

# AN ABSTRACT OF THE THESIS OF

Taworn Prakhongchit for the degree of Doctor of Philosophy

in Education presented on September 4, 1979

Title: EFFECTS OF REST PAUSE INTERRUPTION UPON LEARNING

AND ATTITUDES WITH INSTRUCTION VIA SELF-INSTRUCTION WITH

MULTI-MEDIA PROGRAMS

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Abstract approved: —

/ Benjamin P. Purvis —

## Purpose of the Study

This study was designed to investigate the effect of a brief rest pause interruption within a multi-media self-instructional program upon learning. This was done to determine whether specific rest pause interruptions would have any effect on a subject's learning and attitude toward the treatments.

In order to determine what effect, if any, the rest pause interruptions have on learning, these null hypotheses were tested:

### 1. Achievement

$H_0$ : There will be no significant difference in achievement among the treatment groups.

### 2. Attitudes

a)  $H_0$ : There will be no significant difference in subjects' attitudes toward the self-instructional program among

the treatment groups.

- b)  $H_o$ : There will be no significant difference in subjects' attitudes toward the one-minute rest pause for the treatment groups.
- c)  $H_o$ : There will be no significant difference in subjects' attitudes toward the one-minute music played during the interruption for the treatment groups.
- d)  $H_o$ : There will be no significant difference in subjects' attitudes toward the one-minute rest pause with projected slides for the treatment groups.
- e)  $H_o$ : There will be no significant difference in subjects' attitudes toward the one-minute rest pause with projected slides and music for the treatment groups.

### Methodology

Oregon State University students who enrolled for the class Fisheries and Wildlife Recreational Techniques (FW 161) were selected as the subjects for the experiment. Subjects were randomly assigned into four groups for the treatments. The treatments were: 1) no rest pause interruption; 2) one-minute rest pause interruption halfway through the program with a set of photographic slides programmed to change every six seconds; 3) one-minute rest pause interruption with music played during the interruption; and 4) one-minute rest pause interruption with both photographic slides projected and music played during the rest pause interruption.

The subjects were pretested on achievement and attitudes. The experiment was conducted using a set of three self-instructional programs which had been prev-

iously developed and designed to teach spin fishing. The length of each program selected for the experiment was approximately 30 minutes. The experiment was completed within a three week period. The subjects were then post-tested on both achievement and attitudes.

### Results

The analysis of covariance was used to analyze the data. The results of this investigation were presented in two categories: the subjects' achievement; and the subjects' attitudes toward the specific concepts.

There was no significant difference found on achievement among the treatment groups. However, on the attitudinal results, it was found that the treatment group that received the music only treatment during the rest pause interruption showed a positive significant difference in attitude toward the treatment received. The treatment groups that received the rest pause interruptions with slides only or slides with music showed no significant difference in attitude toward the specific treatment received. The treatment groups that received different rest pause interruptions showed a positive significant difference in attitude toward the one-minute rest pause with music. There were no significant differences in attitude toward the self-instructional program, one-minute rest pause with slides and one-minute rest pause with slides and music.

## Conclusion

Given identical controlled conditions it can be concluded that the inclusion of a one-minute rest pause interruption in a 30 minute multi-media self-instructional program does not significantly increase or decrease learning. Neither does it change student attitude toward the self-instructional program. However, it can be concluded that under identical conditions, students who experience a one-minute rest pause interruption with music during the self-instructional program will have a more positive attitude at the end of the treatment toward a musical rest pause than they had in the pre-evaluation. Other rest pause treatments identified in this investigation will not produce significant attitudinal change.

Effects of Rest Pause Interruption Upon Learning  
And Attitudes With Instruction Via  
Self-Instruction With Multi-Media Programs

by

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A THESIS

submitted to

Oregon State University

in partial fulfillment of  
the requirements for the  
degree of

Doctor of Philosophy

Commencement June 1980

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## ACKNOWLEDGEMENTS

I wish to express my gratitude to my professor, Dr. Benjamin P. Purvis for his valuable support, encouragement and critical reading of the manuscript. I am also pleased to acknowledge my indebtedness to my graduate committee, Dr. Ruth E. Stiehl, Dr. Harold Livingston and Dr. Glenn A. Klein for their advice, helpful comments, and constructive suggestions. In addition, I am indebted to Dr. Wayne E. Courtney for advice on experimental design and statistical analysis methods. Without their contributions, the completion of this dissertation would not have been possible.

I am also grateful to Dr. Howard F. Horton, Professor of Fisheries and Wildlife, O.S.U. for allowing his class to participate in this investigation, and to the department of Computer Science, O.S.U. for providing computer time for analyzing the data. I should also like to thank Mrs. Marilyn Schmidt for typing this manuscript.

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# EFFECTS OF REST PAUSE INTERRUPTION UPON LEARNING AND ATTITUDES WITH INSTRUCTION VIA SELF-INSTRUCTION WITH MULTI-MEDIA PROGRAMS

## I. INTRODUCTION

### Background of the Problem

Self-instructional programs have become popular in schools and colleges as a way of assisting student learning. McKeachnie and Kulik (36) are among those professionals who claim that the programs for self-instruction are one of the fastest spreading innovations in higher education. Fisher and MacWhinney (15) report from their observation that self-instruction is often supported by student-controlled audiovisual media.

A self-instructional program utilizing multi-media, i.e., a slide-tape and video-tape program, has been claimed to be an effective method for enhancing student learning at the college level. Among the professionals in this field, McKeachnie and Kulik (36) and Fisher and MacWhinney (15) point out that the self-instructional program (individualized and/or auto-tutorial instruction) was found to be an effective method in promoting student achievement. However, some of the professionals, Bloom (6), Gagne (18), Glasser (19), and Berliner and Cahen (3) agree that there is no single instructional environment that is best suited

for all students.

Root (45) studied the interaction between learner achievement characteristics and two methods of college instruction: conventional and mastery learning. His study was specifically designed to test whether conventional instruction (lecture with lab) and mastery learning instruction (self-instructional with multi-media support) interact with student characteristics to affect learning outcomes. His findings (46) indicated that:

... one can enhance learning by using achievement via conformance ( $A_c$ ) scores of the California Psychological Inventory to match students learning with an instructional treatment. Those students with low  $A_c$  scores achieved better when assigned to mastery instruction and those students with high  $A_c$  scores achieved better when assigned to conventional instruction (p. 1).

The instructional sequence for the mastery learning modules was developed by Root to investigate the interaction between achievement characteristics and methods of instruction. These programs have been selected as research materials for further investigation. Self-instruction is developed to help students learn at their own pace. However, many other factors exist which affect learning; such as, environment, time of the day, duration, media, and the student's interest. It is necessary to identify and research these factors so that the educator can account for them and design the program to enhance more effective learning.

A rest pause interruption within the program is one of the interesting variables which may affect student learning. A rest pause interruption is a planned break inserted in the instructional segment to allow the learner to pause during the learning process. If this variable can be planned and inserted into the program where the educator believes a threshold of information absorption or attention has been reached by the student, e.g., halfway through the program, it may increase student learning. The rest pause interruption has been found and reported to benefit learning, especially via educational television programs, which were not self-paced.

The work of Pockrass (43) was concerned with the effects on learning of continuous and interrupted exhibition and dealt with two different television programs: a lecture; and a program combining lecture and dramatization. The subjects in this study were college students who expressed interest in the program topics. They were randomly assigned into four groups (between 32 and 34 subjects per group). Each 'group' viewed the program under one of the four conditions:

1. without a rest period;
2. with a one-minute silent rest period half-way through the program;
3. with one-minute musical selection played half-way through the program; and
4. with a one-minute verbal announcement (unre-

lated to the program content) halfway through the program.

The students responded to a series of completion questions which were designed to determine learning outcomes immediately after each of the above treatment conditions. The subjects who received the one-minute rest period inserted in the television program had higher scores. The results were statistically significant at the .05 level. Moreover, all groups that had rest periods achieved larger gain scores than the group without any rest period.

Deese (13) suggested that the length of the rest period, length of the practice period, and the place where the rest intervals occur are important variables in the distribution of practice. He states that,

... almost without exception we can say that well-spaced and frequent rest intervals increase the rate of learning and are beneficial to performance (p. 153).

Similarly, Vernon (54) reported results in her exploratory study on the teaching effectiveness of forty-minute television talks (without interruption). She found that the subjects' scores for material covered in the first half of the televised instructional program were significantly superior to those for the material covered in the second half. Since the learners did well on the first half of the program, the subjects may have needed a brief rest pause to relax before continuing the second half of the program.

A rest pause interruption is a promising variable with which to experiment in investigating learner outcomes in self-instructional programs. The work of Deese and the studies by Vernon and Pockrass seem to indicate that a rest pause may be a significant variable in increasing learning from television programs where the pace is pre-established. However, none of these studies used rest pauses within self-instructional programs. Therefore, it is the unique purpose of this study to investigate the effects of the rest pause interruption inserted in a multi-media self-instructional program where pacing is controlled by the learner.

### Purpose of the Study

This study was designed to investigate the effect of a brief rest pause interruption within a multi-media self-instructional program on student learning. This was done to determine whether specific rest pause interruptions would have any effect on learning achievement and on various attitudes toward multi-media self-instruction and the rest pause interruption. A mastery learning program, as described by Root, was used as the instructional material in this investigation. Different rest pause interruptions were inserted within Root's instructional programs to test their effect on learning outcomes and attitudes. These different treatments included:



1. no rest pause interruption;
2. one-minute rest pause with ten photographic slides programmed to change at 6 second intervals with no accompanying sound;
3. one-minute rest pause interruption with musical selection played, but with no photographic slides; and
4. one-minute rest pause with musical selection played along with ten photographic slides programmed to change every 6 seconds during the rest pause.

The photographic slides and musical selections were the same in each program. The rest pause interruption was inserted halfway through the program.

The purpose of this study was to determine whether a brief rest pause inserted within a multi-media self-instructional program would increase student learning.

### Definition of Terms

#### Audiovisual Materials

Audiovisual materials are any materials which involve the transmission of information through both the visual and auditory channels.

#### Mastery Learning Program

The mastery learning program is a self-instructional program utilizing multi-media (video cassettes, slide-tapes and printed materials) that requires the learner to master a module before proceeding to a new module.

### Multi-Media Program

A multi-media program is a combination of instructional media coordinated as an instructional segment, e.g., a synchronized slide-tape program, or a program which consists of more than one medium.

### Rest Pause Interruption

A rest pause interruption is a planned break inserted in the instructional segment to give the learner an opportunity to pause during the learning process.

### Self-Instructional Program

A self-instructional program is any program which requires the students to study by themselves. The term self-instruction does not necessarily mean an individual pattern of learning that indicates individual pacing. However, the self-instructional program is the same as individualized instruction as described by Kapfer and Kapfer (24). The self-instructional program includes the following characteristics: self-pacing; modularization of the content into units; printed study guides; and a requirement that each unit be finished before the learner proceeds to the next segment or unit of instruction.

### Hypotheses

In order to determine what effect a brief rest pause interruption has on the learning environment (includes at-

titudes) when integrated into a self-instructional program, the following hypotheses were tested:

1. Achievement (Learning Outcomes)

$H_0$ : There will be no significant difference in achievement mean scores among the four treatment groups.

If  $H_0$  were rejected, a multiple comparison test (e.g., LSD Test) was utilized to ascertain where specific significant differences occurred. The following hypotheses were applied for this testing when appropriate:

$$H_1: \mu_c < \mu_1$$

$$H_2: \mu_c < \mu_2$$

$$H_3: \mu_c < \mu_3$$

where  $\mu_c$  = adjusted mean scores of the control group (no rest pause interruption).

$\mu_1$  = adjusted mean scores of the group that received one minute rest pause with slides projected during the interruption.

$\mu_2$  = adjusted mean scores of the group that received one minute rest pause with music played during the interruption.

$\mu_3$  = adjusted mean scores of the group that received the one minute rest pause interruption with both slides and music.

2. Attitudes

- a)  $H_0$ : There will be no significant difference in Ss' attitudes toward the self-instructional program as shown by the mean scores for the four treatment groups.

If  $H_0$  were rejected, a multiple comparison test was utilized to ascertain where specific significant differences occurred and the following hypotheses were tested:

$$H_1: \mu_c < \mu_1$$

$$H_2: \mu_c < \mu_2$$

$$H_3: \mu_c < \mu_3$$

- b)  $H_0$ : There will be no significant difference in Ss' attitudes toward the one-minute rest pause interruption as shown by the mean scores for the four treatment groups.

If  $H_0$  were rejected, a multiple comparison test was utilized to ascertain where specific significant differences occurred. The following hypotheses were proposed for this testing:

$$H_1: \mu_c < \mu_1$$

$$H_2: \mu_c < \mu_2$$

$$H_3: \mu_c < \mu_3$$

- c)  $H_0$ : There will be no significant difference in Ss' attitudes toward the one-minute music played during the interruption as shown by the mean scores for the four

treatment groups.

If  $H_0$  were rejected the following hypotheses were tested:

$$H_1: \mu_c < \mu_1$$

$$H_2: \mu_c < \mu_2$$

$$H_3: \mu_c < \mu_3$$

- d)  $H_0$ : There will be no significant difference in Ss' attitudes toward the one minute rest pause with projected slides as shown by the mean scores for the four treatment groups.

The following hypotheses were tested if  $H_0$  were rejected:

$$H_1: \mu_c < \mu_1$$

$$H_2: \mu_c < \mu_2$$

$$H_3: \mu_c < \mu_3$$

- e)  $H_0$ : There will be no significant difference in Ss' attitudes toward the one minute rest pause with projected slides and music as shown by the mean scores for the four treatment groups.

The following hypotheses were tested if  $H_0$  were rejected:

$$H_1: \mu_c < \mu_1$$

$$H_2: \mu_c < \mu_2$$

$$H_3: \mu_c < \mu_3$$

These hypotheses were written as a guideline for studying and testing the specific concepts. The data analysis and interpretation of the results were selected to be significant at the .05 level of confidence. In order to determine the significant differences among the four treatment groups, the analysis of covariance, the least significant difference (L.S.D.) and the paired t test were selected as statistical methods. The details of using these methods will be discussed in Chapter III.

## II. REVIEW OF THE LITERATURE

### General View of Teaching and Learning With Instructional Media

Instructional media, especially audiovisual aids, have long been used to help teachers teach better and to make learning more interesting and exciting. The literature of audiovisual communication and instruction has provided educators with both information and theories of audiovisual instruction. For example, the text Audiovisual Methods in Teaching by Dale (12) has been very popular and has had a vast influence on the production of audiovisual devices and on their use in teaching situations. Dale cites the following as proven contributions of audiovisual aids. They:

1. supply a concrete basis for conceptual thinking and hence reduce meaningless word responses of students.
2. have a high degree of interest for students.
3. make learning more permanent.
4. offer a reality of experience which stimulates self-activity on the part of pupils.
5. develop a continuity of thought; this is especially true of motion pictures.
6. contribute to growth of meaning and hence to vocabulary development.
7. provide experiences not easily obtained through other materials and contribute to the efficiency, depth, and variety of

learning (p. 65).

Audiovisual media as pointed out by Dale, are an effective way of extending the range of our vicarious experience. Audiovisual methods have also been claimed to be advantageous over the traditional way of teaching.

Travers (53) developed some propositions from a psychologist's view about the effect that audiovisuals have on various learning areas. He stated that audiovisual materials have high value for relating the learner to reality. He explained that:

... audiovisual materials have capability of presenting stimulus patterns in much the same way as they are presented by the environment and that the visual presentation can avoid symbolic representation of phenomena (p. 12).

He gives an example of a presentation of both audio (voice) and visual (picture) of a volcano which brings the students in touch with reality and provides them with a symbol that has an operational definition.

The second proposition states that visual teaching materials involve a language of communication and represents a channel of communication distinct from that of ordinary language. Since audiovisual materials involve the use of symbols they necessarily involve the use of languages. He stated:

... To identify language with learning hardly seems to be profitable and may obscure an important difference between



linguistic and nonlinguistic learning  
when language is otherwise defined  
(p. 14).

The third proposition of Travers is that audiovisual materials provide concrete instances through which verbal concepts can be learned. In this proposition Travers points out that the viewer can learn concepts defined in terms of visual attributes of objects and events and that these concepts can be given verbal labels.

His fourth proposition states that the transmission of information through more than one sensory modality provides reinforcement. This proposition suggests that input of information through different sensory modalities results in more efficient learning than input of information through a single channel. It suggests that the greater the number of sense modalities that are used in learning the better will be the learning.

The last proposition formulated by Travers states that audiovisual materials attract the attention of the pupil and motivates more effectively than other materials. This proposition can be explained by the theory that audiovisual displays resemble entertainment, which in effect, cause the learner to assume an attentive condition.

#### Some Specific Views on Media for Instruction

The propositions of Travers indicate why audiovisual

media have the possibility of assisting learning. There are a number of researchers who have conducted investigations to prove that audiovisual media can help students learn and/or improve learning. The report of the research series:

Enhancements and Simplifications of Motivational and Stimulus Variables in Audiovisual Instructional Material (1965); Word-Picture Relationships in Audiovisual Presentations (1965); and The Role of Student Response in Learning from the New Educational Media (1966) for the United States Office of Education conducted by May showed that the use of audiovisual media such as filmstrips or filmographs (still pictures or diagrams on motion pictures) simplified the presentation and made it more effective. He also states that the techniques used in audiovisual media production tend to improve learning.

#### Learning from Television and Motion Pictures

Television and motion pictures have added the dimension of motion as a means of improving education. Motion can be a valuable aspect of learning where the concept being taught requires movement to portray a realistic event. Many instructional programs are produced utilizing television, especially videotape. Videotape allows the learner to replay and restudy the instructional materials. Many professionals have studied and made suggestions on the effectiveness of television as an instructional tool. Chu and Schramm

(9) are among those who claim television is the most effective tool for teaching and learning if it is used in a suitable manner in learning activities.

Several studies have been reported on the effectiveness of television as an instructional tool. Most of the results indicate that students learn at least as well as or sometimes better than with the conventional methods of instruction. For example, Schramm (48) reported 393 cases in which instructional television had been compared to the conventional method of classroom instruction. Of those, 255 cases (65 percent) found no significant differences between the two modes of instruction. In 82 cases (21 percent), it was found that students learned significantly more with television instruction and in 56 cases (14 percent), it was found that the students learned significantly less than with the conventional method of instruction.

It is essential to consider another medium that is similar to television, the motion pictures. Although motion pictures and television are similar audiovisual projection systems using images projected upon a flat surface and accompanied by synchronized sounds, they are not the same. Motion pictures and television programs usually are viewed in different settings. The presentation of instructional materials via television has been found to be an effective learning aid and instructional method. However, motion pictures also assist learning significantly

when the film content is well organized. Ketchum and Heath (26) investigated learning from films that did not directly portray subject matter, and found that students learned better than those who only heard the sound track.

There have been investigations to determine whether or not motion pictures can affect student perception. Krebs (27) studied the effects of educational films on students' perceptions. He found that the students viewing films tended to perceive facts and information more than a group without film presentation. However, there were no significant differences in retention scores between the groups. Motion pictures also helped students to learn more related technical information and helped them to use manipulation skills more effectively. These results were verified by LeMaster (28). In teaching public speaking, McElroy (33) reported that the students felt the films were a helpful teaching device, but no significant difference was found in general effectiveness. From the studies and reports presented above, one can conclude that films may be an effective tool for teaching and learning similar to other audiovisual media. Therefore, the educator may select films for instruction where speed, motion and/or animation demonstrate concepts to be learned.

#### The VTR System as an Effective Learning Device

One of the most widespread and more accepted new

instruments for teaching and learning is the video tape recorder (VTR) system. This medium uses the same format as television in delivering the information. Educators classify this medium as one system of television.

Television has been used in at least three formats: the broadcast system transmits the signals through the air so anybody with a good receiver can tune in the signals; the closed-circuit system where the signals are transmitted through a coaxial cable to a modified receiver or monitor; and the video tape recorder (VTR) system. The VTR system records signals on to a magnetic tape and at a later time can be played back and received on a TV monitor or modified television set. The VTR system is the least expensive and requires the least technical expertise to operate.

The video tape in the VTR system has the capability of being erased and reused. The lesson can be pre-recorded, evaluated and tested before introduction into the classroom. It is possible to reproduce again in order to improve or update the material used. Once the lesson has been produced it can be used over and over; therefore, it can reduce some instructional costs. The VTR allows a teacher or learner to repeat (replay) the lesson because it provides both ease of operation and instant replay. The system is small, light, portable, and relatively inexpensive. Many educators have adopted this instrument for classroom teaching as well as for the evaluation of performance.

The use of the VTR as an instrument of instruction can be recognized as very similar to television since both use the same or similar format in delivering the information. The difference is that video tape can be played when the teacher or learner desires. It is not restricted to a specific broadcasting time. The video tape programs can also be exchanged between institutions possessing the same video tape facilities. The video tape system allows the same flexibility as films.

The VTR system has proven to be an effective tool for instruction. It has potential for more use in the educational environment as claimed by Burks (5). Meline (58) found that when children are exposed to video presentations showing objects, people, actions and events they consistently and more significantly acquired a firmer concept. Thatcher (52) studied the effectiveness of video tape recordings as an aid for substitute teaching. He found that substitute teaching situations in eighth grade mechanical drawing can be educationally more productive. The results of his experiment revealed that students in the video tape recording treatment group made significantly greater gains in understanding the concepts being taught than did those students who did not view the video tape. In this study, the investigator concluded that the video tape recording might be a valuable aid for permanently assigned teachers.

Concerning the effectiveness of teaching a psychomotor and cognitive task, it has been proven that the use of the VTR can be as effective as the conventional method of teaching. Baron (2) compared the effectiveness of a psychomotor task via a teacher prepared video tape recording to the effectiveness of a live demonstration. The study was designed for teaching cognitive materials and psychomotor skills to seventh grade students. An objective test and a performance test was used to record the data. Moreover, Campbell (8) conducted a study applied to the teaching of two units of agriculture subject matter. He compared the effectiveness of three methods of instruction: lecture, demonstration and student participation; and two styles of presentation: conventional teaching and video taped materials. He found that neither method of instruction nor style of presentation had a significant influence on cognitive or affective learning. However, there was a significant difference in cognitive comprehension learning due to interaction effects. The students taught by means of VTR performed as well as when they were taught by conventional methods.

#### Effective Learning With Slide-Tape Programs

The slide-tape program is considered to be a multimedia program because the program requires more than one medium for presentation of the information. The term multimedia is derived from the combining of visual medium

of the projected slides with the audible medium of recorded sound operating in unison in a prepackaged presentation (58). A simple form of a multi-media presentation is a manually advanced slide projector accompanied by sound (message) via a tape player. Wiseman and Gordon (58) claim that multi-media programs have served aptly in various kinds of training situations for both new and inservice employees (p. 2). However, slide-tape programs are also used in education. Many teachers feel that this medium is a great help in assisting teaching and learning.

A number of studies have reported benefits of the slide-tape medium in teaching and learning situations. Hosley (22) compared two methods of instruction in environmental education by utilizing a field or outdoor approach and a three screen slide-tape presentation of the same concepts. He found no significant difference in retention. A group which was exposed to both methods got the highest scores on the retention test, however, no significant difference was found.

Goldsbury (20) studied the feasibility of providing vicarious field trips via slide-tapes. He concluded that the instructional method of remaining in the classroom to experience a field trip vicariously through slide-tapes proved more effective than the actual field trip.

For these reasons, one can see why more slide-tape programs are being developed. The slide-tape program is



not here to replace the teacher, but rather to assist teachers in presenting better instruction and to help students learn with more understanding by directing the students' attention to the lesson being presented.

### Self-Instructional Programs Utilizing Multi-Media

The self-instructional program is not new. It has been recognized since the 1920's when Sidney L. Pressey (44) designed several machines for the automatic testing of intelligence and information. Since then many teaching machines have been developed and tested in classrooms. B. F. Skinner (49), who invented several teaching machines for self-instruction (programmed instruction), asserts that self-instructional machines are not designed to replace teachers. However, he points out that the equipment is used to assist teachers in the instructional process. The teacher may teach more students than heretofore--this is probably inevitable if the worldwide demand for education is to be satisfied (p. 55). The role of the teacher may well be changed, points out Skinner, since the machine instruction will affect several traditional practices. The student may continue to be grouped in grades or classes, but machines will make it possible for each of them to proceed at their own level.

The self-instructional program, which some have

called individualized instruction, has been developed for various purposes; it has a variety of names to suit these purposes. For example, the Weber Individualized Learning Kit (WILKIT) was developed for self-instructional purposes (4) as a unit of work intended to assist a student in the professional component of teacher education toward the mastery of an educational concept or a teaching skill, process or strategy. Two additional programs that were developed for self-instruction are the Learning Activity Package (LAP), an audio-tutorial system that incorporates mini-courses and masteries; and the ComPac, an instructional package for competency-based teacher education (20). However, not all of these programs were developed on the behavioral basis. Rather, many programs were designed to assist student learning by allowing the learner to control, process and pace his/her own learning.

The self-instructional program allows many alternative modes to the learner. It provides self pacing which allows the students to study at their own speed. Therefore, the fast learning student is not bored and the slower student can study the lesson at his/her own pace with the opportunity to learn as much from the program as the faster students. The self-instructional program needs no regular schedule or specific time for study. Students can study whenever they have the time.

Many studies and reports have been investigated to

show how effective self-instructional methods are in teaching students. Amelon (1) experimented with two methods of teaching metal work at the college level using the self-instructional program with slide-tape and demonstration (conventional method). He found that the experimental group learned significantly better on two units, with no significant difference in three units, and on one unit the self-instruction group did better on learning related information. He concluded that teachers should use self-instruction to save student observation time and to take advantage of individual scheduling. Wilson (55) found in her study that subjects receiving a ten session self-instructional multi-media training program on the care of children from six months to three years of age, gained significantly in child development knowledge over the control group. She found that there was a significant difference between the posttest performances of the two groups. Both differences were beyond the .001 level.

Eckhardt (14) conducted a study on learning in multi-media programmed instruction as a function of aptitude and instruction rate controlled by compressed speech. He found that the ability to learn from multi-media programmed instruction was a function of aptitude. Increasing learning efficiency of high and low aptitude learners was a function of time-compressed speech combined with multi-media programmed instruction. He concluded that in combination with

other developments in instructional technology, time-compressed speech made a significant contribution to improving the efficiency in communication and instruction. In a recent study, Root (45) found that there were no significant differences between the subjects who used self-instruction utilizing slide-tape programs and video-tape programs (mastery learning programs) and the conventional group of students at the college level. However, Root found that the mastery learning group earned higher scores on the semantic differential concept mastery learning than did the conventional group.

From these and other studies, it has been determined that the self-instructional program via multi-media, especially the slide-tape and/or video-tape, is at least as effective as conventional methods of teaching.

#### Learning Theories Applied To Media Instruction

Psychologists who are interested in human learning behavior have formulated many learning theories to explain how humans can learn. The reinforcement learning theory is one among these theories that provides some guidance. Miller (39) proposed certain fundamental factors of learning. First, students must want something. This is what he calls drive or motivation. Second, students must notice something. This Miller termed a cue or stimulus.

The third factor is called a response in which the students must do something as a response, e.g., think. Finally, if learning occurs the students must be able to demonstrate what they have learned.

From Miller's point of view, one may say that audio-visual media have superior qualities for stimulating and directing the attention of the learner. This is consistent with an application of the stimulus-response or reinforcement learning theory which is popular among the behaviorists. In applying this theory to audiovisual instructional media learning situations, the information presented via the media creates new learner responses. They can respond to this information at their own rate, depending on their skills and interest. The students with high motivation or interest in learning may be expected to respond and may be rewarded by understanding what is being presented at a rate suited to their learning ability.

In developing a program to utilize audiovisual media, one must consider the learners' attention in order to attract and retain learners' interest so they can benefit from the program. The instructional program, especially for self-instruction, is commonly presented without interruption or allowing the learner a break. Since the instructional program contains more difficult information than the entertainment program found on commercial television, it may require the learner to exercise greater concentration

on certain parts of the program. This may cause the learner to lose interest or become bored and inattentive as the program continues. The learner might benefit more from the program if he/she receives a break or a brief rest.

### Human Inhibition and Fatigue Affect Student Learning

Among psychologists who have studied human inhibition and fatigue, Hull (24) and his associates explored and experimented with the theory and set forth a theoretical basis. He stated:

Whenever a reaction is evoked in an organism there results a primary negative drive that has an innate capacity to inhibit the reaction potentially of that response, this innate inhibitory tendency being an increasing function of the number of reactions in a sequence and the amount of work involved in execution of the response. This reactive inhibition spontaneously dissipates as a simple negative function of time at rest (p. 300).

In formulating this learning session, postulate #8 of Hull's learning system, Hull acknowledged the contribution of the Mowrer-Miller hypothesis which regarded the inhibition as a need to cease action--a need for rest. He said that anything which reduces this need should serve as a reinforcing state of affairs (p. 297). Solomon (51) stated that the more work per learning session and the less time between sessions, the greater should be the inhibition. McGeoch and Irion (34) also concluded that the interpolation

of a period of change or inactivity tends to benefit learning performance (p. 171).

The self-instructional program using multi-media provides the students with a great deal of information on which to concentrate because they have to watch (visualize) and listen to the information presented along with the visuals. They may become fatigued or bored with the program which may cause them to be less attentive. Deese (13) stated:

If the rest period exceeds a certain critical length, which for most tasks is probably very short, a further increase will not increase the rate of learning performance, whereas almost any variation in length of work will produce an effect (p. 155).

One factor that seems to affect student learning is interest. There is some evidence to show that the lack of interest facilitates the development of inhibition or fatigue. For example, Woodworth and Schlosberg (59) pointed out that one very important factor which minimizes reading fatigue is interest. Moreover, Morrow (40) said that the continuous work demanded by massed practice might be accompanied by declining motivation which causes students to lose interest and would decrease the rate of learning. The interest in learning may also decrease if the program continues too long. These support Hull's theory as mentioned before. Also, if the material presented is especially difficult or uninteresting, the inhibition

will probably accumulate more. Thus, if the program includes a rest period, the learners may have a chance to think-over and recover, which may help them to learn better.

### Effects of Program Length

The length of the program is another factor which affects the learners' attention and interest. Vincent, Ash and Greenhill (55) experimented by varying the factual information. They prepared films of four different lengths (15 to 30 minutes) and fact density (112 to 224 facts). They found that the more information a film contained, the greater amount of information the students learned. However, when adding too much information (224 facts in the 30 minute films), the students did not learn more than the group who saw the shorter program. In a related study dealing with television programs, Hard and Watson (21) found that increasing the number of technical terms did not alter the significant percentage of terms recalled or understood. In this study with college students, they used three different programs ranging from 15 to 25 technical terms.

Most of the research has been more concerned with how media affects students' learning. Not much research has been reported on a suitable length of time for presenting information via media. However, there are a few professionals who work in this field and have reported



some information. For example, Gable (17), who has had experience in teaching by television in Philadelphia, reported that teachers prefer a program ranging from 15 to 30 minutes. It is also reported that the instructors in public schools teaching by closed-circuit television at Hagertown, Maryland, feel that the interest span for average students watching a television program is about 30 minutes. Fritz, Humphrey, Greenlee and Madison (16) expressed the opinion that a televised training program should not be more than 30 minutes in length.

From the information presented, it is suggested that the average length of a program should not exceed 30 minutes. This depends on how complicated or difficult the information is to present. If it is difficult information, the program should be divided into sections, or a rest pause may be inserted within the program.

#### Effects of Rest Pause

There are a number of reports on the beneficial effects rest pauses have on learning. Michael (38) reported that stopping the films to permit time for questions resulted in improved learning involvement. McGuire (35) compared blank rest pauses with pauses filled with statements like "try hard to memorize and get a good score." In this comparison the students were divided into three groups to receive different pauses. The first group received no pause,

the second received a blank rest pause, the last group received a pause filled with statements. He found that the students with no pause did the poorest when compared to the other groups. The students in the no pause group tended to consider the programs too long and showed loss of interest. Pockrass (43) experimented by inserting a brief rest pause in a 30 minute television program. He found that the break is particularly beneficial to learning. He reported:

All of the groups that viewed the interrupted programs were more successful on each of the two tests than the group that saw the uninterrupted program (p. 71).

It seems that the length of the rest pause may be critical. Since there were very few experiments that have reported on the length of the rest pause, it was not possible at this point, to verify the one that would be most beneficial to learning. Pockrass, in his investigation, selected one minute for the rest pause interruption for the 30 minute television program. Deese suggested that the rest pause for most tasks should be very short. Therefore, the one-minute rest pause interruption was selected to be incorporated into the instructional programs for this investigation.

### III. METHODOLOGY

The purpose of this experimental study was to investigate the effects of a rest pause interruption inserted into a self-instructional program with multi-media on student learning and attitudes. This study was directed toward students at the college level. It was not designed to investigate specific subjects or sexual differences. Each subject who was engaged in this study could have been from any school or college since they were enrolled in the selected course which was opened to all Oregon State University students.

The experiment began on October 3, 1978 and ended by October 26, 1978. The subjects were pretested on both achievement and attitude, then they were informed of their participation in the study, but they were not told what the study was about or which group they belonged to. They were told that during the next three weeks they were not required to come to class on a regular schedule. They could come whenever they were available to check out the self-instructional package and study at the Fisheries and Wildlife self-teaching center located in Nash Hall. The self-instructional packages were available during the week, Monday through Friday, from 8:30 a.m. to 5:00 p.m. and from 7:00 p.m. to 9:30 p.m. The directions for finishing each of the packages (modules) were given in the study

guide, however, they were told to proceed with the study at their own pace. They were informed that they had to finish the lessons no later than October 25, 1978. On October 26, they had to return to the regular class schedule and on that day they all received an examination covering all of the lessons presented via the self-instructional packages.

### The Design

This study was designed to use a set of self-instructional programs with multi-media as an instrument for the study. Each program consisted of one or more instructional media, such as synchronized slides and tape or a video tape. The length of each program was approximately 30 minutes of non-interrupted presentation.

The Fisher factorial design (7) was used as the design for this study. The format of the design is a 2 x 4 format. The independent variables for this study (the treatments) were as follows:

1. no pause interruption (this variable served as a control to the experiment);
2. one-minute rest pause interruption inserted halfway through the program with a set of photographic slides programmed to change every 6 seconds;
3. one-minute rest pause interruption with music played during the interruption; and
4. one-minute rest pause interruption with both photographic slides projected and music played during the interruption.

The photographic slides and music selection inserted into the program for interruption were not related to the content of the program. However, the photographic slides and music selection were the same in each program.

The subjects' achievement and attitudes toward the rest pause interruption constituted the dependent variables of the study.

In this investigation, the writer added an attitude measurement test which was given before and after the subjects received the treatments in order to determine how the students felt about or would react toward the self-instructional programs and the rest pause interruption.

#### The Subjects and Sampling Technique

The subjects selected in this study were students at Oregon State University who enrolled for the wildlife recreational techniques course (FW 161) during the fall term of 1978. All subjects who participated in this study were college students. None of them volunteered to participate in the experiment. Schools or departments, grade, sex and years in school were not considered to be factors of this investigation. There were 48 students registered for the class, but only 44 students participated in this class since four students dropped from the class before the experiment began. The subjects were pretested, randomly assigned a number, and then randomly assigned into

one of four treatment groups. Each group was also randomly selected for one of the treatments.

The randomization process proceeded in the following manner: a numbered record card was randomly distributed to and filled out by the subjects. The number on the card was used to represent the individual subject. A random table was selected to randomize subjects into four treatment groups. When the subjects were assigned to one of the four treatment groups, each group was randomly assigned to receive a specific treatment. In order to eliminate bias on assigning the treatment, the random table was used to assign one of the treatments to each group.

### The Program

A mastery learning program which was developed by the Department of Fisheries and Wildlife, School of Agriculture to teach spin fishing in the course wildlife recreational techniques (FW 161) at Oregon State University was used in this study. The content of these instructional programs included instruction on fishing lines, fishing hooks, knots used in angling, sinkers, floats, swivels, terminal tackle, use and care of spinning reels, rod and reel selection, and spin casting for accuracy. Five modules were developed to cover the subject matter utilizing multimedia.

The first module on fish lines and fish hooks was

presented in slides synchronized with tape. The second module (knots used in angling) was presented via a video-tape. The third module (sinkers, floats, swivels, and terminal tackle) was presented on slide-tape synchronization. The fourth module was presented with both video-tape and slide-tape synchronization and concerned the use and care of spinning reels, rod and reel selection, and spin casting. The last module was a printed handout on spin casting for accuracy and included a required practice score sheet.

The programs were designed to teach students general knowledge (cognitive) as well as skills in fishing. For example, students were to learn to identify and develop their skills on selecting, using, and caring for fishing gear. They were required to practice skills in tying specified knots that are commonly used in angling.

#### Program Revision and Subjects' Treatment

Mastery programs used in Root's study did not include synchronized signals to advance the slides. The program required the learner to advance the slides when a signal sound was heard. The programs were not suited to this experiment. The writer, with help from the course instructor, revised and made improvements in the content and quality of the programs. All of the narrations were

revised and rerecorded on master tape to improve sound quality. Later the narrations were duplicated into cassette tape and synchronized signals were added to advance the slides.

Three of the five modules of mastery learning were selected to add different rest pause interruption treatments for this investigation according to the similarity in program length. These modules were:

1. Module #1, Fishing Lines and Fishing Hooks was approximately 32 minutes long without interruption, and was presented via slide and tape synchronization. This module required the student to view slides, listen to an audio taped narration and take notes as necessary.

2. Module #2, Knots Used in Angling was presented via a video tape and was about 24 minutes long without interruption. This module required the student to watch the program and practice tying specific knots with fishing line and hooks that were supplied with the study guide.

3. Module #3, Sinkers, Floats, Swivels, and Terminal Tackle was presented via slide and tape synchronization and was about 30 minutes long without interruption. The program required the student to view slides and listen to the audio taped narration and take notes as necessary.

These modules are further explained in Appendix A.

These three modules were selected as treatments because they were similar in length and utilized the



instructional media, either slide-tape or video tape for presentation. Three different one-minute pause formats were used for each program: (1) ten 35mm slides were projected; (2) music was played; and (3) ten 35mm slides were projected and music was played. All of the rest pause interruptions were inserted halfway through the self-instructional program.

All of the programs were synchronized (pictures and sound). The subjects as they studied the self-instructional lessons, did not have to change the slides while watching the program. It was the writer's intention to add more convenience for the learners. Instructions were written to help them understand and operate the equipment. Using these instructions, the learner could stop the program wherever desired without losing the synchronization. The details of the instructions are presented in Appendix B of this report.

Before receiving the treatment, subjects were required to read a study guide presenting the objectives and guidelines of the information presented in the mastery learning modules. This study guide was also included with the handout for Module #5. The detail of the study guide is in Appendix A.

All of the subjects were randomly assigned into four groups for different treatments. The first group of subjects studied the self-instructional programs without

having any interruption and were designated as the control group. The second group received the treatment with the one-minute rest pause interruption. This interruption was the projected non-related photographic slides inserted halfway through the program. The third group received the treatment: a one-minute rest pause interruption with one-minute of music played halfway through the program. The music selection was not related to the program content. The last group received the treatment: a one-minute rest pause interruption halfway through the program containing a set of ten photographic slides programmed to change every six seconds accompanied by a one-minute music spot. The photographic slides and the music were not related to the program content.

### The Tests

An achievement test that was developed and tested by Root in a previous investigation was used as the pretest and posttest for this experiment. The original test consisted of 40 objective items and covered the content in the instructional modules. The test was composed of multiple-choice items. In the previous investigation, Root tested the reliability and internal consistency based on the pretested scores by using the Kuder-Richardson Formula 20. The reliability coefficient was found to be an acceptable .75.

In a previous study, to check for content validity, Root asked the course instructor to weigh each objective for importance to the instructional sequence. A scale of 1 to 3 was used (1 for not so important; 3 for important) to determine the rating of the importance of the test objectives. The number of items for each module was then determined from the rating of the objectives, the number of objectives that pertained to each module and the amount of content included in each module. The content of the test items was also checked by item analysis and changes were made to eliminate confusion. The test items were evaluated by five experts as to their appropriateness, accuracy, and linguistic validity. Corrections and changes were made based on their recommendations.

Only the first 30 items of the previous test items were selected to use in this investigation. Since the test items selected in this study contained the same information and objectives as were used by Root, the reliability and validity of the test items are the same as in Root's investigation. Therefore, in this study, the test items used to collect data are considered reliable and valid. The test items for the achievement test are presented in detail in Appendix C.

#### Attitudes Measurement

A semantic differential instrument was developed

for attitude measurement. In Root's study, he chose the semantic differential (S.D.) for attitudes measurement which he claimed "... is widely used in behavioral research as a measurement of attitudes and perception of meaning." (p. 45)

The semantic differential is an instrument developed to measure meaning. The term is derived from synthesis which is defined by Warren (56) as:

... a phenomenon characterizing the experiences of certain individuals, in which certain sensations belonging to one sense or mode attach to certain sensations of another group and appear regularly whenever a stimulus of the latter type occurs.

Osgood, Suci and Tannenbaum (42) explained the term semantic differential as a combination of controlled association and scaling which provides the subjects with a concept to be differentiated and a set of bipolar adjective scales against which to do it. Their only task is to indicate each item that will show the direction of their association and its intensity on a seven-step scale.

The scales used in semantic differential measurement can be defined by a pair of opposite-in-meaning terms, such as, good-bad, happy-sad, slow-fast, and so on. The larger the number of scales, the more validly does the point represent the operational meaning of the concept. One can say that the semantic differential is a technique of measurement that can be considered as an index of meaning. Atti-

tudes are difficult to measure. When one says attitude change, it means one has changed the meaning of his beliefs into the degree of likeness (positive) or dislike-ness (negative). To deal with attitude change, a measurement scale must be selected. At this point, the semantic differential technique seems to be the appropriate tool to be used.

In this study, the concepts used to determine students' attitudes toward the rest pause interruption and instructional method were:

1. self-instruction (individualized instruction) program;
2. providing a one-minute break while learning via a self-instructional program;
3. providing music played during the break;
4. providing pictures (slides) projected during the break; and
5. providing both projected slides and music played during the break.

The semantic differential instrument was employed in order to collect the information. The scale polarities used in this study were: good-bad; valuable-worthless; unpleasant-pleasant; dull-sharp; active-passive; slow-fast; weak-strong; hard-soft; and deep-shallow. All of these scales were used in order to collect data for each of the five concepts.

In Root's report, he pointed out that the hard-soft scale had low factor loading, however, those scales used

above were found internally consistent. Since the statistical methods for analyzing the data in this study were different from Root's study, the hard-soft scale would not effect the result. In analyzing the data in this study, it was designed to determine the overall effect, not the effect on any one scale. Therefore, it was the decision of this writer to use all of the scales above to measure attitudes of the subjects who engaged in this experimental study. The details of the semantic differential scales used to measure the specific concepts are presented in Appendix D.

### Statistical Treatment

The analysis of covariance was selected as an appropriate method for the statistical analysis of this experimental design. The design of this study required randomization of subjects for treatments. The data were collected as equidistant interval scale test scores and the significant differences among the treatment groups were tested. The F statistic was utilized to ascertain significance. The analysis of covariance method was applied when the data involved two or more variates. This method is an extension of the analysis of variance in that it incorporates the principle of regression. Courtney and Sedgwick (10) state that:

Covariance analysis is used to make

adjustments in the factor under study for variations in the values of the related independent factors. It is a procedure through which statistical control can be substituted for experimental control (p. 2).

In the analysis of covariance, the significant differences among subject groups on achievement test scores and subjects' attitudes toward the following specific concepts were analyzed: self-instruction (individualized instruction); providing a one-minute break while learning via a self-instructional program; providing music during the break; providing pictures (slides) during the break; and providing both pictures and music during the break.

The analysis of covariance tested for the differences among the adjusted posttest mean scores. Therefore, when the null hypothesis (that the means were not significantly different) was true, the null hypothesis was retained and no further statistical tests were needed. However, when significant differences were found the hypothesis was rejected. For rejected hypotheses, an additional method was required to analyze the results in order to separate out those individual means which were significantly different.

For the present study, the Least Significant Difference (L.S.D.) test was the method used for further analysis of a rejected hypothesis. Courtney and Sedgwick

(11) pointed out that:

The L.S.D. test is one which examines the hypothesis that two means are equal ... However, the test is no better than the usual t test when the sample size is unequal from group to group. This statistic actually uses least significant difference for making its comparison. It is a preferred and popular statistical test because of its simplicity of computation and because it requires only the t table for interpretation (p. 2).

The formula for computing the L.S.D. in this study is:

$$\text{L.S.D.} = t_{\alpha/2} \sqrt{(1/n_1 + 1/n_2 + \dots + 1/n_i) s^2}$$

where:  $n_1, n_2, \dots, n_i$  represents individual subjects

$t_{\alpha/2}$  represents t table value for  $t_{\alpha/2}$

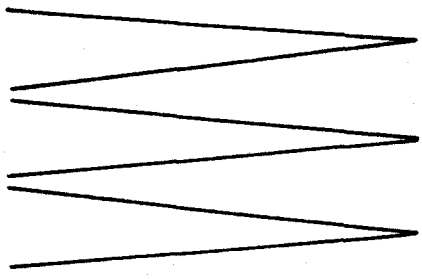
$s^2$  represents mean square error of the test (computed MS error)

The reason for selecting this formula for computing the L.S.D. was that the sample size from treatment group to treatment group in this study was unequal and this formula takes into account and adjusts for unequal sample size among treatment groups.

After the L.S.D. was computed, the comparison of the adjacent ordered means was interpreted. Table I presents the interpretation of the least significant difference test results.



Table I  
Interpretation of L.S.D.

Group No.	$\bar{X}$ 's	Differences (subtracted)	Decision
a	$\mu_a$		
b	$\mu_b$		
c	$\mu_c$		
d	$\mu_d$		

From the table presented above, group a represents the group which had the highest mean score, and the lower mean scores were groups b, c and d, respectively. The interpretation was made upon the differences between the high and low mean scores of two groups. The decision was made when they were compared to the computed L.S.D.

It was stated earlier that "The L.S.D. test is no better than the usual t test when the sample size is unequal from group to group . . .," therefore, if it is necessary or the data indicates the possibility that a significant difference may occur within an individual treatment group on a specific concept the paired t test may be used as an additional statistic to analyze the data. The formula used to calculate the paired t statistic for the test of significance for the difference between the

means of two small correlated samples is: (50)

$$t = (\sum D/n) / (s/\sqrt{n-1})$$

where:  $\sum D$  represents the summation of the differences of the scores

$n$  represents the number of subjects

$s$  represents the standard deviation

#### IV. EXPERIMENTAL RESULTS

The experiment was conducted during the fall term of 1978 at Oregon State University, Corvallis. The subjects who engaged in this study were Oregon State University students from a variety of schools and departments. All of the students who registered for the class were assigned to participate in the experiment. The majority of the subjects were undergraduate students, including all class levels from freshman to senior, along with two graduate student subjects.

The subjects were first administered pretests on both achievement and attitudes toward specific concepts as discussed in Chapter III. The posttests were administered three weeks later. The null hypotheses and major findings of the experiment are summarized in this chapter.

##### Achievement Results

It was hypothesized that the four groups which received different treatments would not show significant differences in achievement mean scores. After the four treatment groups were administered the achievement posttest, the pretest and posttest scores for each group were calculated. The pretest and posttest results are summarized and presented in Table II.

Table II  
Pretest and Posttest Achievement Scores

Subject	Group 1		Group 2		Group 3		Group 4	
Number	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	17	25	10	24	6	21	18	23
2	15	26	8	16	10	25	15	26
3	23	30	12	26	19	30	15	21
4	12	22	19	25	18	28	11	25
5	11	20	12	27	21	28	11	28
6	5	27	19	24	17	25	10	27
7	15	26	20	24	11	22	17	25
8	12	24	5	19	17	20	12	26
9	13	30	11	20	12	30	10	23
10	7	23			21	28	17	24
11	13	26					20	25
12							22	27

The data were computed and analyzed using the analysis of covariance. The mean scores of each treatment group are summarized and presented in Table III.

Table III  
Achievement Mean Scores

Group	Mean Pretest	Mean Posttest	Adjusted Mean
No pause	13.00	25.36	25.63
One-minute pause with slides	12.89	22.78	23.08
One-minute pause with music	15.20	25.70	25.39
One-minute pause with slides and music	14.83	25.00	24.79

The mean scores of pretest and posttest were adjusted and the results were interpreted by using F statistics to test the null hypotheses. Table IV presents the analysis of covariance of the adjusted mean scores.

Table IV  
Analysis of Covariance of Test Scores

Source of Variation	DF	SS	MS	F
Between Groups	3	305.87	8.27	1.516
Within Groups	37	37.61	12.54	
TOTAL	40	343.48	21.81	

The F value with 3 and 37 degrees of freedom is 2.85 at the .05 level of significance. The calculated value is 1.516 which was less than the required F value of 2.85.

Therefore, the first null hypothesis was retained.

### Attitudinal Results

In this study, there were five attitude concepts measured in order to obtain data for analyzing the subjects' attitudes toward the instructional treatments. Both pretest and posttest were administered. This part of the study was designed to test the significant differences in attitude toward the instructional treatments. The analysis of covariance analyzed the combined scores of the nine semantic differential scales for each concept. The results of the analysis of each concept are presented as follows:

#### Attitude Toward Self-Instruction

It was hypothesized that the subjects' attitude toward the self-instructional program (as used in this study) would not show a significant difference among the four treatment groups as indicated by the mean scores. Table V summarizes the means of the nine attitudinal scales on the semantic differential instrument. It shows both pretest and posttest results for each treatment group.

Table V

Pretest and Posttest Mean Scores Representing  
Attitude Toward Self-Instruction  
(Individualized Instruction)

Subject	Group 1		Group 2		Group 3		Group 4	
Number	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	5.22	5.33	4.73	5.22	5.11	4.89	5.78	4.56
2	4.22	4.00	4.56	4.56	6.00	6.33	3.89	5.44
3	3.78	4.44	5.11	5.00	5.11	5.00	5.56	5.56
4	3.33	4.00	4.78	5.67	5.89	5.00	4.11	4.44
5	4.67	4.67	4.00	5.78	4.89	6.11	5.56	5.78
6	5.44	4.22	5.22	5.78	5.44	5.44	4.22	4.22
7	4.44	5.33	4.78	4.44	3.11	3.78	4.33	4.56
8	5.22	5.22	5.22	5.56	5.44	4.67	4.89	5.22
9	4.89	5.56	3.11	2.67	5.56	4.89	3.56	5.89
10	5.56	6.00			4.00	4.33	4.89	4.11
11	5.11	4.78					4.44	4.22
12							5.89	5.67

The data were computed and analyzed using the analysis of covariance. The combined mean scores of the pretest and posttest were adjusted and the results were interpreted by using the F statistic to test the null hypothesis. The summary of the analysis of covariance on subjects' attitude toward self-instruction is presented

in Table VI.

Table VI  
Analysis of Covariance of Attitude  
Toward Self-Instruction

Source of Variation	DF	SS	MS	F
Between Groups	3	54.56	18.19	.52
Within Groups	37	1292.10	34.92	
TOTAL	40	1346.66		

The F value with 3 and 37 degrees of freedom is 2.85 at the .05 level of significance. The calculated F value from the analysis of covariance is .52 which is less than the required F value of 2.85. Therefore, the null hypothesis for the first concept, attitude toward self-instruction, was retained.

#### Attitude Toward the One-Minute Rest Pause Interruption

It was hypothesized that the subjects' attitude toward the one-minute rest pause interruption would not show a significant difference as indicated by the mean scores among the four treatment groups. Table VII summarizes the means of the nine attitudinal scales on the semantic differential. It shows both pretest and posttest results for each treatment group.



Table VII

Pretest and Posttest Mean Scores Representing Attitude  
Toward the One-Minute Rest Pause Interruption

Subject Number	Group 1		Group 2		Group 3		Group 4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	4.22	3.22	5.78	4.89	4.11	4.56	4.56	3.78
2	4.00	4.11	4.67	4.00	3.78	3.78	4.00	4.78
3	3.89	3.78	3.56	4.67	5.00	5.44	5.33	5.33
4	4.22	4.56	2.33	4.56	5.33	5.33	3.67	4.44
5	4.78	4.56	3.89	4.33	6.11	5.44	5.22	4.56
6	5.00	4.89	4.33	5.11	4.22	5.11	3.11	4.11
7	3.78	4.00	4.44	3.89	4.11	7.00	4.67	4.78
8	5.53	5.44	4.00	4.67	4.22	4.67	4.56	4.00
9	4.89	3.78	4.22	4.89	4.56	4.78	4.67	4.33
10	4.22	4.00			4.33	4.33	4.78	4.89
11	4.22	4.22					3.78	4.89
12							4.56	5.33

The data were computed and analyzed using the analysis of covariance. The combined mean scores of the pretest and posttest were adjusted and the results were interpreted by using the F statistic to test the null hypothesis. The summary of the analysis of covariance on subjects' attitude toward the one-minute rest pause interruption is presented in Table VIII.

Table VIII

Analysis of Covariance of Attitude  
Toward the One-Minute Rest Pause Interruption

Source of Variation	DF	SS	MS	F
Between Groups	3	189.00	63.00	1.94
Within Groups	37	1207.54	32.47	
TOTAL	40	1309.54		

The F value with 3 and 37 degrees of freedom is 2.85 at the .05 level of significance. The calculated F value is 1.940 which is less than the required F value of 2.85. Therefore the null hypothesis for the second concept, attitude toward the one-minute rest pause, was retained.

Attitude Toward the One-Minute Rest Pause Interruption With Music

It was hypothesized that the subjects' attitude toward the one-minute rest pause interruption with music would not show a significant difference as indicated by the mean scores among the four treatment groups. Table IX summarizes the means of the nine attitudinal scales on the semantic differential. It shows both pretest and posttest results for each treatment group.

Table IX

Pretest and Posttest Mean Scores Representing Attitude  
Toward the One-Minute Rest Pause Interruption  
With Music

Subject	Group 1		Group 2		Group 3		Group 4	
Number	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	4.22	3.78	6.11	4.00	4.56	4.56	4.56	5.00
2	7.00	4.78	4.67	4.00	3.89	4.00	4.89	4.33
3	4.22	4.00	4.56	5.11	4.11	5.89	6.11	5.67
4	4.00	4.33	3.56	4.67	2.44	5.22	3.00	4.33
5	4.67	2.22	3.22	3.89	3.89	4.67	4.78	4.89
6	4.78	4.43	5.11	5.11	5.11	5.33	4.40	4.33
7	4.44	4.22	4.00	4.44	4.00	7.00	4.67	4.78
8	3.22	3.67	5.00	4.56	4.44	4.67	4.33	4.33
9	4.89	4.56	4.67	4.89	4.33	4.78	4.67	4.67
10	4.44	1.00			3.89	4.22	5.67	4.67
11	4.67	5.00					5.67	6.22
12							3.56	6.33

The data were computed and analyzed using the analysis of covariance. The combined mean scores of the pretest and posttest were adjusted and the results were interpreted by using the F statistic to test the null hypothesis. The summary of the analysis of covariance on subjects' attitude toward the one-minute rest pause interruption with music is presented in Table X.

Table X  
 Analysis of Covariance of Attitude  
 Toward the One-Minute Rest Pause Interruption  
 With Music

Source of Variation	DF	SS	F
Between Groups	3	793.18	4.64
Within Groups	37	2106.46	
TOTAL	40	2899.64	

The F value with 3 and 37 degrees of freedom is 2.85 at the .05 level of significance. The calculated F value is 4.64 which is greater than 2.85. Therefore, the null hypothesis for the third concept, attitude toward the one-minute rest pause interruption, was rejected.

Since the null hypothesis of the subjects' attitude toward the one-minute rest pause interruption with music was rejected, the L.S.D. test was used for further analysis in order to determine which of the pretest - posttest means were significantly different. The results are presented in Table XI.

Table XI  
Adjusted Means and L.S.D. Value

Group	$\bar{X}$ (adjusted means)
1	34.38
2	40.58 L.S.D. = 0.91
3	45.95
4	43.67

The adjusted means were computed from the pretest and posttest scores for each treatment group. In the computation method, the nine semantic differential scale scores were combined. The L.S.D. value of 0.91 was computed by utilizing the L.S.D. formula for unequal cell size as discussed in Chapter III (page 46).

By ordering the means and subtracting the differences, the results in Table XII were derived.

Table XII  
Interpretation of L.S.D.

Group No.	$\bar{X}$ 's	Differences	Decision
3	45.95	--	--
4	43.67	2.28	Significant Difference
2	40.58	3.09	Significant Difference
1	34.38	6.20	Significant Difference

The decisions were made after comparing the differences of the adjusted means. When the computed L.S.D. value of 0.91 was compared with the subtracted differences, the differences were exceeded for the adjusted means of groups 3 and 4, 4 and 2, and 2 and 1. The conclusions of the decisions are presented in Table XIII.

Table XIII  
Conclusions Based Upon the Decisions

$$\mu_3 > \mu_4$$

$$\mu_4 > \mu_2$$

$$\mu_2 > \mu_1$$

Based on Table XIII, the mean scores were largest for the treatment group that received the one-minute rest pause interruption with music. The second and the third

largest mean scores were calculated for the treatment groups that received the one-minute rest pause with slides and music and the one-minute rest pause with slides, respectively. The group which did not receive a rest pause interruption showed the smallest adjusted mean scores.

#### Attitude Toward the One-Minute Rest Pause Interruption With Slides

It was hypothesized that the subjects' attitude toward the one-minute rest pause interruption with slides would not show a significant difference as indicated by the mean scores among the four treatment groups. Table XIV summarizes the means of the nine attitudinal scales on the semantic differential. It shows both pretest and posttest results for each treatment group.

Table XIV

Pretest and Posttest Mean Scores Representing Attitude  
Toward the One-Minute Rest Pause Interruption

Subject Number	Group 1		Group 2		Group 3		Group 4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	4.33	4.56	5.44	4.33	4.00	4.44	5.78	4.89
2	3.78	4.00	4.67	4.33	4.00	3.89	5.11	4.22
3	4.00	3.78	4.56	4.56	6.00	5.56	6.89	5.67
4	4.67	4.33	3.56	4.89	4.67	5.78	3.22	4.22
5	4.89	5.56	3.78	4.67	4.22	5.11	5.33	4.33
6	3.78	4.89	4.56	5.44	4.33	5.44	3.67	4.33
7	5.22	5.22	3.22	4.00	4.67	7.00	4.67	5.00
8	4.67	5.00	3.89	4.44	4.00	4.67	4.00	4.00
9	5.78	4.22	4.44	3.33	4.56	4.78	4.44	4.22
10	4.44	1.00			3.89	4.22	5.67	4.78
11	5.11	4.00					4.78	6.44
12							4.89	3.33

The data were computed and analyzed using the analysis of covariance. The combined mean scores of the pretest and posttest were adjusted and the results were interpreted by using the F statistic to test the null hypothesis. The summary of the analysis of covariance on subjects' attitude toward the one-minute rest pause interruption with slides is presented in Table XV.



Table XV  
 Analysis of Covariance of Attitude  
 Toward the One-Minute Rest Pause Interruption  
 With Slides

Source of Variation	DF	SS	MS	F
Between Groups	3	282.16	94.05	1.36
Within Groups	37	2565.38	69.33	
TOTAL	40	2847.54		

The F value with 3 and 37 degrees of freedom is 2.85 at the .05 level of significance. The calculated F value is 1.36 which is less than the required F value of 2.85. Therefore, the null hypothesis for the fourth concept, attitude toward the one-minute rest pause interruption with slides, was retained.

Attitude Toward the One-Minute Rest Pause Interruption  
 With Music and Slides

It was hypothesized that the subjects' attitude toward the one-minute rest pause interruption with music and slides would not show significant difference as indicated by the mean scores among the four treatment groups.

Table XVI summarizes the mean scores of the nine attitudinal scales on the semantic differential. It shows both pretest and posttest results for each treatment group.

Table XVI

Pretest and Posttest Mean Scores Representing Attitude  
Toward the One-Minute Rest Pause Interruption  
With Music and Slides

Subject	Group 1		Group 2		Group 3		Group 4	
Number	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	4.11	4.44	5.78	4.00	4.33	4.67	4.56	4.22
2	5.20	4.33	5.00	4.11	4.00	4.11	4.22	4.78
3	4.89	3.56	4.00	4.78	4.78	5.56	6.44	5.89
4	4.44	4.33	4.89	4.89	3.67	6.11	3.22	4.44
5	5.33	4.00	4.00	4.22	4.44	4.78	5.22	5.22
6	4.11	5.00	5.78	5.22	4.89	5.44	3.67	4.22
7	5.33	4.11	3.22	4.00	4.33	7.00	4.89	4.78
8	4.67	5.56	4.44	4.22	4.00	4.67	4.33	4.00
9	6.00	4.56	5.00	4.78	4.56	4.78	5.89	4.22
10	4.44	1.00			3.89	4.22	5.33	4.78
11	4.56	4.67					4.78	6.33
12							3.44	3.11

The data were computed and analyzed using the analysis of covariance. The combined mean scores of the pretest and posttest were adjusted and the results were interpreted by using the F statistic to test the null hypothesis. The summary of the analysis of covariance on subjects' attitude toward the one-minute rest pause interruption with music and slides is presented in Table XVII.

Table XVII

Analysis of Covariance of Attitude  
Toward the One-Minute Rest Pause Interruption  
With Music and Slides

Source of Variation	DF	SS	MS	F
Between Groups	3	457.47	152.49	2.31
Within Groups	37	2422.23	66.00	
TOTAL	40	2899.70		

The F value with 3 and 37 degrees of freedom is 2.85 at the .05 level of significance. The calculated F value is 2.31 which was less than the required F value of 2.85. Therefore, the null hypothesis for the fifth concept, attitude toward the one-minute rest pause interruption with music and slides, was retained.

Subjects' Attitude Toward the Treatment Received

It was the writer's decision to determine the subjects' attitude toward the treatment they received. The data for this analysis were separated for each treatment group. Table XVIII summarizes the mean scores of the nine attitudinal scales on the semantic differential instrument. It shows both pretest and posttest results for each treatment group.

Table XVIII

Pretest and Posttest Mean Scores Representing Subjects'  
Attitude Toward the Treatment Received

Subject	Group 2		Group 3		Group 4	
Number	Pre	Post	Pre	Post	Pre	Post
1	5.44	4.33	4.56	4.56	4.56	4.22
2	4.67	4.33	3.89	4.00	4.22	4.78
3	4.56	4.56	4.11	5.89	6.44	5.89
4	3.56	4.89	2.44	5.22	3.22	4.44
5	3.78	4.67	3.89	4.67	5.22	5.22
6	4.56	5.44	5.11	5.33	3.67	4.22
7	3.22	4.00	4.00	7.00	4.89	4.78
8	3.89	4.44	4.44	4.67	4.33	4.00
9	4.44	3.33	4.33	4.78	5.89	4.22
10			3.89	4.22	5.33	4.78
11					4.78	6.33
12					3.44	3.11

The data were computed and analyzed using the paired t test method to determine if there was any significant difference in attitude within each individual treatment group. The results from the paired t test indicated that there was no significant difference in attitude for the group with the one-minute rest pause interruption with slides and the group with one-minute rest pause interruption

with music and slides. However, the computed t test for the group with the one-minute rest pause with music is 2.563. The t value from the table showed that at the .05 level of significance the t value for 9 degrees of freedom is 2.262. This result verified that there was a positive significant difference in attitude within the treatment group that received the one-minute rest pause with music.

## V. DISCUSSION AND CONCLUSION

This study was designed to determine the effects of including a rest pause interruption in selected self-instructional programs utilizing multi-media. This chapter discusses the results of the study and presents investigative conclusions.

### Subjects' Achievement

It was hypothesized that there would be no significant difference in achievement among the control and experimental groups that received different rest pause interruption treatments. The results from the analysis of covariance revealed no significant achievement differences.

Two unique characteristics of the self-instructional program as a teaching method are particularly important in the discussion and interpretation of the results of this study.

### The Effect of Self-Pacing

Unlike many other teaching methods, the self-instructional program is self-pacing. Individual subjects are not only allowed, but are encouraged to select and proceed through each lesson at a comfortable pace. This may include breaks or pauses at will and in any number. In this study, all treatment and control groups had the

same opportunity to pause at any point and any number of times. A programmed rest pause was imposed only on the experimental groups. To attempt to control this self-pacing in this study would have violated the accepted definition of self-instruction. This characteristic of self-instructional materials may be one of the important contributing factors to the results of the study which revealed no effect on student achievement from imposing a rest pause in the middle of the lesson.

#### The Effect of Restudy and Review

The self-instructional program does not forbid subjects from reviewing or restudying a lesson any number of times. In fact, this characteristic is inherent in the definition. Subjects in this study were allowed to restudy or review the program as many times as they desired. This characteristic of self-instruction may have directly affected achievement scores, assuming that some participants reviewed the material while others did not. This variable was considered characteristic of self-instruction, therefore, no record was kept on how many times or how long each subject studied the individual programs.

The following acknowledged limitations of this specific investigation may have also influenced the achievement results in this study.

### The Effect of Subject Matter Selection

The type of subject matter selected for the self-instructional lessons may have had an effect on the achievement results in this study. The content of the course was highly attractive, especially to the participants who voluntarily selected the course in wildlife activities as an elective. It is assumed that the subjects who enrolled in this course were motivated by the subject matter. The selection of different subject matter in relation to student interest may have changed the results and perhaps created more need for the rest pause interruption.

### The Content Density

Pockrass (43) stated in his study:

It seems logical to assume that the difficulty or content density of a program should be a factor in determining whether a program break or rest would be beneficial to learning (p. 89).

In this study, the content density of the selected self-instructional programs was not determined and controlled. It was assumed that the selected programs were of similar difficulty. However, program length was identified and controlled. Content density should be a focal point for subsequent investigation into the need for rest pause interruptions.



### Attitudes Toward Specific Concepts

There were five specific concepts identified in this study in order to determine whether the attitudes toward the concepts were significantly different after the treatments. The five concepts concerned attitudes toward self-instructional programs with multi-media and the three different rest pause interruption treatments.

#### Attitude Toward the Self-Instructional Program

The results of the study revealed no significant differences in attitude toward self-instruction among the treatment groups as revealed by the adjusted mean score. While there was a slight positive change in attitude from the pretest to posttest for all groups, the change was not significant.

It is assumed that the self-instructional program with multi-media is a relatively unfamiliar instructional method when compared to the conventional method of teacher centered instruction. It is possible that learners may need considerably more time to experience and develop significant attitudes toward self-instructional programs with multi-media and demonstrate a significant attitudinal change.

#### Attitude Toward the One-Minute Rest Pause Interruption

The results of the study revealed no significant difference in attitude toward the one-minute rest pause

among the treatment groups at the conclusion of the study. Those subjects who were exposed to the one-minute rest pause tended to have only slightly more positive attitudes toward the one-minute rest pause concept than the subjects receiving no rest pause. A repetition of this study with a larger sample might be necessary to better determine the existence of a significant difference.

#### Attitude Toward the One-Minute Rest Pause Interruption With Music

The results of the study revealed a significant difference in attitude toward the one-minute rest pause interruption with music. The least significant difference (L.S.D.) was employed to separate the means. The computed L.S.D. value (.91) compared the differences among the adjusted mean scores. The differences found exceeded the computed L.S.D. value at the .05 level of significance with the adjusted mean being the largest. The treatment group without a break had the smallest adjusted mean scores. The treatment group receiving the one-minute rest pause interruption with music and slides had the second largest adjusted mean scores. The treatment group with the one-minute rest pause interruption with slides had the smallest adjusted mean scores when compared to the other two rest pause treatment groups.

The subjects who received a rest pause interruption had significantly more positive attitudes toward the rest

pause interruption with music. This finding indicates that, under similar circumstances, the rest pause interruption with music may be the most valuable rest treatment for self-instructional programs via multi-media.

#### Attitude Toward the One-Minute Rest Pause Interruption With Slides

This study revealed no significant difference in attitude toward the rest pause interruption with slides, among the treatment groups. Therefore, the null hypothesis was accepted. This specific type of interruption enticed subjects to continue to watch the program during the rest pause. Since the subject participation in the rest pause was similar to that expected in the lesson, it may have been less restful than audio alone. Although there was no significant difference found, the treatment groups showed a slightly negative attitude toward this concept.

#### Attitude Toward the One-Minute Rest Pause Interruption With Slides and Music

The results obtained from the analysis of covariance were not significant, therefore, the null hypothesis for this concept was accepted. Again, as was stated for the rest pause interruption with slides only, the inclusion of music with the slides seemed to have the same results. It is assumed that the students continued to watch the slides during the rest pause which was similar

to the participation required by the lesson, and may not have allowed the student to rest. Although no significant difference was found the treatment groups showed a positive attitude toward this concept.

#### Attitude Toward the Treatment Received

The results of the study revealed that there was a significant positive attitude toward the one-minute rest pause interruption with music. The subjects that were exposed to this treatment, even with the limited sample size, expressed satisfaction with this experimental treatment. The groups that received the rest pause interruptions with slides only and slides with music, revealed no significant differences in attitude toward the specific treatment received.

The rest pause interruption treatment with music had an effect on the attitude of the subject. The inclusion of materials which distracted the subject, such as slides portraying various scenes, may not have allowed the rest and relaxation that may have been expected. Whereas, with music only, the subject was able to sit back and enjoy the break and, therefore, may have been more prepared to return to the learning task.

#### Conclusion

Given identical controlled conditions it can be

concluded from this study that the inclusion of a one-minute rest pause interruption in a 30 minute multi-media self-instructional program does not significantly increase or decrease learning. Neither does the pause change student attitude toward the self-instructional program. However, it can be concluded that under identical conditions, students who experience a one-minute rest pause interruption with music during the self-instructional program will have a more positive attitude toward a musical rest pause at the end of the treatment than they had in the pre-evaluation. Other rest pause treatments identified in this investigation will not produce significant attitudinal change.

More research needs to be conducted regarding the use of the rest pause interruption. The research must be carefully planned in order to study the most important variables. Therefore, the findings of this investigation should be considered as guidelines for conducting further studies on the rest pause interruption as it relates to self-instructional programs.

#### Suggestions for Further Study

The following recommendations should be considered in future investigations:

1. Replication of the experiment would be desirable with a larger number of subjects per treatment group. This

may increase the tendency toward greater significance.

2. Further investigation of the rest pause interruption with music vs. no rest pause is recommended since this variable showed some evidence that it may be beneficial to learning.

3. Students with different amounts of educational experience should participate in similar studies in order to determine if the rest pause may be more or less beneficial at any given level.

4. Various kinds of subject matter courses, revealing different content density, should be investigated to determine whether the rest pause interruption is beneficial.

5. Further study regarding the optimum length of rest pause interruption needs to be investigated, along with the type of music selection inserted into the self-instructional program with multi-media.

6. Content density should be investigated and controlled in order to better determine possible conditions under which the rest pause might improve learning.

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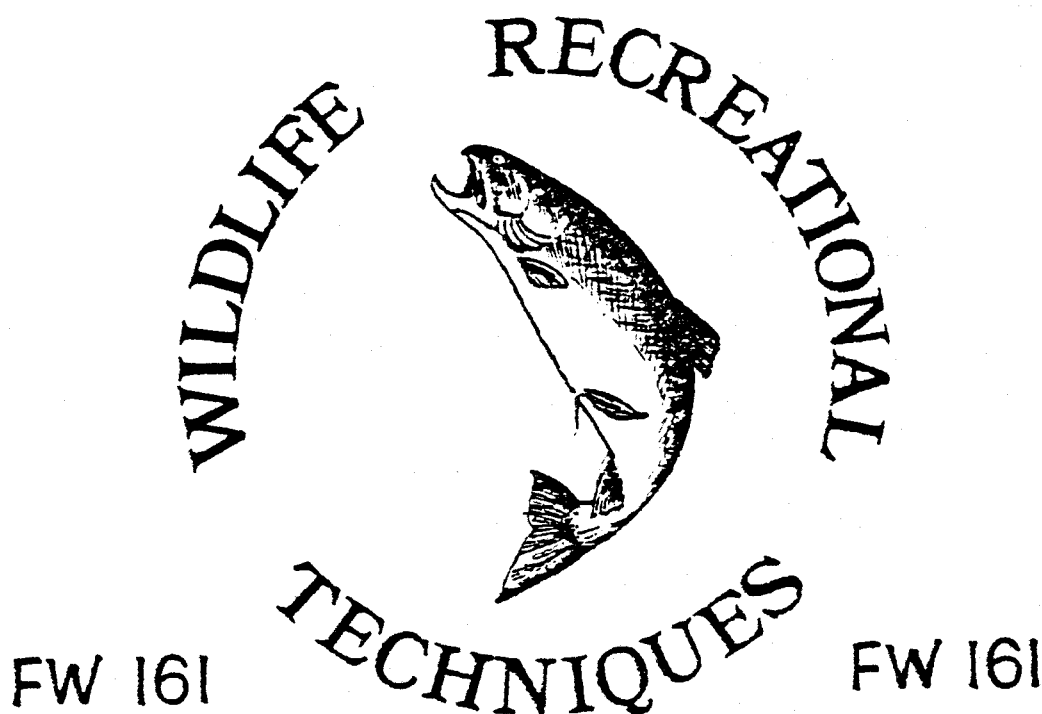
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## APPENDICES

## APPENDIX A. MASTERY LEARNING STUDY GUIDE



**Mastery Learning**

**STUDY GUIDE**

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

The instructions for the next three weeks will be presented in a manner to allow you flexibility in the way you learn. It is individualized so that you only need to take those portions of the instruction that you don't already know. You will be allowed to go at your own speed. You may, if you wish, complete all of the requirements as rapidly as possible.

The instruction will be presented in a variety of formats. The primary components are slide-tapes, video-tapes, printed instructions, and assistance from the instructor or an assistant. There are five modules to complete. Two of the modules will be presented via slide-tapes (projected slides synchronizing with audio-tape), one module is on video-tape (television), and one module is on both slide-tape and video-tape. These modules will be available to view at the Department of Fisheries and Wildlife's Self-Learning Center in Nash Hall, Room 164 from 8:30 to 5:00 p.m. and 7:00 p.m. to 9:00 p.m., Monday through Friday. These modules are supplemented by the printed information and instructions in the remainder of this study guide.

Remember that you are working in an independent learning mode. If you do not feel that you can attain the objectives specified for the module, check out and study the materials.

Module one and three are presented via slide-tape.

Module two is on video cartridge. Module four is in two parts: video-tape and slide-tape. Module five is presented only through the handout, but you must check out equipment for this module from F & W's Self-Learning Center.

Since you will be learning in an independent manner and not attending class, the time that you choose to study the materials is up to you. However, you are required to complete module five not later than October 20, 1978. On October 24th you are to return to the regular classroom schedule and meet in Nash Hall, Room 204 at 8:30. An examination will be given that day over the materials covered in the five modules.

Because everyone is busy with other classes, homework, and activities, the following completion dates are recommended. You may find it helpful to stay with this schedule:

MODULE NUMBER	COMPLETED BY
1	October 6
2	October 11
3	October 13
4	October 18
5	October 20 - It may be desirable to complete this module along with the video-tape portion of the module 4 since it complements module 5.
EXAM	October 24

Remember that all modules must be completed by October 20th. On October 24th you will resume the normal



class schedule and be given an exam over the content covered in modules 1 through 5.

DR. HORTON'S OFFICE IS LOCATED AT NASH HALL, ROOM 42.

HIS OFFICE HOURS WILL BE:

TUESDAY                      0930-1130

WEDNESDAY                   0830-1030

More information and instructions for the modules are found beginning on the following pages.

MODULE #1  
FISHING LINES AND FISHING HOOKS

Objectives related to Module #1

This lesson is intended to help you develop:

A. Fishing Lines

1. Knowledge of the common types of fishing lines used in spin casting and fly fishing
2. Awareness of the application of the different types of lines and some of their advantages and disadvantages.
3. Knowledge of the way in which lines are rated and the importance of the rating to the fisherman.
4. Knowledge of the difference between the standards of fly lines and other fishing lines.
5. Knowledge of the method in which fly lines are identified.
6. Knowledge of the way fly leaders are classified.

B. Fishing Hooks

7. Skill in the selection of the proper hook for specific types of fishing.
8. Knowledge of the different parts of the hook.
9. Knowledge of variations found in fishing hooks, specifically:
  - a. sizes of hooks
  - b. types of points
  - c. hook point positions
  - d. hook bends
  - e. eye patterns
  - f. wire size and shank length
  - g. differences in finishes
10. Skill in the identification of popular hooks by name.

If you feel you already have an adequate background to attain the objectives, you may take the mastery test at the Fisheries and Wildlife Self-Learning Center. If not, follow the instructions in the following paragraph.

To begin this lesson check out the slide-tape for Module #1 from the assistant at the Fisheries and Wildlife Self-Learning Center in Nash Hall. If you are not familiar with the equipment or have any difficulty in operating it

ask the assistant for help. When you have completed the lesson and feel that you know the material ask the assistant at the Fisheries and Wildlife Self-Learning Center for the quiz over the module. If you do not know the material well enough you may review it as often as you like. When you have completed the quiz turn it in to the assistant and she/he will grade it immediately for you.

MODULE #2  
KNOTS USED IN ANGLING

Objectives related to Module #2

This lesson is intended to help you develop:

1. Knowledge of the names of common knots, specifically:
  - a. the "Perfection Loop" knot
  - b. the "Sheet Bend" knot
  - c. the "Clinch" knot
  - d. the "Professional Leader," "Barrel," or "Blood" knot
  - e. the "Blood Dropper Loop" knot
  - f. the "Water" knot
  - g. the "Snelled Hook" knot
2. Knowledge of the use or uses for each of the above knots.
3. Skill in tying the first five knots listed above.

If you feel you already have an adequate background to attain the objectives, you may take the mastery test at the Fisheries and Wildlife Self-Learning Center. If not, read the instructions in the following paragraph.

This lesson is presented in two forms. You should first read the handout which is titled Knots Used in Angling. This handout is in the packet of material that you purchased from the OSU Bookstore. After you have read the handout, have the assistant at the Fisheries and Wildlife (F&W) Self-Learning Center give you the video-tape that is called "Knot Tying." In the envelope on the next page you will find a number of pieces of monofilament line and a fish hook. While you are viewing the video-tape you are to tie the first five knots. If the instruction on the tape goes too fast on any particular knot you should rewind the tape and repeat that portion. You can also refer to the diagrams in the handout. The assistant at the F&W's Self-Learning Center is available to help you if you have tying difficulties. Once you have finished tying the knots have them checked by the assistant at F&W's Learning Center in Nash Hall and take the short quiz that goes with the module.

If you are not familiar with the equipment or have difficulty in operating it - ask the assistant for help.

## MODULE #3

## SINKERS, FLOATS, SWIVELS, AND TERMINAL TACKLE

Objectives related to Module #3

This lesson is intended to help you develop:

1. Skill in the identification of the common types of sinkers used in fishing.
2. Knowledge of the advantage of the common types of sinkers.
3. Knowledge of the uses of the common types of sinkers.
4. Knowledge of the size designation and weight relationship of each of the common types of sinkers.
5. Knowledge of the importance of swivels in fishing.
6. Skill in the identification of the basic types of swivels.
7. Understanding of the size - diameter of wire - pound test relationship of swivels.
8. Knowledge of the use of floats and bobbers.
9. Skill in the identification of common types of floats.
10. Skill in the identification of certain lures.
11. Knowledge of the types of fish for which the different lures are designed.

If you feel you already have an adequate background to attain the objectives, you may take the mastery test at the Fisheries and Wildlife Self-Learning Center. If not, follow the instructions in the following paragraph.

To begin this lesson check out the slide-tape for Module #3 from the assistant at F&W's Learning Center in Nash Hall. When you have completed the lesson and feel that you know the material ask the assistant at the F&W Learning Center for the short quiz over the module. You may, of course, review the material as often as you like. When you have completed the quiz turn it in to the assistant and she/he will grade it immediately for you.

## MODULE #4

USE AND CARE OF SPINNING REELS,  
ROD AND REEL SELECTION, SPIN CASTINGObjectives related to Module #4

This lesson is intended to help you develop:

A. Reels

1. Skill in the identification of the open-faced reel, closed-faced reel, and the semi-closed-faced reel.
2. Knowledge of the advantages and disadvantages of the above reels.
3. Knowledge of the nomenclature of the open-faced reel and the closed-faced reel.
4. Knowledge of spinning reel maintenance procedures.

B. Rods

5. Understanding of the variety of rods available for purchase.

C. Spin Casting

6. Knowledge of the techniques used in the overhead cast, side cast, and the flip or how-and-arrow cast.

If you feel you already have an adequate background to attain the objectives, you may take the mastery test at the Fisheries and Wildlife Self-Learning Center. If not, read the instructions in the following paragraph.

This lesson is presented on both video-tape and slide-tape. The 12 minute slide-tape extends and reviews the material presented about reels on the 25 minute video-tape. It also presents a section on reel maintenance. Either the slide-tape or the video-tape may be viewed first. Ask the assistant at the F&W Learning Center to give you the video-tape or slide-tape for Module #4. Once you have finished studying the video-tape and slide-tape and feel confident that you understand the material presented, ask the assistant at the F&W Self-Learning Center in Nash Hall for the short quiz that goes with the module. When you have completed the quiz turn it in to the assistant and she/he will grade it immediately for you.

Please note that the "Spin Casting" portion of this module directly complements Module #5 on the next page. You may wish to complete both modules during the same period of time.

MODULE #5  
SPIN CASTING FOR ACCURACY

Objectives related to Module #5

This lesson is intended to help you develop:

1. Skill in bait and spin casting for accuracy using the following types of casts:
  - a. the overhead cast
  - b. the underhand cast
  - c. the side cast
  - d. the flip or bow-and-arrow cast

This lesson is presented in the remainder of this study guide. After you have studied the material check out a rod and reel and five targets from the assistant at the Fisheries and Wildlife Self-Learning Center. Find an unobstructed and level space out-of-doors. The athletic field directly behind the Women's Building and directly south of Nash Hall is a good area. Follow the instructions which are detailed on the score sheet on the last page of this study guide. You will score yourself on this module. The scores are not important as this exercise is intended to help improve your accuracy in casting. You must show your score sheet to the assistant at F&W's Self-Learning Center when you turn in the equipment in order to receive credit for having completed the module.

SEE YOU IN CLASS ON OCTOBER 24th! (Don't forget about the exam)



Face target with weight on right foot. Center rod on target with tip at eye level. Forearm should be extension of rod and elbow and upper arm, close to but not pressing against body.



**Aim**

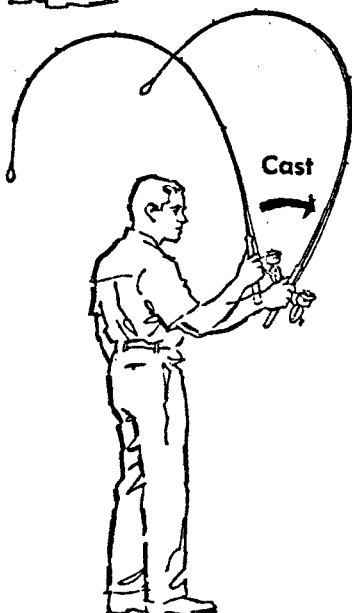
## OVERHEAD CAST

Start cast by bringing your rod hand almost to eye level, pivoting on your elbow so rod is almost vertical. This should be a smooth, upward motion.



**Stop**

Near vertical, weight of lure will develop rod bend. Without pausing, bring rod forward in crisp downstroke, applying only slightest wrist emphasis.



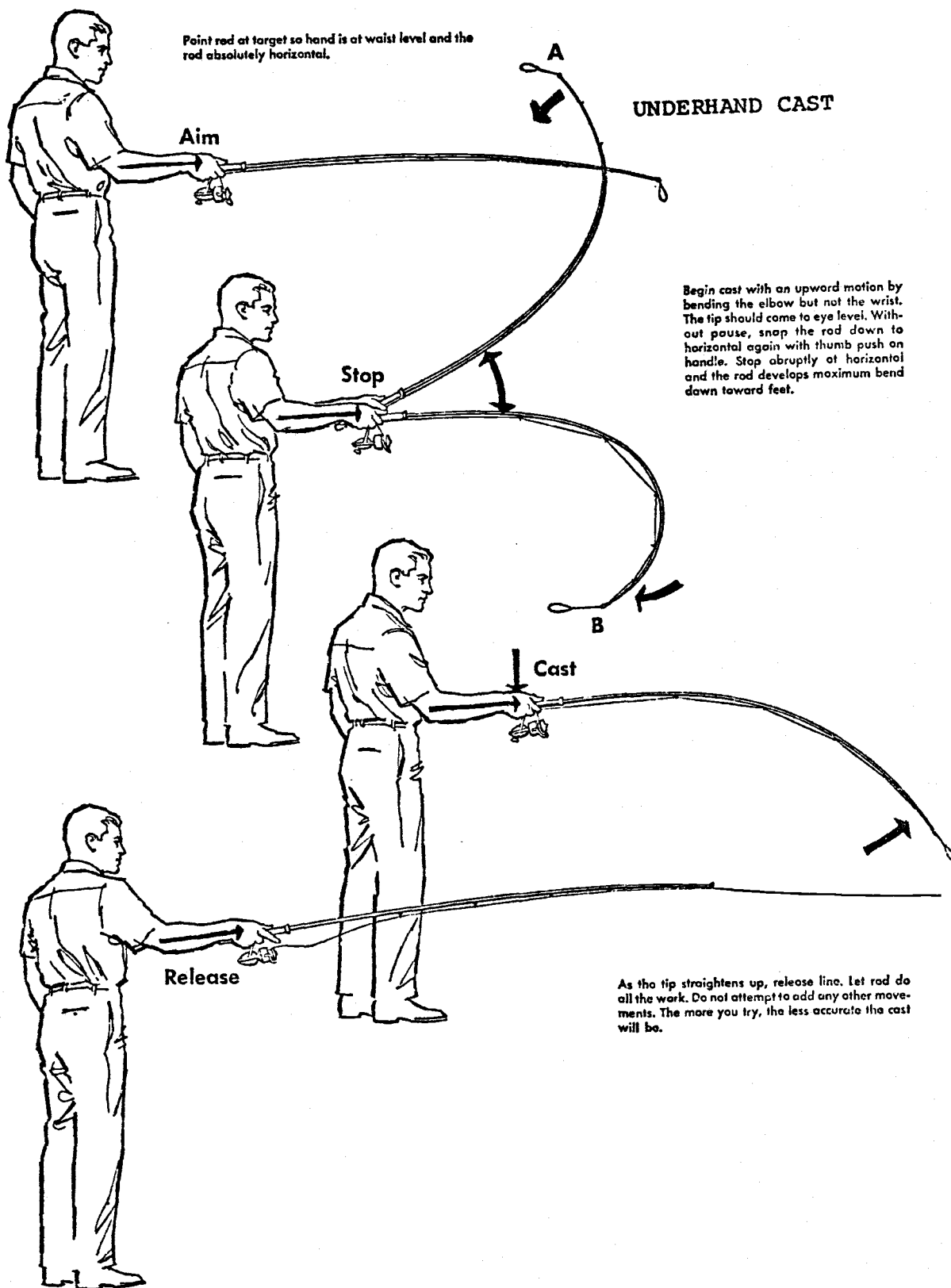
**Cast**



**Release**

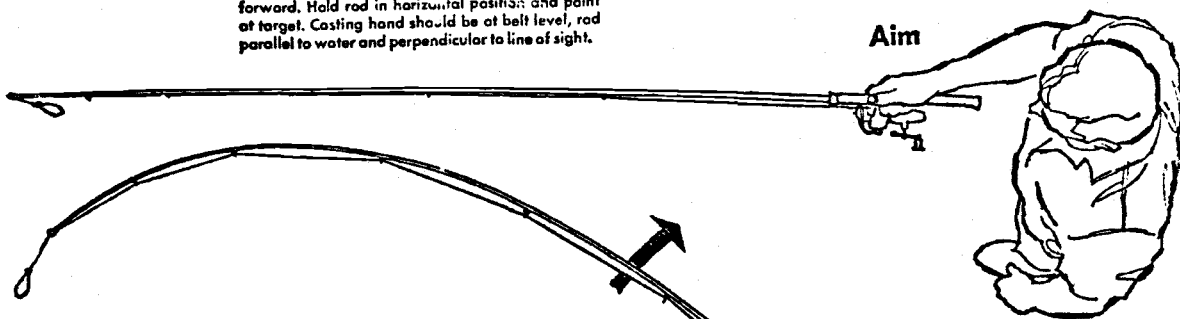
Line is released from forefinger when rod is at about 2 o'clock position. Tip forefinger on spool to check cast.

The Overhead Cast



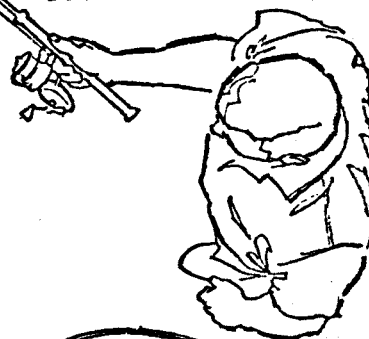
Begin cast with weight on left foot, which is slightly forward. Hold rod in horizontal position and point at target. Casting hand should be at belt level, rod parallel to water and perpendicular to line of sight.

**Aim**



Casting motion is a clockwise arc. The rod hand moves a short part of the arc while rod tip follows longer path in creating the casting bend.

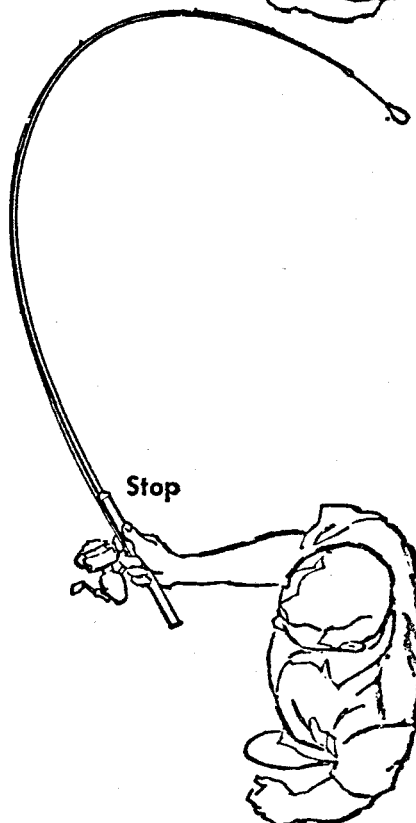
**Back**



## SIDE CAST

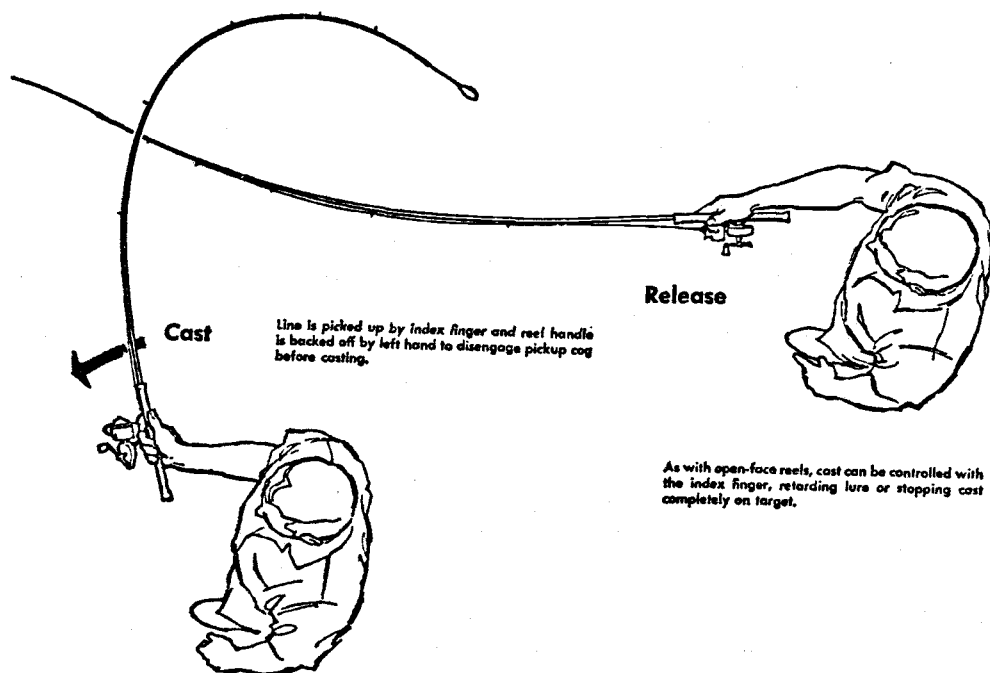
At instant of deepest bend, move your rod hand slightly toward target, adding wrist emphasis for maximum power. Bring your hand back to original starting point, releasing line from forefinger an instant before you stop all arm and wrist movement. Do not pass original point or lure will tend to go to left if you are right-handed.

**Stop**

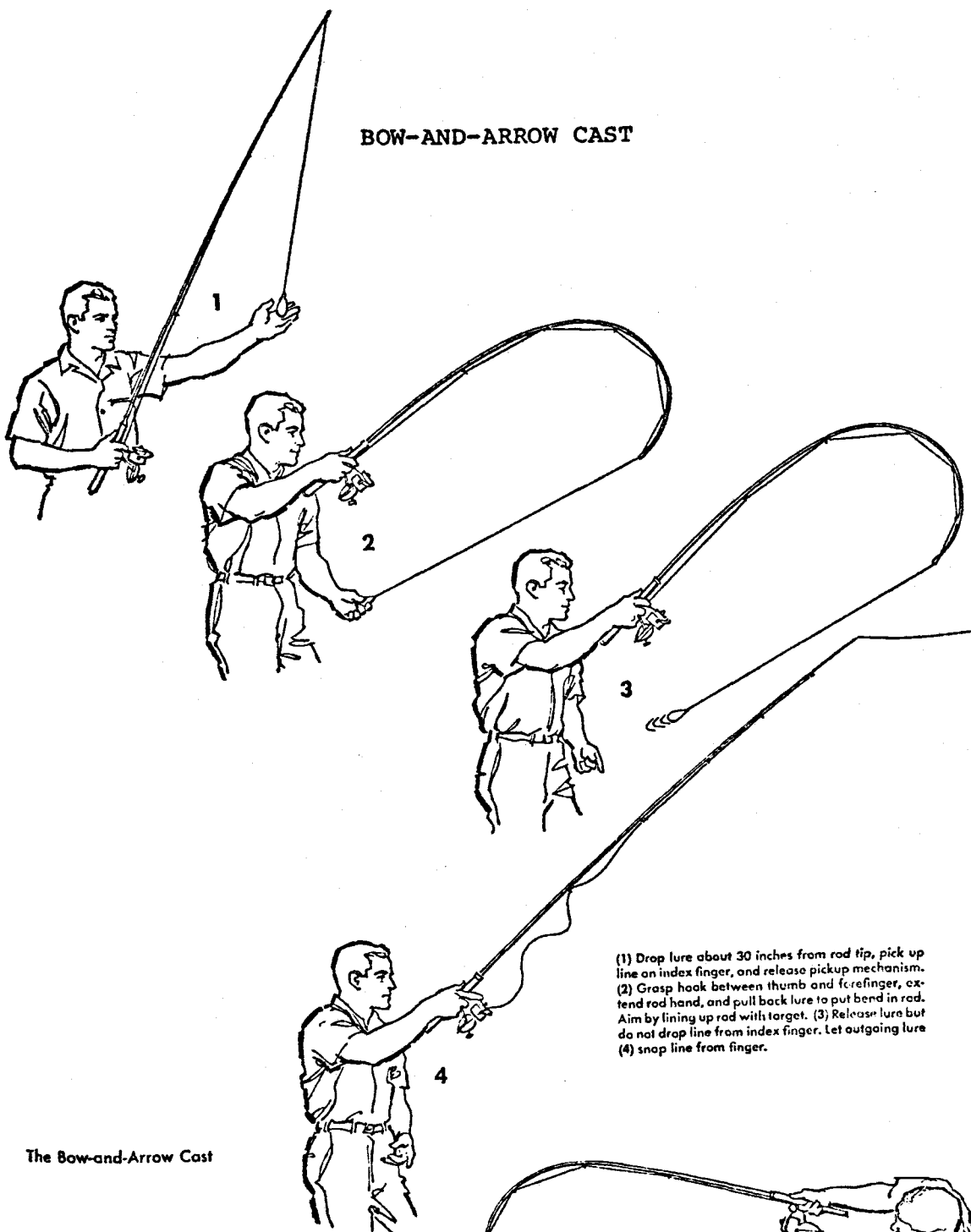


The Side Cast

## SIDE CAST - continued

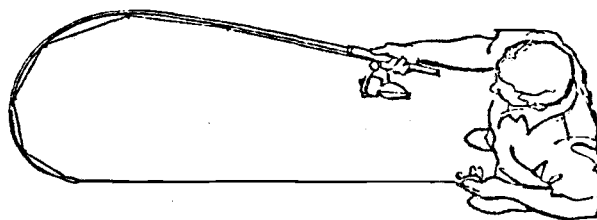


## BOW-AND-ARROW CAST



The Bow-and-Arrow Cast

Bow-and-arrow cast can also be done as a side cast where conditions indicate.



WILDLIFE RECREATIONAL TECHNIQUES  
FW 161

**BAIT AND SPIN CASTING FOR ACCURACY--A VARIATION OF SKISH**

## Targets

Five targets are placed at random at various distances--the nearest being not nearer than 40 feet from the casting point, and the farthest not more than 80 feet away.

## Casting

Ten casts are made, two at each target, beginning with the closest and ending with the farthest.

## Scoring

The plug must fall within or on the rim of the target for the cast to be scored 0 or perfect. One demerit point is scored for each foot, or fraction of a foot, that the plug falls outside the target. Distance is judged from where the plug lands--and not where it bounces. Not more than 10 demerit points may be scored for any one cast. The total score is found by subtracting the number of demerit points from 100 (the score for 10 perfect casts).

## OFFICIAL ACCURACY CASTING SCORE SHEET

[illegible][illegible]

## APPENDIX B. INSTRUCTIONS FOR SELF-LEARNING PACKAGE

PLEASE READ THESE INSTRUCTIONS COMPLETELY BEFORE STARTING  
THE PROGRAM

## 1. WHAT YOU HAVE IN THIS MODULE

This module has a cassette tape, a tray of slides, and a set of instructions.

## 2. HOW TO SET UP THE PROGRAM

- a. Place the slide tray on the projector, note that the mark groove on the tray (#0) should engage to the mark on the projector properly.
- b. Turn on the projector, push forward button to slide #1, the first slide lets you check the focus on your projector, you may do this by turning the focusing knob, then advance one more slide. This time you will see nothing because it is a black-slide.
- c. Place the cassette tape in the cassette player and start the tape. The program will automatically start while the tape is playing. We advise you to complete the whole program at this time, however, you may want to stop the tape, you can do this by simply pressing the button before the slide change. If the slide is changed you still can stop the tape, DO NOT REWIND THE TAPE, then back up the previous slide by pressing the reverse button. When you are through press the advance button one time to change slide and start the tape, the program will continue.

## 3. RETURN THE PROGRAM

- a. When you are done with the program, you have to rewind the tape to the beginning. The slide tray also should be rotated to the beginning position by pressing the selection button and turning the tray around to the zero number position.
- b. Replace the slide tray and the cassette tape in the box and return the program to your lab assistant.

THANK YOU

## APPENDIX C. ACHIEVEMENT TEST

1. Nylon, perlon, tyrelene, and linen lines are rated according to:
  - a. their specific gravity
  - b. their strength in pounds
  - c. their diameter
  - d. their degree of water absorption
2. The least common type of line for spin fishing is:
  - a. nylon
  - b. dacron
  - c. linen
  - d. tyrelene
3. Fly lines are rated according to their weight because:
  - a. weight must correspond with the type of fishing that the fisherman intends to do
  - b. the fly line should sink rapidly
  - c. the rod and line should be balanced
  - d. the fly line should float for approximately 20 seconds before beginning to sink
4. The main difference between dacron and nylon fishing line is that:
  - a. nylon is a continuous filament, dacron is not
  - b. dacron is more affected by water than nylon
  - c. nylon will stretch 17 to 30% before breaking, whereas the maximum elongation of dacron is approximately 10%
  - d. nylon is less affected by sunlight deterioration than dacron
5. The main advantage of wire line for deep trolling is that it:
  - a. sinks by itself
  - b. has a maximum elongation of 12% before breaking
  - c. is stronger when it is wet than when it is dry
  - d. is rated so that it can be balanced with the rod
6. If you wanted to select a sinking fly line that tapers from both ends to balance a rod that responds to 30 feet of number 8 working line which of the following fly line designations should you select?
  - a. WF-8-S
  - b. DT-8-I
  - c. DT-8-S
  - d. ST-8-I



7. As the draw-plate gauge size of the fly-line leader increases numerically (1X, 2X, 3X, etc.), the diameter \_\_\_\_\_ and the strength in pound test \_\_\_\_\_.
  - a. increases, increases
  - b. increases, decreases
  - c. decreases, increases
  - d. decreases, decreases
8. The shank of the hook is that part of the hook which:
  - a. penetrates into the fishes mouth
  - b. extends from the bend to the eye
  - c. is a loop or hole through which the line is tied
  - d. is the distance from the point to the eye
9. The main purpose for a barb on the point of a hook is to:
  - a. keep the bait in place
  - b. aid the fisherman in retrieving the hook from a fish that has been caught
  - c. keep the point embedded by resisting reverse motion of the fish
  - d. bring the point closer to the theoretical line of penetration.
10. Which of the following answers best describes the turned-down-eye on a hook?
  - a. is appropriate for hooks with standard or long shanks
  - b. is appropriate for hooks with short shanks
  - c. is less apt to cut the leader than other eye patterns
  - d. is used mainly with lures which are attached to a spinner
11. The best type of point position for bait fishing in salt water is:
  - a. a straight point
  - b. a rolled point
  - c. a bent-in point
  - d. a bent-out point
12. The three types of hook bends are the:
  - a. turned up bend, turned down bend, and the straight bend
  - b. hump bend, looped bend, and the tapered bend
  - c. straight bend, reversed bend, and the kirbed bend
  - d. central draught bend, sliced bend, and the ball bend

13. Which of the following hooks is used almost exclusively for commercial salmon fishing?
  - a. Gaelic Supreme
  - b. Limerick
  - c. Eagle Claw
  - d. Siwash
14. One of the strongest knots that is commonly used to attach lures or swivels with monofilament is the:
  - a. sheet bend knot
  - b. clinch knot
  - c. perfection loop knot
  - d. blood dropper loop knot
15. The "Perfection Loop Knot" is used for:
  - a. repairing breaks in monofilament line
  - b. attaching hooks to the end of a leader
  - c. tying a loop at the end of a plug casting or spinning line
  - d. adding extra hooks
16. The "Sheet Bend Knot" is used only for:
  - a. attaching leader to fly-line
  - b. attaching flies to the leader
  - c. repairing breaks in braided line
  - d. attaching extra hooks
17. The best knot for splicing monofilament spinning lines is the:
  - a. perfection loop knot
  - b. sheet bend knot
  - c. clinch knot
  - d. professional leader, barrel, or blood knot
18. One advantage of the clamp-on sinker is that:
  - a. the line can run freely through the sinker
  - b. it will hold in turbulent water and bottoms of water
  - c. it can easily be removed from the line
  - d. it is designed to allow the lure to spin around and around
19. The keel sinker is commonly used:
  - a. to prevent the line from twisting forward of the sinker
  - b. so that the line can run through the sinker until the fish has stopped to eat the bait
  - c. because it does not force the bait down when it is used while trolling
  - d. because it can be attached on to the line by clamping it on

20. The heaviest size of split-shot sinker is:
  - a. 7
  - b. BB
  - c. 4
  - d. 3/0
21. Egg sinkers and ball sinkers are similar in that:
  - a. the line is clamped in a slit in the sinker
  - b. they are frequently attached to dropper loops
  - c. they are used on riggings when trolling for Pacific salmon
  - d. the line can run freely through the hole which is in the center of both of these sinkers
22. Which of the following sinkers is usually attached to the line by jamming it in surgical tubing?
  - a. keel sinker
  - b. diamond sinker
  - c. pencil sinker
  - d. dipsey sinker
23. The main advantage that a float gives to a fisherman is:
  - a. it allows the fisherman to float bait down a stream
  - b. it helps to keep the bait on the surface of the water
  - c. it makes it easy to change from one lure to another
  - d. it gives a visual sign of the fish taking the bait
24. In which of the following positions is the quill body bobber meant to be fished?
  - a. upright
  - b. on its side
  - c. upside down
  - d. perpendicular to the line
25. Which of the following floats is normally used by spin fishermen for casting flies?
  - a. plastic air float
  - b. celluloid pencil float
  - c. cork ball float
  - d. transparent, liquid filled plastic float
26. A cross line swivel is used when an angler wants to:
  - a. keep the bait off the bottom of the stream
  - b. attach a sinker, hook, and line simultaneously
  - c. fish extensively for medium to small trout, crappies, large blue gill, and bass

27. The primary function of the swivel is to:
- a. keep the twist out of the line
  - b. keep the bait and sinker up off the bottom of the floor of the stream
  - c. prevent the line and hook from catching on weeds or grass in the river, stream, ocean, or lake
  - d. give action to the lure or bait
28. Which of the following lures is most effective when trolled slowly behind a boat?
- a. flatfish
  - b. surface popper
  - c. silver minnow
  - d. jigs
29. Which of the following terminal tackle are commonly used when fishing for steelhead?
- a. eggs and yarn, oakie drifter
  - b. hootchies, pink lady
  - c. surface popper, gang spinner
  - d. hair tails, silver minnow
30. The most universally used method of catching fish is with:
- a. an Andy Reeker
  - b. a golf tee spinner
  - c. a snelled hook and angle worm
  - d. a Colorado-type spinner

## APPENDIX D. SEMANTIC DIFFERENTIAL INSTRUMENT

On the following pages you will find statements pertaining to how you feel about certain methods of instruction. Each statement is followed by a series of scales on which you are to place a mark (X) at the point best fitting the description of how you feel about the statement given. For example: I think college is:

Good \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Bad

A mark at the point shown indicated that the individual thinks that college is neither good nor bad.

Respond to all statements and all scales AS QUICKLY AS POSSIBLE. We are interested in your first reactions. Individualized instruction is:

Good \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Bad

Valuable \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Worthless

Unpleasant \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Pleasant

Dull \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Sharp

Active \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Passive

Slow \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Fast

Weak \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Strong

Hard \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Soft

Deep \_\_:\_\_:\_\_:X:\_\_:\_\_:\_\_ Shallow

Providing a one minute break while learning via an individualized instruction program is:

Good \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Bad  
 Valuable \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Worthless  
 Unpleasant \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Pleasant  
 Dull \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Sharp  
 Active \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Passive  
 Slow \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Fast  
 Weak \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Strong  
 Hard \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Soft  
 Deep \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Shallow

Providing music during the break is:

Good \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Bad  
 Valuable \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Worthless  
 Unpleasant \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Pleasant  
 Dull \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Sharp  
 Active \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Passive  
 Slow \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Fast  
 Weak \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Strong  
 Hard \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Soft  
 Deep \_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_:\_\_ Shallow

Providing pictures during the break is:

Good	__:__:__:__:__:__:__	Bad
Valuable	__:__:__:__:__:__:__	Worthless
Unpleasant	__:__:__:__:__:__:__	Pleasant
Dull	__:__:__:__:__:__:__	Sharp
Active	__:__:__:__:__:__:__	Passive
Slow	__:__:__:__:__:__:__	Fast
Weak	__:__:__:__:__:__:__	Strong
Hard	__:__:__:__:__:__:__	Soft
Deep	__:__:__:__:__:__:__	Shallow

Providing both pictures and music during the break  
is:

Good	__:__:__:__:__:__:__	Bad
Valuable	__:__:__:__:__:__:__	Worthless
Unpleasant	__:__:__:__:__:__:__	Pleasant
Dull	__:__:__:__:__:__:__	Sharp
Active	__:__:__:__:__:__:__	Passive
Slow	__:__:__:__:__:__:__	Fast
Weak	__:__:__:__:__:__:__	Strong
Hard	__:__:__:__:__:__:__	Soft
Deep	__:__:__:__:__:__:__	Shallow