This is to certify that the

thesis entitled

A STUDY OF THE EFFECTIVENESS OF USING MULTIMEDIA TO INSTRUCT INTELLECTUALLY EXCEPTIONAL STUDENTS IN THE CLASSROOM PHASE OF DRIVER EDUCATION

presented by

Richard Alfred McInenly

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Education

Donald L. Smith
Major professor

Date October 6, 1978

A STUDY OF THE EFFECTIVENESS OF USING MULTIMEDIA TO INSTRUCT INTELLECTUALLY EXCEPTIONAL STUDENTS IN THE CLASSROOM PHASE OF DRIVER EDUCATION

By

Richard Alfred McInenly

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

College of Education

1978

ABSTRACT

A STUDY OF THE EFFECTIVENESS OF USING
MULTIMEDIA TO INSTRUCT INTELLECTUALLY EXCEPTIONAL STUDENTS
IN THE CLASSROOM PHASE OF DRIVER EDUCATION

By

Richard Alfred McInenly

Purpose of Study

It was the purpose of this study to (1) determine whether Intellectually Exceptional (IE) students who were taught the classroom phase of driver education by means of a multimedia instructional program were comparable in driving knowledge with IE students who were taught by means of a regular instructional program; and (2) determine whether a relationship existed between the reading ability of students assigned to three instructional conditions (multimedia instruction, regular instruction, control receiving no instruction) and their post-test performance scores.

Methods of Procedure

A review of the literature related to multimedia systems and use of visuals in teaching Intellectually Exceptional students indicated that use of multimedia is a satisfactory method of imparting knowledge to Intellectually Exceptional students.

A multimedia instructional program was developed by combining the EDEX Educational System with the I.P.D.E. Response Series. All visuals (filmstrips, motion pictures, etc.) for both programs are commercially produced by the Aetna Life and Casualty Insurance Company, U.S.A.

Thirty-one students from Highland Park High School, Ottawa, Ontario, Canada were randomly assigned to one of two instructional conditions, multimedia instruction and regular instruction. Another twenty-eight students were randomly assigned from the remaining population of 90 IE students in the same school to make up the control group receiving no instruction in driver education. All students in the three instructional conditions (MI, RI, C) were similar in reading ability and were classified by the school counsellor as being Intellectually Exceptional.

The multimedia instructional condition was taught by the writer and consisted of 30 hours of classroom instruction. The regular instructional condition was taught by a driver education teacher from Highland Park High School and consisted of 30 hours of instruction. The control group received no instruction throughout the study.

To measure any change following instruction, students of the three instructional conditions were given a 60-item true/false pre-test before instruction and a 60-item true/false post-test after instruction. Both pre-post-tests were administered visually and orally.

The three instructional conditions were first compared using a One-Way Analysis of Variance to determine whether the dependent

variable (pre-test performance scores) would confound the effects of the instructional conditions on post-test performance. This analysis suggested that pre-test performance scores may have confounded the effects of the instructional conditions on post-test performance. Thus, an Analysis of Covariance was performed utilizing the pre-test scores as covariates in the analysis. Significance of correlation between students' reading ability and post-test performance scores were analyzed by means of a significance test on the Pearson Product-Moment correlation coefficient. The test statistic, in this instance, was a student t-distribution with n-2 degrees of freedom.

Major Findings

The major findings of this study were as follows:

1. On the pre-tests (prior to administration of the instructional conditions), there was a significant difference between the students' scores in the MI, RI, C conditions. This difference made it necessary to use the pre-test performance scores as a covariate in further analysis.

2. On the post-tests (after the three instructional conditions were administered), there was a significant difference between the students' scores in the three instructional conditions (MI, RI, C). Further analysis (Scheffé's S-Method) indicated that the differences between the students' scores in the three conditions lie between the MI and C, and the RI and C conditions. There was no significant difference between the MI and RI conditions.

3. There was no significant correlation between reading ability and post-test performance scores for either the multimedia instructional (MI) or control group receiving no instruction (C) condition.

4. There was a significant correlation between reading ability and post-test performance scores for students assigned to the regular instructional (RI) condition.

ACKNOWLEDGMENTS

The writer gratefully acknowledges the contributions of the following people:

Mr. Graham Skuce, Teacher, Highland Park High School, Ottawa, Ontario, Canada, who taught one of the instructional conditions used in this study.

Drs. Donald L. Smith, Dissertation Chairman; Charles V. Mange; Robert E. Gustafson; and Adrian Koert for their willingness to participate as members of my doctoral guidance committee.

Special appreciation is expressed to the staff of the Canada Safety Council whose encouragement provided the will to complete this study.

Special thanks to my wife, Andrea McInenly, for her assistance in the preparation and typing of this study.

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

There is a need in driver education to produce a classroom program that can be used to educate Intellectually Exceptional (IE) students in a way which enables them to be safe and efficient vehicle operators in the highway transportation system. IE students "are those whose intellectual abilities differ from those of other students, thus necessitating curriculum modifications and/or special services in the school" (19). Traditional classifications for IE students have been "Educable Mentally Retarded", "Slow Learners", and/or "Under Achievers".

This need stemmed from observations made by driver educators, special education teachers and special education coordinators within several school districts (17). When teaching the IE to drive a vehicle, educators were often confronted with the following problems:

1. the difficulties of handicaps such as low intelligence, poor reading ability, lack of personal attention by driver education teachers, etc., that the IE student faces in learning the classroom material when he/she is integrated with the regular high school student;

2. the special help that IE students need with course materials cannot be met by the driver education teacher usually because the teacher is not qualified to help, and is sometimes unable to understand the IE student's difficulties; and

3. driver education textbooks and other resources are most often developed for the intellectually normal student, making the material to be learned an extremely difficult task for the IE (17).

Statement of the Problem

The usual process to overcome these problems generally followed the format of the IE being admitted to the regular driver education class; receiving instruction via printed material, lecture and discussion; then going over the same material again with the school's special education teacher (6, 17). This method did have limited success according to some educators, but they also expressed a desire to do away with the repetition that presently occurs. This method of teaching the IE produced a high rate of recidivism, and was extremely time-consuming for the educators.

Some educators have expressed concern as to whether or not driver education programs for IE students should be initiated.

These concerns have developed as a result of the assumptions that:

1. if a person is labeled retarded in school or by society, he is automatically handicapped as an operator of a motor vehicle, and

2. the retarded are not and should not be driving automobiles (1).

Aaron and Strasser (1) considered these assumptions erroneous and further stated that:

> ... An examination of records of convictions for moving violations and/or collision involvement leads to some interesting conclusions. Retarded, deaf, or otherwise handicapped persons do not appear to be significantly different as drivers

than those persons whom we identify as normal. In addition, these same driving records appear to indicate that handicapped students are better drivers.

Whatever the beliefs of educators regarding the teaching of driver education to these students are, the Highway Traffic Act of Ontario (26) entitled IE's to operate a motor vehicle, provided they obtain a provincial driver's license.

Purpose of the Study

The purpose of this study was to test the effectiveness of using multimedia to instruct IE students in the classroom phase of driver education and traffic safety education. The study was designed to determine whether the combining of the EDEX Educational System (18) with the Aetna Life Insurance Company's IPDE (Identify, Predict, Decide and Execute) Response Series (28) with measurable instructional objectives could produce results in terms of knowledge as indicated by comparing the difference between pre-test and post-test scores.

Importance of the Study

The growth of driver education in Ontario during the past 13 years has been phenomenal -- from 24 schools and a few hundred graduates in 1963 to over 30,000 graduates in 1974 (42). Due to the increase in the number of schools offering driver education, the

Ministry of Education funded a Driver Education Task Force in the early Fall of 1973. Its purpose was to examine the parameters of driver education throughout the Province of Ontario and submit a report of its findings.

Two conclusions of the Task Force report that were of pertinent interest to this study were:

> ... the encouragement of differentiated programs by developing and implementing research-based innovated courses, ... by offering these courses to control groups on a trial basis, for study and evaluation, and
>
> ... that there is still a long way to go until the point is reached where every student who wishes to take a driver education course at school can do so (42).

Even though the Task Force on Driver Education supported the need of driver education for students in the Ontario school systems, no mention of a driver education course for the Intellectually Exceptional student was specifically mentioned. The bulk of driver education programs have been directed toward high school students possessing at least average intelligence scores with little attention being given to the education and training of Intellectually Exceptional students.

The programs that did exist were generally not tailored to the IE learning styles and abilities (17). That is, programs usually did not meet the IE's reading level, and learning concepts were generally more abstract than concrete. Standard programs were generally extended in time in order that the IE had longer training sessions in hopes that they would master the essential concepts. In fact, many high schools encouraged or permitted the IE student to repeat the driver education course more than once in order to meet the course objectives.

A curriculum needs to be developed that is designed to fit the learning abilities of the IE. It was the intent of this study to utilize available audio-visual materials to design a multimedia classroom curriculum for use in teaching Intellectually Exceptional students. The audio-visual materials which were utilized, however, were not specifically designed for IE students. The films, filmstrips and slides, etc., can be and are used with regular high school students.

Hypotheses

The following null hypotheses were developed for this study:

Hypothesis I

Group assignment to each instructional condition (multimedia instruction (MI), regular instruction (RI), control group receiving no instruction (C)) will not have an effect on pre-test performance scores.

Hypothesis II

The type of instructional condition (MI, RI, C) will not have an effect on post-test performance scores.

Hypothesis III

No relationship exists between reading scores and post-test performance scores for students receiving the multimedia instructional condition (MI).

Hypothesis IV

No relationship exists between reading scores and post-test performance scores for students receiving the regular instructional condition (RI).

Hypothesis V

No relationship exists between reading scores and post-test performance scores for students receiving the no instructional condition (C).

Definition of Terms

Intellectually Exceptional (IE) Students. Exceptional students are those whose physical, intellectual, communication, social, or emotional abilities differ from those of other students, thus necessitating curriculum modifications and/or special services in the schools. Traditional medically-oriented classifications which have resulted in the labeling of students are inappropriate for the educational programming of exceptional students. As an alternative to such classifications, five broad areas of exceptionality are suggested:

1. Behavioral Exceptionalities
2. Communication Exceptionalities
3. Intellectual Exceptionalities
4. Physical Exceptionalities
5. Multi-Handicapped

The students sampled in this research were categorized by the Ministry of Education as Intellectual Exceptionalities (19).

Special Education. Special Education is defined as that additional educational service over and above the regular school program, which is provided for an exceptional child to assist in the development of his potentials and/or in the amelioration of his disabilities (32).

Multimedia Instruction (MI). MI is defined in this study as the integration of several modes of communication: motion pictures, filmstrips, slides, transparencies and sound tapes packaged into one comprehensive curriculum. It entailed 30 hours of group instruction in a classroom environment.

Regular Instruction (RI). RI is defined in this study as the mode of instruction utilizing printed materials (textbooks), handouts, etc., oral communications from the instructor (lectures), class discussion, and limited use of audio-visual materials. It entailed 30 hours of group instruction in a classroom environment (46).

EDEX Educational System. The EDEX Educational System consisted of a variety of communication modes: motion pictures, filmstrips and sound. The system had 18 30-minute units related to the theoretical aspects of learning to drive a vehicle.

IPDE Response Series. The IPDE Response Series was made up of 20 separate units consisting of a teacher's guide, filmstrips and audio tapes. The series incorporated instructional methods and concepts in an audio-visual format to give students a comprehensive set of learning experiences related to learning to drive.

Nelson Reading Test. This test provided a measure of specific weaknesses in comprehension and yielded a total score that could be used as a general index of a pupil's grade placement in reading (37).

Delimitations of the Study

The study was limited to IE students attending public high school in the County of Carleton, Province of Ontario. The multimedia instruction group consisted of 17 subjects; the regular instruction group was composed of 18 subjects; and the control group receiving no instruction consisted of 28 subjects. The sample size for each

group (MI, RI, C) was unequal due to a variety of internal school problems that arose. That is, the combined sample for the MI and RI groups was selected for participation in the research based on meeting the school's eligibility criterion. The 35 students who met the school's criterion were then randomly assigned to the MI and RI groups. Due to attrition, the MI and RI groups consisted of 15 and 16 subjects respectively at the conclusion of the study.

The 28 control group (C) students were randomly assigned from a group of 90 students who were recommended by the school's guidance counsellor as students who possessed the same general academic ability as the MI and RI students. That is, the control group had comparable reading levels and were classified as IE's. Twenty-eight students was an average class size at Highland Park High School.

Since there was a total of 125 IE students attending Highland Park High School, it would have been ideal to have randomly assigned a larger sample cell size for each instructional condition. However, because of the school's eligibility criterion, only 35 IE's were available for the MI and RI groups.

Because there was only one driver education teacher at Highland Park High School, the most practical way of conducting the study was to have the high school driver education teacher instruct the RI group and the writer instruct the MI group.

Organization of the Remaining Chapters

Chapter II contains a review of the literature. The review of the literature consists of:

1. Innovative materials in driver education
2. Multimedia instructional systems
3. The Intellectually Exceptional student -- driver education instruction
4. Multimedia systems and Intellectually Exceptional student instruction
5. Support of evaluation instrument used in this study

Chapter III contains a complete description of the study methodology: teaching apparatus used, development of the dependent variable (pre-post-tests), selection of subjects for the study, course administration, and the statistical analyses used to measure the outcomes.

Chapter IV contains the findings based on test results.

Presented in Chapter V are the conclusions, discussion and suggestions for future research.

CHAPTER II

A REVIEW OF RELATED LITERATURE

The review of the literature covered the following areas:

1. Innovative materials in driver education
2. Multimedia instructional systems
3. The Intellectually Exceptional student -- driver education instruction
4. Multimedia systems and Intellectually Exceptional student instruction
5. Support of evaluation instrument used in this study

Innovative Materials in Driver Education

Innovations in education have taken the form of programmed instruction*, teaching machines*, filmstrips, motion pictures, and the like. Driver education was no exception when it came to innovations.

---

*These terms are defined in the 1973-74 edition of the Living Webster Encyclopedia Dictionary of the English Language as follows:

Programmed instruction: instruction which requires a student to respond to a prepared set of items or questions and to reply to each correctly before advancing to the next item.

Teaching machines: an automatic device that allows a student to learn at his own rate by presenting a unit of information and questions as part of a planned sequence of such units, and requiring a satisfactory response before the next unit is presented.

The use of television in driver education was used in the 1957-58 school year at Columbus, Ohio. The Columbus schools taught three-fifths of the driver education classroom instruction with television (30). The Cincinnati, Ohio schools reported using closed circuit television during the second semester, 1956-57 (30). Dade County, Florida, in the late 1950's, utilized a three-phase approach consisting of live television instruction operating concurrently with classroom and practice driving (30). During the 1965-66 school year, 229 schools in 27 states received part of this instruction in driver education through the medium of television (38).

The American Automobile Association developed video tapes and film lessons for use in the classroom phase of driver education (45). Each lesson was complete in itself; that is, no reference was made to preceding or following activities. None of the lessons were intended to be all-encompassing, so it was the responsibility of the classroom teacher to expand the subject through group discussion, project development, text reference, and work book assignments. By using this medium, many innovative plans can be established to save time, broaden the base of instruction and enlarge the number of students reached. They may include:

1. The educational television lesson can provide enrichment for the regular instructional program.

2. Recognizing the fact that some schools do not have ETV facilities and that some networks cannot program the series to the advantage of all, kinescope films made from the video tapes are available.

3. A large student group, comprising several regular classes, could view the 30-minute telecasts.

4. When it is not possible to schedule the series during the school day, it would be used in the evening over a public broadcasting station.

5. Finally, it could be used for adult education in the evenings or televised to remote areas in the country by satellite (45).

A Systems Approach Model for instruction in driver education was being used on a limited basis in North America (13). The system involved the identification of instructional goals or terminal student performances which set the overall purpose of the course. Next, each terminal goal or terminal objective was analyzed or "broken down" into subtasks that students must execute after receiving instruction. An analysis of students' prior skill, knowledge and characteristics took place so that remedial and/or advanced instruction could be planned and to establish the general entry level of the students. The next step was the development of performance objectives. They were developed as a direct result of identifying instructional goals and conducting an instructional analysis. The already-identified terminal performances served as a guide for the development of terminal objectives. This step was then followed by the development of criterion-referenced evaluative instruments (test items). The test items should be consistent and in direct agreement with the criteria set forth in the performance objectives. So that the students can master the performance objectives, the designing of an instructional strategy was necessary. This strategy involved the process of choosing what methods, techniques and procedures will be used to have the students achieve the instructional objectives. The behavior expected predicates, to a large degree, what methods will

best allow the student to learn the task at hand. Paralleling the design of instructional strategies was the development of appropriate media and instructional procedures to communicate the selected goals and objectives. Finally, the systems approach called for an evaluation of not only the students' knowledge through criterion-referenced testing, but also for evaluation of the total system. Questions such as the following may be asked:

1. Was the sequence in the instructional analysis determination in a logical order?
2. Was the "step size" in proceeding from one skill to the next too large or too small?
3. Was adequate practice for mastery of the skills allowed during instruction?
4. Did the performance objectives communicate to the students what was expected of them?

Multimedia Instructional System

A considerable number of studies have been conducted that reflect the effectiveness of using teaching machines in a variety of learning situations. Some of these were general references which covered a broad field of education, while others were devoted to specific areas in driver education.

In an article, "A Special Report on Technology for Education," Herbert (25) discussed the development of teaching machines, programmed instruction, and other forms of innovations in educational technology. Among other observations, he stated:

> The greatest involvement of a student in the teaching process and perhaps the method by which he learns most is by interaction with a data source - extracting information, testing hypotheses, making right or wrong decisions and learning by immediate detection and correction of his errors .... The criterion for progress is not how much material is covered, but how well it is learned. Such programmed material changes the teacher's role in a special way ....

Barcus, Hayman and Johnson (3) conducted a study which compared programmed texts, teaching machines and conventional classroom instruction using teachers with varying amounts of training and experience. They found:

> ... With proper conditions and at least with the rather mechanical, non-creative type learning involved in this study, automated instruction can be as effective as the more traditional teacher-directed method. In fact, the teaching machine results suggested that automated instruction can be superior, though conditions for this superiority are uncertain.

Teaching machines generally have student responders that record the students' answers as the program progresses forward. Bridgemen (4) conducted a study utilizing an individual student response system and counter which was placed in view of the instructor but not the students. The students would respond to a battery of multiple-choice questions built around major concepts covered in lectures and laboratory periods. He concluded:

> In general, the student profits by the improved structuring of the information he receives. The instructor retains control of the flow of information, exercises his prerogatives as a personality, and invokes his own style of lecturing. But by using this electronic response device as a learning tool, he can accurately sense the needs of a large group of students and freely adjust his presentation in the tutorial manner.

Lancaster (2), at the Pennsylvania State University, conducted a study utilizing immediate reinforcement to students.

> The theory of learning indicates that students would learn more efficiently if they were reinforced as soon as they made the correct response to a new concept. A simple device called Motivator and Response Indicator (MARI) for giving students immediate reinforcement within a class period was designed, built and tested in actual classrooms. It consists of a visual display which indicates, through the use of lights, correct and incorrect responses. Not only would MARI reinforce the student when he made the correct answer, but it would also indicate to the instructor the percentage of the class responding correctly. The merit of this teaching aid was evaluated in terms of the usual hour tests, by comparing the achievement of students in classes using MARI with control groups not using MARI. The first year, the results were statistically highly significant in favor of using it. Later results were not. Yet, it is strongly believed that some such device could be designed which would enhance classroom learning and that other experiments should be conducted.

The School of Dentistry at Loma Linda University used the EDEX Automatic Teaching System to evaluate the instructional efficiency of a programmed-group instructional approach to teaching in dentistry (10). The non-EDEX group did not receive the traditional instructional program, but highly organized, programmed materials which would be presented in a similar manner to students using the EDEX system.

> In general, results reveal a slight, often non-statistically significant difference between the EDEX and non-EDEX treatments in favor of EDEX. The difference was so modest in the individual class sessions that significant differences were <u>not</u> yielded in all but one of the 12 separate comparisons ....
>
> ... There was no significant difference in the overall quiz performance or midterm performance, although both results favor the EDEX group. There was, however, a significant difference ($p < .01$) on the final examination performance favoring the EDEX group.

During 1966 and 1967, the New Jersey Police Training Commission evaluated different types of teaching environments and materials which affect the learning impact on their personnel (14). Among other things, they found a more favorable attitude rating among those who had received multimedia instruction instead of the lecture-discussion method of teaching. The study also revealed that classroom environment is of the utmost importance if police training programs are to be effective when measured in terms of learning and student satisfaction.

Studies involving Internal Revenue personnel indicated that EDEX training has contributed to improved performance effectiveness (5). Through the use of the EDEX system, such things as classroom time, student activities and student teaching procedures were improved. Instructors were also able to identify quickly high and low scores in the program, thus enabling the instructor to give closer observation and assistance to low scoring students.

A comparatively recent innovation in driver and traffic safety education is the use of multimedia in classroom instruction. An example of such is the EDEX Learning System, more commonly known as the Aetna Drivocator System, which has received favorable support from many instructors who have used it. In the article, "Multimedia - A New Classroom Concept," Cook (11) proposed the following advantages of the Drivocator:

> The film series is designed to take beginning students through driver education's most essential learning phase. Each lesson is complete in itself, since the Drivocator units are designed to correlate readily with textbook materials and thus provide the teachers as much flexibility in his course content as he may desire ....

> ... Early reports reaching us indicate that the Drivocator system lends desirable elements of both flexibility and uniformity to classroom driver education. Surprisingly, for all its technical capability, the system actually demands more of the teacher principally because it draws response from the students.

The Western Greyhound Corporation (43) examined the driving records of 1,500 of their drivers who participated in the Drivocator program, and 1,500 of their drivers who did not participate in the program. The results showed a significantly measurable reduction in the number of accident-producing incidents for the group of drivers who participated in the program.

The Intellectually Exceptional Student -- Driver Education Instruction

It is often thought that driving an automobile requires certain psychophysical motor abilities such as manual dexterity, perceptual discrimination, reaction time, etc. Cantor and Stacey (8) used 175 male mental defectives (persons with genetically determined mental impairment) who were residents of the Syracuse State School, New York to reject the hypothesis that mental defectives had the same manual dexterity as the person with normal intelligence. The chronological ages of the subjects were 14-18 years, and their I.Q. scores ranged from 42-87. The control group for the study was comprised of 865 male industrial workers and 456 male veterans. The Purdue Pegboard Test was used to test manual dexterity of both the mental defectives and the control group. Results showed that the 52 defectives making

the highest I.Q. scores failed to compare favorably with the manual dexterity scores of the control group. However, Cantor and Stacey did observe cases of individual differences wherein a person of low intelligence had the same or equal manual dexterity as that of a person with higher intelligence.

Howe (27), using 43 retarded children with a mean I.Q. of 66 and an equal number of normal children with a mean I.Q. of 98.7, concluded that the retarded group was inferior in a series of motor skill tests consisting of balancing, jumping and strength. Howe also found cases of individual differences similar to those reported by Cantor. No definite pattern of dexterity was evident for individuals in either intelligence group.

A project by Kenard McPherson and Francis C. Kenel (36), investigating a person's ability to perceive potential hazards in traffic situations, was conducted at Illinois State University. They found that a student's perception of potential hazards was improved by providing simulation instruction. This finding was consistent regardless of the educational capacity of the groups (Educable Mentally Handicapped, Average I.Q. and Above Average). It was further discovered that the higher the I.Q. within the study limits, the greater the improvement. "The need for ability grouping in simulation seems apparent for the most effective learning conditions. It is also evident that EMH students can profit from instruction in traffic education," the report stated.

Kahn (29) introduced a unit of driver education into the special class program for mentally retarded students at Hayward High School, California. The students in the class ranged in I.Q. from 50 to 79.

Their chronological ages were from 15 to 18 years. Their reading achievement scores varied from complete nonreaders to the fifth grade reading level. Special counseling was given to students who, because of some physical or psychological disability, were prevented from undertaking the "behind-the-wheel" portion of the course and had the feeling of being left out.

When the driver education course was inaugurated for special students, it was planned for an entire semester (20 weeks) in their sophomore year. Regular students received driver education for nine weeks in the sophomore year. The course was divided into three parts: (1) learning the parts of the car and its operation, (2) studying the motor vehicle code and (3) behind-the-wheel driving.

The author concluded, "The program showed that when the rules of sound teaching for retarded children were followed, the students profited. When the materials were clearly concrete, the end goals explicitly defined and in sight, the course held the interest of the students and learning took place. The key to success in a program of driver education for the slow learner is the development of a course of study which will help the student realize that each step he takes brings him closer to his goal of acquiring a driver's license" (29).

A study was conducted at Hayward High School, Hayward, California (29) comparing the reaction times of normal students and the reaction times of retarded students. Fifty students enrolled in driver education were selected at random from the regular sophomore class. Their reaction times were compared with 50 students in the special classes. Freshmen, sophomores and juniors were tested from the special

classes in order to have a sufficient sample. American Automobile Association testing devices were used. The author concluded that "the reaction of the retarded student seems to fall within the normal distribution of reaction times for the general population."

A 1967 study by Gutshall (23) explored the interrelations among driving ability, driving exposure and socio-economic status of low, average and high intelligence males. The subjects for this study were selected from former high school students who had attended school between 1960 and 1964, who had been issued a Michigan driver's license and who were, at the time of the study, residing within the city limits of Lansing, Michigan. Subjects were assigned to groups on the basis of intelligence scores recorded in their school records.

All subjects were enrolled in the high school special education program for the Educable Mentally Retarded (EMR). They qualified for this study on the basis of the criteria listed above and were assigned to the low intelligence group. Of interest to this report is the following conclusion:

> As a group of drivers, educable mentally retarded males have a larger total of combined convictions for traffic violations and involvement in accidents than groups of male motorists with average intelligence scores. It should be noted that an individual's I.Q. score in and of itself is not necessarily predictive of driving performance (23:69).
>
> As reflected by convictions for moving violations and/or collision involvement, retarded or otherwise handicapped persons are not significantly different drivers than are those drivers with normal intelligence, but are in fact significantly better drivers than those persons who are identified as having above average intelligence (23:66).

Egan (20) conducted a study to determine the actual results of training the EMR to operate automobiles. The information in this study was based on four years of recorded observations and results of tests. Subjects included one group of 18 EMR students and one randomly-selected group of 18 regular class students. Both groups were composed of six girls and 12 boys who ranged in age from 16 to 19 years. Intelligence varied considerably, with the EMR I.Q.'s ranging from 47 to 75, and the regular group I.Q.'s having an even wider range, 85 to 124.

A series of physical tests to compare normal and EMR reactions was given to each student. These tests began with the field of vision test which indicated that vision was no more of a problem for the EMR than for the regular student. The distance judgement tests indicated a deficiency in the EMR's ability to guage the distance between automobiles. The color vision tests revealed no significant difference between the two groups. The complex reaction and steadiness results found the EMR's scoring considerably below the regular students. On visual acuity and sign vision tests, the groups scored equally well. The results of these tests indicated that the normal subjects did have some advantage in the physical characteristics for driving.

The results of examinations on knowledge of traffic laws and regulations indicated that the regular class students possessed a better understanding of the California Vehicle Code and its application to specific situations as developed in the test. With considerable coaching, EMR students passed the state driver's license test.

A comparison of the actual driving records of both groups indicated specific areas in which the EMR had difficulty. The control and distance judgments illustrated the EMR's inability to make quick, accurate appraisals of approaching obstacles and then to make the correct adjustment in driving. In conclusion, the actual driving records of the EMR's indicated an inability to react quickly in tight situations. The EMR student, by his performance on physical tests and written examinations, operated at a marginal level which left in question his ability to drive a car.

Noe (39) reported on two driver education programs which were initiated in the Exceptional Child Center for the exceptional child. The center is located in the City of Fort Lauderdale, Florida, which is centrally located in the Broward County School System. During the 1967-68 school year, the first program was offered to 14 students and consisted of the traditional (one instructor, one car) type program. Transportation difficulties caused four to drop out. With the completion of the course (six hours of behind-the-wheel instruction and over 50 hours in the classroom), seven students received restricted permits, and the other three received regular operator licenses. The second program (one instructor, one car) consisted of a six-hour-a-day, six-week course of instruction. This class began with 16 students and finished with 14 students. Thirteen students received the driving permit, and 11 students successfully passed the course.

Multimedia Systems and Intellectually Exceptional Student Instruction

A study by Thompson and Raibish (47) on the use of filmstrips in teaching personal hygiene to the moderately retarded adolescent reported:

> Trainable mentally handicapped adolescents were taught personal hygiene under two conditions. One group was given instruction by demonstration; the second group received the same demonstration plus filmstrip viewing. Changes in hygiene self help were measured by the teacher's and mother's ratings of behavior. The use of filmstrip increased learning in several areas of hygiene and particularly appeared to improve generalization of newly learned habits from the classroom to the home.

Carter and others (9) compared the effectiveness of three techniques of film utilization in teaching mentally retarded children.

> The relative effectiveness of three audio-visual techniques was studied with mentally retarded public school students. The techniques especially designed to overcome the traits of mental retardates, consisted of conventional film narrated by a teacher, unnarrated film with responses from children on the sound track, and silent film during which students provided their own unrestrained comments. Special classes of educable mentally retarded children provided 104 subjects. Four matched groups were established to provide an experimental group for each of the film techniques and a control group. Data were gathered from pre- and post-tests and recognition test scores. Findings indicated that use of any of the experimental film techniques was no more effective for teaching educable mentally retarded children than teaching the same unit without films.

Driscoll (15), in a study on educational films and the slow learner, reported the following:

> Three varied films designed to test film learning abilities were shown to 402 mentally retarded children in 21 junior and senior high public schools (mean ages 13.2 and 15.1, mean I.Q. 67.9 and 69.2 respectively).

> All children were tested orally and individually in the categories of factual learning, attitudinal learning and concept learning. Pre-post gains on factual learning questions for all three films were significant beyond the .001 level. Pre-post differentials for attitudinal learning were highly significant; concept learning was measured only in post-testing with adequate to good results. Conclusions drawn from the results were as follows: story films can teach concepts of behavior effectively; films need not be short; animation does not teach better than live photography; story line is more important than humor and audio and visual cueing; and color is no more effective than black and white. Further conclusions were that retarded children could generalize rules of behavior from ideas and stories presented visually; children of very limited intelligence could describe filmed actions but could not derive concepts; and factual learning increased when the film was shown twice.

Driscoll (16) also reported on the effects of film learning on mentally retarded students in a study in California.

> Films which covered areas of vocational orientation, consumer education and economics and civics were produced. The study sample was made up of 402 subjects from 21 junior and senior high schools (average age equals 14 years, mean I.Q. equals 68). Tests included oral individual and visual procedures. The responses were recorded and analyzed. The results indicated that special films can be effective as a teaching method for educable mentally retarded pupils.

Support of Evaluation Instruments Used in This Study

The pre-post-tests (dependent variable) used in this study were originally selected from the Handbook for Driving Knowledge Testing (41). This handbook is basically a massive collection of facts about safe, efficient, legal driving, with those facts expressed in the form of multiple-choice test questions. The handbook

was developed in order to provide a resource for use by driver licensing and education personnel in constructing knowledge tests for those persons wishing to operate passenger cars and light trucks (vans, half-ton pick-ups, etc.). The main purpose and usefulness of the handbook was based on how to build tests that truly assess and inform the person(s) to whom they are presented. The driving knowledge test items consisted of three categories and were developed from the following publications:

1. Driving Principles: HumRRO Driver Education Task Analysis (34)
2. Driving Laws: Uniform Vehicle Code (48)
3. Traffic Control Devices: Manual on Uniform Traffic Control Devices (33)

From these publications, a total of 1,328 individual items were constructed.

Driving Principles	725 items
Driving Laws	344 items
Control Devices	259 items
	1,328 items

All 1,328 items went through a three-phase testing sequence (40):

"1. Language Adequacy Evaluation. The purpose of this phase was to augment the Highway Safety Research Institute (HSRI) item writers' application of item construction criteria by exposing each item to a common response mechanism, i.e., an 'applicant'. The goal was to identify those items which, through semantic and syntactic construction, either prevent the person with the required driving knowledge increment from answering the item correctly, or conversely, permit the unknowing person to logically select the correct answer.

To implement this phase, nine local high school students, each of whom had recently completed driver education, were selected to respond to the entire item pool. Each student had taken driver education less than a year before this project activity. Two of the students had taken high school driver education in states other than Michigan; one had commercial driver education; and the remaining six had been instructed in various Michigan schools.

The test items were divided and reproduced into 15 booklets of approximately 90 items each. Within each booklet, the item pages were rotated so that each respondent took the items in a different order. The booklets were administered over a 7-day period, with each respondent instructed to answer every item and to indicate those items that they were unsure of, either because the item was unclear or because they had to guess the answer.

This language review resulted in more than half of the items having words or phrases changed.

2. Content Validity Evaluation. In addition to the language review, assurance was also required that the HSRI item writer had faithfully reflected the intended driving knowledge increment in his item construction.

A review by recognized authorities in traffic safety was selected as the method for assuring accuracy and content validity of the individual items. Candidate reviewers for the 'driving principle' items were selected from the list of judges used in the HumRRO task analysis project. Candidate reviewers for the 'control devices' items were selected from present and previous members of the Motorist

Information Committee of the Highway Research Board. Using those procedures, a list of 64 'primary' authorities and 60 'back-up' experts was assembled.

To use these reviewers, the item pool was broken into 32 sets of approximately 40 items each. Each of the item sets was prepared in booklet form, with each item presented with the source material from which the item was prepared, i.e., a task statement from the HumRRO Task Analysis, a paragraph from the Uniform Vehicle Code, or a section and drawing from the Manual on Uniform Traffic Control Devices.

Since the project plan called for independent review of each item by at least two authorities, each of the 32-item booklets was sent to two of the 64 'primary' reviewers. Selected experts from the 'back-up' list were solicited to fill in for the 'primary' reviewers who declined the task.

Comments provided by the reviewers were generally incisive and helpful. In many instances, contact was made with individual reviewers to clarify a comment or suggestion. As a result of this review by authorities, over half of the items were reviewed and revised to some extent by the HSRI project staff.

3. Psychometric* Evaluation. This phase involved the collection of data on the psychometric adequacy of the items. These data were identified to include as a minimum the following indicators for each item.

---

*Defined as the measurement of the relative strength of the test items in terms of item difficulty, item reliability, etc.

1. Difficulty -- expressed as the proportion of respondents correctly answering the item.

2. Reliability -- the extent to which respondents continue selecting the correct answer on successive exposures to the item, expressed as a correlation between responses in a test-retest situation.

3. Relationship to variables not related to driving -- expressed as correlations with scholastic achievement, verbal ability, sex, age, etc.

4. Relationship to other items -- expressed as a correlation between the given item and other items in a knowledge sub-domain, e.g., freeway driving.

Given the large number of items for which these data were needed coupled with the need for re-testing, the decision was made to use some 2,500 high school driver education students as the respondent group from the State of Iowa.

Given those respondent availability conditions, the item pool was formed into 25 'tests' of about 50 items each. In order to get responses from individuals on all items in a given knowledge area, the 'tests' were formed by grouping all items in a given knowledge sub-domain. Thus, one test consisted of 50 items related to freeway driving, another related to code licensing regulations, another to warning signs, etc.

The first week of testing involved initial administration of the 'tests' and the collection of achievement test scores, where available, from the school records for each of the participating students. In most cases, the achievement scores collected were the scores from two sub-tests of the Iowa Test of Educational Development (ITED). One of those sub-tests (Test 5; Reading, Social Studies) is considered a measure of reading ability; the other (Test 8; General

Vocabulary) is a measure of word comprehension. In cases where those ITED scores were not available, comparable sub-test scores from the Iowa Test of Basic Skills (ITBS) were collected. Of the approximately 2,000 students tested during the first week, a total of 1,926 have those achievement scores available, resulting in an average of 77 students per item set providing both achievement scores and item responses.

Each student then re-took the same item set 'test'. While the students had been alerted to more testing, they were not told, of course, that they would be re-taking the same test. Over 90% of those participating in the initial testing completed the re-test. As a result, a total of 1,797 students provided test and re-test scores, averaging 72 students per item set.

Using specially prepared programs, summary data were prepared for each item and included the following:

1. Item difficulty, i.e., the proportion of respondents correctly answering the item.
2. Correlation between item and achievement scores, using only the ITED Test 8 and the ITBS percentile scores.
3. Correlation between item score and total score on the 'test' containing the item.
4. Correlation between test and re-test scores on each item.

Given those indices of item performance, criteria were developed to identify unacceptable items. For that purpose, individual items were tagged for review if they had one or more of the following characteristics:

1. A correlation of .30 or more with the ITED or ITBS vocabulary scores.

2. A test-retest reliability coefficient of less than .30.

3. A negative correlation with the total score of the 'test' of which the item was a part.

4. An item difficulty (P-value) less than .50, i.e., answered incorrectly by more than half the respondents.

Those indices were used, of course, to isolate items that (1) were excessively related to verbal ability; (2) had an unacceptably large number of respondents change their answer when re-tested; (3) were more often answered correctly (incorrectly) by respondents showing less (more) information about the knowledge sub-domain of which the item was a part; and/or (4) covered little-known content areas or had two or more 'correct' answers.

Applying those criteria resulted in the identification of 481 'defective items'. In order to retain for the item pool the knowledge content of those items, each faulty item was reviewed and re-written by a project staff member using specially-prepared fault/correction guidelines. Subsequently, each revised item was independently reviewed by a second project member to assure knowledge content integrity and item format conformity. Using those procedures, 361 items were revised, 8 were deleted, and 112 were judged adequate in their original form. In addition, ten new items were prepared to restore knowledge content that had been removed in the revision process.

That revision and re-write exercise thus resulted in 371 pool items without psychometric evaluation. To provide those psychometric data and to verify adequacy of the item revisions, arrangements were

again made with the Iowa officials for a smaller scale replication of the earlier testing exercise.

Given identical constraints on driver education student availability, nine test forms consisting of about 50 items each were prepared. Each of the forms had about 40 of the re-written items plus 10 items that had exceeded the psychometric criteria applied to the earlier test results. These 'good' items were added as controls to permit demonstration of student sample comparability between the two field tests.

Each of the 893 students completed one of the nine test forms, providing a range of 95-104 responses per item. Eighty-eight percent of that group was available the following week to re-take the same test form, providing a range of 83-96 re-test responses per item.

Analysis of data from the 10 items common to the first test in Iowa showed sufficient similarity with the first test results, so that comparability of the two student samples was accepted. Analysis of responses and correlations from the 371 re-written items showed considerable success -- some 65% of the reformed items showed acceptably low correlation with vocabulary scores, acceptably high test reliability, and acceptable difficulty. While good practice would require re-writing and re-testing of the remaining 130 items with questionable characteristics, the contract schedule could be stretched no further. Thus, the 130 items were returned to the pool, minus 17 items with completely unacceptable statistics and marginal content relative to safe, efficient, legal driving. This final culling action resulted in a final item pool of 1,313 items, with the great majority having

associated data on difficulty, response distribution (proportion of responses to each answer alternative), correlation with verbal ability, and reliability."

These 1,313 test items covered the following driving knowledge domains:

Pre-Operative Procedures	25 items
Basic Knowledge	427 items
Driving Situations	202 items
Vehicle and Driver	62 items
Driver Responsibility	7 items
Vehicle Code: Laws and Regulations	339 items
Traffic Control Signs, Signals & Markings	251 items
	1,313 items

Because of the completeness of the 1,313 item pool in reflecting present state-of-knowledge with respect to safe, efficient operation of the motor vehicle, these test items were used as the basis for constructing the pre-post-tests used in the execution stage of this study.

Summary

The review of the literature related to multimedia systems as a method of instruction supports that such systems are a satisfactory method of imparting knowledge. Such systems provided an improved structuring of the information to be disseminated to the student.

The student generally received immediate reinforcement as soon as he/she made the correct response to a new concept. Certain of the systems enabled the instructor to identify quickly high and low scores of the student, thus enabling the instructor to give immediate assistance to the low scoring student.

The use of visuals in teaching mental retardates proved to be a useful method of instruction in the academic subjects and in perceptual training. The literature review supported the work of traffic safety educators in their effort to provide driver education for all high school youth including the Intellectually Exceptional student.

Through the extensive research of Pollock and McDole (40) in the development of a test item pool for driver education, a satisfactory list of test items was available for use in this study.

In Chapter III, the methodology used in designing, organizing, presenting, and testing the results of the multimedia curriculum for Intellectually Exceptional students will be presented.

CHAPTER III

METHODOLOGY

To accomplish the purposes set forth in this study, it was necessary to secure data on a number of Intellectually Exceptional students who had received (1) multimedia instruction (MI) consisting of 30 hours of instruction, (2) regular instruction (RI) consisting of 30 hours of instruction and (3) a control group that received no instruction (C) in driver education.

This research study involved combining the EDEX Educational System and the Aetna IPDE Response Series. The combination of these materials and contents made up a comprehensive driver education multimedia classroom curriculum for Intellectually Exceptional students. The content of these two systems was not specifically designed for IE students. The films, filmstrips and slides, etc. can be and are used with regular high school students. So that the two systems could be combined, the writer matched and integrated the visuals and sound tapes of both systems into a multimedia program for IE students. This was done by using a Model 150 Programmer Unit*. The programmer provided a means of making master tapes for automated control of the

---

*A Programmer Unit provides a means of making master tapes for automated control of the EDEX Teaching Machine. The narration track or the data track may be recorded independently, or both tracks may be recorded at the same time. The tape will operate all system functions as it is being recorded.

EDEX teaching system. The narration track and/or the data track may be recorded simultaneously or independently. The final master program tapes automatically presented the entire multimedia instructional condition to the IE students. Each program tape was approximately two hours in duration, a portion of which was presented in 70-minute class periods. The following subject areas in the field of driver and traffic safety education were combined from the two multimedia sources for presentation to the experimental group. Two units from the EDEX program (Social Pressures and Attitudes and Emotions) and three units from the IPDE Response Series (Understanding and Controlling Behavior, Personality and Perception, and Personal/Social Interactions) were omitted from the program administered to the MI condition. These units dealt with attitudinal and personality factors which would be difficult to measure by pencil and paper tests. Furthermore, the test items in the HSRI Handbook of Driving Knowledge Testing did not contain test items in the cognitive area. Since cognitive test items were not available, these units were not utilized.

Challenge of Traffic and a Strategy for Driving
a. Identify and Predict

Psychophysical Factors
a. Man-Machine Interactions

Laws of Nature
a. Forces of Nature I and II
b. Vehicle-Roadway Interactions

Rules of the Road

Signs and Pavement Markings

Basic Skills and Parking Maneuvers

Driving in City Traffic

Driving on Highways and Freeways

Driving Defensively by Separating and Compromising with Traffic

Drinking-Drugs and Driving

The Driver's Responsibility

Weather Conditions and Impediments to Vision

Handling Emergencies

Driver Behavior

Other Motorized Vehicles
a. The Motorcycle
b. Trains

Vehicle Buying and Ownership

The Total Driving Task
a. Putting It All Together
b. Missing Links

To measure the effect of the multimedia instruction (MI), 140 instructional objectives were developed by the writer based on the content in the EDEX educational program and the IPDE Response Series program. Content descriptions of these two programs are in Appendix A.

For each instructional objective, a test item was selected for a total of 140 test items. The items were selected from the Handbook for Driving Knowledge Testing (41). This handbook contains a pool of 1,313 multiple-choice test items covering principles of safe driving, legal regulations, and traffic control devices and knowledge pertinent to passenger car and light truck operation. The driving knowledge domain was drawn primarily from three sources: 1) HumRRO

Driver Education Task Analysis (34), 2) Uniform Vehicle Code (48), and 3) Manual on Uniform Traffic Control Devices (33). Accompanying each test item was the statistical and normative data from testing 2,500 Iowa driver education students, 227 Coast Guard recruits, and Michigan driver license applicants. The Michigan group was composed of 2,940 original license applicants, 34,251 renewal license applicants, 1,090 "problem" drivers, and 511 license-transfer applicants (41).

The HSRI test items were generated with particular concern for the readability level because of the educational diversity of driver license applicants. To keep the items formed at an easy readability level, several writing rules were particularly emphasized.

1. The item's stem was restricted to less than 17 words.
2. Each foil was kept to a minimum, uniform number of words in a given item.
3. One-syllable words, rather than polysyllabic words, were used wherever possible.
4. A list of simpler, equivalent terms was used instead of less common, technical terms, e.g., "speed up" rather than "accelerate".

To determine the effectiveness of these guidelines, a Flesch count* (21) was selected as a simple means of assessing readability for the HSRI test items. The reading level for the HSRI items approximated the seventh grade level (reading ease score of 78).

---

*According to Rudolf Flesch, a word is difficult or easy according to the number of syllables it contains: the more syllables, the harder it is. Flesch recognizes that there are exceptions to this generalization, but he feels that the number of syllables a word contains is usually a good index to its difficulty.

The Highway Safety Research Institute (HSRI) test items were in a multiple-choice format and were rewritten into a true/false format by the writer. Since the nature of this study involved IE students whose reading level approximated grade 4-7 on the Nelson Reading Test (37), it was necessary to rewrite the test items without changing the meaning so that they could be used in this study. This was accomplished by substituting common terms where technical terms were used, e.g., "speed up" rather than "accelerate".
Dr. Donald A. Burke, Professor, Department of Elementary and Special Education, Michigan State University, reviewed the terminology used in the test items and confirmed that the terminology was appropriate for IE students.

The 140 test items and the 140 instructional objectives were further reviewed by Dr. Stephen L. Yelon, Michigan State University, and co-author of the book, Learning System Design (12), to ascertain the compatibility of the objectives to the test items. Appendix B contains the instructional objectives and corresponding test items.

The Sample

The proposal to conduct this study was submitted to the Ottawa Board of Education, Research Branch, and permission was granted by the Board of Education to conduct the study at Highland Park High School, Ottawa, Ontario, Canada.

In Canada, students are eligible for driver education when they reach their sixteenth birthday. They then contact the administration office where their name is put on the driver education enrollment list for the desired semester. The general procedure is "first come, first served" for all eligible students. For the semester in which this research was conducted, 35 eligible students were randomly assigned to the MI and RI groups.

The multimedia instructional condition (MI), consisting of 30 hours of instruction, was administered to 17 randomly-assigned IE students. The regular instructional condition (RI), consisting of 30 hours of lecturing, limited use of visuals and limited use of group interaction teaching techniques, was administered to 18 randomly-assigned IE students. All 35 eligible students were randomly assigned simultaneously using a table of random numbers to each group (21). Due to attrition during the study period, the MI group contained 15 students and the RI group contained 16 students when the instructional conditions were completed.

To establish the control group (C), students with the same general academic ability as the MI and RI students were identified from the school's student files by a school guidance counsellor. That is, the control group had comparable reading levels and were classified as IE's. In all, 90 students were identified. Of this group, 28 were randomly selected using a table of random numbers (22) and were assigned to the control group. A control group population of 28 was chosen because that is the average class size at Highland Park High School.

Nelson Reading Test scores (Appendix C) for all three instructional conditions were obtained from the students' personal files so that a statistical correlation could be performed between the students' reading scores and their post-test scores.

Pre-Post-Tests

All test items were selected from the Handbook for Driving Knowledge Testing on the basis of their test-retest correlation plus their applicability to the instructional objectives and transformed into true/false items. Each of the pre-post-test items had an item difficulty level (p-value) that fell in a range from +.31 to +.81. Items having a p-value less than +.31 were not selected, and items with a p-value greater than +.81 were eliminated from selection because generally the items were relatively easy to answer correctly. There were some situations where there was more than one test item which qualified for inclusion. That is, more than one test item could be used to measure the instructional objective. In these situations, the test item that had an item difficulty level nearest to .50 was selected. After the selection of all 140 test items, the mean item difficulty (p-value) for the pre-post-test items was +.5095 and +.5010 respectively. The pre-test contained 32 true and 28 false items, and the post-test contained 36 true and 24 false items. Appendix D contains the pre-post-test questions and sample answer sheet.

The pre-test contained 60 true/false items. These items were randomly selected from the 140 test item pool using a table of random numbers from the text, Statistical Methods in Education and Psychology (22). The same sampling technique was used for the post-test after all test items were replaced into the pool. This method of selection for the pre-post-test items gave all items an equal probability of being selected.

Both the pre-post-tests were written examinations in a true/false format. The pre-test was administered in one day to all subjects orally and visually (transparency) by the regular driver education classroom instructor. The post-test was administered using the same procedure at the conclusion of 30 hours of classroom instruction. Each test item was reproduced on a transparency using primary size type (1/2 inch). Students were instructed to circle the correct response (T or F) to each true and false item. They were also given special instructions not to leave any item unanswered.

Course Administration

Class periods were 70 minutes in duration, five days per week, for eight weeks. Approximately ten hours of this scheduled class time was devoted to class administration, tests, etc., allowing 30 hours of actual driver education instruction for the MI and RI groups. The writer taught the multimedia instruction condition while a high school driver education instructor taught the regular

instruction condition. Both instructors reviewed a list of instructional objectives prior to each class period and again immediately at the completion of each class period to ensure that the same objectives were taught to both groups. The instructional objectives were predetermined and identical in content for both the MI and RI conditions.

Statistical Analysis

Based upon the questions under study in this investigation, the following null hypotheses were selected for statistical analysis:

1. Group assignment to each instructional condition (multimedia instruction (MI), regular instruction (RI), control group receiving no instruction (C)) will not have an effect on pre-test performance scores.

2. The type of instructional condition (MI, RI, C) will not have an effect on post-test performance scores.

3. No relationship exists between reading scores and post-test performance scores for students receiving the multimedia instructional condition (MI).

4. No relationship exists between reading scores and post-test performance scores for students receiving the regular instructional condition (RI).

5. No relationship exists between reading scores and post-test performance scores for students receiving the no instructional condition (C).

The purpose of developing the first hypothesis was to determine whether the dependent variable (pre-test performance scores) would confound the effects of instructional conditions on post-test performance. Therefore, Hypothesis I was tested for significance by

means of a One-Way Analysis of Variance (ANOVA). This test was chosen for its ability to detect true differences, if any such differences exist, among treatment conditions. The independent variables were the instructional conditions (multimedia instruction (MI), regular instruction (RI), control (C)), and the dependent variable was the pre-test performance score. The variable matrix for this hypothesis is presented in Figure 1.

INSTRUCTIONAL CONDITION		
Multimedia Condition	Regular Condition	Control
X = Pre-test Performance Score SD = n =	X = Pre-test Performance Score SD = n =	X = Pre-test Performance Score SD = n =

Figure 1. Variable Matrix for Hypothesis I

The ANOVA F-ratio was considered significant when found to be larger than the tabled value with the same degrees of freedom (df), and a probability of Type One error less than .05 (alpha $<$ .05). Should Hypothesis I be rejected, then the pre-test scores may confound the effects of the instructional conditions on post-test performance scores. Given this situation, pre-test scores were controlled through the use of an Analysis of Covariance (ANCOVA). If Hypothesis I is not rejected, then it can be expected that the pre-test performance will not necessarily confound the effects of instructional conditions on post-test performance.

Hypothesis II was tested using an Analysis of Covariance (ANCOVA). Instructional condition was the independent variable, post-test scores the dependent, or criterion, variable and reading scores the predictor (covariate) variable. Because Hypothesis I was rejected, pre-test scores were considered a predictor variable and, therefore, used as a covariate in the analysis.

The ANCOVA was chosen for its ability to test for true treatment differences between group means while at the same time controlling for concomitant variables which may also affect criterion variable scores. In this study, both reading ability and previous experience (identified by pre-test scores) had a confounding effect on post-test performance scores. The variable matrix for the Analysis of Covariance is presented in Figure 2.

INSTRUCTIONAL CONDITION					
Multimedia Instruction n = 15		Regular Instruction n = 16		Control n = 28	
Covariates	Post-test	Covariates	Post-test	Covariates	Post-test
Reading Pre-test*		Reading Pre-test*		Reading Pre-test*	
Scores	. . . . .	. . . . . ETC . . .	. . . . .	. . . . .	. . . . .
1 . . . 15		1 . . . 16		1 . . . 28	
$\bar{X}$ =					
SD =					
n =					

*Pre-test performance scores will be used only upon rejection of the first null hypothesis.

Figure 2. Variable Matrix for ANCOVA Using Post-test Performance Scores as the Dependent Variable and Reading Level and Pre-test Performance Scores as Covariates

Significant F-ratios were further analyzed using Scheffé's S-Method (21). The Scheffé technique, a post-hoc comparison procedure, was chosen for its ability to make pair comparisons between means calculated from cells having unequal numbers of subjects. The multimedia instruction (MI), regular instruction (RI) and control (C) had 15, 16 and 28 subjects per cell respectively.

Hypotheses III-V attempted to determine a relationship between reading scores and post-test performance scores. That is, do students who possess higher reading scores also obtain higher post-test scores? The purpose of obtaining these correlations is to determine whether students with low reading ability would perform better in either the MI or RI condition. Therefore, intercorrelations between post-test performance scores and reading scores for the three instructional conditions (MI, RI, C) were analyzed by means of a significance test on the Pearson Product-Moment correlation coefficient. The test statistic, in this instance, was a Student t-distribution with n-2 degrees of freedom (22).

Summary

In this chapter, the methodology used in designing, organizing, presenting and analyzing the results of the study have been presented.

In Chapter IV, the data and statistical analyses for the five null hypotheses will be presented.

CHAPTER IV

ANALYSIS OF DATA

Prior to performing the analysis of the data for the five null hypotheses, a t-test was performed on pre-post-test scores for each instructional condition (MI, RI, C). This was done to determine whether a significant gain occurred between the pre-post-test scores. The results indicated (Table 1) that in all three instructional conditions there was a significant difference (alpha = .05).

Table 1

Summary Table for t-test Data on Pre-Post-Test Scores for Each Instructional Condition (MI, RI, C)

Instructional Condition	Mean Differences	Standard Deviation	t	Critical Value	Decision
Multimedia Instruction n = 15	5.53	5.57	3.84	2.15	sig.
Regular Instruction n = 16	3.75	2.79	5.36	2.13	sig.
Control Receiving No Instruction n = 28	4.29	4.29	6.81	2.05	sig.

According to Campbell and Stanley (7), this type of analysis does not control for several variables, i.e., history, maturation, etc. Thus, further analysis was performed on pre-test scores for each instructional condition using a One-Way Analysis of Variance. The mean, standard deviation and sample size for each instructional condition on pre-test performance scores are presented in Table 2.

Table 2

Mean Pre-test Performance Scores
for each Instructional Condition
(MI, RI, C)

	INSTRUCTIONAL CONDITION		
	Multimedia Instruction	Regular Instruction	Control
X =	43.53	43.81	40.32
SD =	4.26	4.69	3.31
n =	15	16	28

Based upon the five questions under study in this investigation, the analysis of the data indicated the following findings for each null hypothesis.

Hypothesis I

> Group assignment to each instructional condition (multimedia instruction (MI), regular instruction (RI), control group receiving no instruction (C)) will not have an effect on pre-test performance scores.

The results of the One-Way Analysis of Variance (ANOVA) indicated there were significant differences between the three instructional conditions. Hypothesis I was, therefore, rejected. Since a significant difference did exist, this suggested that pre-test performance scores may have confounded the effects of the instructional conditions on post-test performance. Thus, pre-test scores were utilized as a covariate.

Prior to using the One-Way Analysis of Variance to test Hypothesis I, consideration was given to the three assumptions underlying the test:

1. The population from which the samples were drawn was normally distributed.
2. The sampling procedure ensured that the samples drawn were independent.
3. The variances within each cell are approximately equal (homogeneity of variance).

The first assumption of normality is satisfied if the subjects are randomly sampled from a normally distributed population (31). Moreover, the F-test is robust* with respect to deviations from within the population (31).

The second assumption, concerning the independence of the observations, was satisfied by the use of a random assignment procedure. Each subject was given a number which was then randomly assigned, using a table of random numbers, to an instructional condition (22). This procedure reduced the probability of systematic

---

*Robust in the case of normality refers to the inability of the distribution of mean scores to effect the F-statistic. Only in cases where the distribution of scores are markedly skewed would one become concerned about meeting the assumption of normality.

bias entering into the observations. Since the subjects in the treatment conditions were unaware of the experimental nature of the study, there is little reason to expect that interaction among them occurred at any time during the study. Thus, the assumption of independence of observations would appear to be satisfied.

The third assumption concerning the homogeneity of error variance was examined using the Bartlett-Box F Test. The assumption of homogeneity of variance is robust in cases where sample sizes are equal (30). Since the sample sizes for each cell vary across instructional conditions, the "robustness" of this assumption is vitiated. Therefore, the Bartlett-Box F Test (B) procedure was selected in order to determine whether homogeneity of variance can be assumed. B is considered significant if found to exceed the tabled value of B (alpha = .05).

The B statistic was found to equal 1.30 (critical value = .273) for the pre-test performance data. This statistic is not significant and, therefore, the assumption of homogeneity or error variance is tenable.

Since all three assumptions were accepted, the One-Way Analysis of Variance was performed. Table 3 presents the results of that analysis.

Table 3

Summary Table for the Analysis of Variance on Pre-test Scores for the MI, RI, C

Source of Variation	df	SS	MS	F-Probability
Between Instructional Condition	2	166.30	83.15	.008
Within Instructional Condition	56	880.28	15.72	
Total	58	1046.58		

Hypothesis II

The type of instructional condition (MI, RI, C) will not have an effect on post-test performance scores.

Before testing the above hypothesis, consideration was given to the assumptions underlying the test, as was the case in the above analysis of variance. As in the first situation, the first and second assumptions were satisfied. The third assumption, homogeneity of variance, however, had to be tested prior to conduct of the Analysis of Covariance (ANCOVA). Therefore, the Bartlett-Box F test statistic was employed for examination of the assumption.

The B was determined to be .356 (critical value = .701). When compared to the tabled value, this statistic was found not significant.

Hypothesis II was tested by ANCOVA and rejected. Therefore, it can be interpreted that the post-test scores were significantly different for the instructional conditions (MI, RI, C). The F-test for treatment conditions was significant (F = 11.32). Individual student pre-post-test scores, group means and standard deviations for each instructional condition are presented in Table 4.

Table 4

Individual Student Pre-Post-Test Scores, Reading Level Scores
Group Means and Standard Deviations for each
Instructional Condition (MI, RI, C)

INSTRUCTIONAL CONDITION								
Multimedia Instruction n = 15			Regular Instruction n = 16			Control n = 28		
Covariates		Post-test	Covariates		Post-test	Covariates		Post-test
Reading	Pre-test		Reading	Pre-test		Reading	Pre-test	
4.7	40	52	6.5	50	49	5.1	36	39
7.9	42	43	8.0	47	49	7.0	43	42
5.5	46	51	4.4	47	42	5.5	43	43
5.9	44	44	5.1	48	48	7.5	37	43
5.6	33	53	4.2	45	49	6.3	43	46
5.9	47	48	6.2	44	48	5.2	42	31
4.5	48	48	5.1	47	52	5.3	35	46
6.5	44	51	6.5	37	45	5.0	45	41
6.5	43	47	6.8	50	51	5.2	42	36
6.6	42	54	5.9	47	47	6.8	39	50
4.2	38	41	3.4	39	40	6.2	44	48
6.1	49	52	7.2	41	48	6.2	40	41
6.9	46	54	2.9	35	41	5.2	34	42
6.7	48	52	6.2	40	46	6.7	45	45
5.9	42	48	5.9	39	47	4.8	44	44
			6.4	45	47	7.1	44	47

Table 4 (continued)

INSTRUCTIONAL CONDITION								
Multimedia Instruction n = 15			Regular Instruction n = 16			Control n = 28		
Covariates		Post-test	Covariates		Post-test	Covariates		Post-test
Reading	Pre-test		Reading	Pre-test		Reading	Pre-test	
						5.1	37	41
						5.0	36	41
						5.2	41	45
						4.6	36	41
						6.0	40	50
						6.0	41	43
						7.2	37	43
						5.4	43	45
						6.3	42	47
						6.2	41	39
						6.4	37	40
						5.9	42	41
X=5.89	43.53	49.20	5.67	43.81	46.81	5.87	40.32	42.82
SD= .968	4.26	4.07	1.39	4.69	3.37	.810	3.31	4.07
n= 15	15	15	16	16	16	28	28	28

Table 5 contains a summary for the Analysis of Covariance (ANCOVA).

Table 5

Summary Table for the Analysis of Covariance
on Post-test Performance Scores for the MI, RI and C

Source of Variation	df	SS	MS	F	F-Probability
Covariates					
Pre-test	1	169.18	169.18	12.70	.001
Reading	1	41.98	41.98	3.15	.082
Instr. Cond.	2	301.68	150.84	11.32	.001
Explained	4	563.23	140.81	10.57	.001
Residual	54	719.48	13.32		
Total	58	1282.71	22.12		

The amount of variance explained in the analysis (ANCOVA) was also significant (F = 10.57). The reading scores were not significant. The difference between the pre-test performance scores were significant, as was the case in the Analysis of Variance performed for Hypothesis I.

Since a significant F-ratio does not suggest where specific differences lie, a post-hoc comparison (Scheffé's S-Method) was used to compare the means between types of instructional conditions (21). Thus, in order to examine Hypothesis II, the three following comparisons were made: (1) multimedia instruction versus regular instruction; (2) multimedia instruction versus control receiving no instruction; and (3) regular instruction versus control receiving no instruction. In Table 6, these comparisons are presented.

Table 6

Comparison Between the Independent Variables (MI, RI, C) on Post-test Scores

Contrast	Difference Between Means*	Confidence Interval	Decision
$\bar{X}_{MI} - \bar{X}_{RI}$	2.19	-1.12 to 5.50	n.s.
$\bar{X}_{MI} - \bar{X}_{C}$	5.77	2.88 to 8.66	sig.**
$\bar{X}_{RI} - \bar{X}_{C}$	3.58	.69 to 6.47	sig.**

*Difference between group means was computed using the adjusted means from the ANCOVA. The means have taken into account the effects of the two covariates.

**Confidence intervals developed for alpha = .05.

Comparisons between the two instructional conditions (MI and RI) were each significantly different from the control receiving no instruction. However, Hypothesis II was concerned with whether the MI students' scores were significantly different than those of the RI students. That analysis showed that there was no significant difference.

In the null Hypotheses III, IV and V, it was stated that:

Hypothesis III

No relationship exists between reading scores and post-test performance scores for students receiving the multimedia instructional condition (MI).

Hypothesis IV

No relationship exists between reading scores and post-test performance scores for students receiving the regular instructional condition (RI).

Hypothesis V

No relationship exists between reading scores and post-test performance scores for students receiving the no instructional condition (C).

It was found (see Table 5) that reading was not a significant factor in the study as is indicated by the ANCOVA. An F-ratio (3.15) indicated by the variation of scores among the three instructional conditions (MI, RI, C) versus that of the error variance was not significant.

However, because it was hypothesized that reading ability might play a major part in the test scores of the regular instruction condition (RI), correlations between post-test scores and reading ability for all three instructional conditions were developed to investigate these hypotheses in more depth. Table 7 presents the tabulations of the Pearson Product-Moment Correlation and the results of a subsequent t-test of those correlations.

Table 7

Pearson Product-Moment Correlation Coefficient Between the Multimedia, Regular, Control Instruction Conditions Post-test Scores and Reading Quotients

Instructional Condition	r	r^2	n	Critical Values
Multimedia Instruction	.06	.004	15	.85
Regular Instruction	.62	.384	16	.01
Control w/o Instruction	.35	.123	28	.10

Analysis of that data showed no significant difference between reading and the MI, and no significant difference between reading and the C. The RI condition, however, yielded a correlation coefficient of .62, which was significant at alpha = .05. This analysis suggests that 38 percent of the variability of post-test performance scores was accounted for by reading scores.

Summary

In summary, the analysis of data indicated that group assignment (MI, RI, C) in this study did have a confounding effect on pre-test scores. Thus, it was necessary to utilize the pre-test scores as a covariate in further data analysis.

Through the use of the pre-test scores as a covariate, a significant difference was found between the type of instructional condition (MI, RI, C) and post-test performance scores. However, additional analysis (Scheffé's S-Method) showed that the differences lay between the two instructional conditions (MI and RI) and the control group receiving no instruction (C). Differences between the MI and RI were not significant, which was the major thesis of this study.

A variety of correlations were performed between reading and post-test performance scores. A significant correlation between reading and post-test scores for students receiving the regular instruction was found (.62).

A discussion on the analysis of data along with the writer's conclusions and suggestions for future research in this area are contained in Chapter V.

CHAPTER V

CONCLUSIONS, DISCUSSION AND SUGGESTIONS FOR FUTURE RESEARCH

How to provide a successful educational learning experience for the Intellectually Exceptional student in driver education has proven to be a difficult task for both driver and special education teachers. Some of the major reasons are:

1. the difficulties of handicaps such as low intelligence, poor reading ability, lack of personal attention by driver education teachers, etc. that the IE student faces in learning the classroom material when he/she is integrated with the regular high school student;

2. the special help that IE students require with course materials cannot be met by the driver education teacher usually because the teacher is not qualified to help, and is sometimes unable to understand the IE students' difficulties; and

3. driver education textbooks and other resources are most often developed for the intellectually normal student, making the material to be learned an extremely difficult task for the IE.

Typically, IE students are performing substantially below the grade norms of average intelligence students and are generally required to repeat the classroom phase of a driver education program in order to successfully complete the program objectives. Investigations into driver education programs for the IE student (6, 17, 23, 29) indicated that IE students do not perform as well as normally achieving students because the IE student required a "special" or "tailor-made" driver education curriculum.

In order to investigate this idea, three groups of students identified as Intellectually Exceptional were assigned to three different instructional conditions: multimedia instruction (MI), regular instruction (RI), and a control group receiving no instruction (C).

Of major interest to the writer was an answer to the question: Do students receiving multimedia instruction (MI) perform better than students receiving regular instruction (RI)?

The multimedia instructional condition, consisting of 30 hours of instruction, was administered to 17 randomly-assigned IE students. The resular instructional condition, consisting of 30 hours of lecturing, limited use of visuals and limited use of group interaction teaching techniques, was administered to 18 randomly-assigned IE students. Due to attrition during the study period, the MI group numbered 15 students and the RI group numbered 16 students when the instructional conditions were completed. The control group (C) consisted of students with the same general academic ability as the MI and RI students. Ninety IE students in all were identified by the school guidance counsellor as being eligible to participate in this study. Of this group, 28 were randomly selected using a table of random numbers, and were assigned to the control group. A control group population of 28 was chosen because that is the average class size at Highland Park High School.

Aside from the main question -- Do students receiving MI perform better than students receiving RI? -- the writer wanted to investigate

in this study the relationship between student reading scores and their post-test performance scores for each instructional condition (MI, RI, C).

Based upon the questions under study in this investigation, the following null hypotheses were selected for statistical analysis:

1. Group assignment to each instructional condition (multimedia instruction (MI), regular instruction (RI), control group receiving no instruction (C)) will not have an effect on pre-test performance scores.

2. The type of instructional condition (MI, RI, C) will not have an effect on post-test performance scores.

3. No relationship exists between reading scores and post-test performance scores for students receiving the multimedia instructional condition (MI).

4. No relationship exists between reading scores and post-test performance scores for students receiving the regular instructional condition (RI).

5. No relationship exists between reading scores and post-test performance scores for students receiving the no instructional condition (C).

Conclusions

The following are conclusions based on the null hypotheses tested.

Hypothesis I

Group assignment to each instructional condition (MI, RI, C) will not have an effect on pre-test performance scores.

Result: The results of the One-Way Analysis of Variance (ANOVA) showed there was a significant difference. Hypothesis I was, therefore, rejected. Since a significant difference did exist, this suggested that pre-test scores may have

confounded the effects of the instructional conditions on post-test performance scores. Thus, pre-test scores were utilized as a covariate in testing Hypothesis II.

Hypothesis II

The type of instructional condition (MI, RI, C) will not have an effect on post-test performance scores.

Result: Hypothesis II was tested using an Analysis of Covariance (ANCOVA) and rejected. Therefore, it can be interpreted that the post-test scores were significantly different for the instructional conditions (MI, RI, C).

Because the ANCOVA does not suggest where specific differences lie, a post-hoc comparison (Scheffé's S-Method) was used to compare the means between types of instructional conditions.

Result: Comparisons between the two instructional conditions (MI and RI) were each significantly different than the control group receiving no instruction (C). Comparisons between the MI and RI showed that there was no significant difference.

The following three hypotheses were analyzed by means of a significant test on the Pearson Product Moment correlation coefficient. The test statistic, in this instance, was a student t-distribution with n-2 degrees of freedom.

Hypothesis III

No relationship exists between reading scores and post-test performance scores for students receiving the multimedia instructional condition (MI).

Result: Hypothesis III was not rejected. That is, there was no significant correlation between reading scores and post-test multimedia instruction scores.

Hypothesis IV

No relationship exists between reading scores and post-test performance scores for students receiving the regular instructional condition (RI).

Result: Hypothesis IV was rejected. There was a significant correlation between reading scores and post-test regular instruction scores.

Hypothesis V

No relationship exists between reading scores and post-test performance scores for students receiving the no instructional condition (C).

Result: Hypothesis V was not rejected. There was no significant correlation between reading scores and the post-test scores for the control group receiving no instruction.

Discussion

There were two basic research questions addressed in this study. One question was concerned with the effects that three different instructional conditions (MI, RI, C) would have on student performance test scores. The second question was concerned with the relationship between reading ability and student performance test scores for each of the three instructional conditions.

Studies investigating the use of teaching machines that utilized primarily multimedia materials (filmstrips, 35mm slides, motion pictures, etc.) have suggested that students generally show more achievement in terms of knowledge gained than students who are placed in regular classroom programs (10, 14). It seemed plausible to this writer that if students who were identified as Intellectually Exceptional could have the benefits of learning the concepts of driver education using a multimedia format, they would be able to comprehend the material satisfactorily and obtain higher performance scores than IE students who receive a regular driver education program.

The results of this study indicated that students receiving this multimedia instructional program did not perform any better than did students receiving the regular driver education program. One possible explanation for this may be the small cell sizes of the MI and RI, 15 and 16 respectively. Perhaps larger sample sizes would indicate that true differences do exist. Also, because there were no differences shown between the MI and RI, the multimedia system itself may be an inefficient means of instructing IE students. Perhaps modifications in the multimedia system would be appropriate, i.e., reproduction of the program narrative tracks into the IE's verbal understanding level.

Finally, one possible reason why no differences are indicated between the MI and RI groups might be attributed to the fact that some individuals in each group actually regressed, as indicated by their post-test scores. This could be a result of the type of testing procedure used, namely, a verbal evaluation. The use of situational diagrams, behavioral measurements, etc. may be a more accurate criteria to use when measuring student achievement.

It was expected that there would be a significant difference between the MI and C, and RI and C because the control group (C) did not receive any instruction. The results suggested that some instruction was better than no instruction at all, as measured by the driver knowledge test.

The relationship between post-test performance scores and reading ability for all three instructional conditions (MI, RI, C) showed a significant correlation between the RI and reading (.62).

Correlations for MI and reading, and C and reading were .06 and .35 respectively. One can only speculate, based on these correlations, the following:

1. Students assigned to a regular driver education program most likely should have a reading level that coincides with the readability level of the instructional materials. In this study, the instructional materials used for the RI were written at a grade 10 readability level.

2. Students who generally possess a lower reading level than that used in the driver education instructional materials (grade level 8 to 10) would most likely succeed in learning the driver education material if they were assigned to a driver education program that utilizes multimedia instruction. In this study, a significant relationship between the MI reading ability and post-test performance was not evident. This suggests that students who receive a multimedia program are not handicapped because of their reading ability.

Suggestions for Future Research

Based on the summary of findings in this research, the following suggestions are offered:

1. Because the mean scores for the MI (43.53) and RI (43.81) groups were in close proximity to each other, this writer recommends that the study be replicated using larger sample cell sizes. It is recognized in research that larger sample sizes allow for a more accurate measure of the statistical hypotheses being tested.

2. The literature suggested that IE students spend about 20 hours covering the introductory units with a special education teacher prior to the beginning of formal instruction in driver education. It further suggested that an IE driver education program should be extended in duration so that the IE can master the course content (6, 16). This writer believes that these recommendations are not valid as stated.

The IE's in this study received 30 hours of classroom instruction only, and both the MI and RI approximated an average passing score of 73 percent (based on 100 percent).

This writer recommends that future research explore the differences in performance scores (pre-post-test) of IE's learning driver education through a multimedia mode and non-IE's learning driver education through a multimedia mode. The same exploratory study should be done with IE's learning through a regular instructional condition and non-IE's learning through a regular instructional condition. It is the belief of this writer that insufficient thorough examination of IE versus non-IE learning ability as it relates to driver education has been performed to date.

3. This study specifically looked at the IE's performance scores in the classroom phase of driver education. The IE's performance was measured by a paper and pencil test. It may be that more significant research should focus on the actual driving skills of IE students. Research into measuring the performance of on-street driving skills of IE's in a multimedia instructional condition versus IE's learning in a regular instructional condition would contribute a great deal to the overall understanding of driver education and the Intellectual Exceptional student.

4. The use of multimedia is an expensive proposition for most schools when compared to purchasing textbooks, etc. Future research should inquire into developing driver education reading materials (textbooks) aimed at the IE's reading level and then testing these materials against a multimedia instructional condition, using IE students to determine if written materials are equal or better than a multimedia program.

5. Future research needs to look at the relationship between student Intelligence Quotients and driver education. The major concern of such research should address the following question: What is the minimum Intelligence Quotient that a person can have and still be licensed by law to operate an automobile? In today's society, driving laws exist which require licensing re-examination for persons over the age of 65. Also, driving laws exist which regulate driver licensing applications to persons over the age of 16 years. There are laws governing the driving of an automobile for persons with special medical conditions (epilepsy, etc.). The question arises: Is there a need for regulations related to a person's I.Q.?

6. Most driver education instructional materials (textbooks, films, filmstrips, etc.) are developed for students with average intelligence and reading ability. This writer recommends that a multimedia system such as that used in this study be developed solely for the use of instructing IE students. Attention should be given to developing narrative tracks, visuals, etc. that are easily understood and comprehended by these students.

In summary, the New York Times, July 18, 1952, quoted J. S. Baker as saying that "Morons Make Best Driver" because they devote their primary attention to the driving task whereas intellectually superior people think of everything else except driving. Mr. Baker may have spoken the truth, but a great deal of scientific investigation must be carried out in the future to truly verify his belief.

LIST OF REFERENCES

LIST OF REFERENCES

1. Aaron, James E. and Marland K. Strasser. Driving Task Instruction. New York: Macmillan Publishing Co. Inc., 1974.

2. An Abstract of Pertinent Research Related to EDEX Education Systems. Mountain View, California: EDEX Corporation, pp. 5-6. Citing Otis E. Lancaster. "MARI: Motivator and Response Indicator," I.R.E. Transactions on Education, December, 1961.

3. _____. Citing Delbert Barcus, John L. Hayman, and James T. Johnson, Jr., "Programmed Instruction in Elementary Spanish," Phi Delta Kappan. March, 1963.

4. _____. Citing Charles Bridgeman. "A Lecture Response Device: A Preliminary Report on a Key Aspect of a Coordinated Teaching Program in Anatomy," Journal of Medical Education. February, 1964.

5. _____. "Report on EDEX-APD Training for the Internal Revenue Service," ("no date"), p. 13.

6. Allard, Roger and Dennis Kostyla. A Report of a Program in Special Education/Driver Education. Department of Education, Rhode Island, 1973.

7. Campbell, Donald T. and Julian C. Stanley. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally College Publishing Company, 1973.

8. Cantor, G. H. and C. L. Stacey. "Manipulative Dexterity in Mental Defectives," American Journal of Mental Deficiency. LVI, 1951, pp. 401-410.

9. Carter, Lamore J. and others. "A Comparative Study of the Effectiveness of Three Techniques of Film Utilization in Teaching a Selected Group of Educable Mentally Retarded Children Enrolled in Public School in Louisiana," Louisiana: Grambling College, 1960.

10. Collins, Edwin M., Earl C. Collard and Deryck R. Kent. "Programmed Group Instruction in Dental Education," Journal of Dental Education, XXXI, No. 4, ("no date"), pp. 511-512.

11. Cook, Dean R. "Multimedia - A New Classroom Concept," CALDEA Calendar. XV, No. 2 ., October, 1967, p. 24.

12. Davis, R., Lawrence T. Alexander and Stephen L. Yelon. Learning System Design. East Lansing, Michigan: Michigan State University, 1972.

13. Dick, W., P. F. Merril and H. F. O'Neil, Jr. New Directions in Learning. Annual Progress Report, W. Dick, H. Lippert and D. Hausen. Tallahassee, Florida: Florida State University, CAI Center, 1969.

14. Drawbaugh, Charles C. "Evaluating the Concept of Mobile Police Training," The Police Chief. August, 1968, p. 60.

15. Driscoll, John. "Educational Films and the Slow Learner," Mental Retardation, VI, No. 1, February, 1968, pp. 32-34.

16. _____. "The Effects of Mental Retardation on Film Learning," California University, Los Angeles Office of Education (HDEW, Washington, D.C.), 1960.

17. Driver Education-Special Education Workshop - A Report, Michigan Department of Education, State of Michigan, U.S.A., 1968.

18. EDEX Educational System, Driver Education Services D-A, Aetna Life and Casualty, What is Multimedia? Hartford, Connecticut, ("no date").

19. Education of Exceptional Children. Ministry of Education, Province of Ontario, Canada, Identification No. 74-75/4142.

20. Egan, R. "Should the Educable Mentally Retarded Receive Driver Education?" Exceptional Children. XXXIII, No. 5, January, 1967, p. 323.

21. Flesch, R. "A New Readability Yardstick," Journal of Applied Psychology, June, 1948.

22. Glass, G. V. and J. C. Stanley. Statistical Methods in Education and Psychology. New Jersey: Prentice-Hall, Inc., 1970.

23. Gutshall, Robert W. "An Exploratory Study of the Interrelations Among Driving Ability, Driving Exposure and Socio-Economic Status of Low, Average and High Intelligence Males." Unpublished doctoral dissertation, East Lansing, Michigan: Michigan State University, 1967.

24. _____. "Can He Be Taught to Drive"? Safety Education. November, 1963, p. 31.

25. Herbert, Evan. "A Special Report on Technology for Education," International Science and Technology, August, 1967, p. 31.

26. Highway Traffic Act, Province of Ontario, August, 1975.

27. Howe, C. E. "A Comparison of Motor Skills of Mentally Retarded and Normal Children," Exceptional Children. XXV, 1959, pp. 351-354.

28. I.P.D.E. Response Series, Driver Education Services D-A, Aetna Life and Casualty, How Can You Develop Decision-Making Drivers? Hartford, Connecticut, ("no date").

29. Kahn, Charles H. "Teaching Driver Education to Mentally Retarded Adolescents," Exceptional Children. XXII, No. 8, May, 1956, pp. 17-19.

30. Key, N. Status of Driver Education in the United States. National Education Association, National Commission on Safety Education, Washington, D.C., 1966.

31. Kirk, R. E. Experimental Design: Procedures for the Behavioral Sciences. Belmont, California: Brooks/Cole, 1968.

32. Kirk, Samuel A. Educating Exceptional Children. Boston: Moughton Mifflin Company, 1962.

33. Manual on Uniform Traffic Control Devices. U.S. Department of Transportation, Federal Highway Administration, U.S. Government Printing Office, Washington, D.C., 1970.

34. McKnight, J. and B. B. Adams, Driver Education Task Analysis. Vol. I: Task Descriptions. Human Resource Research Organization. Final Report on Contract NHTSA-FH-11-7336, November, 1970.

35. _____. Driver Education Task Analysis. Vols. I-V. Human Resource Research Organization, Final Report on Contract NHTSA-FH-11-7336, March, 1971.

36. McPherson, Kenard and Francis C. Kenel. "Perception of Traffic Hazards: A Comparative Study," Traffic Safety Research Review. XII, No. 2, June, 1968, pp. 46-49.

37. Nelson, M. J. The Nelson Reading Test. Revised Edition, Grade 3-9, Boston: Houghton Mifflin Company, 1962.

38. Nineteenth Annual Driver Education Achievement Program, Insurance Institute for Highway Safety, Washington, D.C., 1966.

39. Noe, Clarence. "Driver Education for Exceptional Children," Quarterly Journal of the California Driver Education Association. XVI, No. 3., 1969, pp. 13-14.

40. Pollock, W. T. and T. L. McDole. Development of a National Item Bank for Tests of Driving Knowledge. Highway Safety Research Institute, Ann Arbor, Michigan: University of Michigan, September, 1973.

41. _____. Handbook for Driving Knowledge Testing. Highway Safety Research Institute, Ann Arbor, Michigan: University of Michigan, January, 1974.

42. Report of the Ministry's Task Force on Driver Education. Ministry of Education, Province of Ontario, Canada, 1974.

43. "Something New in Safety," EDEX Teaching Systems. EDEX Corporation, Mountain View, California, ("no date"), p. 2.

44. Stack, H. J. History of Driver Education in the United States. National Education Association, National Commission on Safety Education, Washington, D.C., 1966.

45. Teachers Guide for Use with 30 Video Tape or Film Lessons in Driver and Traffic Safety Education. Church Falls, Virginia: American Automobile Association, 1967.

46. Teachers Manual for the Driver Education Instruction Programme in Ontario Secondary Schools. The Ontario Ministry of Transportation and Communications, August, 1973.

47. Thompson, Mary Martha and George M. Faibish. "The Use of Filmstrips in Teaching Personal Hygiene to the Moderately Retarded Adolescent," Education and Training of the Mentally Retarded. V, No. 3, October, 1970, pp. 113-118.

48. Uniform Vehicle Code and Model Traffic Ordinance. National Committee on Uniform Traffic Laws and Ordinances, Revised Edition, Charlottesville, Virginia: The Michie Company, 1968.

GENERAL REFERENCES

GENERAL REFERENCES

Borg, R. Walter and Meredith D. Gall. Educational Research - An Introduction. 2nd Edition, New York: David McKay Company, Inc., 1971.

Ebel, Robert L. Essentials of Education Measurement. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

Lewis, Terman M. and Maud A. Merrill. Stanford-Binet Intelligence Scale - 1972 Norms Edition. Boston: Houghton Mifflin Company, 1973.

Slonim, Morris James. Sampling. New York: Simon and Schuster, 1960.

Terrace, Herbert and Scott Parker. Psychological Statistics. San Rafael, California: Individual Learning Systems, Inc., 1971.

Wechsler, David. The Measurement of Adult Intelligence. Baltimore: The Williams and Wilkins Company, 1944.

APPENDICES

APPENDIX A

EDEX EDUCATIONAL PROGRAM CONTENT DESCRIPTION

Title	Content Description
THE CHALLENGE OF TRAFFIC	This introductory unit is designed to instill in the student an increased awareness of the importance of good driving habits and to motivate the student to active personal involvement in traffic safety efforts. From the detailed analysis of a typical traffic accident, within the experience range of most teenagers, a rationale is established for including the student's thinking along the lines of the more general economic, social and political implications of the total traffic problem. In spite of its deceptive simplicity, driving is demonstrated to be a complex developmental skill that is best acquired through formal driver education.
PSYCHOPHYSICAL FACTORS	This unit is designed to develop an increased awareness of the psycho-physical factors relating to safe driving, to develop the student's ability to assess his psychophysical characteristics and to assist him in correcting and/or compensating for recognized deficiencies.
SOCIAL PRESSURES	This unit is designed to create an awareness of social pressures impinging upon the individual, to explain how these pressures operate, and to re-emphasize the individual driver's crucial role in the accident chain.

ATTITUDES AND EMOTIONS	This unit is designed to provide each student with a basic knowledge of personality dynamics and introspective insight into his subjective expectations and behavioral tendencies.
FORCES OF NATURE I	This unit is designed to provide the student with an understanding and appreciation of the natural phenomenon of gravity, friction and centrifugal force and to develop techniques for driving in accordance with their natural laws.
FORCES OF NATURE II	This unit is designed to develop an understanding and appreciation of the natural laws relating to the energy developed by a moving vehicle - kinetic energy.
RULES OF THE ROAD	It is the obligation and responsibility of every driver to understand and appreciate the purposes and functions of the basic rules of the road and to drive in accordance with them. The general objective of this unit is to prepare students to accept and discharge these obligations and responsibilities.
SIGNS OF LIFE	The general purpose of this unit is to acquaint the student with the shape, color and other characteristics of the traffic control devices and to develop skill in interpreting and responding to these devices in traffic situations.
GETTING READY TO DRIVE	This unit introduces the phase of the course that focuses on the operation of the automobile. In this unit, the student is expected to learn the position, function and use of each of the instruments and switches in the driver's compartment of a typical automobile. Also, the student is expected to become proficient in using these devices to evaluate the operating condition of the vehicle and to operate and maintain it efficiently and effectively.

LEARNING BASIC SKILLS	Good form in basic skills develops from an understanding and appreciation of the sequence of steps involved in complex performance and intensive, disciplined, purposeful practice in translating such understanding into efficient habit patterns. The development of a thorough understanding and appreciation of the sequence of steps involved in basic driving skills is the objective of this unit.
PRECISE MANEUVERS	This unit extends the use of manipulative skills into the area of precise maneuvering. Emphasis is focused on the functional relationship between skill and judgment in the execution of complex traffic maneuvers. Therefore, this unit provides a transitional bridge between the learning of manipulative skills and the development of refined driving techniques.
CITY DRIVING	This unit focuses on the issues involved in blending in the stream of traffic, anticipation of potential hazards and recognition of developing traffic patterns. Its aim is to achieve an effective integration of skills and knowledge and, hence, the development of the attitudes and judgments prerequisite to safe driving.
THE OPEN ROAD	The higher speeds of the highway and expressway require the student to adapt the basic skills of city driving to the quicker pace of the open road. This unit is designed to provide the student with the knowledge, skills and attitudes necessary for sound judgment and efficient performance in driving on highways and expressways.

DEFENSIVE DRIVING	This unit is designed to develop increased alertness and attention to potential hazards, facility in perceptual skills necessary to identify clues to danger, and the ability to anticipate the relative importance of each clue and to take compensatory defensive action in coping with potential highway hazards. The ultimate objective is to integrate previously acquired knowledge and skill with tendencies toward cooperation, caution and competent application of strategy in traffic behavior.
DRIVING EMERGENCIES	The objective of this unit is to provide the student with the knowledge necessary for quick accurate responses when faced with common driving emergencies.
ADVERSE DRIVING CONDITIONS	This unit is designed to provide the student with concepts and procedures needed to cope with common adverse driving conditions, because adaptive behavior is the key to driving efficiency.
THE RESPONSIBLE DRIVER	The purpose of this unit is to develop an understanding and appreciation of the personal, social and economic responsibilities a driver assumes in exercising the privilege to drive, and to develop in the student an increased tendency to accept and behave in accordance with the adult role driving imposes.
MISSING LINKS	This unit is designed to provide an integrated overview of basic concepts covered within the course and to assess the student's ability to critically apply these concepts to practical traffic problems.

IPDE RESPONSE SERIES CONTENT DESCRIPTION

Title	Content Description
STRATEGY FOR DRIVING	Is the introductory unit which defines and conceptualizes the driving task as a decision-making process through the use of the IPDE model. The IPDE model is then applied throughout the series.
IDENTIFY AND PREDICT	Involves perceptual training in the identification of critical objects and figures and the predictions associated with them.
ISOLATE AND STABILIZE	Describes and demonstrates the techniques of isolating the vehicle from potential conflict and stabilizing it in various traffic formations.
COMPROMISE AND SEPARATE	Illustrates and explains the strategies of separating risks and making appropriate compromises in the driving environment.
PRINCIPLES OF PASSING	Relates the IPDE model and sub-strategies to the tasks of overtaking and passing other vehicles in a variety of environments. Principles are established and defined for making critical passing decisions.
JOINING AND LEAVING TRAFFIC FORMATIONS	Applies the logical extension of the IPDE model and the sub-strategies of isolating and stabilizing to the relationships of time and space when faced with merging or crossing traffic.

EVALUATING EXPRESSWAY DYNAMICS	Discusses the peculiar dynamics of expressway formations in terms of the IPDE model and sub-strategies. The evaluations and interactions with the distinctive environments of modern highways are stressed.
REACTING TO EMERGENCIES	Describes and demonstrates procedures that deal with minimizing vehicle and driver failure. Emphasis is placed on emergency situations which require semi-automatic response.
IMPEDIMENTS TO VISION AND CONTROL	Is designed to increase the student's ability to identify adverse environmental factors and to execute compensatory actions, thus minimizing hazards in accordance with limitations of existing conditions.
VEHICLE/ROADWAY INTERACTIONS	Demonstrates various techniques for predicting and identifying variations in frictional grip between tires and roadway. Kinetic energy, centrifugal force and gratitational variables are described and illustrated as a basis for structuring driving decisions. Braking distances and force of impact are functionally related to the variables of speed, friction and executional technique. The function of restraining devices is also demonstrated.
MAN-MACHINE INTERACTIONS	Analyzes psychophysical prerequisites and limitations to effective driving. Visual activity, depth perception, field of vision, glare recovery, kinesthetic feedback and reaction are all related to the driving tasks. The relations of speed, bio-feedback and input overload are also demonstrated. Temporary and permanent impairment to driver performance are discussed and corrective and/or compensatory measures are demonstrated.

UNDERSTANDING AND CONTROLLING DRIVER BEHAVIOR	Will assist the student in recognizing the influences of his own personality on his driving behavior. The IPDE model is used to demonstrate the means for arriving at appropriate behavior.
PERSONALITY AND PERCEPTION	Helps the student to recognize his personality traits which affect his perceptual discrimination and provides methods with which to deal with traits that might have adverse affects. This unit is important since personality strongly influences the way we perceive things.
PERSONAL/SOCIAL INTERACTIONS	Discusses the behavior influences of consequences, associates and self on the driving task. The consequences of reaching decisions without all the necessary information are graphically illustrated.
DRINKING AND DRIVING	Describes the effects of alcohol on the functions of identification, prediction, decision and execution. Considered here are factors and consequences relating to the decision to drink.
DRUGS AND DRIVING	Deals with the effects of drugs such as uppers and downers on driving behavior and the psychophysical processes.
DRIVER RESPONSIBILITY	Involves the implied responsibilities of a driver when faced with an accident. Procedures for behavior at the scene of an accident are recommended.

INTERACTION WITH MOTORCYCLES	Discusses characteristics and conditions which affect motorcycle operation. This information will help the automobile driver to more accurately predict motorcyclist's behavior in response to traffic and roadway conditions, allowing him to make more accurate decisions for avoiding conflict.
GETTING YOUR MONEY'S WORTH	Explores considerations for buying a used car from the IPDE standpoint. Clues to the identification of a potential "lemon" are given along with an explanation of insurance in order to help a car buyer understand his needs. Car maintenance is considered so that the owner can maintain a safe and economical vehicle.
PUTTING IT ALL TOGETHER	Emphasizes the driver as a decision maker. Relevant variables in the traffic environment are reviewed and the generalization of the IPDE strategy is demonstrated.

APPENDIX B

INSTRUCTIONAL OBJECTIVES AND CORRESPONDING TEST ITEMS

Challenge of Traffic and a Strategy for Driving
a. Identify and Predict

OBJECTIVE: The student will choose the correct procedure for scanning the environment while driving.

TEST ITEM: When driving, you should avoid looking at any one thing for more than a few seconds.

OBJECTIVE: The student will choose the correct procedure to follow when driving through road construction areas.

TEST ITEM: You come to an area where there is road repair going on. You should watch for flagmen and instructions.

OBJECTIVE: The student will choose the correct procedure to follow while driving in a residential area.

TEST ITEM: When driving near homes, you should stop at each cross street even if there are no stop signs.

OBJECTIVE: The student will choose the correct procedure to follow when a pedestrian steps out on the street ahead of his vehicle.

TEST ITEM: A person crosses the street in the middle of the block in front of you. You should slow down and be prepared to stop.

OBJECTIVE: The student will choose the correct procedure to follow when approaching an intersection with no traffic controls.

TEST ITEM: You come to an intersection where there are no traffic controls. You should continue at the same speed and watch for traffic.

OBJECTIVE: The student will choose the correct response that indicates his understanding of the yield right-of-way rule.

TEST ITEM: At an intersection, you see a vehicle coming from the left. You should continue at the same speed, since you have the right-of-way.

OBJECTIVE: The student will choose the correct procedure to follow when approaching the crest of a hill.

TEST ITEM: When approaching the top of a hill, you should slow down because you cannot see very far ahead.

OBJECTIVE: The student will choose the correct method of reducing the noise within a vehicle while driving.

TEST ITEM: In order to be alert to sounds around your vehicle, you should keep the radio volume down.

Psychophysical Factors

a. Man-Machine Interactions

OBJECTIVE: The student will choose the correct response which indicates the necessity of knowing the order of the lights in a traffic signal.

TEST ITEM: You have a hard time telling colors apart. You should learn the order of the lights in the traffic signals.

OBJECTIVE: The student will choose the correct response which indicates the necessity of having ones eyes checked periodically.

TEST ITEM: The best way to check that your vision is good for driving is to take a vision test when you get your license.

OBJECTIVE: The student will choose the correct response which indicates the need for looking for poorly illuminated objects at night.

TEST ITEM: When driving at night, you should watch for dark or dim objects on the road.

OBJECTIVE: The student will choose the correct response which indicates the procedure to follow when meeting a car with bright lights at night.

TEST ITEM: An oncoming vehicle refuses to dim its lights at night. You should leave your headlights on high beam.

OBJECTIVE: The student will choose the correct response which indicates the technique used to compensate for tunnel vision.

TEST ITEM: You cannot see to the sides of the road very well. You should keep moving your eyes across the road.

OBJECTIVE: The student will choose the correct response which indicates the order of colors, from top to bottom, in a traffic signal.

TEST ITEM: The color of traffic signals, from top to bottom, are green - yellow - red.

OBJECTIVE: The student will choose the correct response which indicates the necessity of regular eye checkups by an eye doctor.

TEST ITEM: You should have your eyes checked every so often because your vision may fail without your knowing it.

Laws of Nature

a. Forces of Nature I and II
b. Vehicle/Roadway Interactions

OBJECTIVE: The student will choose the potential dangers of mixing rain and road oil and its effect on gripping efficiency.

TEST ITEM: If you are driving and it starts to rain, be careful since rain and road oil may create a slippery surface.

OBJECTIVE: The student will choose the correct relationship between speed and travel distance.

TEST ITEM: As your speed increases, the distance you travel after applying your brakes depends on the skill of the driver.

OBJECTIVE: The student will choose the appropriate response that indicates the relationship between turning and stopping to rainy road conditions.

TEST ITEM: You should be most careful when turning or stopping during the first half-hour of rain.

OBJECTIVE: The student will choose the appropriate response that indicates how different road surfaces can affect friction.

TEST ITEM: A paved road surface tends to be more slippery at an intersection.

OBJECTIVE: The student will choose the appropriate response that indicates the relationship between cornering and speed as it relates to slippery roads.

TEST ITEM: When driving on a slippery road, you should not make quick turns.

OBJECTIVE: The student will choose the appropriate response that shows the relationship of centrifical force and vehicle cornering.

TEST ITEM: When driving around a curve, your vehicle will tend to move to the inside of the curve.

OBJECTIVE: The student will choose the appropriate response that indicates how speed is best controlled while cornering a vehicle.

TEST ITEM: You find that you are going through a curve too fast. You should shift into a lower gear.

OBJECTIVE: The student will choose the appropriate response that indicates the proper procedure to take before descending a steep hill.

TEST ITEM: Before going down a long, steep hill, you should test your brakes and shift into a lower gear.

OBJECTIVE: The student will choose the appropriate response that indicates his understanding of speed control while descending a hill.

TEST ITEM: Your vehicle continues to speed up while going downhill. You should use your parking brake.

OBJECTIVE: The student will choose the appropriate response that indicates the correct procedure for braking while descending a hill.

TEST ITEM: While going down a hill, you should try to keep a constant speed.

OBJECTIVE: The student will choose the appropriate response that represents an average person's reaction time.

TEST ITEM: To react, think, and apply brakes under good conditions, it takes the average driver 3/4 of one second.

OBJECTIVE: The student will select the correct response that represents the most effective device in a car for protecting passengers from injuries.

TEST ITEM: The most effective device for protecting passengers when in an accident is safety door latches.

OBJECTIVE: The student will select the appropriate response that indicates the part of the human body that can be injured by using a shoulder belt.

TEST ITEM: A shoulder belt will be least helpful in preventing you from hitting the dashboard or windshield.

OBJECTIVE: The student will choose the appropriate response that indicates the relationship between speed and stopping distances.

TEST ITEM: If you double your speed, it will take about two times the distance to stop.

Rules of the Road

OBJECTIVE: The student will choose the appropriate response that indicates proper lane positioning on roads with no pavement markings.

TEST ITEM: There are no painted lines on the road. You should drive as if there were lines.

OBJECTIVE: The student will choose the correct response that indicates the right-of-way rule for simultaneous arrival at uncontrolled intersections.

TEST ITEM: You and another vehicle reach an intersection at the same time. The vehicle on the larger road has the right-of-way.

OBJECTIVE: The student will choose the correct response that indicates the right-of-way rule for vehicles entering a street from a driveway or alley.

TEST ITEM: When entering a highway from an alley or private drive, you must yield to all approaching vehicles.

OBJECTIVE: The student will choose the correct response that indicates right-of-way rule when a vehicle is turning at a crosswalk of an uncontrolled intersection.

TEST ITEM: You are turning at a crosswalk where there are no traffic control signals. You should proceed with your turn because you have the right-of-way.

OBJECTIVE: The student will choose the correct response that indicates the proper signalling of intentions for a sudden reduction in speed.

TEST ITEM: You have to slow down quickly or make a sudden stop. You should signal to the vehicles behind you if possible.

OBJECTIVE: The student will choose the correct response that indicates the correct procedure for turning at intersections when traffic control devices are present.

TEST ITEM: When turning at an intersection, you must follow the directions given by the traffic control devices.

OBJECTIVE: The student will choose the correct response which indicates knowledge of the basic speed law.

TEST ITEM: You should always drive at a safe and reasonable speed.

OBJECTIVE: The student will choose the correct response that indicates the first consideration before passing a vehicle.

TEST ITEM: Before passing another vehicle, you should first judge the distance available for passing and how fast you are approaching the other vehicle.

OBJECTIVE: The student will choose the correct response which indicates when passing is permitted on a two-lane road.

TEST ITEM: On a two-lane road, you should pass only when there is a solid line to the left of your lane.

OBJECTIVE: The student will choose the correct response that indicates a correct judgment after deciding to pass on a two-lane road.

TEST ITEM: You decide to pass on a two-lane road. You should judge the distance to the first oncoming vehicle.

OBJECTIVE: The student will choose the correct response that indicates the proper use of the center lane on a three-lane road.

TEST ITEM: The middle lane on a three-lane road is for passing and turning left.

OBJECTIVE: The student will choose the correct response that indicates the appropriate decision of when to return to the right side of the road after passing.

TEST ITEM: When passing a vehicle, you should return to the right side of the road when the other driver signals you to do so.

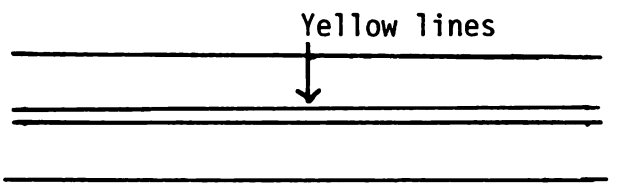
OBJECTIVE: The student will choose the correct response that indicates a warning to the driver that has just been passed that the passing vehicle is returning to the right lane.

TEST ITEM: Before pulling in front of a vehicle you have just passed, you should put on your signal.

Signs and Pavement Markings

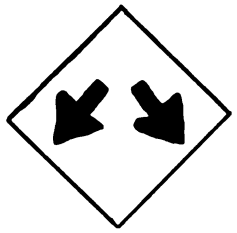
OBJECTIVE: Given different types of pavement markings, the student will indicate the proper traffic movement associated with each.

TEST ITEM: These lane lines mean changing lanes is permitted if done with care.



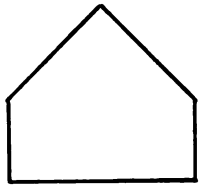
OBJECTIVE: Given a variety of warning signs, the student will state their meaning.

TEST ITEM: This sign means divided road ahead, keep right.



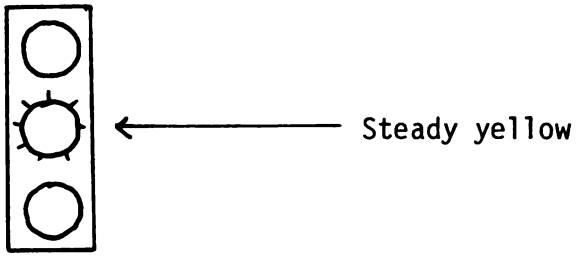
OBJECTIVE: The student will identify traffic signs according to their shape.

TEST ITEM: The message on this sign might be school crossing.



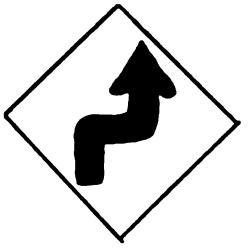
OBJECTIVE: The student will identify traffic signals according to their driver action.

TEST ITEM: This traffic signal means stop before entering the intersection if you can safely do so.



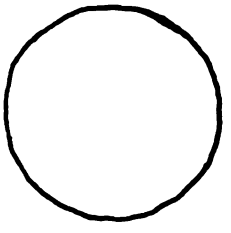
OBJECTIVE: The student will identify traffic signs according to their driver action.

TEST ITEM: This sign means slow down and prepare to turn to the right and then to the left.



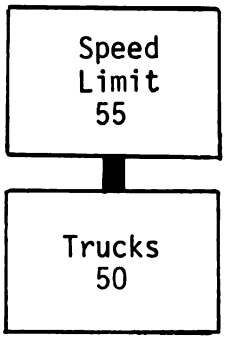
OBJECTIVE: Given a variety of symbols of traffic signs, the student will identify traffic signs according to their symbols.

TEST ITEM: The shape of this sign indicates stop.



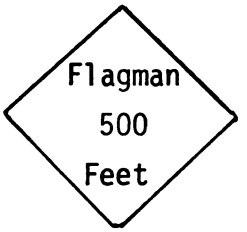
OBJECTIVE: The student will identify the meaning of regulatory signs.

TEST ITEM: When you see this sign, you should not drive faster than 50 miles per hour if you are driving a truck.



OBJECTIVE: The student will state the meaning of construction signs.

TEST ITEM: When you see this sign, you should slow down and be prepared to stop.



OBJECTIVE: The student will explain the purpose of roadside delineators.

TEST ITEM: Reflectors on the road and curb are used to help you stay in the correct position on the road.

Basic Skills and Parking Maneuvers

OBJECTIVE: The student will choose the correct response which indicates the proper procedure for pulling away from the curb.

TEST ITEM: You are about to drive away from the curb. You should signal, yield right-of-way and pull into the street.

OBJECTIVE: The student will choose the correct response that indicates the location of the blind spot for the vehicle being passed.

TEST ITEM: When passing a vehicle, you should remember that the other driver will not be able to see you when you are directly behind his vehicle.

OBJECTIVE: The student will choose the correct response which indicates incorrect focus point.

TEST ITEM: It is unsafe to look on the road just in front of the hood.

OBJECTIVE: The student will choose the correct response that indicates when to slow down for right and left turns.

TEST ITEM: You should slow down for a right or left turn as you are going around the turn.

OBJECTIVE: The student will choose the correct response which indicates the first step to execute before moving to the left lane.

TEST ITEM: When moving into the left lane, you should first check your blind spot.

OBJECTIVE: The student will choose the correct response which indicates the correct timing for release of the starter switch.

TEST ITEM: When using the starter switch, you should release it slowly and gradually.

OBJECTIVE: The student will choose the correct response which indicates the first step of the pre-ignition procedure.

TEST ITEM: Before starting the engine, you should adjust the driver's seat.

OBJECTIVE: The student will choose the correct response which indicates the proper adjustment of the outside rearview mirror.

TEST ITEM: You should set your left outside mirror so that you just see the left edge of the car when you are sitting in the seat.

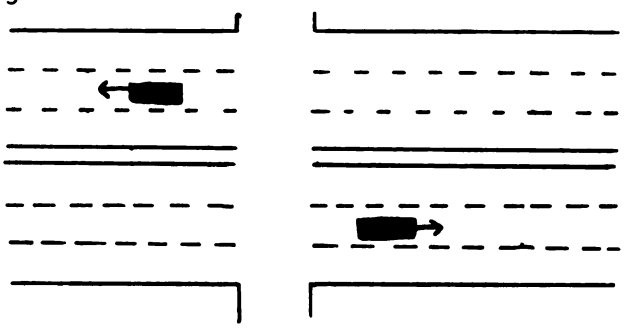
OBJECTIVE: The student will choose the correct response which indicates the proper adjustment of the inside rearview mirror.

TEST ITEM: The inside rearview mirror should be set to see the top of the trunk.

Driving in City Traffic

OBJECTIVE: Given a diagram of a multiple lane road, the student will indicate what lane to travel in when he is planning on going a long distance without turning.

TEST ITEM: On this six-lane road, these two lanes should be used by through traffic.



OBJECTIVE: The student will choose what lane he should travel in when driving on multiple lane roads.

TEST ITEM: You should drive in the right lane of a six-lane highway when you want to pass other vehicles on the highway.

OBJECTIVE: The student will choose the most appropriate time interval when following a vehicle.

TEST ITEM: When driving, you should stay at least 3/4 of a second behind the vehicle in front of you.

OBJECTIVE: The student will select the proper vehicle positioning for making a right turn at an intersection.

TEST ITEM: When you want to turn right at an intersection, you should drive close to the right hand side of the road.

OBJECTIVE: The student will select the correct response for a hand signal to the left.

TEST ITEM: The hand signal for a left turn is putting the arm straight out.

OBJECTIVE: The student will select the correct response for a hand signal to the right.

TEST ITEM: The hand signal for a right turn is to hold the arm and hand up.

OBJECTIVE: The student will choose the correct response that indicates the types of signal apparatus that may be used for signalling his turns.

TEST ITEM: To legally signal for a turn, you must use mechanical signals.

OBJECTIVE: The student will choose the correct visual procedure to follow when approaching an intersection.

TEST ITEM: When making a right turn, you should always check the road that you are turning onto for vehicles.

OBJECTIVE: The student will indicate the procedure to follow when approaching an intersection that is controlled by a police officer and a signal light.

TEST ITEM: You come to an intersection where there is a traffic light and a traffic officer. You should obey the traffic signal.

OBJECTIVE: The student will choose the best method for avoiding a collision with other vehicles crossing his path of travel.

TEST ITEM: Where traffic enters or crosses the road, it is best to speed up to pass that area quickly.

OBJECTIVE: The student will choose the procedures for joining traffic while pulling away from a curb.

TEST ITEM: If you are about to drive away from the curb, you should signal, yield right-of-way and pull into the street.

OBJECTIVE: The student will choose the most logical method to use when following vehicles that stop frequently (buses, delivery vans) in order to avoid conflicts.

TEST ITEM: When you are following vehicles which often stop (buses, big trucks, post office vans), you should wait until they turn off the road before passing them.

OBJECTIVE: The student will choose the kinds of vehicle behavior that may exist at uncontrolled intersections.

TEST ITEM: At intersections with no traffic controls, you should expect the vehicle in front of you to continue at normal speed.

OBJECTIVE: The student will choose the correct condition which would warrant a change of lane.

TEST ITEM: The first thing to do if the vehicle in front signals or puts on its brakes is to change lanes.

OBJECTIVE: The student will choose the correct following distance to maintain before passing another vehicle.

TEST ITEM: When about to pass, you should maintain usual following distance until you change lanes.

OBJECTIVE: The student will choose the correct response to take when pedestrians are present at intersections.

TEST ITEM: You should slow down at an intersection if there are pedestrians near the corner.

OBJECTIVE: The student will choose the correct procedure to follow when turning at an intersection.

TEST ITEM: When coming to an intersection, it is most important to look for and obey the traffic lights and signs.

OBJECTIVE: The student will choose the correct procedure to follow when approaching and turning at an intersection.

TEST ITEM: Before turning at an intersection, you should maintain your normal speed.

OBJECTIVE: The student will choose the correct procedure for finding a gap in traffic that will allow him to enter or cross a highway, freeway, or roadway.

TEST ITEM: When you are entering a freeway, you should select a large enough break in traffic so that you will not interfere with other vehicles.

Driving on Highways and Freeways

OBJECTIVE: The student will choose the procedure to follow when he misses his exit on a freeway.

TEST ITEM: You exit at the wrong place on a freeway. You should back up onto the main freeway and continue when safe.

OBJECTIVE: The student will choose the correct response that indicates the proper method of checking traffic when entering the freeway from the right.

TEST ITEM: When entering a freeway from the right, you should look straight ahead and use your mirrors.

OBJECTIVE: The student will choose the correct response that indicates an awareness of hidden hazards which exist along the highway.

TEST ITEM: When driving on a freeway, you should pay attention only to the vehicle ahead and the vehicle behind you.

OBJECTIVE: The student will choose the correct response requiring him to make distance judgments.

TEST ITEM: When you decide to pass on a two-lane road, you should judge the distance to the first oncoming vehicle.

OBJECTIVE: The student will choose the correct response that indicates his understanding of overtaking/passing on the right.

TEST ITEM: When there are two lanes of traffic going in your direction, you can use the right lane to pass vehicles that are making left turns.

OBJECTIVE: The student will choose the correct response that indicates the proper technique for entering the expressway when a vehicle is ahead on the acceleration lane.

TEST ITEM: There is a vehicle ahead of you on the acceleration lane. It is best to wait until it enters the freeway before you do.

OBJECTIVE: The student will choose the correct response that indicates the need for observing signs on a rural highway.

TEST ITEM: Before deciding to pass another vehicle, you should first check for signs prohibiting passing.

OBJECTIVE: The student will choose the correct response that indicates his understanding of distance needed to pass another vehicle and speed.

TEST ITEM: The faster the vehicle in front of you is going, the more distance you need to pass.

OBJECTIVE: The student will choose the correct response that indicates his understanding of passing vehicles on the left.

TEST ITEM: On two-lane roads, you may pass if the vehicle ahead is indicating a left turn.

OBJECTIVE: The student will choose the correct response that indicates the correct procedure to take if he runs out of passing distance while overtaking another vehicle.

TEST ITEM: While passing and it appears that you will not have time to complete the pass, you should slow down and return to the right lane behind the vehicle you were passing.

Driving Defensively by Separating and Compromising with Traffic

OBJECTIVE: The student will choose the correct response that indicates the proper space cushion when approaching parked vehicles.

TEST ITEM: When passing a parked vehicle, you should leave room in case a door opens or a pedestrian steps out.

OBJECTIVE: The student will choose the correct response that indicates the proper speed adjustment to make if the vehicle passing from the rear suddenly decides not to complete the passing maneuver.

TEST ITEM: The vehicle passing you is in the way of oncoming traffic. You should slow down if he speeds up and speed up if he slows down.

OBJECTIVE: The student will choose the correct response that indicates the proper action to take when an oncoming vehicle crosses into his lane and approaches him.

TEST ITEM: An oncoming vehicle crosses the center line and drives into your lane. You should slow down and steer to the right.

OBJECTIVE: The student will choose the correct response that indicates his knowledge of defensive driving when driving near heavy pedestrian traffic.

TEST ITEM: When driving in an area where children are present, you must drive carefully and sound your horn when necessary.

OBJECTIVE: The student will choose the correct response which indicates proper scanning technique while driving.

TEST ITEM: When driving, you should avoid looking at any one thing for more than a few seconds.

OBJECTIVE: The student will choose the correct response that indicates his understanding of driving in heavy pedestrian traffic.

TEST ITEM: When driving in an area where there are many pedestrians, you should put your headlights on.

OBJECTIVE: The student will choose the correct procedure to take while driving near children.

TEST ITEM: When driving by children playing near the edge of the road, you should be ready to make a quick stop.

<u>Drinking - Drugs and Driving</u>

OBJECTIVE: The student will choose the correct method of not being a threat to drivers when he has been drinking.

TEST ITEM: You have had several drinks in a short period of time. You should wait one hour for each one of the drinks taken before driving.

OBJECTIVE: The student will choose the correct response that indicates his understanding of how alcohol affects the mind and body.

TEST ITEM: Having one or two drinks before driving will affect your reactions and judgment.

OBJECTIVE: The student will choose the correct response that indicates his understanding of the death rate related to drinking drivers.

TEST ITEM: Drinking drivers and drinking pedestrians are involved in accidents causing the death of about 10,000 people each year.

OBJECTIVE: The student will choose the correct amount of alcohol that can affect the judgment of a person driving.

TEST ITEM: Your judgment can be affected by as little as one ounce of whiskey.

OBJECTIVE: The student will choose the correct response that indicates his understanding of the percentage of accidents involving drinking drivers.

TEST ITEM: The percent of fatal highway accidents involving a drinking driver is about 25 percent.

OBJECTIVE: The student will choose the correct response that indicates his knowledge of the provincial laws regarding drinking and driving.

TEST ITEM: It is illegal to drive while under the influence of alcohol.

OBJECTIVE: The student will choose the correct response that indicates the amount of alcohol needed in the blood to make it illegal to drive.

TEST ITEM: The smallest percent of blood alcohol needed to presume that you were under the influence is .20 percent or more.

OBJECTIVE: The student will choose the proper relationship between drugs and driving.

TEST ITEM: It is safe to drive after taking sedatives.

OBJECTIVE: The student will choose the correct procedure to take when he gets sleepy while driving a vehicle.

TEST ITEM: If you get sleepy while driving, it is best to take anti-sleep pills.

OBJECTIVE: The student will choose the correct response that indicates his understanding of the laws regarding the use of narcotics and driving.

TEST ITEM: It is illegal to take a non-prescribed narcotic drug before driving.

OBJECTIVE: The student will choose the correct response that indicates his understanding of the law regarding court fines and jail sentences, as it relates to using drugs and driving.

TEST ITEM: When convicted for a first offense of driving under the influence of drugs, you will be fined and/or put in jail.

The Driver's Responsibility

OBJECTIVE: The student will choose the appropriate response that indicates his understanding of providing assistance to injured persons.

TEST ITEM: To help a seriously injured person after an accident, you should cover him and try to control the bleeding.

OBJECTIVE: The student will choose the appropriate response that indicates the first procedure to take when confronted with an accident situation.

TEST ITEM: You are involved in an accident where someone is hurt. The first thing to do is help the injured person.

OBJECTIVE: The student will choose the correct response that indicates his understanding of the procedure to take at the scene of an accident.

TEST ITEM: You are involved in an accident resulting in injury or death. You should stop immediately and remain at the scene of the accident.

OBJECTIVE: The student will choose the correct response that indicates his understanding of his responsibility when involved in a property damage accident.

TEST ITEM: When involved in an accident that only results in property damage, you should stop only if you are at fault.

Weather Conditions and Impediments to Vision

OBJECTIVE: The student will choose the correct response which indicates awareness of the disadvantages of parking on an upgrade in snow.

TEST ITEM: When stopping in snow, you should try not to stop on an upgrade.

OBJECTIVE: The student will choose the correct response which indicates proper following distance when visibility is poor.

TEST ITEM: If bad weather makes it hard for you to see, you should increase your following distance.

OBJECTIVE: The student will choose the correct response which indicates the degree of illumination to use when driving in fog at night.

TEST ITEM: When driving through fog at night, you should use your high beam headlights.

OBJECTIVE: The student will choose the correct response which indicates the degree of braking to use during a skid.

TEST ITEM: In order to get out of a skid, you should keep a constant pressure on the gas pedal.

OBJECTIVE: The student will choose the correct response which indicates the direction in which to turn the steering wheel during a skid.

TEST ITEM: You are coming out of a skid. You should turn the steering wheel in the opposite direction as your vehicle approaches the desired way you want to go.

OBJECTIVE: The student will choose the correct response that indicates the proper tools for cleaning ice and snow from the windshields.

TEST ITEM: To remove ice or snow from your windshield before driving, you should use a brush or plate scraper.

OBJECTIVE: The student will choose the correct response which indicates correct position of front wheels when starting on ice and snow.

TEST ITEM: When starting a vehicle in snow, the front wheels should be headed toward the side of the road.

OBJECTIVE: The student will choose the correct response which indicates proper acceleration when starting on ice or snow.

TEST ITEM: To avoid spinning the tires on a slippery surface, you increase speed slowly.

OBJECTIVE: The student will choose the correct response which indicates knowledge of speed as applied to road and weather conditions.

TEST ITEM: You should drive according to the road and weather conditions.

OBJECTIVE: The student will choose the correct response that indicates proper procedure for checking road surface when starting to drive in adverse conditions.

TEST ITEM: When starting to drive on snow or any slippery surface, you should spin the tires to see how slippery it is.

OBJECTIVE: The student will choose the correct response which indicates the method of obtaining the best traction on ice and snow.

TEST ITEM: The best way to get good traction on hard-packed snow is to use snow tires.

OBJECTIVE: The student will choose the correct response which indicates the direction in which to turn the wheel as the vehicle is coming out of a skid.

TEST ITEM: The rear of your vehicle is skidding to the left. You should turn the top of your steering wheel to the right.

OBJECTIVE: The student will choose the correct response which indicates the point at which braking is permitted during a skid.

TEST ITEM: You are coming out of a skid. You should apply your brakes only if you have to come to a stop.

OBJECTIVE: The student will choose the correct response that indicates his understanding of hydroplaning as it relates to driving a vehicle.

TEST ITEM: At low speeds, your tires are most likely to ride on top of the water if they are bald.

OBJECTIVE: The student will choose the correct response that indicates his knowledge of using high and low beam headlights in rural driving.

TEST ITEM: When you approach an oncoming vehicle, you must dim your lights when you are 500 feet away.

Handling Emergencies

OBJECTIVE: The student will select the steps to take should he experience a loss of steering with a vehicle.

TEST ITEM: If the engine stalls and the power steering fails as you are driving, you should try to restart the engine.

OBJECTIVE: The student will choose the correct response should the hood of his vehicle fly up on him while driving.

TEST ITEM: Your hood opens while driving. You should come to a stop on the road and put the hood down.

OBJECTIVE: The student will choose the correct response should his vehicle have a flat tire while travelling on the roadway.

TEST ITEM: You have a blowout while driving. You should look for a safe place to drive off the road.

OBJECTIVE: The student will choose the appropriate method of drying out his brakes after travelling through deep water.

TEST ITEM: Your brakes are wet after driving through deep water. You should brake hard the next time you need to stop.

OBJECTIVE: The student will choose the appropriate method to take should his brakes fail completely while driving.

TEST ITEM: Your brakes fail completely. You should pump the brake, shift into a lower gear, and slowly apply the parking brake.

OBJECTIVE: The student will select the most appropriate response from the ones given for handling a tire blowout while driving on the freeway.

TEST ITEM: You have a blowout while driving. You should apply the brakes gradually after you begin to slow down.

OBJECTIVE: The student will choose the appropriate response when faced with deep water covering his path of travel ahead.

TEST ITEM: Deep water covers the road ahead. You should speed up and go through the water.

OBJECTIVE: The student will select the proper procedure to take after driving through water.

TEST ITEM: After driving through a deep puddle, you should stop and check your vehicle.

OBJECTIVE: The student will choose the appropriate procedure for avoiding a vehicle that is coming straight at him in his lane.

TEST ITEM: A vehicle is coming straight at you, and you cannot stop. You should look for an open space to the right of the oncoming vehicle.

Vehicle Buying and Ownership

OBJECTIVE: The student will choose the correct response that indicates his knowledge of how worn out equipment on a vehicle can be dangerous.

TEST ITEM: You should check for a leaky exhaust system because it may allow carbon monoxide to enter the vehicle.

OBJECTIVE: The student will choose the correct response that indicates his understanding of good tire care.

TEST ITEM: Your tires will get worn in the middle if they have too much air in them.

OBJECTIVE: The student will choose the correct method of evaluating a used car he intends to buy.

TEST ITEM: If the tires are badly worn, you should replace them.

OBJECTIVE: The student will choose the ways of maintaining a car properly.

TEST ITEM: You should have the steering and suspension systems checked about once every two to three months.

OBJECTIVE: The student will choose the correct response that indicates his understanding of liability insurance.

TEST ITEM: The kind of insurance that will provide proof of financial responsibility is liability insurance.

APPENDIX C

MULTIMEDIA INSTRUCTION (MI)
PRE-POST-TEST, READING SCORES

Student	Pre-test Score	Post-test Score	Reading Level
X_1	40	52	4.7
X_2	43	43	7.9
X_3	46	51	5.5
X_4	44	44	5.9
X_5	33	53	5.6
X_6	47	48	5.9
X_7	48	48	4.5
X_8	44	51	6.5
X_9	43	47	6.5
X_{10}	42	54	5.5
X_{11}	38	41	4.2
X_{12}	49	52	6.1
X_{13}	46	54	6.9
X_{14}	48	52	6.7
X_{15}	42	48	5.9

REGULAR INSTRUCTION (RI)
PRE-POST-TEST, READING SCORES

Student	Pre-test Score	Post-test Score	Reading Level
C_1	50	49	6.5
C_2	47	49	8.0
C_3	47	42	4.4
C_4	48	48	5.1
C_5	45	49	4.2
C_6	44	48	6.2
C_7	47	52	5.1
C_8	37	45	6.5
C_9	50	51	6.8
C_{10}	47	47	5.9
C_{11}	39	40	3.4
C_{12}	41	48	7.2
C_{13}	35	41	2.9
C_{14}	40	46	6.2
C_{15}	39	47	5.9
C_{16}	45	47	6.4

CONTROL (C)
PRE-POST-TEST, READING SCORES

Student	Pre-test Score	Post-test Score	Reading Level
C_1	36	39	5.1
C_2	43	42	7.0
C_3	43	43	5.5
C_4	37	42	7.5
C_5	43	46	6.3
C_6	42	31	5.2
C_7	35	46	5.3
C_8	45	41	5.0
C_9	42	36	5.2
C_{10}	39	50	6.8
C_{11}	44	48	6.2
C_{12}	40	41	6.2
C_{13}	34	42	5.2
C_{14}	45	45	6.7
C_{15}	44	44	4.8
C_{16}	44	47	7.1
C_{17}	37	41	5.1
C_{18}	36	41	5.0
C_{19}	41	45	5.2

CONTROL (C)
PRE-POST-TEST, READING SCORES
Continued

Student	Pre-test Score	Post-test Score	Reading Level
C_{20}	36	41	4.6
C_{21}	40	50	6.0
C_{22}	41	43	6.0
C_{23}	37	43	7.2
C_{24}	43	45	5.4
C_{25}	42	47	6.3
C_{26}	41	39	6.2
C_{27}	37	40	6.4
C_{28}	42	41	5.9

APPENDIX D

PRE-TEST QUESTIONS
True/False

1. A paved road surface tends to be more slippery at an intersection. (T)

2. When driving through fog at night, you should use your high beam headlights. (F)

3. You have a hard time telling colors apart. You should learn the order of the lights in the traffic signals. (T)

4. The best way to get good traction on hard-packed snow is to use snow tires. (F)

5. Your hood opens while driving. You should come to a stop on the road and put the hood down. (F)

6. You come to an intersection where there is a traffic light and a traffic officer. You should obey the traffic signal. (F)

7. When starting a vehicle in snow, the front wheels should be headed toward the side of the road. (F)

8. Before turning at an intersection, you should maintain your normal speed. (F)

9. When making a right turn, you should always check the road that you are turning onto for vehicles. (T)

10. You are coming out of a skid. You should turn the steering wheel in the opposite direction as your vehicle approaches the desired way you want to go. (T)

11. When entering a freeway from the right, you should look straight ahead and use your mirros. (F)

12. You are coming out of a skid. You should apply your brakes only if you have come to a stop. (F)

13. You should set your left outside mirror so that you just see the left edge of the car when you are sitting in the seat. (T)

14. You have had several drinks in a short period of time. You should wait one hour for each one of the drinks taken before driving. (T)

15. Your vehicle continues to speed up while going downhill. You should use your parking brake. (F)

16. You are turning at a crosswalk where there are no traffic control signals. You should proceed with your turn because you have the right-of-way. (F)

17. A shoulder belt will be least helpful in preventing you from hitting the dashboard or windshield. (F)

18. On two-lane roads, you may pass if the vehicle ahead is indicating a left turn. (T)

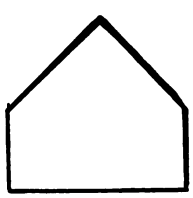
19. Reflectors on the road and curb are used to help you stay in the correct position on the road. (T)

20. When coming to an intersection, it is most important to look for and obey the traffic lights and signs. (T)

21. When driving on a freeway, you should pay attention only to the vehicle ahead and the vehicle behind you. (F)

22. You exit at the wrong place on a freeway. You should back up onto the main freeway and continue when safe. (F)

23. The message on this sign might be school crossing. (T)



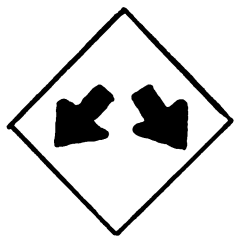
24. The rear of your vehicle is skidding to the left. You should turn the top of your steering wheel to the right. (F)

25. When driving at night, you should watch for dark or dim objects on the road. (T)

26. When starting to drive on show or any slippery surface, you should spin the tires to see how slippery it is. (F)

27. The first thing to do if the vehicle in front signals or puts on its brakes is to change lanes. (F)

28. This sign means divided road ahead, keep right. (F)



29. When passing a parked vehicle, you should leave room in case a door opens or a pedestrian steps out. (T)

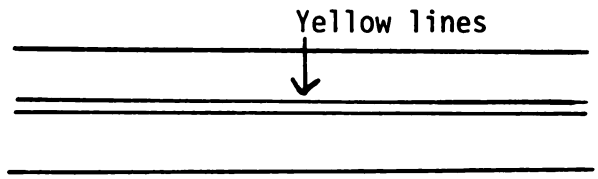
30. When moving into the left lane, you should <u>first</u> check your blind spot. (T)

31. When convicted for a first offense of driving under the influence of drugs, you will be fined and/or put in jail. (T)

32. You cannot see to the sides of the road very well. You should keep moving your eyes across the road. (T)

33. The best way to check that your vision is good for driving is to take a vision test when you get your license. (F)

34. These lane lines mean changing lanes is permitted if done with care. (F)



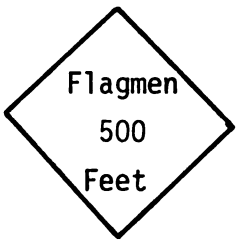
35. When you want to turn right at an intersection, you should drive close to the right hand side of the road. (T)

36. Where traffic enters of crosses the road, it is best to speed up to pass that area quickly. (F)

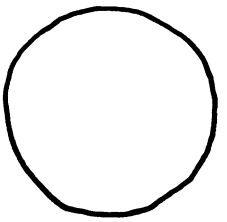
37. You decide to pass on a two-lane road. You should judge the distance to the first oncoming vehicle. (T)

38. It is illegal to drive while under the influence of alcohol. (T)

39. When you see this sign, you should slow down and be prepared to stop. (T)



40. The shape of this sign indicates stop. (F)

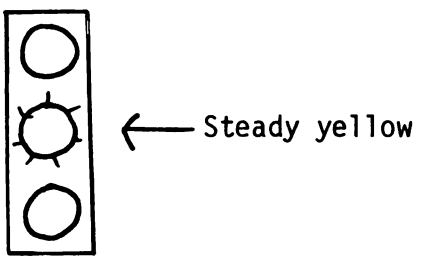


41. You have a blowout while driving. You should look for a safe place to drive off the road. (T)

42. While passing and it appears that you will not have time to complete the pass, you should slow down and return to the right lane behind the vehicle you were passing. (T)

43. If you double your speed, it will take you about two times the distance to stop. (F)

44. This traffic signal means stop before entering the intersection if you can safely do so. (T)



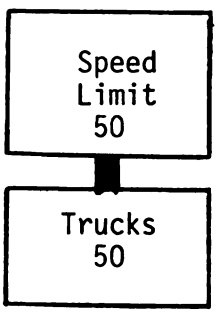
45. The middle lane on a three-lane road is for passing and turning left. (T)

46. The vehicle passing you is in the way of oncoming traffic. You should slow down if he speeds up and speed up if he slows down. (T)

47. When stopping in snow, you should <u>not</u> try to stop on an upgrade. (T)

48. When driving by children playing near the edge of the road, you should be ready to make a quick stop. (T)

49. When you see this sign, you should not drive faster than 50 miles per hour if you are driving a truck. (T)



50. You should drive according to the road and weather conditions. (T)

51. If the tires are badly worn, you should replace them. (T)

52. At intersections with no traffic controls, you should expect the vehicle in front of you to continue at normal speed. (F)

53. The percent of fatal highway accidents involving a drinking driver is about 25 percent. (F)

54. To help a seriously injured person after an accident, you should cover him and try to control the bleeding. (T)

55. The inside rearview mirror should be set to see the top of the trunk. (F)

56. When there are two lanes of traffic going in your direction, you can use the right lane to pass vehicles that are making left turns. (T)

57. You and another vehicle reach an intersection at the same time. The vehicle on the larger road has the right-of-way. (F)

58. When you are entering a freeway, you should select a large enough break in traffic so that you will not interfere with other vehicles. (T)

59. When passing a vehicle, you should return to the right side of the road when the other driver signals you to do so. (F)

60. The most effective devices for protecting passengers when in an accident are safety door latches. (F)

POST-TEST QUESTIONS
True/False

1. The color of traffic signals, from top to bottom, are green - yellow - red. (F)

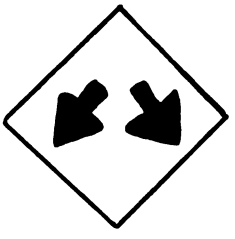
2. If you get sleepy while driving, it is best to take anti-sleep pills. (F)

3. A vehicle is coming straight at you, and you cannot stop. You should look for an open space to the right of the oncoming vehicle. (T)

4. You are involved in an accident where someone is hurt. The first thing to do is help the injured person. (T)

5. An oncoming vehicle refuses to dim its lights at night. You should leave your headlights on high beam. (F)

6. This sign means divided road ahead, keep right. (F)



7. When making a right turn, you should always check the road that you are turning onto for vehicles. (T)

8. When you want to turn right at an intersection, you should drive close to the right hand side of the road. (T)

9. At low speeds, your tires are most likely to ride on top of the water if they are bald. (T)

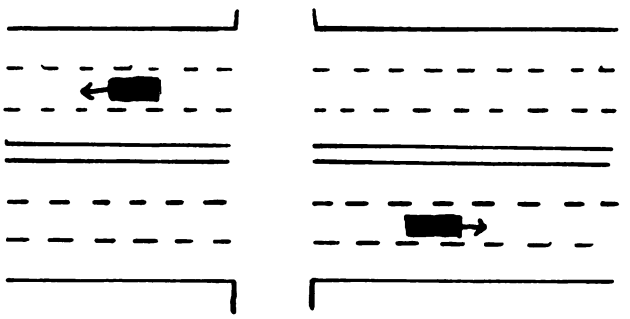
10. The smallest percent of blood alcohol needed to presume that you were under the influence is .20 percent or more. (F)

11. When you are entering a freeway, you should select a large enough break in traffic so that you will not interfere with other vehicles. (T)

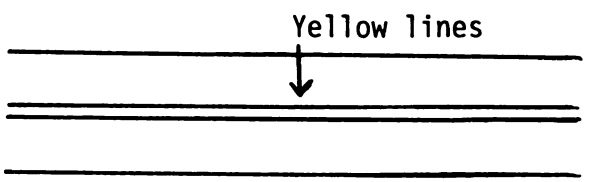
12. When involved in an accident that only results in property damage, you should stop only if you are at fault. (F)

13. In order to get out of a skid, you should keep a constant pressure on the gas pedal. (F)

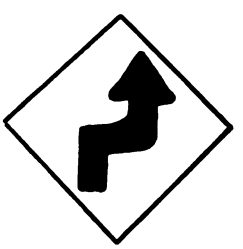
14. On this six-lane road, these two lanes should be used by through traffic. (T)



15. These lane lines mean changing lanes is permitted if done with care. (F)



16. This sign means slow down and prepare to turn to the right and then to the left. (T)

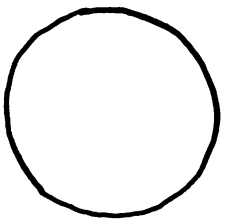


17. You come to an intersection where there are no traffic controls. You should continue at the same speed and watch for traffic. (F)

18. While going down a hill, you should try to keep a constant speed. (T)

19. You should check for a leaky exhaust system because it may allow carbon monoxide to enter the vehicle. (T)

20. The shape of this sign indicates stop. (F)



21. A shoulder belt will be least helpful in preventing you from hitting the dashboard or windshield. (F)

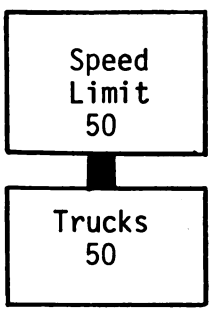
22. When about to pass, you should maintain usual following distance until you change lanes. (T)

23. You have to slow down quickly or make a sudden stop. You should signal to the vehicles behind you if possible. (T)

24. If you are driving and it starts to rain, be careful since rain and road oil may create a slippery surface. (T)

25. The best way to check that your vision is good for driving is to take a vision test when you get your license. (F)

26. When you see this sign, you should not drive faster than 50 miles per hour if you are driving a truck. (T)



27. The faster the vehicle in front of you is going, the more distance you need to pass. (T)

28. When driving on a slippery road, you should not make quick turns. (T)

29. You exit at the wrong place on a freeway. You should back up onto the main freeway and continue when safe. (F)

30. When passing a vehicle, you should return to the right side of the road when the other driver signals you to do so. (F)

31. You are about to drive away from the curb. You should signal, yield right-of-way, and pull into the street. (T)

32. You should drive in the right hand of a six-lane highway when you want to pass other vehicles on the highway. (F)

33. You should have your eyes checked every so often because your vision may fail without your knowing it. (T)

34. You come to an intersection where there is a traffic light and a traffic officer. You should obey the traffic light. (F)

35. There is a vehicle ahead of you on the acceleration lane. It is best to wait until it enters the freeway before you do. (T)

36. Before passing another vehicle, you should first judge the distance available for passing and how fast you are approaching the other vehicle. (T)

37. You are coming out of a skid. You should turn the steering wheel in the opposite direction as your vehicle approaches the desired way you want to go. (T)

38. Deep water covers the road ahead. You should speed up and go through the water. (F)

39. To help a seriously injured person after an accident, you should cover the victim and try to control the bleeding. (T)

40. Your brakes fail completely. You should pump the brake, shift into a lower gear, and slowly apply the parking brake. (T)

41. To avoid spinning the tires on a slippery surface, you increase speed slowly. (T)

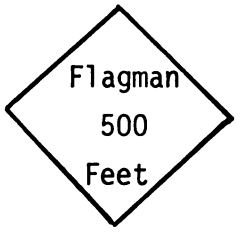
42. Before going down a long, steep hill, you should test your brakes and shift into a lower gear. (T)

43. The message on this sign might be school crossing. (T)

44. You have a blowout while driving. You should apply the brakes gradually after you begin to slow down. (T)

45. When entering a highway from an alley or private drive, you must yield to all approaching vehicles. (T)

46. When you see this sign, you should slow down and be prepared to stop. (T)



47. Before turning at an intersection, you should maintain your normal speed. (F)

48. The best way to get good traction on hard-packed snow is to use snow tires. (F)

49. Drinking drivers and drinking pedestrians are involved in accidents causing the death of about 10,000 people each year. (F)

50. If the tires are badly worn, you should replace them. (T)

51. At an intersection, you see a vehicle coming from the left. You should continue at the same speed since you have the right-of-way. (F)

52. When stopping in snow, you should try not to stop on an upgrade. (T)

53. The percent of fatal highway accidents involving drinking drivers is about 25 percent. (F)

54. Your hood opens while driving. You should come to a stop on the road and put the hood down. (F)

55. You decide to pass on a two-lane road. You should judge the distance to the first oncoming vehicle. (T)

56. You should slow down at an intersection if there are pedestrians near the corner. (T)

57. To react, think, and apply brakes under good conditions, it takes the average driver 3/4 of one second. (T)

58. When driving by children playing near the edge of the road, you should be ready to make a quick stop. (T)

59. You should slow down for a right or left turn as you are going around the turn. (F)

60. To remove ice or snow from your windshield before driving, you should use a brush or plate scraper. (T)

DRIVER EDUCATION TRUE/FALSE TEST

INSTRUCTIONS

CIRCLE THE CORRECT RESPONSE TO EACH TRUE AND FALSE ITEM. DO NOT LEAVE ANY ITEM UNANSWERED. MAKE A GUESS IF YOU HAVE TO.

1. T F	21. T F	41. T F
2. T F	22. T F	42. T F
3. T F	23. T F	43. T F
4. T F	24. T F	44. T F
5. T F	25. T F	45. T F
6. T F	26. T F	46. T F
7. T F	27. T F	47. T F
8. T F	28. T F	48. T F
9. T F	29. T F	49. T F
10. T F	30. T F	50. T F
11. T F	31. T F	51. T F
12. T F	32. T F	52. T F
13. T F	33. T F	53. T F
14. T F	34. T F	54. T F
15. T F	35. T F	55. T F
16. T F	36. T F	56. T F
17. T F	37. T F	57. T F
18. T F	38. T F	58. T F
19. T F	39. T F	59. T F
20. T F	40. T F	60. T F