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WARD, DIANNE STANTON. A Comparison of Two Teaching Methods in Beginning Golf: Expository versus Guided Discovery. (1970)
Directed by: Dr. Pauline A. Loeffler and Dr. Gail Hennis

pp. 79

The purpose of this study was to determine the effectiveness of two teaching methods, expository and guided discovery, in skill and knowledge learning of golf at the beginning level.

The subjects were sixty college women attending Coker College, Hartsville, South Carolina, during the academic year 1969-1970. The subjects were enrolled in four classes of beginning golf. Two classes were designated as the expository group and two as the guided discovery group.

The golf unit was constructed using the swing theory as stated by Hicks and Griffin. (11) The unit lasted fifteen weeks and classes met two days a week for fifty minutes a session. Three subjects were dropped from the study for reason of absences.

At the end of the unit the subjects were evaluated by means of the Porter-Gaskin five iron full swing skill test (48), an eighteen hole course play, and a fifty item objective knowledge test constructed by the experimenter. However, due to a low internal reliability rating, the knowledge test was not included as a criterion measure of golf understanding.

Fisher's "t" for significance of difference between means was the statistic used to determine if there were a difference between the groups. Fisher's "t" for the eighteen hole course play evidenced a difference between the guided discovery group and the expository group significant at the .05 level of confidence. The skill test showed no difference between the groups.

Therefore, it was concluded that a guided discovery technique of teaching could be helpful in the learning of beginning golf. However, the results of the study were not conclusive.

A COMPARISON OF TWO METHODS OF TEACHING
BEGINNING GOLF: EXPOSITORY VERSUS
GUIDED DISCOVERY

by

Dianne Stanton Ward

A Thesis Submitted to
the Faculty of the Graduate School at
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CHAPTER I

INTRODUCTION

Mastery of the fundamental ideas of a field involves not only the grasping of general principles, but also the development of an attitude toward learning and inquiry, toward guessing and hunches, toward the possibility of solving problems on one's own. (4:20)

In recent years, education has been criticized for being teacher-centered and for failing to meet the needs of the individual student. Some critics of modern day education complain that the emphasis is on the product rather than the process involved in learning. A major difficulty of product-centered education is that the teacher becomes the center of the learning experience. All knowledge flows from the teacher to the student. (40) However, there is a trend away from this type education to one in which the student is an active participant in the learning process. "Knowing is a process, not a product." (5:72)

This study concerns itself with the examination of two teaching methods and their contribution to the learning and understanding of complex motor skills. The two techniques reviewed are expository and guided discovery. The complex motor skills are those necessary for successful golf play.

The debate between expository and guided discovery learning is not a novel one. In early China, the aim in learning was memory. The student who could memorize most accurately was given the

highest grade. Only the priestly class in the Hebrew culture was privileged to study and to inquire. Even in ancient Athens the highest object in learning was imitation. However, Socrates initiated a movement toward guided learning with his interrogative inquiry method of teaching. But with the Middle Ages came a wane in the use of discovery. The emphasis during this period was on the lecture method. (19)

In modern times, Jean-Jacques Rousseau, Maria Montessori, and John Dewey have been leaders in the advocacy of discovery learning. (25) Three occurrences proved to be catalysts in the contemporary development of discovery learning. The curriculum revolution after the First World War set the stage for discovery teaching. The educators' disclosure of the importance of a learner finding his own knowledge and the rebirth of the writings of Piaget helped to augment the development of discovery in learning. (1)

The purposes for using each method are credible. Expository teaching is less complex than other methods, can be accomplished with greater ease than other methods, and its results are easily measured. Moreover, in teaching through an expository method, more material can be covered in less time than through a discovery method. In using a discovery method, one seeks to promote greater understanding, to promote prolonged retention, and to promote transfer of knowledge to other learning situations. (19, 27) In a discovery learning situation, the student is the manipulator of his knowledge and a participator in his learning.

Both methods have been advocated by many people. There are those who feel that learning can only occur through discovering one's own knowledge. Other theorists argue that expository teaching accomplishes just as much in less time. A third school of thought believes that both methods are important, but debates the appropriate time to use each method. (34) This study resolved to determine if one method facilitated learning better than the other method.

CHAPTER II

STATEMENT OF PROBLEM

THE PROBLEM

This study proposed to compare the difference between two teaching methods and the learning of gross motor skills. The two teaching methods were expository and guided discovery. The motor skills were those necessary for successful golf play. The writer was also interested to see if there was any difference in golf understanding as evidenced by an experimenter-constructed knowledge test.

DEFINITIONS

For the purpose of continuity, several definitions have been established for use in this study.

Expository Method

The expository method is a method in which the teacher is the main source of all knowledge. (43). He makes generalizations, demonstrates principles, and answers questions.

Discovery Method

The discovery method is a "method in which verbalization is delayed until the end of the instructional sequence by which the concept or generalization is to be taught." (43:226)

Guided Discovery Method

The guided discovery method is a method by which a student can be guided through verbal cues to discover the correct answer. The basic difference between this and other styles of teaching is that the answer is never given. (13)

CHAPTER III

REVIEW OF LITERATURE

The literature reviewed for this study consisted of two major categories: theory and research. In the first section, the theoretical arguments concerning expository, discovery, and guided discovery are presented. In the second section the research studies in education are reviewed. In education, some research was available on discovery. However, in physical education no research studies were found concerning either of these methods. Some physical education research was available on a similar teaching method, problem solving.

LITERATURE RELATED TO THE DISCOVERY METHOD

Expository Method

Expository learning has always been associated with memorization. However, expository learning does not have to be rote. Rote outcomes only occur as an abuse of this method. (27) Discovery learning can be just as rote as the most basic form of expository learning. (23)

Expository learning gives a student facts from which he can formulate questions or draw conclusions. ". . . we in education have tended to forget that ideas grow best in minds well nourished with organized facts." (26:11) It is this lack of factual information which seems to be a hindrance in discovery

theory. Students must have a vocabulary of abstract terms from previous tangible experiences. New material will not be very meaningful unless the student can organize, explain, or integrate concepts. (15)

In teaching through an expository method, more information can be covered in less time than through other teaching methods. Expository teaching is also very ordered and controlled. Discovery learning has no control. (22) There is no way to check the thinking and discovery processes of the students. A discovery sequence may be designed for a student to discover a certain concept. However, there is no way to control the discovery of a concept which is not the desired one. This inaccurate discovery process could be very destructive in a learning sequence. A learner who is forced to exchange his incorrect "discovery" for one which is correct could become quite discouraged. (22, 26, 27)

Discovery Method

Bruner (24), one disciple of the discovery method, gives four reasons in support of the discovery method. Through discovery one can: (a) increase his intellectual potential, (b) substitute internal for external satisfaction in learning, (c) learn how to "discover" facts for himself, and (d) aid his memory process.

It is theorized that man prefers to learn in creative and innovative ways rather than through preformulated, authority learning. Authority learning is a "telling" process by which a person is told what to learn and he accepts this to be true

because it comes from an authority. The authority can be a book, a newspaper, or another individual's opinion. (42) "Many things can be learned more effectively and more economically if they are learned creatively rather than by authority." (42:368)

Arguments for the discovery method also include the importance of a learner being able to find answers and to process information for himself rather than the retaining of large amounts of factual knowledge. (29) Through discovery techniques, a student is challenged to explore facts and make inferences for himself. A student, therefore, can do his own thinking and play an integral part in his own learning process. (27)

Meaningfulness is a key in the use of discovery learning. When a student is active and self-directed in the learning process, knowledge becomes real and exciting to him. When a student has shared in the collecting and the interpreting of his knowledge, it will become meaningful to him. Ultimately, the more meaningful knowledge becomes and the more involved a student becomes with his own learning, the more motivated he becomes. (38)

Maximum learning encourages conditions of individual inquiry. The spirit of inquiry cannot flourish in conditions where knowledge is absolute and the thinking process is secondary. Inquiry can only occur in an uninhibited environment in which the student is free to build his own theories and meet his own needs. A teacher cannot be as aware of the learner's needs as is the learner himself. When a student is led through an environment which has been structured for him by the teacher, rote outcomes could occur. (38)

Increased failure on the high school and college levels could be caused by an over emphasis on rote learning. (34)

The arguments for discovery teaching are summated by Polya in Mosston's book on physical education teaching methods:

A great discovery solves a great problem but there is a grain of discovery in the solution of any problem. Your problem may be modest, but if it challenges your curiosity and brings into play your inventive faculties, and if you solve it by your own means, you may experience the tension and enjoy the triumph of discovery. Such experiences at a susceptible age may create a taste for mental work and leave their imprint on mind and character for a lifetime. (13:147)

Guided Discovery Method

Discovery advocates theorize that learning takes place at the moment of discovery. Guided discovery supporters feel that learning occurs after the discovery is made. It is after the point of discovery that the teacher is needed most to guide and direct the discovery into systematic knowledge. (27) Without this guidance, discovery can only be restricted to special usage such as in the learning of isolated facts. Pure discovery with no teacher interference has been limited to mathematical and scientific fields. This type discovery does not usually occur in the learning of concepts. Discovery learning through mere trial and error is time consuming. The use of a familiar word achieves the instruction more rapidly and efficiently. (28) Therefore, a "guided" process of discovery with the teacher giving clues and directing the learner, seems to be the most beneficial.

In physical education literature, the major proponent of guided discovery learning is Mosston. (13) Mosston explains that the reason for using guided discovery is one of cognition. In other methods of teaching physical education such as command, small groups, or individual learning, the learner does not engage in activities which demand great usage of his intellectual capacities. The learner remains unchallenged except for the occasional use of memory or recall. It is through "cognitive involvement" that a learner can reach a high level of insight and understanding. (13)

This involvement can be more fully realized through a mode of teaching which brings forth inquiry and does not allow the cognitive faculties to be inactive. (13) An analysis of classroom questions and test questions has shown that these call for reproduction of facts, of which 90 per cent are only at the level of recognition or reproduction. (41) Teachers can improve the learning quality of their students by asking more questions requiring thinking. (41) This seems possible through guided discovery.

Singer has said this about the teaching of physical skills:

Drill has always been the basic means of teaching motor skills primarily because it does provide results and possibly because it does not require much creativeness and ingenuity on the part of the instructor. (17:221)

But if coaches or physical educators merely train instead of educate, if they make robots of their pupils, they have done them a great disservice. (17:222)

In golf teaching, the primary method used is lecture-demonstration. The teacher discusses the proper technique to use, illustrates it, and allows the students to follow or imitate the technique illustrated. However, it is easy to be so definite in the teaching of fundamentals that other information is forgotten. Students in this situation may try too hard to remember each detail mentioned, which results in tenseness and artificial movements. (11) Perhaps through the use of guided discovery a learner can be led to learn the techniques for successful golf play more effectively.

Guided discovery for the physical educator and the learner of physical skills appears to have great potential as a teaching/learning device. As a learner works for an answer and makes a correct discovery, he has made the knowledge personal. This in turn creates a more meaningful relationship between the learner and the subject matter. Identification of meaningful relationships could do much to motivate the student to seek more knowledge in a field, or perhaps to give him insight into the learning of other skills.

Teaching physical education is a road toward creative physical responses, toward enhancement of self concept in a changing environment, and toward clear use of the thinking abilities. (13:xiii)

Hence, the primary concern of this study is to ascertain whether an expository or a guided discovery teaching method yields better results in the learning of a complex motor skill, namely golf.

RESEARCH RELATED TO THE DISCOVERY METHOD

Education

Discovery theory has not been supported well by discovery research. In fact, there is little research to be found which is concerned with the discovery method. The research which does exist seems to be strongly biased in favor of the researchers and their convictions. (16) Ausubel (16), a discovery critic, gave two explanations for the success of the discovery method. One is that students who were involved in the studies were inadequately prepared in the fundamentals of the subject matter. Another reason lies with the experimenters giving the discovery technique less and less attention. As the learning progresses, the discovery technique is only given token recognition.

Research in the discovery method could be easily invalidated by uncontrollable variables in the study. One such variable is in subjects who feel that the tester or experimenter has a personal interest in them. (4) This personal interest could occur through the use of competent teachers to conduct the study or the use of teachers who are given special favors. These special favors might include a light teaching load, or an expense paid study course for conducting the study. These teachers become enthusiastically interested in the study and the students in the study. (16)

Hermann (31) did a review of the studies done in discovery to see what conclusions could be drawn. He found the results to

be conflicting with a slight favoring of the discovery method. The results were affected by limited research designs. A comparison of research studies was made difficult by the different meanings given to the term "discovery". (31)

Gutherie (30) conducted a study to test the hypothesis that discovery learning furthers retention and transfer. His subjects, seventy-two college students enrolled in an undergraduate educational psychology course, were tested in the deciphering of cryptograms with and without rules being given. The group which was given rules first was superior to the no-rules group in remote transfer. Gutherie concluded that discovery aids in transfer, but not with retention; while the expository method aids in retention, but hinders transfer. In this study a form of pure discovery was used which employed no verbalization or clues to aid the discovery process.

Scandura (37) sighted two purposes in his research: to examine some variables and interrelationships which complicate the comparing of expository and discovery methods, and to provide a framework for more accurate experimentation. Twenty-three sixth grade students were divided into expository or discovery groups and were taught mathematical subset relationships. The material was presented on cards. The two groups were given routine and novel tests. The routine test resembled the problems presented in class, and the novel test was unlike the class problems. The discovery group was found to be superior in the novel test at the one per cent level of confidence. In a similar study, using fourth and fifth grade students, Scandura found no

significant results. However, the expository group scored higher than the discovery group on the novel test.

A study which found the expository group to be significantly better was done by Keurst and Martin. (34) Thirty-six fourth grade students were divided into two groups for expository and discovery learning. Their problem was to add a group of equally spaced and consecutive numbers such as 17, 19, 21, 23, 25. These numbers could be summed quickly by multiplying the middle number by the total number of units in the set. The expository group was found to be superior to the discovery group at the one per cent level of confidence in the solving of the problem.

A thorough study by Worthen (43) concerned itself with the variables involved in expository/discovery research. The two main purposes of the study were to isolate and discuss the variables in learning a task, and to compare two teaching methods in a natural situation where the time sample and learning tasks were very similar. Worthen found the variables which most influence discovery research to be equal time for both teaching methods, similar sequence of material used in the study, and the ability of the teacher to utilize the teaching method appropriately. Worthen's study used 432 fifth and sixth grade students in sixteen arithmetic classes learning rules through either an expository or a discovery method. The same amount of work time and the same amount of verbalization was used with each group. The expository group was better than the discovery group on the initial learning test at the one per cent level of confidence. The discovery group was

better than the expository group on concept transfer. The same group was significantly better at the .05 level of confidence on retention and transfer of heuristic or inquiry ability. (43, 44)

The previous studies were concerned with an expository teaching method or a variation of that method in comparison with a discovery method. Some studies have been done on the guided discovery method.

Kormeich (35) used ninety-nine subjects randomly assigned to three groups. The subjects were students enrolled in an introductory psychology course. These students received extra credit for participation in experimental research. The students worked with twenty-four concept identification problems in either a programmed, discovery, or guided discovery group. The concepts used were color, size, position, and letter. In the programmed learning group, a rule was given every four problems to help define the strategy used. The guided discovery group received the same two rules verbally after every four problems and were told to "rethink what you are doing before beginning the next problem." (35:387) The discovery group was told nothing.

The criteria for measurement in the study was the number of subjects in each group that acquired the "focusing strategy". A focusing strategy is a pattern of responses which indicates one particular concept during a number of trials. The guided discovery group was significantly superior to the discovery group at the .001 level of confidence and better than the programmed

group at the .05 level of confidence. The programmed and discovery groups did not differ significantly from each other. Kormeich was surprised that the group which received less information had a greater number of students who discovered the strategy than the group which received more information. He observed that more subjects in the guided discovery group reread the directions during the learning sequence and seemed to do more thinking than the other group.

Tanner (39) used 389 ninth grade general science students in fourteen classes in the learning of mechanical principles by different teaching methods. The subjects were given a preliminary aptitude test and two weeks later the program was begun. The students were randomly divided into three groups including expository, guided discovery, and minimal guidance. The students were tested as to comprehension, vertical transfer, lateral transfer, and interest. Tests of retention were given four weeks later. There was no significant difference between the groups in comprehension, transfer, interest or retention.

In a study by Ray (36) of expository and guided discovery teaching, ninety ninth grade boys, equated in age, socioeconomic status and intelligence were taught the use of calipers. There was no significant difference between the groups in initial learning. However, after one week the guided discovery group scored higher than the expository group in retention. After six weeks the guided discovery group scored significantly higher than the expository group at the .05 level of confidence. After

the first and sixth weeks the guided discovery group also scored significantly higher on tests of transfer.

Kersh (33) conducted a study in which two novel rules concerning the concept of addition were taught to ninety high school geometry students by three different methods. The methods used were programmed learning, guided discovery, and minimal guidance. Tests of recall and transfer showed the guided discovery and the minimal guidance groups to be superior to the programmed group at the .05 level of confidence. A questionnaire showed that the guided discovery group practiced the rules between learning periods and test periods more often than the other subjects.

In a study by Jamieson (32), the groups were given a test to determine arithmetic ability before the learning sequence began, and a test following the learning sequence on binary number. There was a positive correlation of .689 between the standardized arithmetic test score and the binary number test score for both experimental methods. The subjects were eighty females divided into four groups by age. The groupings were young, young adult, adult, older adult. The youngest and oldest groups learned significantly better at the .02 level of confidence through a guided discovery technique rather than a programmed, or minimal guidance technique. An attitude test which was administered to the subjects showed they preferred the experimental methods of learning over the methods to which they were normally exposed.

These research studies disclosed little due to their conflicting results and variety of experimental designs. Inconsistencies in the defining and the interpreting of expository, discovery, and guided discovery were also responsible for the different results. However, support for both the inclusion and exclusion of discovery learning could be found in the literature. (43) There is a need to utilize more comprehensive and systematic research techniques and to establish better control over the many variables which have the potential for affecting instructional outcomes. (25)

Physical Education

No physical education research studies were found on the discovery or guided discovery methods. The studies which most resembled the discovery method were those pertaining to problem-solving. Problem-solving was a technique in which students were given a problem and were allowed to seek a solution on their own. (49) Problem-solving required the learner to put together two or more simple principles to discover a higher order principle. (38) "Problem-solving situations are usually designed to require discovery on the part of the learner." (38:147)

Russell (50) studied the effects of problem-solving in the learning of a gross motor skill. Fifty-five college women in three beginning volleyball classes for major students were subjected to three teaching treatments in the learning of the round-house serve. The three methods were explanation and demonstration

with focus on the demonstrator's movement pattern, problem-solving with a movement exploration focus, and problem-solving with a focus on mechanical principles. The roundhouse or windmill serve was a novel skill to all fifty-five subjects. Subjects were given skill tests on the third, eighth, thirteenth, and eighteenth days of the session. In the final testing there was no significant difference among the three groups as to skill level. However, the improvement of both problem-solving groups was statistically significant at the one per cent level of confidence. The improvement of the explanation/demonstration group was not significant as compared to the problem-solving groups.

A study to determine the effects of a problem-solving method on skill development in bowling and attitude was conducted by LaPlante. (47) Thirty-three subjects in three classes were given instruction in bowling through either an explanation/demonstration method or a problem-solving method. The results showed no significant difference between the two groups in bowling ability, or in attitude. However, both groups did improve significantly in bowling skill.

A study of two teaching methods and their effect on gymnastic skill and the students' movement concept was done by Richardson. (49) The subjects were forty-eight college women enrolled in two gymnastic classes. The two methods were a lecture/demonstration technique, and a problem-solving technique involving movement exploration. There was no difference in the skill improvement between the two classes, but the

problem-solving group differed significantly from the lecture/demonstration group in movement concept as measured by the Q-sort technique.

Movement description combined with structured practice drills, and structured problem-solving were the two teaching methods compared by Berendsen. (46) Structured problem-solving was a method of learning in which a student was guided through meaningful structured experiences to gain insights and understandings about a particular topic. The subjects were sixty-five beginning tennis students enrolled in two classes. The evaluation tools were three tennis skill tests and a standardized knowledge test. There was no significant difference in skill learnings between the classes. However, the problem-solving group was significantly different from the movement description/drill group at the .05 level of confidence in tennis understanding as measured by the knowledge test.

Zeigler (45) compared a problem-solving technique with an explanation/demonstration technique in the teaching of gymnastics. The subjects were eleventh grade girls enrolled in four gymnastics classes. The subjects were taught by either an explanation/demonstration method or a problem-solving method. There was no significant difference between the groups in gymnastic ability after the completion of the teaching session.

Smith (51) studied problem-solving in relation to skill learning and knowledge in bowling. Forty-eight women enrolled in three beginning bowling classes were divided into two groups:

a control or a lecture-demonstration group, and an experimental or problem-solving group. Game scores were utilized as a measure of skill in bowling. There was no difference between the groups in skill learning, although they both improved. There was also no difference in the two methods used as shown by a previously validated knowledge test.

In summary, physical education research has shown little difference between a lecture/demonstration method and a problem-solving method.

CHAPTER IV

PROCEDURE

The purpose of this study was to compare two teaching methods, expository and guided discovery, as to their effectiveness in the learning of skill and knowledge in golf at a beginning level of competency.

Subjects

The subjects were sixty college-aged women enrolled in four beginning golf classes during the spring semester at Coker College in Hartsville, South Carolina. They were enrolled in the classes to partially fulfill the physical education requirement at Coker College. Students were not allowed to enroll in the beginning classes if they had previously completed a semester course in golf at the college level. One subject dropped out of school after the thirteenth lesson and was dropped from the study.

Selection of Teaching Methods

The two teaching methods compared were the expository and guided discovery methods. An expository method was one in which explanation and demonstration were used to teach the skill. Exposition is a very common teaching method used in physical education in the teaching of movement skills. Vannier and Poindexter listed demonstration and participation as an important teaching method.

In teaching any skill the instructor should: (1) briefly explain what she is doing and how to do it. (2) show others how to do it by means of demonstration, (3) give individual assistance to all who are having difficulty copying her movements, (4) help each evaluate the progress made. (21:13)

Ausubel (23) stated that most subject matter could be taught meaningfully and efficiently through verbal exposition.

Guided discovery is a style of teaching which employs the discovery concept. The teacher aids the learner, but never gives the answer. (13) Halsey (10) wrote that discovery was very necessary and that educators should be aware of a student's need to develop individually and at his own pace. This is possible through discovery. When a student evolves answers by himself, he has reinforced his learning and established a more intimate relationship between the subject matter and himself. (13) Guided discovery is a successful teaching technique, because it helps the student to retain the material more completely, thereby making the material more meaningful.

Conduct of Study

The subjects were sixty college girls enrolled in four golf classes. The experimenter taught all four classes, which met consecutively at 10:00, 11:00, 1:30, and 2:30 o'clock. The 10:00 o'clock class and the 1:30 o'clock class formed the experimental group and were taught by a guided discovery technique. The 11:00 o'clock and 2:30 o'clock classes formed the control group and were taught through an expository method. The experimenter was only concerned in this study with the subjects'

learning of the techniques and theory of golf. Knowledge concerning golf etiquette and rules was given to the students for their own use.

All lessons in the golf unit were constructed using the theory of swing as stated by Hicks and Griffin. (11) The swing theory was expressed in terms of three fundamentals: control, balance, and rhythm. Each golf skill was taught using these concepts as a foundation.

The unit was taught during the spring semester of 1970, and lasted for fifteen weeks. The classes met twice a week, on Monday and Wednesday, with each class lasting for fifty minutes. There were twenty-six lessons in the unit. Either the golf course or the gymnasium was used depending upon weather conditions.

The aim of both teaching methods was to develop the highest possible degree of skill and knowledge in a semester of beginning golf. However, there were difficulties in keeping all variables equal. This was evidenced in the verbalization section of each lesson. Teaching golf through a guided discovery method generally utilized more verbalization time due to a need for the student to find his own answers. In teaching through an expository method, the period of verbalization was only as long as was necessary to describe a particular skill. The amount of practice time for each group was the same, and the experimenter made an effort to keep the time factors similar.

Group teaching and individual teaching were employed. In the control group, all individual teaching was through exposition. In the experimental group, all individual teaching was through guided discovery. When questions were asked in the control group, direct answers were given. In the experimental group, no questions were answered. All questions were reversed so that a student might search for her own answer.

In order to insure that the teaching techniques which were employed in the study were actually being carried out as proposed, the experimenter recorded four days of lessons on tape. Taping was done after thirteen lessons had been completed. The lessons to be taped were selected at random. Numbers for lessons fourteen through twenty-two were placed in a box and four slips were drawn. The fourteenth, fifteenth, seventeenth and twenty-second lessons were those chosen for taping. The fourteenth lesson was used as a practice for the other recording sessions. All four classes were recorded on each day selected. From the tape transcriptions it was determined that both teaching methods were conducted satisfactorily. Samples of these recorded lessons may be found in Appendix B.

A questionnaire was given to the students during the last class period in order to obtain information not known by the experimenter. This information included previous golf experience of the subjects, amount of outside practice by the subjects, and whether the subjects noticed any difference between the method by which they were taught and any other method to which they had previously been exposed.

From the questionnaire, it was determined that both groups had similar previous experience and spent a similar amount of time in practice outside of class. Through the questionnaire it was observed that both methods fulfilled the desired objectives of the experimenter. A copy of the questionnaire may be found in Appendix C.

Selection of Evaluation Techniques

The evaluation techniques used were an eighteen hole course play score, a five iron full swing test, and a fifty-item knowledge test. All techniques were selected by the experimenter as valid criteria for the measurement of golf skill and knowledge.

Vannier and Poindexter stated "as in all individual sports, the true evaluation of the game of golf is in the individual's ability to play a game properly with good score results." (21:177)

The skill test used was a five iron full swing test devised by Porter and Gaskin. (48) The five iron full swing is generally considered a good indicator of golfing ability. The Porter-Gaskin test was designed and validated by the authors as a part of a self-test battery. The test was designed to measure distance, flight in the air and roll, and accuracy. In using the test with beginning students, the authors found a reliability coefficient of .90. The test was accepted at face validity.

The knowledge test was a fifty-item multiple choice test constructed by the examiner. All items were on golf technique and principles involved in golf. No items concerned with rules

or etiquette were used, because the investigator did not feel that these reflected a subject's ability to play golf. As stated earlier, rules and etiquette were not a part of the experimental design.

Test Procedure

The eighteen hole course play occurred on the twenty-third and twenty-fourth lessons. Previously, on the eighteenth lesson, a nine hole match play tournament was conducted as a preliminary to the eighteen hole play. All subjects were paired randomly for the course play. They played in pairs, each one keeping score for the other. All fifty-nine subjects turned in scores for the eighteen hole course play.

In the sixteenth lesson, the five iron full swing test was given to the classes as a self testing experience. At this time they were told that this would be their skill test at the end of the semester. On the twenty-fifth lesson, the actual skill test was administered to fifty-seven subjects. Two students missed the test due to illness and were excluded from the study.

The area for the five iron test consisted of a field sixty yards wide and one hundred and ten yards long. This area was divided down the center forming two equal lanes. Ten testing stations were located at the end line so that ten students could be tested at one time. Five stations were located in each of the two testing lanes. The subjects were given twenty balls to be hit from the ground. The first ten balls were hit from one station, On the next ten balls, the subjects changed

positions in each lane. This change in position was designed by the authors so that no subjects would be affected by the testing stations located near the boundary of each lane.

The scoring area was the lane directly in front of the student. Both lanes were divided into five areas: 0, 1, 2, 3, 4. The balls had to clear area 0, thirty yards in length, on the fly. Credit was not given for balls which failed to clear this area. Each ball was then scored as to where it came to rest. Values of 1, 2, 3, and 4 points were given these respective areas, which were twenty yards in length. The authors felt the need to give some credit for balls which cleared the area 0, yet rolled out of bounds to the left or right of any of the four areas. It was determined that any ball which landed outside a lane was to be given one-half the score of the adjacent zone.

The subjects' hits were scored by a partner using a prepared score card. See Appendix A for a sample of the score card. All balls landing on a boundary were given the higher score. All balls which were swung at and missed were scored as zero. All subjects were tested during their respective class periods.

The knowledge test was administered during the twenty-sixth class period. All fifty-nine subjects were present for the test. However, two were eliminated from the study for failure to take the skill test. At this same time, the questionnaire was administered.

Treatment of Data

Fisher's "t" for significance of difference between means (9) was the statistic chosen for analysis of the data. Tests of significance of difference between groups were computed for the eighteen hole course play and the skill test.

No validity or reliability scores were available for the knowledge test prior to its administration. Therefore, the experimenter calculated these rating from the scores of the subjects. The Kuder-Richardson formula for measuring reliability, and the Flanagan technique for measuring test item validity (2) were the processes used. Raw scores from the testing may be found in Appendix A.

CHAPTER V

PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to compare the effectiveness of two different teaching methods, expository and guided discovery, on the learning of golf at the beginning level.

Sixty women students enrolled in four beginning golf classes at Coker College, Hartsville, South Carolina, were used as subjects. One subject left school and two other subjects failed to take the required skill test due to illness. Therefore, these subjects were dropped from the study.

The classes met two days a week, fifty minutes per class, for fifteen weeks. Three evaluation methods were employed as criteria for learning golf. An eighteen hole course play score and a five iron skill test were used as indicators of skill learning. A fifty item knowledge test was designed by the experimenter to indicate understanding of golf.

Fisher's "t" for determining the difference between uncorrelated means (9) was the statistic used to treat the data. The .05 level of confidence was accepted as the standard for significance.

Eighteen Hole Course Play

Fisher's "t" was used to calculate the difference between the means of the control and experimental groups for the eighteen

hole course play. The test evidenced a t-value of 2.73. The standard for significance at the 5 per cent level of confidence was 2.01. Therefore, there was a significant difference between the groups. The experimental group scored a lower mean for the eighteen hole course play and was superior to the control group in this aspect of golf learning. Table I contains information related to the eighteen hole course play.

Five Iron Full Swing Skill Test

Fisher's "t" for significance of difference between means was computed for the two groups in regard to achievement on the Porter-Gaskin five iron full swing test. A "t" of 1.58 was found which was not large enough to reject the hypothesis of no difference at the 5 per cent level of confidence. Therefore, it was concluded that there was no difference between the two groups in respect to skill learning as evidenced by the five iron full swing test. The results of the five iron full swing test are presented in Table II.

Knowledge Test

Before comparing the results of the two groups on the knowledge test, the experimenter resolved to establish a reliability and a validity score for the examiner-made test. All fifty multiple choice items were concerned with golf knowledges and understandings. No items pertaining to etiquette, rules, or terminology were included, because the examiner was only concerned with knowledge which could affect skill performance. The knowledge

TABLE I

SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS
OF CONTROL AND EXPERIMENTAL GROUPS ON
EIGHTEEN HOLE COURSE PLAY

Groups	N	Means	Standard deviation	"t"
Control	30	107.6	11.12	
Experimental	27	102.5	15.53	2.73*

*Significant at the .05 level of confidence.

TABLE II

SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS
OF CONTROL AND EXPERIMENTAL GROUPS ON
FIVE IRON FULL SWING SKILL TEST

Groups	N	Means	Standard deviation	"t"
Control	30	21.85	14.81	
Experimental	27	18.61	9.54	1.58

test was included as a partial measure of golf learning. However, there was no substantial evidence to indicate that when a student understood a motor skill he would perform it well.

The Kuder-Richardson formula (2) was selected as the statistic to compute test reliability. This formula was selected because it could be used when only one administration of a knowledge test was available. It also eliminated the errors of splitting the test into halves, which occurs with some reliability formulas. The reliability score obtained from the Kuder-Richardson formula is considered to be the lower level of a test's real reliability. (2) A reliability score of .36 was evidenced through the use of the formula.

An item analysis by the Flanagan Method (2) was used to compute the validity of the knowledge test. The Flanagan Method compared the upper 29 per cent and the lower 29 per cent of the test scores available with the upper and lower 9 per cent receiving double weighting. This method could establish a difficulty rating for each item, could determine the ability of each item to discriminate between students who knew and the ones who did not, and could indicate the degree to which each foil functioned. (2) The latter was not included in this study because of the nature and purpose of the knowledge test and the fact that no revision of the test was necessary for another administration. The difficulty rating ranged from zero per cent to one hundred per cent with a mean rating of 47 per cent. The discrimination

level for the individual items ranged from $-.19$ to $.59$ with an average discrimination index of $.29$.

The ratings of difficulty and discrimination were used in conjunction with the Test Analysis Report Form published in Scott and French. (15) It was found that the test in its original form did not measure up to the standards required in the Test Analysis Report. Therefore, a revision was necessary before the knowledge test could be used as a criterion measure.

Five of the poorest test items according to the Test Analysis Form were deleted and a new reliability score was computed for the now forty-five item objective test. A reliability score of $.48$ was determined for the new test by the Kuder-Richardson formula. Although the revised test met the validity standards as set forth by the Test Analysis Report Form, the reliability rating was too low for it to be accepted as a proper evaluation tool. On this basis, the experimenter did not compute a "t" score for significance of difference between groups in regard to golf understanding.

Interpretation of Data

It was hypothesized that there was no difference between an expository group and a guided discovery group in the learning of golf at the beginning level. This learning was to be determined through three evaluative processes: golf course play, a skill test, and a knowledge test.

A significant difference at the 5 per cent level of confidence was found for the eighteen hole course play. The results

found for this measure of golf ability could have been influenced by a variation in verbalization time between the two groups. Teaching through a guided discovery method utilized more discussion time than did an expository method. In expository teaching, the skill was explained and demonstrated. In the guided discovery group, the teacher and pupil continued to exchange verbalization until the desired results occurred.

Often, in the beginning stages of the study, the expository group would complete a lesson identical to the one used by the discovery group in a shorter length of time. No new material was presented and no additional practice time was given to the control group when this time variable occurred. The examiner desired to maintain a sameness in the lesson plans, sequence of material, and practice times used within the two groups. When there was a variance in time between the two groups, the experimenter attempted to use this time in rule and etiquette discussions. Perhaps, this time variable had an effect on the effort of the groups.

The results of the Porter-Gaskin five iron full swing test indicated that there was no difference between the control and the experimental groups in skill learning as measured by that test. As can be seen in Appendix B, the lesson plans included a five iron self test. The test was included as a teaching lesson, because it was designed for self-testing. This could have affected the final scores on the test. When administered as a teaching lesson, the subjects were very interested

and enthusiastic. However, when the test was given at the end of the teaching unit, the students failed to be as enthusiastic as before. Perhaps this was due to the fact that the test was no longer new or the fact that the subjects were stressed by the testing session. The scores of the self-test and skill test administrations were similar, however.

Because of a low reliability score the examiner-made knowledge test was not included in the Fisher's "t" computations. An objective knowledge test should have had an average difficulty of fifty per cent of the total number of test items. (2) The means of the original and revised knowledge tests were approximately twenty-three and twenty-one, respectively, as compared to twenty-five and twenty-three required by the standard used in this study.

The test results yielded a relatively low standard deviation which could have affected the test's reliability score. The standard deviations of the original and revised test were 4.4 and 4.6, respectively. A small standard deviation, or a clustering of scores around the mean, may be caused by test items which are too difficult, too simple, or have little discriminating power. (15) However, it was thought that this low standard deviation could also have been caused by the very homogeneous nature of the subjects and the conditions surrounding the experiment.

As evidenced by golf course play scores, it is possible that the guided discovery method did improve golf learning better

than the expository method. Yet, both methods could be effective in teaching golf as shown by the full swing skill test scores. The evidence obtained in this study is inconclusive.

CHAPTER VI

SUMMARY, LIMITATIONS, AND CONCLUSIONS

The purpose of this study was to determine if there was any difference between two teaching methods, expository and guided discovery, in the learning of golf at the beginning level. A secondary purpose was to determine if either of the two methods aided in golf understanding as evidenced by an experimenter-made objective knowledge test.

The subjects were sixty women enrolled in four beginning golf classes at Coker College. Two classes were designated as the control group and were taught through an expository method. The other two classes constituted the experimental group and were taught through a guided discovery method.

After a fifteen week unit of golf, both groups were tested by three evaluation tools. A five iron full swing skill test was administered as a measure of golf skill. An eighteen hole game score was obtained on the Coker College golf course. A fifty item objective knowledge test was administered as a measure of golf understanding.

The data for the skill test and course play were treated statistically by the Fisher's "t" formula. The experimental group evidenced a significant "t" at the 5 per cent level of confidence. No significant difference was observed between the two groups in regard to the five iron full swing test.

Validity and reliability ratings were determined for the examiner-made knowledge test. However, due to a low reliability score, the knowledge test was not used as a measure of golf understanding.

The limitations of the study were:

1. The subjects were all college-aged girls.
2. There was a difficulty in keeping the time variable the same for both groups. Often an expository lesson used less verbalization time than did a guided discovery lesson.
3. The experimenter was inexperienced in the use of the experimental method.
4. No judges were used to evaluate the lesson plans or the teaching technique of the examiner.
5. There was no attempt to evaluate the knowledge test before its administration to the subjects in this study.
6. None of the first thirteen lessons were taped so they could not be objectively evaluated as to techniques used.
7. As in any methods study involving an actual classroom experience, it was often difficult to maintain exact similarity among the four classes. However, an attempt was made to keep the lesson plans, sequence of material, amount of verbalization time, and amount of practice time similar.

From the study, it was concluded that:

1. The guided discovery method used in this study was more beneficial in the learning of beginning golf, as evidenced by the eighteen hole course play score.
2. The expository method used in this study was just as beneficial as the guided discovery method in the learning of golf measured by the five iron skill test.

These conclusions might suggest that a more efficient unit plan would contain both the guided discovery and the expository methods of teaching.

Recommendations for Further Research

1. A study could be done utilizing a junior or high school group of male and female subjects.
2. Other motor skills could be tested in place of golf.
3. A similar study could be done using a valid knowledge test to determine if there was any difference between groups as to golf understanding.
4. A study could be done to compare the guided discovery technique of teaching to other methods of teaching.

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APPENDIXES

Diagram of Bowling Area for
Five Inch Skill Test

How to Score for Bowling Play
and Five Inch Test

DIAGRAM OF SCORING AREA FOR
FIVE IRON SKILL TEST

APPENDIX A

Diagram of Scoring Area for
Five Iron Skill Test

Raw Scores for Course Play
and Five Iron Test

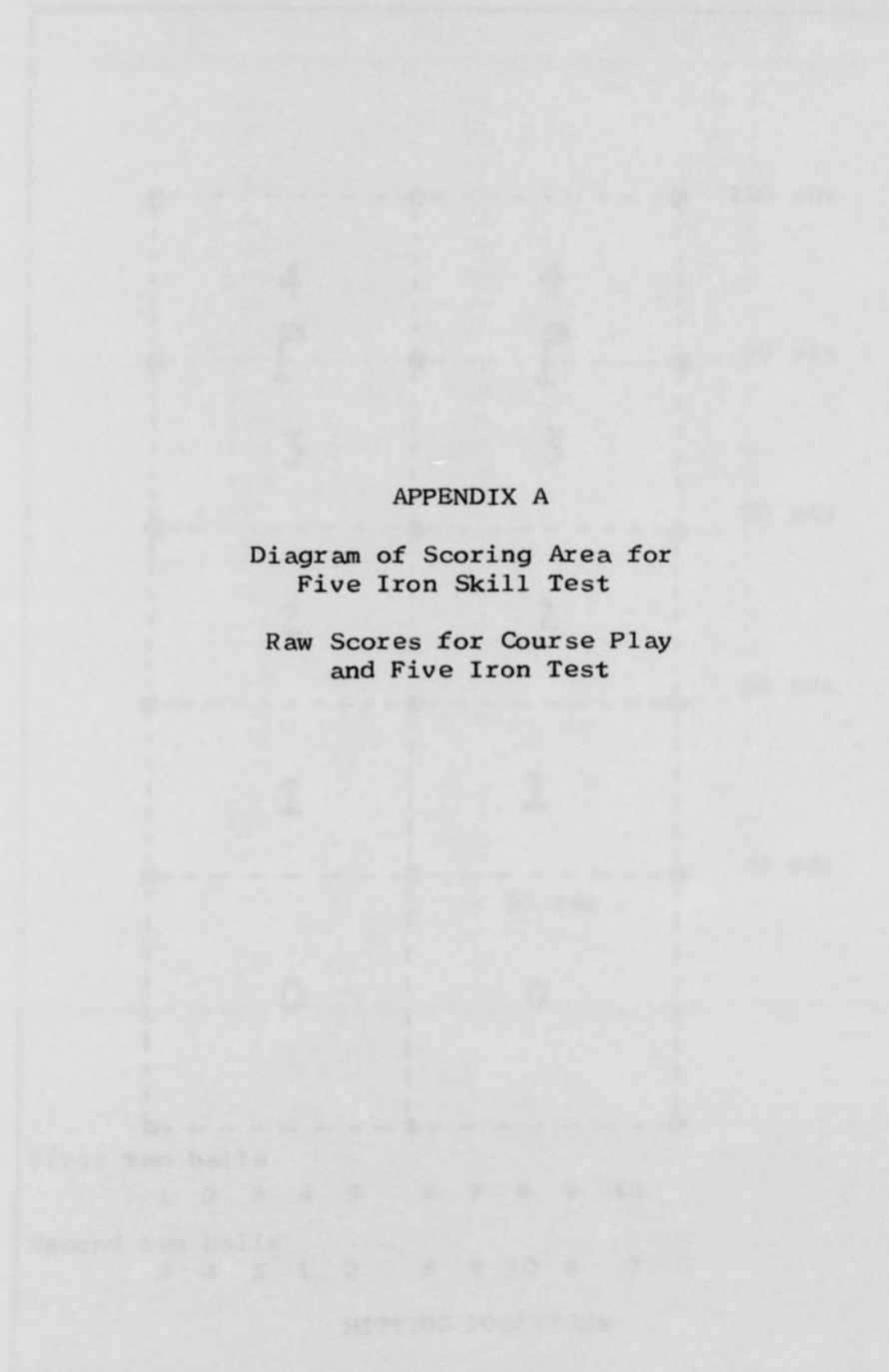
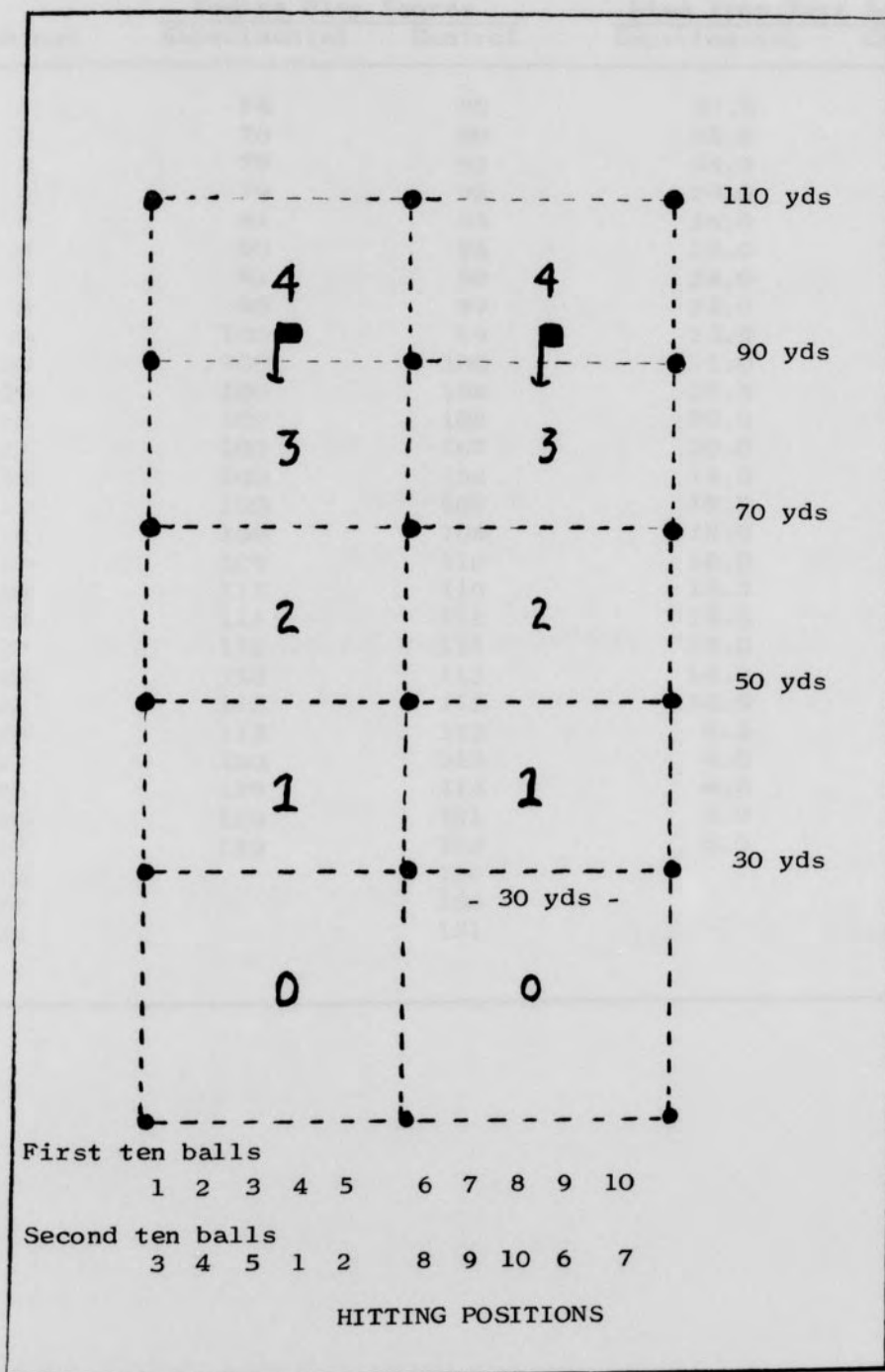


DIAGRAM OF SCORING AREA FOR
FIVE IRON SKILL TEST

(48)



RAW SCORES FOR COURSE PLAY
AND FIVE IRON TEST

Subject	Course Play Scores		Five Iron Test Scores	
	Experimental	Control	Experimental	Control
1	74	90	37.5	56.0
2	76	90	35.0	51.5
3	78	92	34.0	45.5
4	79	92	29.0	44.0
5	81	95	26.0	36.0
6	90	96	25.0	34.0
7	92	98	24.0	29.0
8	95	99	24.0	28.5
9	100	99	23.5	26.0
10	100	100	21.0	23.5
11	100	104	20.5	23.0
12	102	104	20.0	22.5
13	103	107	20.0	22.0
14	103	108	19.0	22.0
15	103	108	19.0	22.0
16	106	108	18.0	21.0
17	109	110	18.0	19.0
18	111	110	15.5	18.0
19	111	111	15.5	15.5
20	112	111	15.0	15.5
21	112	112	14.0	15.0
22	112	113	10.5	15.0
23	113	113	8.5	11.0
24	120	113	6.0	9.0
25	128	114	4.0	7.5
26	129	121	0.0	7.5
27	129	123	0.0	7.0
28		126		6.0
29		130		3.0
30		131		0.0

GOLF UNIT PLAN

LESSON 1

Subject: Rules and etiquette in golf

Practices: Rules and etiquette

LESSON 2

Subject: Rules and etiquette

Practices: Etiquette

LESSON 3

Subject: Swing and backswing swing

Practices: Swing

APPENDIX B

Golf Unit Plan

LESSON 4

Sample Lesson Plans -
Original and Transcribed

Subject: Rules and etiquette in golf

Practices: Rules and etiquette

LESSON 5

Subject: Swing of clubbing the ball

Practices: Partial swing

Practices: Practice for

LESSON 6

Subject: Pitch shot

Practices: Practice for

LESSON 7

Subject: Putter and run shot

Practices: Putter and run shot

GOLF UNIT PLAN

Lesson 1

Subject: Rule and etiquette instruction

Practice: Indoor discussion

Lesson 2

Subject: Rules and etiquette

Practice: Filmstrip

Lesson 3

Subject: Stance and beginning swing

Practice: Indoor - plastic balls

Lesson 4

Subject: Swinging and missing the ball

Practice: A.M. - indoor - plastic balls
P.M. - outdoor - hard balls

Lesson 5

Subject: Review of missing the ball
Partial swings

Practice: Practice tee

Lesson 6

Subject: Pitch shot

Practice: Practice tee

Lesson 7

Subject: Pitch and run shot

Practice: From apron to green

Lesson 8

Subject: Putting

Practice: A.M. - Outdoors - putting green
P.M. - Indoors - brush mats and carpet

Lesson 9

Subject: Swing with medium irons

Practice: Practice tee
Putting green
Played three holes

Lesson 10

Subject: Long irons

Practice: Practice tee
Played four holes - partner play

Lesson 11

Subject: Woods and tees

Practice: Practice tee - with and without balls
Played two holes

Lesson 12

Subject: Swing

Practice: 5-iron on practice tee
Played three holes

Lesson 13

Subject: Review of pertinent material

Practice: Indoor discussion:
grip
stance: square, open, closed
partial swings: pitch, chip, pitch and run
putting: type grass, greens

Lesson 14

Subject: Review of all swings
Practice: A.M. - Outdoor practice tee
P.M. - Indoor brush mats

Lesson 15

Subject: Sand shots
Putting
Practice: Green exercises and play
Trap practice

Lesson 16

Subject: 5-iron self test
Practice: Test situation

Lesson 17

Subject: Error corrections:
pull/push
hook/slice
shank/tee
fat/top
Practice: Indoor discussion
Played three holes

Lesson 18 and 19

Subject: Match play tournament
Practice: 9 holes

Lesson 20

Subject: Lies
Practice: Plastic ball practice on lies
Played 2 holes

Lesson 21

Subject: Wood and long iron review

Practice: Practice tee
Played one hole

Lesson 22

Subject: Partial swing review

Practice: Indoors - worked on pitch and chip

Lesson 23

Subject: Putting review and beginning of course play

Practice: Practice green
18 holes play

Lesson 24

Subject: Course play continued

Practice: 18 holes

Lesson 25

Subject: 5-iron full swing skill test

Practice: Test

Lesson 26

Subject: 50 item knowledge test

SAMPLE LESSON PLANS - ORIGINAL AND TRANSCRIBED

Lesson 15 - Original
Guided Discovery Technique

Subject matter: Golf
 Specific matter: Sand shots
 Concepts: Control, rhythm, balance

Objectives:

1. To learn a technique for getting the ball out of sand traps.
2. To learn some different situations of balls in traps.
3. To attempt to understand an explosion shot.
4. To understand the basic concepts involved in a sand shot.

QUESTIONS	ANTICIPATED ANSWERS
1. When do you use a sand shot?	1. When you are in a sand trap.
2. What will be the difference between a sand shot and a fairway shot?	2. Type surface.
3. What difference will this make in your technique?	3. Must swing harder, hold club firmer, get up under the ball.
4. Are traps located in some general area?	4. Near greens.
5. Are all traps alike?	5. No.
6. How are they different?	6. Some are low, shallow, bigger, different shapes.
7. Is all sand alike?	7. No.
8. How different?	8. Texture: wet/dry.
9. Are all sand shots alike?	9. No.
10. What makes them differ?	10. Distance to green, placement in trap.

QUESTIONS

ANTICIPATED ANSWERS

- | | |
|--|--|
| 11. What will this do? | 11. Cause you to hit harder. |
| 12. What else makes one sand shot different from another? | 12. Placement in sand. |
| 13. How? | 13. It could be on top or under the sand. |
| 14. How will these two shots differ: the one on the sand and the other buried or partially buried in the sand? | 14. On top, have to hit ball first. In sand, have to hit sand first. |
| 15. Will the shot on top of the sand be similar to another shot you know? | 15. Yes, chip. |

LESSON 15

SAND SHOTS

Tape Transcription
Experimental Group
April 8, 1970

1:30

- t: All right. Can I have your attention, please? All right. When would you use a sand shot?
- s: When you're in a sand trap.
- t: Very good. All right. All right. What would be the difference between a shot taken in the sand and a shot taken on the fairway?
- s: It's softer.
- t: What's softer?
- s: The sand.
- t: The sand is softer.
- s: You want it to go higher.
- t: You want it to go higher, much less roll. You have to come up under it. All right. All these things. All right. What differences will this make in your technique? In the way you go at hitting the ball?
- s: (answer uncertain)
- t: Where?
- s: (answer uncertain)
- t: Yes, you want to get underneath it.
- s: (reply uncertain)
- t: Are traps located in some general area on the course? You know, where are they generally located?
- s: Near the green?

- t: Usually near the green. They don't necessarily have to be, but they usually are located near the green. Are all traps alike?
- s: No.
- t: What makes the difference?
- s: Size, shape?
- t: Shape, size, depth. Good; okay. All right. Is all sand alike?
- s: No.
- t: What's different about sand?
- s: Fine, harder, it could be packed.
- t: Fine, harder, packed. What about some conditions that would make it different?
- s: Right after a rain.
- t: Right, right. Wet and dry. That's good. All right. Are all sand shots alike?
- s: No.
- t: What would make them different?
- s: How deep it was. How wide. How far you want it to go to the green.
- t: How deep it was. How wide, how far the green is from the sand trap. Good, all right. What difference will this make in your shot? What difference, let's say in talking about the one in the relationship of where the sand trap is to the green. What difference will this make in your shot? From one that's close and one that's far away?
- s: You won't hit it as hard if the green's closer.
- t: All right. What about your swing?
- s: Shorter.
- t: The shorter swing, the closer you are to the green. All right. What else makes a sand shot different from another, one shot different from another? You've told me all the things about the distance to the green and placement.

s: Your address?

t: What would make one shot in here (trap), let's say you and I were shooting for this green and both of us landed in the trap?

s: The first could be buried.

t: The first could be buried, or mine could be what?

s: Up.

t: Up, right. And this will make two different types of shots: One which is, say, you know this is not good sand. Most sand just sinks any time anything touches. One ball could land here and get buried into the sand. The other could be on this rise area where very little of it would be touching the sand. All right. How will these two shots differ? Could I have two balls please? (balls are placed: one on sand and one in sand).

s: You have to get under that one.

t: You have to get under that one, what else? What do you have to hit here?

s: The dirt.

t: The sand.

s: You'd probably have to hit it harder.

t: Yes. What about here?

s: You're not going to hit much sand there.

t: You're not going to hit much sand there. All right, this shot. What would, would it be like another shot you know?

s: Chip?

t: Chip. It would be a lot like a chip shot. All right. Suppose you are in a trap like this near a green. Will your grip change, or should your grip change?

s: No.

t: Nothing about it? What about just the variation of it. Is there anything you might want to do to vary it here?

s: Wouldn't it be kind of like a normal chip shot?

t: Normal chip shot, well, is there anything different about a normal chip shot?

s: Hands would, maybe be a little lower.

t: Hands may be a little lower on the club. And what else?

s: Would the club be looser?

t: What would happen if the club was looser in your hand?

s: It wouldn't be quite as tight.

t: Why will it not be quite as tight?

s: . . . control.

t: You don't need as much control?

s: I don't think you'll have as much control.

t: Do we want control here or not?

s: Yes.

Lesson 15 - Original
Expository Technique

Subject matter: Golf
Specific matter: Sand shots
Concepts: Control, balance, rhythm

Objectives:

1. To learn a technique for getting the ball out of sand traps.
2. To learn some different situations of balls in traps.
3. To attempt to understand an explosion shot.
4. To understand the basic concepts involved in sand shot.

Statements:

1. A sand shot is used when one is in a sand trap. The difference between this shot and a fairway shot is the type surface: grass and sand.
2. In a sand shot, you will need to swing harder, hold the club firmer, and get under the ball.
3. Most traps are located near the green. However, all traps are not alike. Some are low, shallow, big, small, various shapes.
4. Sand also differs in texture and condition (wet and dry).
5. Shots in sand will differ by their distance from the green and their placement in the sand.
6. Some balls will land on top of the sand and some buried or partially buried in the sand. Two different techniques will be used. On top, the ball is hit first and then the sand. This is similar to a chip shot and you may need to grip down further.

LESSON 15

SAND SHOTS

Tape Transcription
Control Lesson
April 8, 1970

2:30

- teacher 1. All right. Today we're going to talk about sand shots. And you make a sand shot when you get in a sand trap.
2. The main difference between this shot and a fairway shot is the type surface that you're working on. The grass out here is much more firm, of course (fairway). And the sand in here (trap) is not as firm.
 3. Some changes you may need to make in your technique would range from hitting a little harder in here, or using a little more backswing, or holding the club down a little bit closer on the grip to have a little more control over it.
 4. Most greens are located, excuse me, most sand traps are located near a green, but not necessarily. There is such a thing as a fairway green, fairway sand trap. But we're not concerned with those. We're really working with one near a green.
 5. All sand traps are not alike. I think you can tell just by looking at the one we have here. They vary in size, shape, and of course in the depth. These are very low because they need sand, not because they are designed to be this low. They usually don't have lips on them quite this big. And, of course, grass does not grow in them.
 6. All right. Sand itself is not alike. All sand is not alike. The difference is texture. Some could be fine and some could be coarse. And there's also a variation when the sand is wet. When the sand is wet it's packed down. It's not loose like dry sand is.
 7. All sand shots are not alike. Occasionally, well, if we both hit together and I hit into the trap, more

than likely, I would hit in an entirely different place than where you would hit in a trap. It could possibly land here or it could land at the back of the trap, the side. It could also land in the dirt or on top of the sand. Okay.

student: 8. (question unclear)

teacher: 9. I don't think there's any ruling against it. I don't think it would be very advantageous. What would be the advantage?

student: 10. (response unclear)

teacher: 11. I mean I could probably do it with my hand, it seems; you can move your hand down here. And there's no rule that would cover where you put your hands on the shaft. I don't. It might be interesting to know why somebody would want to do that. You can putt out of here. I don't teach it. I don't think it's a very good policy, because it's not the ideal, you know. But you could putt out of here if you wanted to. You could putt from the tee, but of course. . . .

12. All right. Let me have two balls. Just to show you what a different shot. We don't have real good sand here. But here's one shot and then here's another (places two balls in the sand, in different locations). If you're familiar with sand; if you've ever played on the beach much, you know how sand is. It doesn't take much to get buried in the sand.
13. This shot, one that would be made from here (on top of the sand) (demonstration). The shot there, it wasn't a very good one, is very much like a chip shot. You hit the ball, try to get it into the air, and onto the green.
14. When you're in a sand trap, if I could use your club again, your grip may be a little bit tighter. You know, if you hit through the sand, it could clog you up badly and really cause you not ever to get through if your grip goes loose.
15. Or you might want to grip further down on here. I think you might have a little more control if you try to grip the end down here rather than remaining here.
16. Most sand shots are short shots. You don't have to use a full swing. So you might want to come down here and get more control over it.

Lesson 17 - Original
 Guided Discovery Technique

Subject matter: Golf
 Specific matter: Errors correction
 Concepts: Balance, rhythm, balance

Objectives:

1. To learn some common errors in golf.
2. To learn to correct these errors.
3. To understand the relationship between the errors and the golf swing.

QUESTIONS	ANTICIPATED ANSWERS
1. Have you ever failed to hit the ball correctly?	1. Yes!
2. Did you ever wonder what was causing this error?	2. Yes!
3. Let's consider some possible errors and what could cause them. Have you ever attempted to hit a ball and it went directly left or right of the desired direction?	3. Yes!
4. Left of the target is called a "pull" and right is a "push". What could cause a pulled ball?	4. Improper alignment of the club, or the club-face facing left on impact, twisting the shaft.
5. What could cause a "pushed" ball?	5. Same thing, except to the right.
6. Have you ever hit a ball which you thought was going okay and suddenly it veared to the left or right?	6. Yes!
7. When this occurs to the right, it is called a slice. To the left, a hook. What could cause these two problems?	7. (one answer expected)

QUESTIONS

8. Remember when we talked about spin. You said back-spin could slow a ball down spinning backward. And forward spin, going faster in the air. What could spin have to do with slice and hook? What would clockwise or counterclockwise spin do?
9. Will this spin cause immediate movement to the outside?
10. What causes this spin, or could cause this spin? Think about the center of the ball?
11. What could cause this hitting to the left or right of center? In the swing?
12. How?
13. What could be done to prevent this?
14. Could this be related to the pull or push?

ANTICIPATED ANSWERS

8. Spin to the right could cause the ball to move outward to the right. Spin to the left, a move to the left.
9. No, slow.
10. Hitting either left or right of the center of the ball.
11. Moving out of the proper swing plane.
12. Moving inside or outside of the swing plane.
13. Swing in the proper swing plane.
14. Yes, a pull or push is, or could be, a severe hook or slice mistake.

LESSON 17

ERRORS CORRECTION

Tape Transcription
Experimental Group
April 15, 1970

10:00

- t: What we want to talk about today is error correction. I think we all need this. Okay. Have you ever failed to hit the ball correctly?
- s: Yes.
- t: Good. All right. Did you ever wonder what made you do this?
- s: Yes.
- t: All right. Let's consider some of the errors that you have. All right. Have you ever attempted to hit a ball and it went directly to the left or right? Have you ever done this?
- s: Yes.
- t: It's a very common thing. To give you a term, when it goes to the left, it's called pull. When it goes to the right, it's called push. All right, talking about pull, what could cause a pulled ball?
- s: Feet out of line.
- t: Feet out of line. Right.
- s: If your clubhead was rotated.
- t: The clubhead rotated and hit the ball incorrectly. And what really causes this clubhead rotation?
- s: When you're not holding the club firmly.
- t: Yes. Or what are you doing with the club when you swing? What are your hands doing?
- s: (response unknown)
- t: If your clubhead hits the ball at an angle, what are your hands doing?

s: Your wrists are not firm.

t: Your wrists are not firm. Okay. What about a pushed shot?

s: Same thing.

t: Same thing. Okay. Now, this is push to the direction of the left, and that one is to the direction of the right. All right. Have you ever hit a ball in which you thought was going straight, yet somewhere on the path it veared to the left or the right? Have you ever done this? This is a little more advanced error. More difficult.

s: (no answer)

t: When it goes to the left, it is called a hook and to the right, slice. All right, think about these. These are a little more difficult. To the left, what could cause a hook? Or a slice to the right?

s: (No answer)

t: All right. Do you remember when we were talking about chip shots and pitch shots and were talking about ball spin? And we said that you could either make the ball spin forward, toward the hole, or you could make the ball spin backward. Could there be any relationship of spin here? Could spin do anything? What about it?

s: (no answer)

t: Could spin cause these errors?

s: Yes.

t: What kind of spin? Tell me about it?

s: (response unclear)

t: Backward spin would be going this way.

s: (unclear)

t: Come on and think. How many ways can the ball spin? Just forward and backward?

s: No.

t: Okay, Kay. Talk about that to the side.

s: (response unclear)

- t: Yes. It does. That's good.
- s: How does a ball spin to the left? I can understand how it spins backward.
- t: I am going to get a ball so I can let you look at it. Okay, here it is. And you told me if you hit under it, the spin would go here (backward). If you glaze on top of it, it would go here (forward). All right, Kay, tell me how I can get spin to the left and right?
- s: (response unclear)
- t: Just like Kay said, first it starts out with a lot of force, spin is going to cause it, finally, to creep off either left or right. That's very good. Now, we have to find out how we're getting this spin. All right now, Kay, how do you get this spin? Talk about the clubhead striking the ball. Somebody said at an angle. Talk about the center of the ball, that may help you.
- s: Uh.
- t: Well, like when you get left spin or right spin, are you hitting the center of the ball?
- s: No, you're hitting either to the right or the left of the ball.
- t: Okay, you're either hitting the right or left of the ball. So you glaze the left of the ball, its going to spin outwards and the right, its going to go the opposite way. Now, our problem is to find out how we get this off-angle hitting. What's the cause? I said these hooks and slices are more advanced errors. You're more likely as a beginner to do pulls and pushes. Now, can you think what would cause this hitting off of center?
- s: If you're bent and you straighten a little, your aim would be off.
- t: Well, yes. Now we're thinking of something that's a little more complex, a little more difficult. Something, say, that an ordinary beginner would not do. Think about your swing, think about something in your swing which would cause this.
- s: (no answer)
- t: Chris, can you think of anything?

s: (response unclear)

t: Well, yes. But actually its got to be at contact, or something that happens at contact. But, it develops in your swing. Now, can you think of anything that you could do in your swing that would cause this?

s: (no answer)

t: All right, you think about your normal swing pattern, just back and through. If you go back and through correctly, you are going to hit the ball. You are going to hit it right in the middle. Okay. What is something you could do in back and through which would cause you to glaze or graze the ball right off either side?

s: If you didn't come straight through with your swing. . . .

t: What are you, if you. . . .

s: Left or right.

t: That's right, if you don't come straight through. All right. Now what's she mean here?

s: You mean, go forward a little bit or backward?

t: No, I'm just talking in your swing. She said if you don't come straight through. If you go either to the side. Can you understand that, what Judy said?

s: Not keeping your arms straight?

t: Well, its a little more, you've got to think in a little more complex terms, Sarah, than that. What are you really doing when you're not keeping your arms straight?

s: (no answer)

t: All right, let's go back to what Judy said. Judy's the closest one to it. All right. She said if you don't come straight through. Well, where are you going to go if you don't go straight through?

s: To the side.

t: To the side. Okay. What would that be like? Suppose we go, Okay, up, how could I get, say a slice? I go up, Okay, in the right way, now how could I get a slice?

s: Twisting your body that way?

- t: All right. Think. The slice goes to the right.
- s: Well, if you leaned over more, it would cause you to hit the ball you know, on the outer.
- t: Okay. This is for slice.
- s: No, slice. If you, wait, let me try and think. Okay. If you stood up, kind of. Oh, I don't know.
- t: Just think about the arms. Just think about the arm swing. I'm here all right (top of backswing), now how can I get a slice out of this?
- s: Bring the club closer into your body.
- t: Bring the club closer to your body, or you see this way. Which way I've got to go, talk about inside or outside my swing. Okay, this is my swing. Okay, to go inside that swing, I have to get up under it; for the outside I have to go around it. Do you understand? Can you understand these two terms? Okay. Now thinking about the two terms, how can you get a slice or a hook. Thinking about going outside or going inside.
- s: A slice should go inside.
- t: A slice should go inside. Okay. Here's inside. All right, now let's say that I've gotten up all right, up correctly. And we've got to get me a slice. Now do I go inside or outside?
- s: I think you go outside.
- t: All right. I do go outside. See, instead of going down correctly, I go outside my swing which causes one to hit what side of the ball?
- s: The right-hand side.
- t: See. I got up Okay. I've gone outside. See where I'll hit the ball?
- s: Uh huh.
- t: Where?
- s: On the top of the right hand.
- t: All right. If you're standing behind it speak of left and right. That will give you direction. Would you hit the left up or the right up? If you went outside?

s: Right.

t: Well, look here.

s: I thought you were talking (many responses). Mrs. Ward, you hit the left.

t: See, you'd be hitting the left. See. You're up here, you're outside, you go across it. See here. And it goes that way. And there's your slice. Now think about the hook. All right, now you told me to hit a hook we had to hit on the right side of it to cause it to spin this way.

s: So you're inside it.

t: So I'm inside my swing. Okay. So, if I go inside up, and inside down, I've hit a good swing. So what about my going up?

s: That's okay, but you come down inside?

t: What about the way I take my upswing?

s: (no answer)

t: All right. I know this is hard. We'll just leave it and go to something else. It's very difficult and I think its good you ever understood your spins.

Lesson 17 - Original
Expository Technique

Subject matter: Golf
Specific matter: Errors correction
Concepts: Balance, control, rhythm

Objectives:

1. To learn some common errors in golf.
2. To learn to correct these errors.
3. To understand the relationship between these errors and the golf swing.

STATEMENTS

1. All of you have at one time or the other failed to hit the ball correctly and wondered why.
2. We are going to talk about these errors. One type error is when the ball goes directly left or right of where you are hitting. This is called a "push" to the right and a "pull" to the left.
3. A pulled ball is caused by either improper alignment at address, letting the clubface turn left or impact by twisting or rotating the shaft.
4. A pushed shot is caused by the same errors except made to the right.
5. A finer error is when the ball goes straight then veers left or right. This is called a hook to the left and a slice to the right.
6. These problems are caused by ball spin. For a slice, spin to the right. For a hook, spin to the left; but the factor which caused this spin is the clubface striking the ball on either side of its center.
7. This hitting left or right of center is caused by coming out of the correct swing plane.
8. In a slice, the movement stays inside the proper plane in the upswing, but on the downswing, comes out.

9. In the hook, the swing goes up outside the proper swing and comes down back inside the swing plane.
10. This is, of course, related to pull and push. Pull and push could be severe errors of this type. Inside/out and outside/in.

LESSON 17

ERRORS CORRECTION

Tape Transcription
Control Lesson
April 15, 1970

11:00

- teacher 1. All right. We want to talk today about errors and how to correct your errors. And I think this is, you know, timely. You know what I mean. All of you have at one time or another failed to hit the ball correctly. I think that's agreed upon. And you know, you've wondered what causes this. Is it just a quirk of fate. Or is it, you know, just a problem I have.
2. We're going to talk about some errors, some very common errors. And one variety is when the ball goes directly left or right of the green which you're approaching. Directly left or right. You'll notice I have these labeled: left is a pull. If you want to get this down to, you know, common terms. And to right is called a push. Is this familiar to you? Have you ever done this? Anybody ever hit and it went directly the wrong way? I think you noticed this in the little test we took Monday. By the way, I took the average of all my golf classes. The average was about nineteen. That's average. I think, if you're surprised because most of you didn't do nineteen, is that we had several people who went, I had one who went to sixty. And a couple that went to fifty-five. It really, you know, blew the curve.
3. All right. A pulled ball, the ones to the left, is caused either by improper alignment at address, or by letting the clubface turn. And on impact, face left. All right, now we're talking about a pull. The ball goes directly left. This is caused by either lining up wrong, which is a very common problem, or in your swing you let your club or your wrist rotate and it comes through and contacts and goes left.
4. All right, this same thing is with a push except it's right. You've either lined up incorrectly or you let your clubhead rotate and it aims right.

5. All right. A finer error or a more advanced error. They, people, usually say if you do a pull or a push, that you're much easier to correct or to help than if you have a slice or a hook. And which is what we're talking about. A hook is a ball that goes directly towards the green and then sharply veers to the left. And a slice goes right. Has anybody experienced this?

student: 6. (no answer)

teacher: 7. It is. It's a very common thing, especially the more you play, and the more you get your errors down to fine points the more this will come in to it.

8. Uh, these problems, the hook and the slice, are caused by ball spin. You know when we talked about backward spin and forward spin. This is caused by sideward spin. Spinning clockwise will cause a slice. Counterclockwise will cause a hook. And the reason is, if you're wondering, its almost like a phenomenon, if you've ever had one happen. 'Cause it just goes "whoosh" - right out. And it's just, you know, kind of weird. But it is the ball spin which causes this, because the momentum it has starts it going straight. And yet, finally the wind will get under this ball and make it go either to the left or to the right.

9. This spin itself is caused by hitting either left or right of center. If you speak about left, its when you're looking at it. Now you make this slice spin, is if you hit it off the left-hand side and cause it to go 'round. The same is with the right, you will cause it to go left.

10. All right. But what causes that? What causes that incorrect hitting? All right. Now this is difficult and you will have to concentrate on what I'm saying. It's involved in your swing. It's in your swing. All right, she's going to get me a club and I'll try to illustrate this. Give me a seven.

11. All right. A correct plane, swing plane, is one which goes directly up in the right plane. Which-ever is correct for you. And down in that same plane. You agree with that? All right, what happens, though, if you come out of this plane? Either out or in.

- teacher: 12. All right. In a slice, we said we had to hit off the left-hand side making it spin clockwise. All right, to do that what you've done in your swing, is you've come up correctly. But when you get ready to downswing, you have cast. Like a cast of a fishing rod. You have cast out and come out of your line of swing. You see. When you follow through you think it's in the right way. But what you have done is you have grazed the side of it and caused this rotation.
13. This is the most common - the slice. Most common to all golfers. You say, "Oh, my slice. What am I going to do about my slice?" Not as many people hook. But it is another common one.
14. And to hook, you start outside the plane. See. You swing outside the plane, and then try to come back in. And see what you've done is you've gone to the right-hand side of it and caused it to spin around this way. And you may not even understand what I have said. But if you will think about it the next time this happens to you, this error occurs to you, then think, "Am I swinging up and down in the same plane. Or am I casting out here and casting out on the downswing."
15. All right. Those are, those two, are advanced errors. Do you see the relationship between a slice and a hook and a pull and a push? All right. Now this is just food for thought. These two are related, the pull and the slice. Hook and push. Okay. I want you to think about that please and if I happen to talk about it again, be ready to give me a reason for the relationship between the slice and the pull and the hook and the push. You might want to draw this on paper or something when you go home. You know, to kind of get it in your mind a little better.

Time of Class _____

1. Approximately how much gold did you go through in _____
 this semester, including that which was left at the end of
 term? (Please be specific. This will be so we can measure
 your grade.)

_____ none _____ 25 hours

_____ 5 hours _____ 35 hours

_____ 10 hours _____ other, specify

_____ 20 hours

2. What did you find _____
 all interesting about _____

APPENDIX C

Questionnaire

_____ nothing

_____ different approach

_____ different materials

_____ other, specify

_____ no improvement

_____ other, specify

_____ other, specify

_____ other, specify

QUESTIONNAIRE

Time of Class _____

1. Approximately how much golf play did you do outside of class this semester, excluding that which was part of an assignment? (Please be truthful. This will in no way influence your grade.)

_____ none	_____ 27 holes
_____ 5 holes	_____ 54 holes
_____ 9 holes	_____ other, specify
_____ 18 holes	

2. What did you find different in this class from other physical education classes which you have taken?

_____ nothing

_____ different approach

_____ different attitude

_____ used demonstration

_____ no demonstration

_____ asked questions

_____ asked no questions

_____ other, specify

3. Before this course, how much did you know about golf and where did you get your information?

- _____ nothing
- _____ private lessons (few)
- _____ relative. How much? _____
- _____ pro (several)
- _____ high school
- _____ college course (semester)
- _____ part of college course. How much? _____
- _____ Other, specify