.

RECOMMENDATIONS

While the use of behavioral objectives was rejected in this study, it seems quite possible that behavioral objectives would prove valuable in other situations. It is, therefore, recommended that additional studies be conducted:

1. using other types of activities in both the team and individual sport categories.

2. using non-sport oriented activities such as physical fitness, dance, or movement fundamentals.
3. using more complex psychomotor performances.
4. using behavioral objectives as an organizational technique rather than as a teaching aid.
5. which would evaluate retention over longer periods of time.
6. where subjects would be blocked according to personality factors instead of I.Q.
7. where subjects would be blocked on functional ability according to a test such as The Analysis of Learning Potential.
8. where subjects would be blocked according to motor adeptness.
9. where subjects would be blocked according to grade-point average.
10. where subjects would be blocked according to past grades received in physical education courses.
11. using other age and/or grade classifications of students.
12. using both male and female subjects.
13. using students enrolled in elective rather than in required physical education activities.

At this time, research in the area of psychomotor learning and the use of behavioral objectives is scant. Much research needs to be completed before a final conclusion can

be reached relative to the effectiveness of behavioral objectives as an aid to psychomotor learning. Further investigations of the nature indicated previously would provide a broad, empirical framework upon which to base the decision to provide or not to provide specific behavioral information to students.

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APPENDIX A

HANDOUTS TO THE STUDENT

Given a tennis ball and racket, the student will rally against the wall, from a distance of 15 feet, until she has attempted 20 hits. On each hit or attempted hit the student is to move to a position with both feet parallel to the wall.

Appendix A-1

Behavioral Objective

Tennis is currently a leading recreational sport in the United States. Using a racket and ball to rally against the wall is one way to practice tennis without a partner.

September, 1975

To: Student

From: Miss Hatfield

I am currently working toward a Master's degree at Kansas State University. I am studying the learning of tennis and would appreciate your help. I would like to have you perform some tennis skills to aid me in my study. Your participation will be similar to what you would do in a normal physical education class. I hope that you will benefit from the study by learning some tennis skills. If you have any questions I will be glad to answer them. If you are willing to take part in this study during class, please read and sign the following statement. Please note that your performance in the study will not be reflected in any way on your grade.

- - - - -

I agree to participate in the study mentioned above and to allow information about my performance to be used in the study. I further understand that all performance scores will remain confidential and that I may choose to withdraw from the study at any time.

Signed _____

Appendix A-3

Informed Consent Letter

APPENDIX B

INSTRUCTIONAL AND SCORING MATERIALS

Appendix B-1

PRESENTATION BY THE INSTRUCTOR

- I. Introduction
 - A. Experimental nature of the activity
 - B. Separate subjects into appropriate groups
- II. Distribute handouts
 - A. Read handouts to each group
 - B. Collect handouts
- III. Reunite group and present lecture-demonstration
 - A. Important points in wall rallying
 - 1. Straight armed swing
 - 2. Turn feet parallel to wall
 - a. Demonstrate correct position
 - b. Demonstrate incorrect position
 - c. Repeat correct position
 - d. Repeat incorrect position
 - B. Demonstrate wall rallying
- IV. Explanation of skill practice and test sequence
 - A. Location of practice and test stations
 - B. Ball shaggers
 - 1. For self during practice
 - 2. Provided during test
 - C. Replacement balls during test
 - D. Raters
 - 1. Location
 - 2. Function - to count correct performances

- E. Counter - to count attempted hits
- V. Move subjects to starting position
 - A. Seating area
 - B. Begin practice sequence

PSYCHOMOTOR LEARNING AND RETENTION
RELATIVE TO THE PRESENCE OR ABSENCE OF A
BEHAVIORAL OBJECTIVE

by

MARY KATHRYN HATFIELD

B.S.E., Kansas State Teachers College, 1969

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AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Health, Physical Education, and Recreation

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1975

Abstract

PSYCHOMOTOR LEARNING AND RETENTION RELATIVE TO THE PRESENCE OR ABSENCE OF A BEHAVIORAL OBJECTIVE December, 1975

Mary Kathryn Hatfield, B.S.E., Kansas State Teachers College

Directed by: Mr. Ray Wauthier

This study was undertaken to evaluate the following hypotheses: (1) students who receive a behavioral objective defining a psychomotor skill will perform better on a test of that skill than will students who do not receive the behavioral objective, (2) within each of three mental ability groups; high, middle, and low, students receiving the behavioral objective will perform better than students not receiving the behavioral objective, (3) students who receive a behavioral objective defining a psychomotor skill will perform better on a delayed retest of that skill than will students who did not receive the behavioral objective, and (4) within each of three mental ability groupings; high, middle, and low, students receiving the behavioral objective will perform better on a delayed retest of that skill than will students who do not receive the behavioral objective.

Subjects for the study were 60 seventh grade girls enrolled in a required physical education course. These girls were blocked into high, middle, and low mental ability groups. Within each mental ability group, subjects were randomly assigned to receive either a behavioral objective or a placebo

statement.

On the day designated for the first testing, subjects were separated into the two treatment conditions and each group was supplied with the appropriate statement. The class was then reunited and all subjects heard the same lecture-demonstration which covered the technique of backboard rallying with a tennis racket and ball. After practicing for approximately ten minutes, each subject was tested on her ability to perform in the manner identified in the behavioral objective. As identified in the behavioral objective, evaluation was based only on correct footwork. No score was given based on the number of times the subject hit the ball. Data from this testing was subjected to analysis of variance to test Hypotheses One and Two. The results of this analysis led to the rejection of Hypotheses One and Two.

One week later the same test was administered again. Data from the retest was subjected to analysis of variance to test Hypotheses Three and Four. Results of this analysis led to the rejection of Hypotheses Three and Four.

A possible explanation of this result may be found in the fact that all subjects had been exposed to the performance required by the behavioral objective. Half of the subjects were generally exposed to this information in the lecture-demonstration, while the other half received a behavioral objective intended to focus their attention on the specific explanation of the action which was to be rated. Since groups receiving the behavioral objective failed to score higher than

groups not receiving the behavioral objective, it was concluded that, in this study, behavioral objectives were not an effective aid to psychomotor learning.

The effectiveness of behavioral objectives to define programs, to aid in the selection of activities or to determine evaluative techniques was not evaluated in this study. Further study relative to the function of behavioral objectives in physical education was recommended.