# A STUDY OF THE EFFECTIVENESS IN THE DRIVER EDUCATION CLASSROOM OF ADJUNCT LEARNING MATERIALS

By

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ABSTRACT

A STUDY OF THE EFFECTIVENESS IN THE DRIVER EDUCATION CLASSROOM OF ADJUNCT LEARNING MATERIALS

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This study examined the use in the driver education classroom of a package of supplemental driver education materials composed of the Shell Answer Books and accompanying Learning Activity Packets developed by the writer. Effectiveness was determined by measuring student performance on objectives randomly selected from all those objectives in the Learning Activity Packets. Scores of control and experimental groups were then compared by using the student's t-test.

Also investigated was the question of a possible difference between the experimental group's performance on the objectives related to the material assigned as out-of-class work and the material covered in the traditional classroom driver education instruction.

The experimental group performed at a statistically significant higher level than did the control group on the selected objectives. The experimental group students showed a difference in post-test scores between those objectives covered in class and those covered out of class.

The following conclusions were made:

1. The use of the supplemental materials package composed of the Shell Answer Books and Learning Activity Packets developed by the writer resulted in significantly higher scores on the post-test by the experimental group than the controlled group which had only the traditional driver education instruction.
2. There was no significant difference in scores on the post-test by the experimental group on those objectives related to supplemental materials studied in class or out of class.

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# CHAPTER I

# THE PROBLEM

## Statement of the Problem

Teachers frequently adapt commercially produced materials for use in their classrooms. Materials produced for promotional or consumer informational purposes often lend themselves easily to use as effective teaching aids.

Shell Oil Company has developed for general public use a series of consumer information pamphlets entitled the Shell Answer Books.[1] The Shell Answer Books have been available for several years. They have subsequently been used in teaching situations by driver education teachers throughout the country in an effort to enhance driver education instruction. Mr. Hal Power, Senior Representative for Corporate Advertising and Public Relations, Shell Oil Company, has stated that several state boards of education routinely order quantities of the books for distribution to driver education teachers. Mr. Power also indicated that a number of other groups, e.g. the U.S. Army, senior citizens groups, etc. have requested the books for use in safety instruction courses.

Because the Shell Answer Books have been used in a variety of ways and methods, the writer attempted to make their use more uniform and effective by developing an

instructional program to accompany the books. The program attempted to present the material contained in the Shell Answer Books in a more organized and thorough manner through the use of learning activity packets (LAPs). This supplemental material, when combined with the Shell Answer Books, formed a package of supplementary instructional materials for the driver education teacher.

While the package of supplemental materials was used by the writer and several of his colleagues in the Memphis City Schools, Memphis, Tennessee, there had been no scientific evaluation of the package or the Shell Answer Books themselves. This study, therefore, was an attempt to evaluate student performance on mastery of selected driver education objectives when a driver education course utilized the package of supplementary materials consisting of the Shell Answer Books and the LAPs.

## Purpose of the Study

The purpose of the study was to measure the accomplishment of selected driver education objectives when instruction had been supplemented by the Shell Answer Books and the package of supplemental materials developed by the writer. A control group received only the traditional driver education program at East Lansing High School (ELHS) without the supplemental package. The traditional driver education program at ELHS consisted of: 75 hours of classroom instruction, six hours of range instruction, ten

hours of simulation instruction, and four hours of behind-the-wheel instruction. Another group received the traditional program plus the Shell Answer Books and the LAPs.

Specifically, the study had a two-fold purpose. The first was to evaluate the mastery of selected driver education objectives to determine if a significant difference existed between a group of driver education students receiving the traditional program and another utilizing the Shell Answer Books and the LAPs. The second purpose was to determine if a significant difference existed within the experimental group utilizing the Shell Answer Books and LAPs in regard to the mastery levels of a set of selected driver education objectives related to supplemental material studied in class and a set of selected objectives covered in an out-of-class study setting.

## Importance of the Study

Commercially produced materials can be valuable to driver education instructors in several ways. Teachers are constantly under pressure to present a quality program in an atmosphere of steadily shrinking finances. The Shell Answer Books are a no-cost alternative for consumable classroom materials. However, that alternative must have educational worth and content.

Another reduction faced by driver education instructors is that of time. Any quality driver education program has

more necessary content that must be covered than time will allow. This problem is exacerbated by the reduction of time spent in driver education through the implementation of alternative programs in an effort to find an effective, less expensive program. The Shell Answer Books, used in an efficient manner, can help in this respect.

There is ample precedent for the use of supplemental materials in the field of driver education. Nearly every published text has a workbook and/or other materials for use with that text. There are materials distributed by many commercial firms that have been used by driver education teachers for quite some time. There is no end to potential materials for the enterprising driver education teacher.[2]

The Shell Answer Books and accompanying LAPs have measurable, behavioral objectives for each unit. Therefore, the effectiveness of the package may be measured to determine the benefit, if any, to be gained from the use of the package in a driver education class.

It was believed that this study could contribute to the field of driver education by:

1) presenting useful information to people in the field of traffic safety and driver education and by the evaluation of a recommended instructional package in a driver education classroom; and

2) presenting useful information to people in the field of traffic safety and driver education by the

evaluation of a recommended instructional package in an independent study setting.

## The Research Questions

The following question was of primary concern in the study:

> Will use of the Shell Answer Books and LAPs package as a supplemental aid in the driver education classroom result in higher post-test scores on a selected set of objectives than without use of the package?

A question of secondary importance considered in the study was:

> Will the experimental group have higher post-test scores on those selected objectives relevant to material covered in a classroom setting than those relevant to material covered in an out-of-class study setting?

## Research Hypotheses

The following research hypotheses were analyzed and tested in the study:

### Hypothesis

There will be a difference in achievement levels of mastery of selected objectives between the experimental and control groups as measured by a post-test.

### Sub-Hypothesis

There will be a difference in achievement levels of mastery of selected objectives between the post-test scores (of the experimental group) on those selected objectives relevant to material covered in a classroom setting and those relevant to material covered in an out-of-class study setting.

## Evaluation Instrument

The evaluation instrument used in the evaluation of the study was a 125 item test consisting of 60 true/false questions and 65 multiple-choice questions. Twenty-five objectives were randomly selected for testing from the available 213, with five items developed for each objective.

The items were selected from accepted and validated sources in the driver education field, e.g. the Highway Safety Research Institute test bank of questions, the PRIDE Project, etc.

The selected objectives and related items were then reviewed by Dr. Robert O. Nolan, Director of the Michigan State University Highway Traffic Safety Center (HTSC), and Mr. Fred Vanosdall, Assistant Director of the HTSC, to determine that the items were appropriate for their related objectives. Both individuals found the items and objectives to be appropriately related and declared the test instrument to be a valid measurement of mastery of those selected objectives.

## Generalizability

Since the pupils involved in the study were from the ELHS and were randomly assigned to driver education classes by means of computer scheduling, the results of this study could be assumed to hold true for the rest of the ELHS population.

## Limitations of the Study

The study was limited to driver education students at ELHS in the spring term of 1981. The control group consisted of 39 students while the experimental group had 83 students. The experimental group consisted of two of the three driver education classes at ELHS during the spring term 1981. The writer acted on the suggestion of Dr. Norman T. Bell, Professor of Educational Psychology at Michigan State University, and used two classes for the experimental group and one class for the control group, thereby utilizing all students.

Only cognitive knowledge, as indicated by post-test scores of the students, was evaluated. No other type of measurement was used.

ELHS is a surburban high school in a fairly affluent neighborhood. The socio-economic status could possibly have an effect on the results of the study.

## Definition of Terms

Learning Activitiy Packets (LAPs) - A program developed to specifically utilize the Shell Answer Books. The program is comprised of 21 LAPs. Each LAP includes a Shell Answer Book and has the following structure: a list of behaviorally stated objectives; a true/false worksheet; a completion worksheet; a short-answer worksheet; where applicable, a vocabulary list; a list of suggested student projects, also

were applicable; and a summary specifically addressing the objectives.

Shell Answer Books - Promotional pamphlets distributed by the Shell Oil Company as a consumer service/advertising promotional activity. The Answer Books are available at Shell Oil Company retail outlets (or in selected publications at no cost).

## Summary and Organization of Remaining Chapters

This chapter has examined the Shell Answer Books, their use by driver education teachers and others, as well as the development by the writer of a package of materials to make the Answer Books more useful and informative in the driver education classroom. The Shell Answer Books are presently being used widely in the field of driver education. The question examined in this study was whether or not the Shell Answer Books, used with the materials developed by the writer, significantly increased learning by driver education students as measured by selected objectives.

The question of paramount interest was whether or not use of the Shell Answer Books with the package of supplemental materials increased learning. A question of secondary concern was whether the students would learn more in a formal class setting or in an out-of-class setting. This too was investigated.

The succeeding chapters are organized in the following manner: Chapter II is a review of the related literature.

Chapter III deals with the procedure and methodology used in the study. Chapter IV presents the analysis of data, and Chapter V summarizes the study and discusses the conclusions and recommendations of the study.

## References

[1]The Shell Answer Books are a series of pamphlets containing driving tips and information. The books are a community service effort presented in a promotional format by the Shell Oil Company. The books are in reality pamphlets of only a few pages. Each book deals with a specific and limited subject area. The books are free and available at Shell gas stations and in selected publications

[2]Accessibility of Classroom Materials," E. C. Fields, Jr., Journal of Traffic Safety Education, Vol. XXVI, No. 2, 1979 (January) Winter issue.

# CHAPTER II

# REVIEW OF THE LITERATURE

This chapter presents a review of the literature related to this study and the evaluation utilized. The review of the literature was divided into three areas dealing with the study. The areas were: Use of the Learning Activity Packets, Criterion-Referenced Tests vs. Norm-Referenced Tests, and Knowledge Mastery Levels. Most of the studies were from the last decade.

## Use of Learning Activity Packets

A search of the literature, including the Educational Resources Information Center (ERIC), failed to surface a study similar to this one. While it is not claimed that this study is unique, the adaptation of a commercially produced consumer aid to structured classroom use, through the utilization of Learning Activity Packets, was not found in the literature.

LAPs are also known as learning modules, module instruction, self-paced instruction, individually programmed intruction, instructional modules, personalized learning packages and so forth. The terms are actually inter-changeable, because with some variations they all involve the same type of structure and delivery. Students are evaluated at the end of a segment to determine progress

and mastery of the material. The types and extent of remedial material, if any, are as varied as the titles and structures of the LAPs.

The Highway Users Federation published a booklet in 1970 entitled Preparation and Use of Instructional Modules in Driver and Traffic Safety Education.[1] In that booklet an instructional module was described as a tool for teaching usually found in a criterion-referenced classroom. This particular publication listed the parts of a module as: objectives telling the student what was required for demonstration of mastery of the material; sample test items to indicate how that mastery would be demonstrated; and suggested activities that tell the student how to achieve the objectives of the module.

The booklet pointed out that a significant difference between a traditional driver education course and one that utilized modules was the orientation of the program toward success. The distribution of a normal curve of grades with some passing, some failing was not applicable. All the students were given the incentive and credible urging to succeed.

The development of a module begins with the determination of objectives, a key factor stressed in the booklet. This is one of the most important facets of using modules or LAPs, because by first determining objectives the instruction will be improved due to greater focus and positive direction.

The booklet also stressed the importance of items that match the objectives. Without this credibility, the decision on how well a student mastered an objective would be impossible.

Robert Calvin, in Personalized Learning Packages Aid Student Progress, gave some uses and a description of a LAP.

> The trend toward the use of performance objectives has led to the development of personalized student learning packages which often can be succesfully completed without the immediate supervision of the teacher. A number of progressive teachers and innovative developers have found ways to integrate aspects of independent study into their existing framework.[2]

Calvin went on to discuss the "black-out method," which is made feasible by using LAPs. The teacher eliminates everything from the lesson except what is necessary for achieving the objective. Therefore, the teacher can cut down on instructional teaching time without cutting back on the learning taking place.

Calvin listed the parts of a LAP as: title, purpose, main idea, objectives, pre-test, learning activities, self-check, post-test, options and teacher's guide. He went on to say that LAPs are an orderly, flexible, personalized approach to learning. They are easily implemented and easily changed after evaluation. Calvin further stated:

> A completely personalized curriculum would be feasible, yet it is financially impractical at the present. Learning packages can start any program toward personalized student learning, and they provide an ample degree of individual instruction even in large group settings.[3]

George Carmignani, in an unpublished doctoral dissertation, defined a Learning Activity Module as:

> ...a lesson plan for use by students which contains: the purpose of studying the module, terminal objectives for clarification of what is expected from the students' efforts, supporting objectives to guide the students to attainment of the terminal objectives, learning activities in which the student will choose to participate, and enrichment activities for further understanding which students may or may not choose to complete.[4]

It should be stressed that a complicated structure is not required. The main parts of a packet are objectives, activities and tests based on the objectives to measure student mastery of those objectives after completing the prescribed work.

Carmignani cited numerous successful studies utilizing LAPs or learning modules in a wide number of subject areas that ranged from elementary grades to post-graduate instruction. The format may vary in the development of various programs, but they all have the basic LAP structure in common. That structure is: objectives, pre-tests or worksheets, activities for the student, evaluation instruments and enrichment activities or student projects.

Carmignani went on to state that the literature supports the effectiveness of LAPs or modules when they have been evaluated by criterion-referenced methods. He also cited their superiority when they have been compared to traditional teaching methods. Carmignani noted in his conclusions that the students, by using LAPs, were capable

of achieving 80% mastery on knowledge skills and 90% mastery on driving skills in his study.

Carmignani also said that the basic building blocks of a LAP are student objectives. These are the performance requirements to be demonstrated by the students. Successful performance indicates mastery. Unsuccessful performance means unsuccessful mastery but, more important in the concept of using objectives, an opportunity to work through some remedial material and try again until mastery is attained.

Objectives should be behavioral. They should prescribe what the learner must do in order to demonstrate mastery of the objective. Robert F. Mager,[5] stated that there are three basic conditions a well-written objective must meet: the performance, conditions, and criterion. These conditions state what the student must do, under what conditions it must be done, and how well it must be done or to what extent. These firm statements greatly aid students as they move productively toward the desired ultimate goal of knowledge or ability to perform a useful task.

Using objective-based LAPs for individualized instruction facilitates teaching and learning. More gets done in less time with more effective, demonstrated results. In personal interviews with Drs. Peggy Riethmiller, Cass Gentry, Ben Bohnhorst and Stephen Yelon, they all indicated that the use of LAPs as a main course structure was a long time accepted practice in education.[6]

LAPs, therefore, with their structure and objectives give structure to the teaching process. Learning is enhanced by this method of material presentation.

## Criterion-Referenced Tests vs. Norm-Referenced Tests

The definitions of criterion-referenced tests ranged from very strict to very loose and all-inclusive. The same situation did not apply to norm-referenced tests. There did seem to be some confusion, however, as to the proper use of norm-referenced tests and, indeed, whether or not they should even be used.

Part, if not all, of the problem in the confusion of criterion-referenced tests was the relatively new arrival on the educational scene of that type of test. Robert Glaser[7] first used the term criterion-referenced test in a paper in 1963.

Ronald K. Hambleton and Melvin R. Novick[8] attempted to clarify the issue about a criterion-referenced test definition. Hambleton and Novick said that a number of definitions have been applied to criterion-referenced tests. These are so wide that the same test may be classified as either a criterion-referenced test or a norm-referenced test, or both simultaneously.

W. George Gaines[9] addressed some of the basic differences between criterion-referenced tests and norm-referenced tests. He went into the history of the criterion-referenced tests movement, giving some needed

light to a vague and little known part of criterion-referenced historical development.

Gaines pointed out that criterion-referenced tests and norm-referenced tests cannot be determined by simply looking at the test questions. Rather, it is the purpose for which the test is to be used that determines which type of test the instrument is best suited. Gaines differentiated between the processes of test construction of each. A criterion-referenced test has two steps: first, set up the task domain, and secondly, assemble unbiased items that are estimators of the students' competence in that domain.

Gaines went on to say that a primary concern in item selection for norm-referenced tests is to have items that meet statistical requirements as well as content considerations. Questions must meet median difficulty level, or about one-half of the students answering them incorrectly in order to be selected for a norm-referenced test. This is due, according to Gaines, to the necessity of the maximum number of graduates in the group of students taking a test.

Marna Broekhoff[10] discussed some conditions and problems with norm-referenced tests. Criterion-referenced tests were discussed, outlining some advantages and problems with that type of test. Some of the basic differences between the two were also addressed. Broekhoff defined norm-referenced tests as any test on which a group of students answers

the same questions under the same type of conditions. When the grades are applied to a graph, a normal curve appears.

However, Broekhoff did say that some problems are present with norm-referenced tests. For example, she stated that a norm-referenced test may not truly display ability because of any particular group's dissimiliarity to the originally tested group. Problems here are those of cultural bias, which translates into artificially high standards, or the opposite which would allow a gifted group to score high on a test with very little actual learning having occurred. Whether or not any particular student learned the basics of a course is not indicated by a low rank order on a test, just failure.

After all, what is the norm? To quote Broekhoff directly:

> Because it is practically impossible to isolate a valid cross section of the diverse American student population, the composition of the norming groups is always somewhat arbitrary. It is thus pointless to use its average score as a standard for subsequent groups to achieve.[11]

Broekhoff pointed out another common problem in norm-referenced tests when she stated:

> An important and damning feature of norm-referenced scoring is that items which are answered correctly or incorrectly by a majority of students are ineffective in creating response variance, and thus, ineffective in creating a normal distribution of scores. So with the passage of time, the items eliminated from standardized tests are those which teachers spend the most time teaching. Inevitably, then the items most likely to remain are trivial and esoteric

> because they do the best job of creating bell curves.[12]

Broekhoff recognized the differences between norm-referenced tests and criterion-referenced tests as follows:

> ...the essential differences between norm and criterion-referenced testing lies in their different sources of standards of success: the former derives them from the performance of the initially tested, normative populations; the later from the task itself.[13]

Broekhoff stated that the problems with criterion-referenced tests are, nevertheless, present. Tests to identify mastery of tasks are difficult because of the necessity of breaking down learning processes that don't lend themselves to fragmentation. Consequently a number of little tests may be needed to identify mastery by the student.

In an effort to determine mastery, Broekhoff stated that the use of the 80/80 criterion for mastery has been used somewhat to aid class progress in the realm of criterion-referenced tests. That is, when 80% of the group shows mastery of the material 80% of the time; then it is ready to move on. This ends the perpetual re-testing process in trying to reach 100% mastery. While hard evidence was not present or supported this concept, it has been helpful to teachers who have used it.

Broekhoff, in addressing the positive aspects of criterion-referenced tests, pointed out that some of the advantages were: students are not compared with each other;

one student's success does not depend on another's failure; criterion-referenced tests seem to encourage cooperation rather than competition; students seem to develop better attitudes toward school as well as improved self-images. She stated another advantage of criterion-referenced tests was that the evaluation was taken from the task itself, rather than based on an arbitrary population.

Broekhoff identified as probably the greatest advantage of criterion-referenced tests was that they encourage the writing and implementing of course objectives. Therefore, by getting the achievement levels or standards from the tasks themselves, criterion-referenced tests place the proper emphasis on the objectives. This eliminated the mismatching between what was taught and what was tested because the test came directly from what was taught.

In the controversy between the two types of testing, norm-referenced tests and criterion-referenced tests and which was best, William H. Angoff[14] had an interesting view of the two and how they are used. His approach was neutral, but thoughtful and worthy of serious consideration.

According to Angoff, the end result one wishes to achieve actually determines what test should be used. Angoff gave an example of a man being told by his doctor that he is overweight. But what exactly does that mean? In the norm-referenced test view the man would be heavier than the average male of his height and build. In the criterion-

referenced test he would be heavier than what is good for him personally.

Both tests go hand in hand, sometimes almost inadvertently. Norm-referenced tests are used to measure individuals in relation to group ranking and criterion-referenced tests to measure what those individuals are capable of performing themselves.

Angoff felt there was not any conflict between the two types of tests nor should one be felt to be better than the other. Each should be used for its appropriate purpose or together if desired.

W. James Popham[15] felt strongly that criterion-referenced tests were preferable to norm-referenced tests. He cited problems with the use of norm-referenced tests and pointed out that use of criterion-referenced tests would solve those problems.

Popham attacked norm-referenced tests because: what they measure is too loose; they have to produce response variance in scores; those items missed or answered most frequently are dropped. This last item is what he called the "catch-22" of American education. The more important a teacher felt a topic to be, the more it was taught; then more students answered it, and it was dropped from the test as unsuitable.

Popham stressed that norm-referenced achievement tests were not capable of detecting the effects of instruction. They were heavily based on the background of the student

rather than on what was taught in school; they were actually biased. He suggested that criterion-referenced tests would remedy this because goals or objectives were formed and they did not automatically eliminate items that most students answer correctly.

Popham gave three advantages of using criterion-referenced tests. They described the state of learner performance; teachers could teach toward a defined class of desired behaviors in the criterion; and research indicated that targeted, directed instruction was improved, effective instruction.

According to Popham, these advantages led to two facets of criterion-referenced tests as opposed to norm-referenced tests which included: criterion-referenced tests don't have to drop often-answered test items and therefore reflect more truly the effects of good teaching; additionally, since the areas tested are specifically defined, there will be a closer alignment of instruction with the measurement of that instruction.

John R. Kazalunas[16] gave an insightful analysis of the differing use and purposes of norm-referenced tests and criterion-referenced tests. He described the uses of criterion-referenced tests as follows: 1) Testing progress in subject areas which are of a cumulative or progressively complex nature. 2) Testing in areas demanding proven competence; those areas are such that they require ability to perform specific skills, e.g., driving a car, flying an

airplane, practicing surgery, where group comparison is not important but rather personal skill or ability. 3) When diagnostic purposes are needed, criterion-referenced tests better provide specific information about programs and their individual parts; in other words, criterion-referenced tests can tell how each student is doing in each part of the program; norm-referenced tests cannot do this. 4) Criterion-referenced tests measure skills, such as typing or physical education requirements; norm-referenced tests cannot do this.

Kazalunas then said that some of the uses of the norm-referenced tests were: 1) Assessing progress in areas where no minimum competency is required; for example, social studies which is not a cumulative knowledge subject. 2) Norm-referenced tests are necessary for establishing rank in a group for admission purposes. In this case a criterion-referenced test would be useful only if admission was for all qualified applicants, rather than a top group of them. 3) Norm-referenced tests should be used to predict levels of success. Criterion-referenced tests cannot do this since they do not or cannot show differences between standards.

Charles W. Smith[17] went into a detailed description of the difference between norm-referenced tests and criterion-referenced tests. Smith said that a norm-referenced test grade gave no definite idea of student strengths or capabilities.

Smith then defined the advantages and uses of criterion-referenced tests and discussed the interchangeability of the two types, as well as applications of the two together. There were eight areas, according to Smith, of contrast between the two types: 1) Variability of scores - norm-referenced tests seek and need it; criterion-referenced tests don't. 2) Scope - norm-referenced tests are likely to measure only the course objectives; criterion-referenced tests get to the behavior stated in the objectives. 3) Style - norm-referenced tests are descriptive type questions, like what to do in a given situation; criterion-referenced tests require a student to demonstrate an action or describe accurately the action. 4) Criterion - Success on a norm-referenced test may be decided after a test with all grades in. Success on a criterion-referenced test is determined prior to the test with a specified mastery levels, for example 80% required on each objective. 5) Follow up - a criterion-referenced test is more likely to have remedial material for those items not mastered or achieving 100% mastery. 6) Expectations - criterion-referenced tests, because of their objective based test items, are more likely to state prior to testing what is desired of the students. Norm-referenced tests are less likely to do this due to the competitive nature of the tests. 7) Missed Items - questions often missed on a norm-referenced test are reviewed for revision. Those items in a criterion-referenced test will cause a review of the

instruction. 8) Construction - criterion-referenced tests are more difficult to develop because of the problem of determining performance standards. Until more empirical specific methods are developed, the determination of a cut-off score is purely judgemental and subjective.

Smith said, in addressing criterion-referenced tests specifically, that the validity was preserved by making certain that the items measured the performance required by the objectives. Care must be taken that items do, indeed, measure the behavioral objectives.

The questions of norm-referenced tests being revised until they are meaningless was brought up again by W. James Popham, et. al[18]in testimony before the Congressional Committee on Education and Labor. The vagueness of commercially produced tests was also attacked. The feeling that criterion-referenced tests remedied these situations was made clear.

In reference to teaching to the test in a criterion-referenced test situation, Tom Haladyna[19]had an interesting viewpoint. He felt that teaching to the test may not be a beneficial situation and that higher scores on criterion-referenced tests may be induced by the situation and not the test itself. Haladyna advocated that the claim of reduced spread in student scores as a result of criterion-referenced tests was not supported. Actually, the reduced variance was a by-product of the teaching itself in a post-test situation. In an effective teaching situation with a

criterion-referenced test, the teaching was toward the test with its objectives.

Appealing for compromise in test usage was Thomas J. Fitzgibbon, Vice President of Harcourt, Brace, Jovanovich, Inc.[20] He pointed out that both were needed. He also pointed out that the wave of criterion-referenced tests popularity may be premature or unwarranted.

Fitzgibbon resisted the attack on norm-referenced tests and the cry that they were irrelevant. He maintained that norms or ranking will always be needed, even demanded. Fitzgibbon did state, however, that norms used should be made more relevant to the comparisons being made as well as made more understandable by those using the norms. A compromising point he advanced was to develop another set of references within the norm measurements, to establish the difference with each learner as to what the learner really knows and what the society feels the learner should know.

Fitzgibbon said that criterion-referenced tests and norm-referenced tests were, but should not be, considered to be opposite. There was apparently a one-against-the-other situation that cannot exist if we are to have differing tests for differing needs. Criterion-referenced tests were not just for formative testing nor were norm-referenced tests solely for summative testing.

Fitzgibbon cautioned criterion-referenced tests advocates that the movement to support criterion-referenced tests could collapse under its own weight, due to the demand

for specificity required in criterion-referenced tests. That demand and resultant workload may develop a negative reaction to a good form of testing.

Frank Peter Stetz[21] outlined four specific types of test situations and which type of test best fit the need and why. Stetz succinctly identified various purposes of testing and which type of test, criterion-referenced test or norm-referenced test, was best suited to the purpose and/or information sought. Those four types of tests identified by Stetz were: mastery-specific, total comparative testing, predictive testing and diagnostic testing.

Mastery-specific testing, according to Stetz, was best satisfied by using a criterion-referenced test because the information needed was whether or not a student met specific objectives and a detailed look at items answered correctly. Total comparative testing was best suited for norm-referenced tests because the information needed was not in-depth or detailed. Summary data was all that was necessary for pupil analysis in this situation. Predictive testing was best suited to norm-referenced testing because it ranked students on an ability, or score, continuum. Individual items were not of interest in this type of testing, only total scores. Diagnostic testing looked at responses on items or patterns of responses to items. The learner has to show mastery or non-mastery of skills or objectives. Criterion-referenced tests were best for this type of testing.

Emajean McCray and John Lottes[22] also supported the theory that the purpose of the test or the decision to be made was really the determinant as to which type of test was given. However, it was pointed out that the use of some type of criteria was inescapable in evaluating norm-referenced tests. One has to use some sort of standards in ranking students' scores or efforts.

It was also pointed out by McCray and Lottes that the purposes of the decision really determined the type of test. If specific skills were to be measured, e.g. a job analysis, then a criterion-referenced test was required. If admission to a program was contingent upon ranking within a group, then a norm-referenced test was called for.

The literature indicated a preference for criterion-referenced tests over norm-referenced tests, although both have their specific uses and advantages. The end result and use of the information dictate the type of test to use.

## Knowledge Mastery Levels

In a personal interview with Dr. Irv Lehman, Professor of Educational Psychology at Michigan State University, he indicated that mastery was whatever one felt comfortable using. There were no guidelines accepted as to what mastery was. He went on to say that setting a mastery level or cut-off point was an arbitrary judgement on the part of those parties writing or giving the test. He cited the fact that in a testing program in Mexico, in which he was

involved as a consultant, mastery was decided to be 51% of the material mastered. This decision was based on the policy of the Minister of Education that to have mastered a subject, at least 50% of the material should be mastered. Therefore, the program established a cut-off score of 51% or one percent more than half.

In a personal interview with Dr. Ed Roeber, Director of the Michigan Educational Assessment Program (MEAP), Dr. Roeber supported Dr. Lehman in the statement that setting cut-off scores was an arbitrary judgemental decision. He cited MEAP as an example.[23]MEAP was the first large organization to use criterion-referenced tests with four out of five of the questions per objective correct as the required level for mastery. He said this 80% mastery level established a trend over the country because a number of other organizations have since adopted the same level. Dr. Roeber said that level of mastery as a minimum was an arbitrary, albeit thoughtful, decision with no precedent. It seemed high, but reasonable. With the 80% level, he went on to say, there was only a 2% chance of a student guessing four or five questions correctly and thus appearing to have mastery when the student does not.

In a personal interview with Dr. Kara Schmitt, Research Consultant, Michigan State Department of Licensing and Regulation, she supported Dr. Roeber in his statement.

Jeffrey K. Smith[24]said the required levels for mastery should be placed at the cut-off levels of 80% to 90%. The

cut-off scores on criterion-referenced tests and mastery tests were generally in the 80% to 100% mastery level. This was because a score that high would indicate success in later units. The determining of cut-off scores was always a subjective decision and a difficult one.

Jack Housden and Lonnie LeGear[25] gave some examples of programs using criterion-referenced tests and having specific levels of mastery set for the tests. Different tests and programs had varying levels of mastery requirements due to the nature of the programs and the exit skills required. They also addressed some of the requirements of criterion-referenced test evaluation instruments.

Housden and LeGear pointed out that criterion-referenced tests were to reflect the content of a specific curriculum which was defined in a set of objectives. Student achievement was then indicated by mastery of the set of objectives.

According to Housden and LeGear, criterion-referenced tests, by nature, required the statement of objectives for a course. What level was required for mastery was arbitrary. While, the authors pointed out, there were no set standards for mastery, there were some examples of instructional programs that have established levels of mastery felt to be appropriate. These levels included: the Banning Adult School in Wilmington, California with an 80% mastery standard in a programmed, individualized setting; the

Central City Occupational Center in Los Angeles, California with an 85% mastery standard; and the Southern California Regional Occupational Center in Torrance, California which requires 100% mastery for certification in their auto tune-up program.

To use a criterion-referenced test evaluation model, Housden and LeGear continued to say that one must have test items that are objective-specific. Objective-specific means the test questions are directly related to the objectives established for the instruction to be taught. The test questions must also be criterion related. In other words, a pre-set level or standard for determining mastery of the items must be established prior to administration of the test.

The problem of guessing answers on a test by students was brought into focus by Linda Crocker and Jeri Benson.[26] They felt that criterion-referenced tests minimized pressure and apparently altered patterns of guessing and risk taking. The authors pointed out that in a criterion-referenced test, anxiety about the test may be reduced since there was no limit on how many succeed and there was no peer group pressure as in a norm-referenced test.

Crocker and Benson suggested that if test anxiety was reduced, the amount and patterns of risk taking, guessing and achievement levels may be altered. Their definitions of guessing and risk-taking were taken from a study which said the difference betwen guessing and risk-taking depended on

whether or not the respondent was aware of a penalty for guessing. If it was known that a non-penalizing situation existed, answering an item when one does not know the answer was guessing. If it was known a penalty existed, then it was risk-taking.

Melvin R. Novick and Charles Lewis[27] dealt with the problems of test length and number of items on criterion-referenced tests. They felt that the number of items was determined by: what the information will be used for; the level of functioning felt necessary for each objective; consideration for the possibility of false-negative and false-postive answers; information on the students' background as well as the instructional process itself and how much time was available.

Hse Tse-Chi[28] talked about objectives and the number of items necessary to adequately measure the mastery of the objectives. He also addressed the problem of mastery levels in general. Tse-Chi said the number of objectives on a test and number of items per objective can vary according to the nature of the objective. Mastery was simply the cut-off score at which a student was either declared a master or non-master. He stressed that at this time there were no adequate statistical methods for the determination of test items on a criterion-referenced test.

Tse-Chi then pointed out that times have changed and so have our needs. Norm-referenced tests were no longer adequate by themselves. The additional individual data

provided by criterion-referenced tests was needed. A mastery level for each objective was better than a mastery level for a group of objectives.

Ronald A. Berk[29] went into some detail in a discussion of how best to determine the number of questions on a criterion-referenced test and the confusion over how many questions were appropriate. Berk stated that the determination of just how many items should be selected for an objective or set of objectives was one of the most confusing aspects of criterion-referenced tests and that there was no single or specific answer to the question. The literature seldom spoke to the question of test reliability, but to the question of the relationship of test length to decision-validity.

Berk addressed four factors in the determination of number of items on a criterion-referenced test: 1) the type of decision to be made with the data, either tentative or permanent; 2) the importance of the objectives; 3) the number of objectives; and 4) time constraints of the test.

According to Berk, a test should have between five and ten items per objective if the decision to be made with the test results were of a tentative or reversible nature. That number (a minimum of five) took into consideration the frequency of errors in placement and formative decision. If the student was to be advanced or retained in a program, then this was a tentative decision; it could be reversed.

However, Berk stated that if the student was to be passed or failed at a grade level and a classroom summative statement or program evaluation was involved, then that decision was a permanent or irreversible one. This type of decision, said Berk, required 15 to 20 items per objective as well as all of the corrobative evidence and material available for the making of the decision. This area dealt with decisions made at the school, area and state levels.

Berk's second category to consider in the determination of the number of items was the importance of the objectives in the test. Berk stated that the process was entirely judgemental. Berk then said that the third area of consideration in determining the number of items on a test was the number of objectives themselves. He said that when a long list of objectives were employed, there were two options: 1) to write one item for each objective; or 2) sample the objectives and develop items only for those objectives.

Finally, Berk stated that the fourth area of consideration in determining the number of items on a test was that of practical constraints such as time limits and actually administering the test, as well as the personal characteristics of the students such as age, maturity, grade level, etc. An overly lengthy test could bore or anger the students. When this occured, the true picture of what they knew or could do was not projected.

Ronald Hambleton and Melvin R. Novick[30] also talked about the judgemental nature of setting cut-off scores on criterion-referenced tests. They pointed out that norm-referenced tests were basically "fixed-quota" tests. They were tests to rank individuals on a scale. Criterion-referenced tests were basically "quota-free." There was no set number of students who could exceed the cut-off or threshold score. Criterion-referenced tests have two groups of students: those who equalled or surpassed the cut-off scores and those who did not. Hambleton and Novick emphasized that in the present state of theory development on criterion-referenced tests, setting cut-off scores was purely judgemental and artitrary. No one has come forth with a definitive theory as to what a proper score for minimal achievement was.

Harold P. Schwartz[31] gave an insightful look into the establishment of cut-off scores and test items per objective. He addressed the problem of how many items per objective and pointed out that the usual number is five to ten per objective, not through any sound psychometric basis so much as time constraints in test administration, length of the test itself influencing student fatigue or interest and the possibility of making evaluation errors (false-positive or false-negative).

Jason Millman[32] in presenting a paper to the American Educational Research Association convention said that if judgement must be used, five basic guides may be applied in

setting a passing score on a criterion-referenced test. Millman's guides were: 1) setting a norm-referenced test type of standard by establishing a cut-off score so that a pre-set number of students may pass the test; 2) making value judgements on how critical it was that students answer each item (or master each objective) correctly and then setting levels accordingly for mastery; 3) requiring higher levels of mastery for skills important to later progress and lower levels for the less critical or to-be-covered-later material; 4) lowering the cut-off was acceptable when remedial costs were low, e.g. self-concept, available time, low motiviation, as well as money; and 5) raising the number of items to compensate for error in measurement as well as safeguarding against false-positive and false-negative classification of students.

Mastery learning, therefore, was determined by the individuals or individual administering the test in question. The setting of the level of mastery was a personal and arbitrary decision. It should be approached thoughtfully, however.

## Summary

The review of the literature indicated the established use of LAPs in the educational process at all levels of instruction. It also illustrated the differences between norm-referenced tests and criterion-referenced tests as well

as their relationship to each other. The purpose of each were also clearly shown.

The question of mastery of learning and how it was measured was addressed. The fact that the setting of any cut-off level in a test situation was judgmental was thoroughly covered. However, the review of the literature did show that 80% mastery, or higher, was generally felt to be the cut-off point most indicative of student mastery of the material.

The studies reviewed were intended to emphasize the advantages of LAPs as opposed to traditional teaching methods and the advantages of criterion-referenced tests over norm-referenced tests. The review of the literature showed LAPs and criterion-referenced tests to be satisfactory, if not superior, methods of teaching and measuring that teaching.

In Chapter III the methodology used in designing, organizing, presenting and testing the results of this study will be presented.

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# CHAPTER III

# METHODOLOGY

This chapter outlines and describes the design and methodology used in the study. The procedure for use of the Learning Activity Package (LAP) in a driver education class is also presented, along with the method used for data analysis.

## Selection of the Research Sample

To accomplish the purposes of this study it was necessary to obtain sample data from a high school driver education population. The East Lansing High School (ELHS) driver education program was selected for this study because of the following reasons: the school had a four phase driver education program consisting of classroom, simulation, range and behind-the-wheel instruction; the driver education instructors were willing to cooperate with the study; and the proximity of the school to the writer.

East Lansing High School had approximately 1300 students in grades 9-12. It was located in East Lansing, Michigan, a suburb of Lansing, Michigan with a population of approximately 51,000. The students at ELHS who participated in driver education in the spring term, 1981 were evenly divided between males and

females, ages 15 to 18 years old, and were in grades 10 to 12.

## The Sample

The proposal to conduct this study was acceptable to the ELHS administration. The two driver education instructors at ELHS, Martin Dolan and Ronald Bradford, agreed enthusiastically to cooperate in the study.

The population for the study was all spring 1981 driver education students at ELHS. The total number of students participating in the study was 122. Thirty-nine students (18 males and 21 females) were in the control group not receiving the LAPs and 83 (41 males and 42 females) students were in the experimental group receiving the LAPs. The experimental group was composed of two classes of 39 and 44 students each. There were three driver education classes offered during the spring term 1981 at ELHS. Rather than have one control class and one treatment class, the writer acted upon the advice of Dr. Norman T. Bell[1] and included two classes in the experimental group, thereby utilizing all spring term 1981 driver education students at ELHS during the period of the study.

Selection was not a concern in this study because the participating students were randomly assigned to the driver education classes by computer. The students were not specifically selected from a population for

participation in this study. Those applications were then placed in the school computer. The computer was programmed to assign students randomly to classes. No special scheduling, tracking or other considerations were made for either superior or special students. All students were assigned to whatever class was available. The ratio of male to female students was approximately equal. The class sizes of 39, 44 and 39 were the average class sizes for driver education at ELHS. The traditional driver education program at ELHS was given to the control group, while the experimental group was given the traditional driver education course and the LAPs.

## The Package of Materials

The supplemental materials presented to the experimental group were used by the writer and several colleagues in the Memphis, Tennessee City Schools driver education program prior to this study. While the earlier use of the package was not under strictly controlled conditions nor the results scientifically analyzed, the teachers and students involved felt the package to be helpful in learning the material covered in the Shell Answer Books.

The supplemental materials presented to the experimental group consisted of the Shell Answer Books and accompanying materials prepared by the writer. As

shown below in Tables I and II, there were 21 LAPs, each of the LAPs corresponded to a Shell Answer Book.

TABLE I

LEARNING ACTIVITY PACKETS

| In-Class Assignment | |
|---|---|
| Book Number | Title of Book |
| 1 | The Early Warning Book |
| 2 | The Breakdown Book |
| 3 | The Gasoline Mileage Book |
| 4 | The Car Buying and Selling Book |
| 5 | The 100,000 Mile Book |
| 6 | The Rush Hour Book |
| 8 | The Car Repair Shopping Book |
| 9 | The Car Crime Prevention Book |
| 10 | The Car Fix-Up Book |
| 12 | The Unexpected Dangers Book |
| 13 | The Emergency Repair Book |
| 15 | The Accident Book |
| 17 | The Self-Service Book |
| 18 | The Tune-up Book |
| 19 | The Gasoline Book |
| 23 | The How Your Car Works Book |
| 24 | The More Miles for Your Money Book |

| Out-of-Class Assignment | |
|---|---|
| Book Number | Title of Book |
| 7 | The Driving Emergency Book |
| 11 | The Foul Weather Driving Book |
| 14 | The Driving Skills Book |
| 21 | The Driving Hazards Book |

This series of 21 LAPs came from 21 of the first 24 Shell Answer Books. Three of the 24 Shell Answer Books did not deal with automobiles or driving, so they were not included in the program. (A representative LAP from the program is in appendix A.)

Each Shell Answer Book and accompanying material was presented to the experimental group as a LAP. Each LAP consisted of a set of behaviorally stated objectives for that specific topic; a true/false worksheet; a completion worksheet; a short-answer worksheet; a summary specifically addressing the objectives for that topic; a list of suggested projects for out-of-class assignments, wherever appropriate; a list of vocabulary words from the specific book; plus the corresponding Shell Answer Book.

The control group had the same course objectives as the experimental group, all of which were covered in both groups. The control group did not receive the LAPs, but was given the traditional driver education course presented in the standard format of video-tape introduction of the lesson topic, lecture and class discussion.

The experimental group received the traditional format presentation plus the LAPs. After a video-tape introduction and some brief remarks or lecture by the instructor, the appropriate LAP for that topic was given to the students. The students first received the

appropriate Shell Answer Book with the short answer and completion sheets. After completing them, the students handed the answer and completion sheets back to the instructor and received the true/false worksheet, to be completed without the aid of the Shell Answer Book. After completion of the true/false worksheets, the students checked their answers with the instructor for immediate feedback and reinforcement. The students were given the summary of the objectives of that book to keep for later review and study. Class discussion on the topic and materials was held at the end of the class period.

Both groups had the same objectives as the basis for the course instruction and evaluation. The two instructors involved in the study agreed that the objectives for the LAPs in the package matched those of the school in those areas of the driver education course as taught at ELHS. It is believed that the only difference between the groups was the treatment. The instructional objectives and basic material covered were identical for both groups.

The program had 21 LAPs with a total of 213 objectives, averaging approximately ten objectives per unit. Both groups involved in the study received instruction based on those objectives and both were tested on them at the completion of the course.

## Internal Validity

### History

The control and experimental groups had the treatment conducted in the same time-frame at the same school, ELHS, during the spring term of 1981. It is assumed that all significant events that occurred to the study population occurred to both groups and had the same impact on both.

### Maturation

Because of the short duration of this study, maturation was not a concern. Sixteen weeks were required for the study. What little maturation that did occur is assumed to have occurred within each group equally.

### Statistical Regression

Statistical regression did not apply to this study. The respondents in the study were not selected for participation on the basis of extreme scores or scores of any kind.

### Mortality

The number of students remained stable in this study. Three students moved out of the school district during the course of the study. The reasons for this negligible decrease were the age of the respondents (15 to 18 years of age) and the short duration of the study (only 16 weeks). This decrease was the same as for past driver education classes at ELHS.

## External Validity

### Interaction Effects of Selection Biases and the Experimental Variable

Interaction effects were controlled by the fact that students were randomly assigned to the driver education classes by registration computer. The population under study was not specifically selected for this study.

### Reactive Effects of Experimental Arrangements

Reactive effects were not a factor because the study setting was not an experimental arrangement per se. The study group was a driver education class in a high school of the same population. The conduct of the study was within the framework of a traditional driver education class. It was not artifically imposed upon in an overt, abstract manner.

### Multiple Treatment Inference

Multiple treatment inference was not a factor due to the fact that the three driver education classes participating in the study were short- lived and had no other experiments conducted with them. They had no history of experiment participation as a driver education class prior to the conduct of this study. This study was the only one in which those classes participated. The classes came together for one semester and then dissolved.

## Course Administration

The LAPs were administered by the two driver education teachers at ELHS, Martin Dolan and Ronald Bradford. Both teachers agreed that the objectives in the LAPs written by the writer matched their objectives for the same material as taught at ELHS in driver education. Both teachers conferred daily to ascertain that the objectives of the material were being thoroughly covered with both groups.

The material was presented February 8, 1981 through June 2, 1981, a total of 16 weeks. Classes were 55 minutes in length. The classes scheduled were the first, second and sixth periods. The first period was designated as the control group, with the second and sixth periods as the experimental groups. This designation was made because it was felt by the cooperating teachers that less contact would occur between the control and experimental groups if the control group was taught first in the day.

The school was visited to observe implementation of the program at least twice weekly, the visits made during different periods of the three groups and always unannounced. Great care was taken not to establish a discernible pattern in order to obtain a more true assessment of how the program was being implemented. Each visit showed the study to be implemented as agreed with the two cooperating teachers.

Because of the nature of the sub-hypothesis, the LAPs were presented to the experimental group in two methods. The first method was to cover 17 of the 21 units in class. The second method was to assign four of the 21 units as out-of-class, independent study. Each student had six hours of free time at school granted specifically for this purpose. Those objectives from the four units asigned as out-of-class work were identified as such in the test instrument and for study as a sub-hypothesis in the experiment.

## The Post-Test

The specific structure for the test instrument was 60 true/false items and 65 multiple choice items. The 60 true/false items were listed first and the 65 multiple choice followed. This arrangement was selected after consultation with Dr. LeRoy Olson[2] at Michigan State University. Dr. Olson recommended placing all the true/false items first and the multiple choice items second (in his opinion) for the following reasons: this structure is more efficient in giving instructions to the students; it enables students to keep a common mental frame of reference between the true/false absolutes of either right or wrong and the decisions between the various options of mulitple choice questions; and the students may remain in one mode and then go to the other rather than having to

constantly shift thought processes between the two types of questions. Dr. Olson went on to say that beginning a test with true/false items eases students into a test situation, possibly helping to get their confidence up before having to cope with the more difficult multiple choice type of questions. A conference with Dr. Stephen Yelon[3] of Michigan State University corroborated the recommendations of Dr. Olson about the test instrument structure.

The post-test was administered to both groups in two hour blocks on the same day. The test instrument itself was a document 15 pages in length. The participants were instructed to mark-sense the correct answer in the appropriate bubble on a separate answer sheet (appendix B). The test was administered by the supervising driver education teacher at ELHS under the direction of the writer. The students were told not to leave any item unanswered.

The post-test was composed of five test items for each of 25 objectives selected randomly from the total of 213. Twenty-five objectives were selected because of the total number of test items ultimately to be placed on the post-test instrument. Since each objective was to have five items, 25 objectives resulted in a test instrument of 125 items. A test instrument in excess of this number was judged by experts to be too lengthy to be effective. Student

fatigue and time limits were felt to be critical factors in determing test length. Therefore, 25 objectives with 125 test items were felt to be the maximum number for testing the effects of the treatment.

Five items per objective were determined to be necessary in order to accurately determine mastery or non-mastery of each selected objective in the post-test. Mastery of each objective was determined to be four or five correct anwers of the five items relevant to each objective. This required level of mastery was recommended by Dr. Kara Schmitt,[4] Research Consultant, Michigan State Department of Licensing and Regulation. This level of required mastery is also supported by the literature in the area of testing and evaluation.

The test items were selected from accepted sources in the field of driver education. The items specifically related to those objectives were randomly chosen for evaluation. The test items with the corresponding objectives were submitted to Dr. Robert O. Nolan and Mr. Fred Vanosdall, Director and Assistant Director of the Michigan State University Traffic Safety Center, respectively, for review and scrutiny. They determined in their professional opinions that the items did indeed address the objectives for which they were intended. After minor rewording of some few test

items for clarification or amplification (without in any way altering or changing meaning or intent of any test item), both experts were satisfied that the test items and objectives were compatible. In so doing the post-test instrument was validated and ready for administration to the control and experimental groups for evaluation of group mastery of the selected objectives. Appendix C contains a listing of the selected objectives with the five test items selected for each objective. Appendix D is the test instrument used for the post-test.

## Statistical Analysis

The research question under investigation in this study was: Will the use of the Shell Answer Books and the LAPs as a supplemental aid in the driver education classroom result in higher test scores on a selected set of objectives than without use of this program?

A secondary research question under investigation in this study was: Will the students in the experimental group score higher on those selected objectives covered in a classroom setting or those covered in an out-of-class study setting?

Based upon these questions under investigation in the study, the following null hypothesis and sub-hypothesis were selected for statistical analysis:

There will be no difference in achievement levels between the experimental and control groups as measured by a post-test.

The sub-hypothesis was:

There will be no difference in mastery levels betwen the experimental groups on those objectives covered in class and those covered out of class as measured by a post-test.

The design for the null hypothesis was:

$$H_0: \quad \frac{(u_3 + u_2)}{2} - u_1 = 0$$

$$H_1: \quad \frac{(u_3 + u_2)}{2} - u_1 \neq 0$$

where $u_3$ and $u_2$ = experimental groups and

$u_1$ = control group

The design for the sub-hypothesis was:

$$H_0: \quad u_1 - u_2 = 0$$

$$H_1: \quad u_1 - u_2 \neq 0$$

where $u_1$ = units used in class and

$u_2$ = units used as independent study

The purpose of developing the first hypothesis was to determine if the treatment of the LAPs caused a significant difference in the mean post-test scores between the two groups.

The purpose of the sub-hypothesis was to determine if there was a difference in the mastery levels of those objectives taught in a traditional classroom setting and those objectives covered in an out-of-class study assignment as indicated by examination of post-test scores of the experimental group. All

objectives were randomly sampled, the out-of-class and in-class objectives being different objectives.

A post-test was given to both groups. The two groups were compared for significance in level of mastery of selected objectives from the supplemental package of materials between the experimental and control groups.

The test statistic used in this study for determination of significance was the students' t-test. The decision rule for significance was a level of .05 alpha. A two-tailed test was used in both the hypothesis and sub-hypothesis with 78 degrees of freedom for the hypothesis and 82 degrees of freedom for the sub-hypothesis.

The t-test was selected because this study involved comparisons of means and mastery levels between two groups.

The independent variable was the LAPs used as supplemental instructional materials with the experimental group. The dependent variable was the post-test performance scores.

The t-test statistic was considered to be significant when found to be larger than the tabled value with the same degrees of freedom after applying the group mean scores to the student's t-test formula and tables. The tabled value for both hypothesis and sub-hypothesis was $t = \pm 1.96$.

If the null hypothesis was rejected, then it may be assumed that the supplemental materials were responsible for the difference in the group mean mastery levels. If the sub-hypothesis was rejected, then it may be assumed there were differences between the mastery level means on those objectives studied in class and those studied in an out-of-class setting.

## Summary

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

In Chapter IV the data collection results and statistical analysis of that data for the null hypothesis and sub-hypothesis is presented.

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# CHAPTER IV

# THE ANALYSIS OF DATA

## Introduction

In Chapter III the methodology used in designing, organizing, presenting and analyzing the results was described. This chapter reports the findings of the two analyses which were conducted as a hypothesis and sub-hypothesis.

The purpose of the study was two-fold:

1) To compare the group mean mastery levels of the experimental and control groups on selected objectives; and

2) To compare the mean mastery levels of the experimental group on selected objectives relevant to Learning Activity Packets (LAPs) assigned as in-class work and those selected objectives relevant to LAPs assigned as out-of-class study.

The student's t-test was chosen for the statistical analysis because the study involved the comparison of means between two groups in both the hypothesis and sub-hypothesis. The questions of normality, equality of variance and independence between groups were satisfied by the appearance of an approximately normal distribution in

the group scores, approximately equal variances between the groups and a minimum of interaction between the groups. Also, the assignment to groups was made on a random basis by the scheduling computer at East Lansing High School (ELHS), with no special tracking or student capabilities taken into consideration in class assignments.

The test instrument consisted of 125 items, with 60 true/false and 65 multiple choice questions. Each of the 25 selected objectives had five items relevant to that specific objective in the test instrument.

A student was considered to have mastered an objective if at least four of the five relevant items were answered correctly. This was a minimum mastery level of 80% for each objective.

For the hypothesis the group scores were applied to the student's t-test formula in a two-tailed test. The critical t value (or tabled value) for determination of statistical significance between group scores was +1.96. The critical or tabled value was the same for the sub-hypothesis.

The differing number of objectives in the groups of in and out-of-class objectives on the test instrument (14 objectives relative to in-class material and 11 objectives relative to out-of-class material) required a linear transformation of the scores of the experimental group into percentages rather than means for the purposes of the

analysis of the sub-hypothesis. In a personal interview, Dr. Richard Houang, Professor of Educational Psychology, Michigan State University, recommended this process prior to applying the scores to the student's t-test formula. He stated this process would control for the larger number of objectives in one of the groups. Without the linear transformation the group of in-class objectives would have a higher mean because of its larger number, resulting in a false reading of a statistically significant difference in the mastery level of in-class objectives by the experimental groups. The linear transformation was performed on the scores. They were then submitted to the student's t-test.

## Analysis of Data

Data for analysis consisted of the post-test scores of students of the ELHS driver education classes for the spring term, 1981. The post-test scores were coded onto cards and analyzed at the Michigan State University Computer Center. The program used for analysis was the Statistical Package for the Social Sciences (SPSS). The method of statistical analysis was the student's t-test for significance between group means. This was based on the mean number of objectives mastered by the experimental and control groups. Also under scrutiny was a sub-hypothesis concerning the mean level of mastery of objectives covered in a classroom

setting as opposed to those objectives covered in materials assigned as out-of-class study. The sub-hypothesis was concerned only with the experimental group.

The questions of interest in this study were:

1) Will use of the Shell Answer Books and the LAPs as a supplemental aid in the driver education classroom result in higher test scores on a selected set of objectives than without use of the materials?

2) Will use of the Shell Answer Books and the LAPs in the classroom result in higher test scores on selected objectives from that material than on test scores on objectives from the Shell Answer Books and LAPs assigned as out-of-class study?

As shown in Table II, the number of students mastering objectives had a wide range. In the experimental group the number of students mastering an objective went from a low of 34 students on objective #2 to a high of 71 students on objective #14. The control group had a low of seven students mastering objective #4 and a high of 38 students mastering objective #8.

TABLE II

Mastery of Objectives

| Objective Number | Experimental Group (n=83) Number of Students | Control Group (n=39) Number of Students |
|---|---|---|
| 1 | 63 | 20 |
| 2 | 34 | 14 |
| 3 | 55 | 19 |
| 4 | 44 | 07 |
| 5 | 63 | 31 |
| 6 | 43 | 24 |
| 7 | 60 | 23 |
| 8 | 65 | 38 |
| 9 | 59 | 27 |
| 10 | 59 | 35 |
| 11 | 59 | 24 |
| 12 | 54 | 16 |
| 13 | 60 | 23 |
| 14 | 71 | 25 |
| 15 | 52 | 22 |
| 16 | 65 | 26 |
| 17 | 53 | 28 |
| 18 | 64 | 11 |
| 19 | 58 | 33 |
| 20 | 57 | 18 |
| 21 | 47 | 09 |
| 22 | 60 | 26 |
| 23 | 50 | 19 |
| 24 | 67 | 28 |
| 25 | 59 | 32 |

Table III shows the number of students in both the experimental and control groups which failed to master each of the selected objectives. In the experimental group the number of students who failed to master an objective went from a low of 12 students on objective #14 to a high of 49 students on objective #2. The control group had a low of

one student who failed to master objective #8 to a high of 32 students who failed to master objective #4.

TABLE III

Non-Mastery of Objectives

| Objective Number | Experimental Group (n=83) Number of Students | Control Group (n=39) Number of Students |
|---|---|---|
| 1 | 20 | 19 |
| 2 | 49 | 25 |
| 3 | 28 | 20 |
| 4 | 39 | 32 |
| 5 | 20 | 08 |
| 6 | 40 | 15 |
| 7 | 23 | 16 |
| 8 | 18 | 01 |
| 9 | 24 | 12 |
| 10 | 24 | 04 |
| 11 | 24 | 15 |
| 12 | 29 | 13 |
| 13 | 23 | 16 |
| 14 | 12 | 14 |
| 15 | 31 | 17 |
| 16 | 18 | 13 |
| 17 | 30 | 11 |
| 18 | 19 | 28 |
| 19 | 25 | 06 |
| 20 | 26 | 21 |
| 21 | 36 | 30 |
| 22 | 23 | 13 |
| 23 | 33 | 20 |
| 24 | 16 | 11 |
| 25 | 24 | 07 |

Tables IV and V show the number of students in the experimental group that mastered or failed to master those randomly selected objectives used for in-class assignments and those randomly selected objectives used for out-of-class assignments. All of the selected objectives were different, no objective was in both groups.

TABLE IV

Student Mastery of In-Class Objectives
Experimental Group (n=83)

| Objective Number | Mastery Number of Students | Non-Mastery Number of Students |
|---|---|---|
| 1 | 63 | 20 |
| 2 | 34 | 49 |
| 3 | 55 | 28 |
| 4 | 44 | 39 |
| 5 | 63 | 20 |
| 6 | 43 | 40 |
| 7 | 60 | 23 |
| 8 | 65 | 18 |
| 19 | 58 | 24 |
| 20 | 57 | 26 |
| 21 | 47 | 36 |
| 23 | 50 | 33 |
| 24 | 67 | 16 |
| 25 | 59 | 24 |

TABLE V

Student Mastery of Out-of-Class Objectives
Experimental Group (n=83)

| Objective Number | Mastery Number of Students | Non-Mastery Number of Students |
|---|---|---|
| 9 | 59 | 24 |
| 10 | 59 | 24 |
| 11 | 59 | 24 |
| 12 | 54 | 29 |
| 13 | 60 | 23 |
| 14 | 71 | 12 |
| 15 | 52 | 31 |
| 16 | 65 | 18 |
| 17 | 53 | 30 |
| 18 | 64 | 19 |
| 22 | 60 | 23 |

Null Hypothesis

There will be no difference in achievement levels between the experimental and control groups as measured by a post-test.

The design for the null hypothesis was:

$H_0 : \frac{(u_3 + u_2)}{2} - u_1 = 0$

$H_1 : \frac{(u_3 + u_2)}{2} - u_1 \neq 0$

where $u_2$ and $u_3$ = experimental groups and

$u_1$ = control group

TABLE VI

Comparison of Group Means
Experimental/Control Groups
All Objectives

| | n | $\bar{X}$ | S.D. | t-value |
|---|---|---|---|---|
| Experimental | 83 | 17.3373 | 4.043 | -3.33* |
| Control | 39 | 14.8205 | 3.824 | |

(degrees of freedom = 78)
Significant level ±1.96
*Significant at alpha = .05
The null hypothesis was rejected.

The group mean of selected objectives for the control group was 14.8205. The group mean of selected objectives for the experimental group was 17.3373. The means indicated the average number of objectives mastered per student in

that group. The standard deviation for the control group was 3.824 while the standard deviation for the experimental group was 4.043.

The comparison of the two group means in a two-tailed t-test resulted in a computed t-value of -3.33 (with 78 degrees of freedom). The critical t-value needed for significance between the differences of the means was $\pm 1.96$ at alpha level of .05. There was a significant difference between the group means. Therefore, the null hypothesis was rejected. There was a significant difference between the achievement levels of the two groups with the experimental group having had the higher of the scores.

Sub-Hypothesis

There will be no difference in achievement levels between the post-test scores (of the experimental group) of those units used in a classroom setting and those used in an out-of-class study setting.

The design for the sub-hypothesis was:

$H_0 : u_2 - u_1 = 0$

$H_1 : u_2 - u_1 \neq 0$

where $u_2$ = units used in a classroom setting and

$u_1$ = units used in an out-of-class study setting

The sub-hypothesis was applicable only to the experimental group, since the experimental group had the supplemental materials used in the study, part of which was assigned as work to be done outside of the normal class

setting. In this manner the potential for comparing the mastery levels of the two different settings was developed.

A paired t-test was performed on the mean mastery levels of the in-class and out-of-class objectives achieved by the experimental groups. The 25 selected objectives were composed of 14 in-class objectives and 11 out-of-class objectives. The mean level of mastery was first determined for each of the two groups of selected objectives and then a paired t-test performed on those means. The critical t-value was $\pm 1.96$ at alpha level of .05 with 82 degrees of freedom.

Table VII shows the group mean comparison between the in-class and out-of-class objectives by the experimental group.

TABLE VII

Group Mean Comparison Between Mastery of In and Out-of-Class Objectives by the Experimental Group

| Objectives | n | $\bar{X}$ | S.D. | t-value |
|---|---|---|---|---|
| In-class (n=14) | 83 | 66.6954 | 15.628 | |
| Out-of-class (n=11) | 83 | 70.6462 | 22,819 | 1.80* |

degrees of freedom = 82
Significance level $\pm 1.96$
*Not significant at alpha = .05
The null hypothesis was not rejected.

The mean mastery level of the in-class objectives by the experimental group, after a linear transformation was performed on the data to convert it to percentages, was 66.6954 with a standard deviation of 15.628. The mean mastery level of the out-of-class objectives by the experimental group, after a linear transformation was performed on the data, was 70.6462 with a standard deviation of 22.819. The conversion of the data to percentages was necessary for an accurate comparison because of the differing sizes of the two groups. The difference between the mean mastery levels of the two groups of selected objectives by the experimental group was -3.9509 with a standard deviation of 19.961. After comparison of these means by a paired t-test, the computed t-value was found to be 1.80. This was less than the critical t-value of $\pm$1.96. Therefore, no significant difference in the mean mastery levels, by the experimental group, of the in and out-of-class objectives was found. The null sub-hypothesis was not rejected. While there was no statistically significant difference between the mastery levels of the two groups of objectives by the experimental group, it should be pointed out that there was a slightly higher level of mastery of the out-of-class objectives.

## Summary

In summary, the analysis of the data indicated that the supplemental materials given to the experimental group did

have an effect on the post-test scores. The students in the experimental group mastered, on the average, two and one-half more objectives per student on the post-test than did the control group. The difference was statistically significant at the alpha level of .05 through use of the student's t-test. The null hypothesis was rejected.

The sub-hypothesis was an examination of the possible differences in student achievement between material taught in class and that assigned as out-of-class study. This was limited to the scores of the experimental group.

A paired t-test was performed on the experimental group's mean scores of the in and out-of-class objectives on the post-test. The difference was not statistically significant at alpha level of .05. The null sub-hypothesis was not rejected.

A discussion on the analysis of data along with conclusions and recommendations for future research are contained in Chapter V.

# CHAPTER V

## SUMMARY, FINDINGS, CONCLUSIONS, RECOMMENDATIONS, RECOMMENDATIONS FOR FURTHER RESEARCH, DISCUSSION

In Chapter IV was presented the results of the analysis of data in this study. This chapter will include: a summation of the study including methods and findings, the conclusions warranted by the resulting data, recommendations, recommendations for further study and a discussion.

### Summary of the Study

The primary purpose of this study was to determine the mastery of randomly selected driver education objectives by the experimental and control groups when the driver education instruction for the experimental group had been supplemented by the use of the Shell Answer Books and the Learning Activity Packets (LAPs) developed by the writer. Both groups had the same instructional objectives.

The subjects participating in the study were all of the driver education students at East Lansing High School (ELHS) in the spring term, 1981.

Specifically, the study examined the following research questions:

1) Will the use of the Shell Answer Books and LAPs package as a supplemental aid in the driver education classroom result in higher test scores on a randomly selected set of objectives than without use of the package?

2) Will the students in the experimental group score higher on those randomly selected objectives covered in a classroom setting or those used in an out-of-class study setting?

Based upon these research questions, the following null hypothesis and sub-hypothesis were formulated.

The null hypothesis was:

> There will be no difference in achievement levels between the experimental and control group as measured by a post-test.

The null sub-hypothesis was:

> There will be no difference in mastery levels within the experimental group on those objectives covered in class and those covered out of class as measured by a post-test.

## Research Design

The study was conducted at ELHS in East Lansing, Michigan during the spring term, 1981. This school was chosen because of the four-phase program at the school, the close proximity of the school to the writer and the willing cooperation of the teachers involved.

One hundred twenty-two students, ages 15 to 18 in grades 10 to 12, participated in the study. The ratio of males to females was approximately equal.

There were three driver education classes during the spring term, 1981 at ELHS. One of the classes was chosen as the control group. The remaining two classes were designated as the experimental group. The control group had 39 students, while the experimental group had 83 students. The study lasted 16 weeks, from February 8, 1981 to June 2, 1981.

The post-test instrument was of a true/false, multiple choice format. Sixty of the questions were true/false, while 65 were multiple choice for a total of 125 items. The test was administered to all three groups at one sitting during a double class period. Two separate t-tests were conducted to analyze the data collected.

## Findings

The null hypothesis, as stated, was:

> There will be no difference in achievement levels between the experimental and control groups as measured by a post-test.

The post-test results were analyzed by the student's t-test. The tabled critical value in a two-tailed test of significance was $\pm 1.96$. The computed t value was $-3.33$ at alpha = .05 and 78 degrees of freedom. Therefore, significance was found. The null was rejected.

The null sub-hypothesis was:

> There will be no difference in mastery levels within the experimental group on those randomly selected objectives covered in class and those covered out-of-class as measured by a post-test.

The post-test results were analyzed by the student's t-test. The tabled critical value in a two-tailed test of significance was again $\pm$ 1.96 at alpha = .05 with 82 degrees of freedom. A linear transformation was performed on the scores of the two differing size groups converting them to percentages so they could be properly compared. A t-test was applied to the scores and the computed t value was 1.80. This was not in the rejection area of $\pm$1.96. Therefore, no significance was found. The null sub-hypothesis was not rejected.

1) Analysis of the data indicated the experimental group achieved a higher level of mastery on the selected objectives than the control group.
2) The largest number of students in the experimental group mastering an objective was 71 students on objective #14. The smallest number of students in the experimental group to master an objective was 34 students on objective #2.
3) The largest number of students in the control group mastering an objective was 38 students on objective #8. The smallest number of students in the control group to master an objective was seven students on objective #4.
4) Analysis of the data indicated no statistically significant difference on the mastery levels of those groups of selected objectives studied in class or out of class by the experimental group.

5) Within the experimental group, the range of mastery on the in-class objectives ran from a low of 34 students on objective #2 to a high of 67 students on objective #24.

6) Within the experimental the range of mastery on the out-of-class objectives ran from a low of 60 students on objective #13 to a high of 71 students on objective #14.

## Conclusions

The LAPs were proven to have value in the driver education classroom in this study.

The LAPs may be utilized equally as well in either manner, in class or out-of-class. Regardless of how they may be assigned, they were proven in this study to enhance the traditional driver education course.

## Recommendations

The t-tests conducted on the hypothesis showed that a significant difference existed between the mastery levels on the post-test of the experimental group and the control group in favor of the experimental group. The experimental group had a higher mastery level than the control group on 19 of the 25 selected objectives.

In the investigation of the sub-hypothesis, a t-test was conducted to determine if a significant difference existed between mastery of those selected objectives covered

in class and those covered out-of-class in an independent study setting. This was applicable only to the experimental group since the control group did not utilize any supplemental material. The t-test revealed that no significant difference in mastery levels existed between the two sets of objectives within the experimental group. While some difference was apparent, it was not large enough to be statistically significant.

Since there was no significant difference between the experimental group mastery levels on the in-class and out-of-class objectives, a dual utility for the LAPs becomes apparent. The experimental group students performed almost equally as well on either set of objectives. Therefore, either method of learning when using the LAPs worked equally as well. This allows the driver education teacher a great deal of latitude in the use of the LAPs. If time is short, as it is in an abbreviated driver education course, then most or all of the LAPs could be assigned as out-of-class study and class time could be devoted to other methods of presentation. If time is not a problem, then the driver education teacher could cover as many LAPs as desired in the classroom. The students should perform as well with either format in using the Shell Answer Books and the LAPs.

The Shell Answer Books and LAPs could easily form the curriculum for an adult education program in driver education where a 30 hour classroom schedule is impossible.

Whatever class time is available could be maximized by using these materials.

Commercial driving schools could use the Shell Answer Books and LAPs in their programs, whether in class or assigned individually. These materials could improve the caliber of instruction in the commercial schools, particularly when classes are taught by personnel other than a certified driver education teacher. The self-instruction format of the LAPs might help compensate for the weaknesses of a poor teacher, or enhance the effectiveness of a competent teacher.

These materials should be made available to future driver education teachers through driver education teacher preparation courses, such as a methods and materials course or an innovations course. Presentation in a methods and materials course would make the materials known or available to prospective teachers insuring proper application of them. The job of a beginning teacher would also be made more effective by relieving some of the review and search by the new teacher for good materials to use in class. An innovations course could make use of the materials by demonstrating what can be developed for classroom use simply from one's everyday surroundings.

The LAPs should be published for widespread dissemination throughout the profession of driver education teachers. This study proved that students using the LAPs with the Shell Answer Books performed significantly better

on a post-test of selected objectives than a group of students who had only the traditional driver education course. Therefore, these materials should be made available to all driver education teachers so they might implement them into their curriculum in whatever manner desired. The Shell Answer Books are free, upon request, in bulk. Publication costs of the LAPs would be minimal. The potential benefit to be derived from use of these materials is immeasurable.

Martin Dolan and Ronald Bradford, the driver education teachers who cooperated in this study at ELHS, have expressed a commitment to completely remodel the driver education course at ELHS to incorporate all the Shell Answer Books and LAPs used in this study into the driver education curriculum at ELHS. They have a strong conviction that these materials were of benefit to their driver education students. It is felt by the writer that the availability of this program would be given the same enthusiastic reception by most, if not all, driver education teachers for use in their classrooms.

## Recommendations for Further Research

The following recommendations for further research are based on the observations, findings and conclusions of this study.

1) A study should be conducted with one class as a control group, one as an experimental group with

all LAPs covered in class and another class as an experimental group with all LAPs assigned as out-of-class work. This might determine if a difference really exists between mastery levels on work covered in and out-of-class.

2) A study should be conducted using the same materials in the more prevalent 30 hour classroom driver education program to ascertain what differences, if any, in achievement levels manifest themselves.

3) A study should be conducted to determine the relationship between a student's score on the post-test instrument and subsequent behind-the-wheel performance and, if possible, accident and violation involvement.

4) This study should be replicated using 60% mastery or three correct items out of five as the minimum level accepted to determine if significantly larger numbers of students attain mastery at that lower level.

5) A study should be conducted matching IQs and GPAs with each student's mastery levels to determine if a correlation exists between the items.

6) This study should be replicated using three items per objective with two items correct indicating mastery of that objective to determine if significantly larger or smaller numbers of

students attain mastery at that level of mastery. The number of objectives tested should remain the same, thus only the number of test items is reduced.

7) This study should be replicated using a random sampling of all the high schools in the state of Michigan in order to get generalizability of results to the entire state of Michigan and, therefore, a much larger student population.

## Discussion

The results showed no significant difference in scores of the experimental group on the objectives studied out of class or those covered in the traditional classroom setting. Therefore, it is feasible to consider assigning all of the LAPs as out-of-class work in a supplemental capacity only. The lecture could be used to cover other critical aspects of driver education while the scope of the course is expanded by the LAPs covering additional information outside the classroom.

1) At the 80% mastery level, the experimental group had: a low of 12 students mastering objective #13 and a high of 49 students mastering objective #18.
2) At the 100% mastery level, the experimental group had: a low of 11 students mastering objective #2 and a high of 55 students mastering objective #14.

3) At the 80% mastery level, the control group had: a low of five students mastering objective #4 and a high of 21 students mastering objective #25.

4) At the 100% mastery level, the control group had: a low of one student mastering objective #3 and a high of 30 students mastering objective #8.

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# APPENDIX A

# SAMPLE LEARNING ACTIVITY PACKET

# APPENDICES

SAMPLE LEARNING ACTIVITY PACKET

Book #8

THE CAR REPAIR SHOPPING BOOK

Objectives

1. The student will correctly identify the seven aspects to look for in finding a good shop.

2. The student will correctly describe the importance of a written guarantee.

3. The student will correctly describe the significance of the term "certified mechanic."

4. The student will correctly identify th term "auto cap."

5. The student will correctly identify the number of autos and mechanics in the U.S.

6. The student will correctly identify the busiest and therefore worst days to have work done on an auto.

7. The student will correctly identify the best way to tell a mechanic what is wrong with an auto.

8. The student will correctly identify the "Flat Rate Manual."

9. The student will correctly describe the following auto rip-offs: honking, slashing, short-sticking, shock treatment, battery boil, hot oil filter.

BOOK #8

THE CAR REPAIR SHOPPING BOOK

## True/False Worksheet

Answer the following statements TRUE (T) or FALSE (F):

_____ 1. A good reputation should be of concern when looking for a shop to do auto repair.

_____ 2. Certification should be your main concern when judging a mechanic.

_____ 3. A neat shop usually indicates quality work.

_____ 4. "Five o'clock surprise" usually means paying less for repair than you expected.

_____ 5. There are 100,000 autos on the road today.

_____ 6. There are 200,000 mechanics in the U.S.

_____ 7. Always try to tell the mechanic what the cause of the problem is.

_____ 8. A brake job can vary from $30 to $175.

_____ 9. The flat rate manual is a register listing mechanics' prices per job.

_____ 10. The best way to feel comfortable about a repair is to feel comfortable about the place doing the work.

BOOK #8

THE CAR REPAIR SHOPPING BOOK

Fill in the Blank Worksheet

Fill in the blanks with the appropriate word or words:

1. The practice of dropping a seltzer tablet on the battery to make it appear to have boiled over is called _____.
2. Slashing the fan belt while checking under the hood is called _____.
3. Telling you the oil filter needs replacing because it is too hot is called the _____ trick.
4. Puncturing the tire while checking the air is called _____.
5. Squirting oil on the shocks to make them look like the seals are broken is called the _____.
6. Not pushing the dipstick all the way down to check the oil is called _____.
7. Americans spend over _____ dollars per year on auto repair.
8. When talking to a mechanic, tell him the _____ not the _____ of the problem.
9. In determining prices, many places use the _____ Manual.

BOOK #8

THE CAR REPAIR SHOPPING BOOK

Short Answer Worksheet

1. Identify the seven areas the consumer should look for in finding a mechanic. a) _____ b) _____ c) _____ d) _____ e) _____ f) _____ g) _____

2. Identify the "five o'clock surprise." _____

_____

3. What does the term NIASE mean? _____

_____

4. List the six service station rip-offs listed in the book.

a) _____

b) _____

c) _____

d) _____

e) _____

f) _____

5. Describe the Flat Rate Manual. _____

_____

6. What are the worst days to try to get an auto repaired?

_____ _____ _____

7. How much do consumers spend yearly on auto repairs?

_____

BOOK #8

THE CAR REPAIR SHOPPING BOOK

## Answer Key

### True/False Worksheet

1. T
2. F
3. T
4. F
5. F
6. F
7. F
8. T
9. T
10. T

### Fill-in-the Blank Worksheet

1. Battery boil
2. Slashing
3. Hot oil filter
4. Honking
5. Shock treatment
6. Short sticking
7. 35 billion
8. Symptoms; causes
9. Flat Rate Manual

### Short Answer Worksheet

1. a) reputation; b) qualifications; c) equipment; d)convenience; e) estimates; f) neatness; g) guarantees
2. Paying more for repairs than you were told
3. National Institute for Automotive Excellence
4. a) honking; b) slashing; c) short sticking; d) shock teatment; e) battery boil; f) hot oil filter
5. It is a manual listing of prices charged for repair jobs.
6. Mondays, Fridays, Saturdays
7. $35 billion

BOOK #8

# THE CAR REPAIR SHOPPING BOOK

## Vocabulary

1. NIASE - The National Institute for Automotive Service Excellence.

2. Five o'clock surprise - the shock of having to pay more for auto repairs than you were told or anticipated.

3. Certified mechanic - a mechanic who generally has passed tests on the various systems of an auto and has at least two years practical experience.

4. Auto cap - Automotive Consumer Action Panel

5. Honking - while checking the air pressure, the attendant punctures your tire.

6. Slashing - while checking the hood, the attendant cuts the fan belt.

7. Short sticking - the practice of not pushing the dip-stick all the way down when checking the oil to make it read low.

8. Shock treatment - squirting oil on the shock absorbers to make them appear to have broken seals.

9. Battery boil - dropping a seltzer tablet on the battery to make it boil over.

10. Hot oil filter - the oil filter is apparently too hot and needs replacing, but this is a ruse.

BOOK #8

# THE CAR REPAIR SHOPPING BOOK

## Summary

1. The seven apsects to look for in finding a good shop are: a) reputation; b) qualifications; c) equipment; d) neatness; e) convenience; f) estimates; and g) guarantees.

2. A written guarantee is important in preventing paying more for repairs than you expected.

3. The term "certified mechanic" generally means that the mechanic has passed tests on car repair and received a certification.

4. The term "auto cap" means Automobile Consumer Action Panel.

5. There are approximately 100 million autos and 800,000 mechanics in the U.S.

6. The busiest days, and therefore the worst, to have work done on your auto are Monday, Friday and Saturday.

7. The best way to tell a mechanic what is wrong with an auto is to tell him the symptoms or what it does or does not do. Also state the specific conditions in which the problem occurs.

8. The "Flat Rate Manual" is a manual describing specific labor rates for mechanical jobs.

9. The following terms are considered auto rip-offs:

   a) honking - puncturing your tire when checking air pressure;

   b) slashing - cutting the fan belt while checking under the hood;

   c) short sticking - not pushing the dipstick all the way down when checking the oil;

   d) shock treatment - squirting oil on the shock absorbers to make you think the seal is broken;

e) battery boil - dropping a seltzer tablet on the battery to make it boil over.

f) hot oil filter - telling you the oil filter is hot and needs replacing.

BOOK #8

THE CAR REPAIR SHOPPING BOOK

## Projects

1. Take a survey of auto repair shops and service stations in your area. How many have NIASE certified mechanics?

2. Get a service representative from an auto dealership to come speak to the class about the two sides of having your auto repaired and how best to correct problems.

3. Get some different estimate forms from various, repair shops. How do they compare? What, if anything, shows up regularly?

4. Choose some routine repair jobs and call various repair outlets to get the different prices on the same job. If a price varies greatly, find out if more or less than the standard work is done.

5. Have a representative of the local Better Business Bureau speak to the class on auto repair cheating and what to do about it.

# APPENDIX B

# ANSWER SHEET

ANSWER SHEET FOR SHEEL ANSWER BOOK TEST PERIOD_____NAME_____

SCORE_____GRADE_____

| | | | | |
|---|---|---|---|---|
| 1. T F | 26. T F | 51. T F | 76. A B C D | 101. A B C D |
| 2. T F | 27. T F | 52. T F | 77. A B C D | 102. A B C D |
| 3. T F | 28. T F | 53. T F | 78. A B C D | 103. A B C D |
| 4. T F | 29. T F | 54. T F | 79. A B C D | 104. A B C D |
| 5. T F | 30. T F | 55. T F | 80. A B C D | 105. A B C D |
| 6. T F | 31. T F | 56. T F | 81. A B C D | 106. A B C D |
| 7. T F | 32. T F | 57. T F | 82. A B C D | 107. A B C D |
| 8. T F | 33. T F | 58. T F | 83. A B C D | 108. A B C D |
| 9. T F | 34. T F | 59. T F | 84. A B C D | 109. A B C D |
| 10. T F | 35. T F | 60. T F | 85. A B C D | 110. A B C D |
| 11. T F | 36. T F | 61. A B C D | 86. A B C D | 111. A B C D |
| 12. T F | 37. T F | 62. A B C D | 87. A B C D | 112. A B C D |
| 13. T F | 38. T F | 63. A B C D | 88. A B C D | 113. A B C D |
| 14. T F | 39. T F | 64. A B C D | 89. A B C D | 114. A B C D |
| 15. T F | 40. T F | 65. A B C D | 90. A B C D | 115. A B C D |
| 16. T F | 41. T F | 66. A B C D | 91. A B C D | 116. A B C D |
| 17. T F | 42. T F | 67. A B C D | 92. A B C D | 117. A B C D |
| 18. T F | 43. T F | 68. A B C D | 93. A B C D | 118. A B C D |
| 19. T F | 44. T F | 69. A B C D | 94. A B C D | 119. A B C D |
| 20. T F | 45. T F | 70. A B C D | 95. A B C D | 120. A B C D |
| 21. T F | 46. T F | 71. A B C D | 96. A B C D | 121. A B C D |
| 22. T F | 47. T F | 72. A B C D | 97. A B C D | 122. A B C D |
| 23. T F | 48. T F | 73. A B C D | 98. A B C D | 123. A B C D |
| 24. T F | 49. T F | 74. A B C D | 99. A B C D | 124. A B C D |
| 25. T F | 50. T F | 75. A B C D | 100. A B C D | 125. A B C D |

# APPENDIX C

# SELECTED OBJECTIVES WITH CORRESPONDING TEST ITEMS

SELECTED OBJECTIVES WITH CORRESPONDING TEST ITEMS

Objective 11 of Book 1

Shell Answer Book: The Early Warning Book

Objective: The student will correctly describe the following tire symptoms and the conditions causing each: a) tread wear indicator showing, b) worn center tread, c) worn tire edges, and d) one tread edge more worn that the rest of the tire.

The five questions from the Mastery Test relating to the above objective are:

1. If "wear bars" are showing when you check the tires, it means that they

   a) Are nearly new and in good condition

   b) Are in poor condition and need replacement

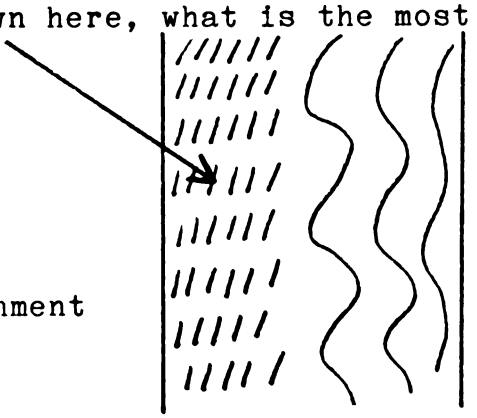
   c) Have about 5,000 miles left before needing replacement

   d) Have about 10,000 miles left before needing replacement

   Correct Answer: (b)

   Source: Michigan Driver Education, Book 15, p. 17.

2. If your tires are worn as shown here, what is the most likely cause?



   a) Overinflation

   b) Underinflation

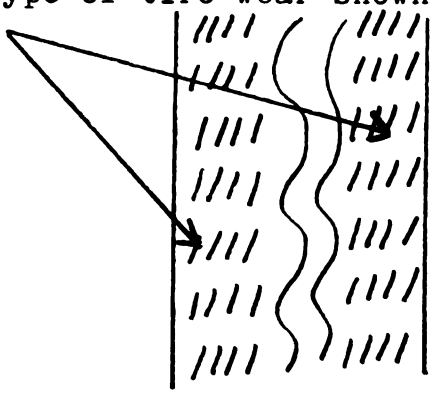
   c) Wheels out of balance

   d) Front wheels out of alignment

   Correct Answer: (d)

   Source: Michigan Driver Education, Book 15, p. 16.

3. What is the reason for the type of tire wear shown here?



a) Overinflation

b) Underinflation

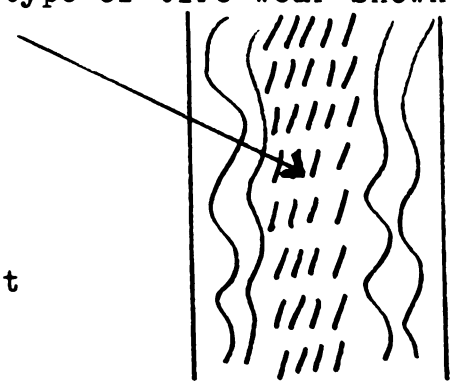
c) Wheels out of balance

d) Wheels out of alignment

Correct Answer: (b)

Source: Michigan Driver Education, Book 15, p. 16.

4. What is the reason for the type of tire wear shown here?



a) Overinflation

b) Underinflation

c) Wheels out of balance

d) Wheels out of alignment

Correct Answer: (a)

Source: Michigan Driver Education, Book 15, p. 17.

5. It is important to keep the tires and wheels aligned properly because improper alignment causes

a) Overheating problems

b) Poor and uneven tire wear

c) Heavy pressure on the brakes

d) Danger to the exhaust system

Correct Answer: (b)

Source: Michigan Driver Education, Book 16, p. 5.

* * * * * * * * * * *

Objective 4 of Book 2

Shell Answer Book: The Breakdown Book

Objective: The student will correctly describe problems associated with engine overheating.

The five questions from the Mastery Test relating to the above objective are:

1. When the temperature light comes on as you are driving, it usually means that the

   a) Water pump is not working properly

   b) Temperature inside the car is dangerously warm

   c) Fan belt is tight and causing too much friction

   d) Engine operating temperature has risen above the the safe level

   Correct Answer: (d)

   Source: Michigan Driver Education, Book 9, p. 8.

2. When the temperature gauge shows that the coolant in the engine is boiling, or over 200 degrees, you should

   a) Stop the car and run the engine at a fast idle

   b) Turn the engine off and add water slowly while the engine is off

   c) Driver very slowly without stalling the engine and stop at the first service station

   d) Turn the engine off and let it cool down, then add water while the engine is running

   Correct Answer: (d)

   Source: Michigan Driver Education, Book 9, p. 11.

3. If the temperature light is on, you should

   a) Drive in low gear until the light goes out

   b) Stop immediately and check the coolant level

   c) Have the coolant checked when you next buy gas

   d) Stop the car at a service station as soon as possible

Objective 4 of Book 2 (cont.)

Correct Answer: (b)

Source: Michigan Driver Education, Book 9, p. 10.

4. If your engine overheats, you should slow down. Answer True or False.

Correct Answer: (False)

Source: Safe Performance Driving, p. 260.

5. If the temperature warning light or gauge shows "hot," you should immediately drive to the nearest service station for repairs. Answer True or False.

Correct Answer: (False)

Source: Drive Right, p. 53.

* * * * * * * * * * *

Objective 5 of Book 2

Shell Answer Book: The Breakdown Book

Objective: The student will state the meaning and proper actions to be taken when the alternator light comes on.

The five questions from the Mastery Test relating to above objective are:

1. If a car is operated for a period of time while the alternator light remains on, the battery may go dead. Answer True or False.

Correct Answer: (True)

Source: Drive Right, p. 315.

2. If the alternator light does not go out when the engine starts, you should

a) Pump the accelerator to make the alternator charge more

b) Check the condition of the battery with the engine shut off

c) Check the condition of the fan belt with the engine running

Objective 5 of Book 2 (cont.)

d) Have the alternator checked by a mechanic as soon as possible

Correct Answer: (a)

Source: Michigan Driver Education, Book 9, p. 10.

3. When the engine is running and the alternator light/ ammeter is on, it is most likely that

a) Battery is over-charged

b) Capacitor is burned out

c) Engine is running too fast

d) Alternator is not producing enough current

Correct Answer: (d)

Source: Michigan Driver Education, Book 9, p. 9.

4. What should a driver do if the alternator light/ammeter comes on?

a) Drive to a service station or garage for help

b) Pull off the road at once and turn off the engine

c) Check to see if there is enough oil in the engine

Correct Answer: (a)

Source: Building Safe Driving Skills, Chapter 7.

5. During ordinary driving conditions, the alternator or generator light/ammeter should show red. Answer True or False.

Correct Answer: (False)

Source: Tomorrow's Drivers, (1974 edition), p. 61.

* * * * * * * * * * *

Objective 6 of Book 2

Shell Answer Book: The Breakdown Book

Objective: The student will state the meaning and proper actions to be taken when the oil pressure light comes on.

The five questions from the Mastery Test relating to above objective are:

1. When the oil light/gauge comes on, it means the

   a) Oil is too hot

   b) Oil level is low

   c) Oil pressure is low

   d) Oil pressure is high

   Correct Answer: (c)

   Source: Michigan Driver Education, Michigan, Department of Education, Book 9, p. 9.

2. The oil pressure light/gauge indicates when the oil should be changed. Answer True or False.

   Correct Answer: (False)

   Source: Drive Right, p. 53.

3. If the oil pressure warning light/gauge stays on while the car is running, it should receive attention the next time the car is in for a lubrication and oil change. Answer True or False.

   Correct Answer: (False)

   Source: Drive Right, p. 315.

4. The oil pressure indicator shows the level of oil in the automobile engine while the engine is running. Answer True or False.

   Correct Answer: (False)

   Source: Tests for Driver Education, p. 25.

5. What should a driver do if the oil pressure warning light/gauge comes on?

   a) Slow down to keep the pressure from becoming too great

Objective 6 of Book 2 (cont.)

b) Drive to a service station or garage for help

c) Pull off the road at once and turn off the engine

Correct Answer: (c)

Source: Building Safe Driving Skills, Chapter 7.

* * * * * * * * * *

Objective 5 of Book 3

Shell Answer Book: The Gasoline Mileage Book

Objective: The student will correctly identify gas saving tricks that can result in an improvement in mileage.

The five questions from the Mastery Test relating to above objective are:

1. You get better gas mileage by accelerating briskly instead of gradually. Answer True or False.

   Correct Answer: (False)

   Source: Iowa Energy Project, Vehicle Operation.

2. A steady speed is one of our best fuel savers. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Traffic Strategies.

3. For best fuel economy, it is better to change path than it is to change speed. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Traffic Strategies.

4. You can wait a full minute at a stop sign and not burn as much fuel as you would speeding up rapidly. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Traffic Strategies.

Objective 5 of Book 3 (cont.)

5. In a full size car, sudden hard acceleration can drop gas mileage to three or four miles per gallon. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Guide, Vehicle Operation.

* * * * * * * * * * *

Objective 7 of Book 3

Shell Answer Book: The Gasoline Mileage Book

Objective: The student will correctly identify the "mileage price" of optional equipment.

The five questions from the Mastery Test relating to above objective are:

1. The extra weight of power steering and other power options take extra fuel. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Vehicle Selection.

2. The greater the frontal area of a vehicle, the poorer the gas mileage. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Vehicle Selection.

3. The larger the engine, the poorer the fuel economy. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Vehicle Selection.

4. Five speed transmissions are always more economical than a four speed transmission. Answer True or False.

   Correct Answer: (False)

   Source: Iowa Energy Project, Vehicle Selection.

Objective 7 of Book 3 (cont.)

5. Snow tires take more fuel than do regular tires. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Vehicle Selection.

* * * * * * * * * * *

Objective 10 of Book 3

Shell Answer Book: The Gasoline Mileage Book

Objective: The student will correctly identify the prescribed principles of saving gas.

The five questions from the Mastery Test relating to above objective are:

1. Best fuel economy results when each person drives his/her own car. Answer True or False.

   Correct Answer: (False)

   Source: Iowa Energy Project, Planning for Economy.

2. Your reason for driving can strongly influence your gas mileage. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Vehicle Operation.

3. A cold start has no effect on summer time fuel economy. Answer True or False.

   Correct Answer: (False)

   Source: Iowa Energy Project, Temperature.

4. A want list can help you save fuel. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Planning for Eonomy.

5. Gas mileage of cold vehicles driven on short trips is only reduced in winter. Answer True or False.

   Correct Answer: (False)

   Source: Iowa Energy Project, Planning for Economy.

* * * * * * * * * * *

Objective 1 of Book 5

Shell Answer Book: The 100,000 Mile Book

Objective: The student will correctly identify the best way to make a car last 100,000 miles or more.

The five questions from the Mastery Test relating to above objective are:

1. The best guide for an adequate preventive maintenance program for a particular car is contained in the owner's manual for that car. Answer True or False.

   Correct Answer: (True)

   Source: Tests for Driver Education, p. 17.

2. The BEST place to find information on maintaining your vehicle is from

   a) A car magazine

   b) The owner's manual

   c) A gas station mechanic

   d) Somebody who knows a lot about cars

   Correct Answer: (b)

   Source: Michigan Driver Education, Book 15, p. 1.

3. A periodic maintenance check of your car should be done

   a) Every three months

   b) Every six months

   c) When the warning lights come on

   d) According to the owner's manual suggetions

   Correct Answer: (d)

   Source: Michigan Driver Education, Book 15, p. 40.

4. An owner's manual is an important part of a maintenance program. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Vehicle Maintenance.

Objective 1 of Book 5 (cont.)

5. Which of the following would generally not be found in a new car owner's manual?

   a) Proper tire pressure to be maintained

   b) Suggested retail price of the car

   c) Engine oil requirements

   d) Time and mileage spans for period check-up

   Correct Answer: (b)

   Source: Driving: A Task Analysis Approach, p. 228.

* * * * * * * * * * *

Objective 1 of Book 7

Shell Answer Book: The Driving Emergency Book

Objective: The student will correctly identify possible actions to take in case of brake failure.

The five questions from the Mastery Test relating to above objective are:

1. If the brakes of the car fail, a good think for a driver to do is to:

   a) Apply the parking brake

   b) Downshift to neutral

   c) Sound the horn

   Correct Answer: (a)

   Source: Exercises for Driver Education, p. 88.

2. Pumping your brakes rapidly is a good emergency response when

   a) Your car stalls

   b) A tire blows out

   c) The gas pedal sticks

   d) Your brakes fail on a downgrade

Objective 1 of Book 7 (cont.)

Correct Answer: (d)

Source: Michigan Driver Education, Book 9, p. 13.

3. When your brakes fail, try slowing the car by shifting to a lower gear. Answer True or False.

Correct Answer: (True)

Source: Safe Performance Driving, p. 257.

4. When the foot brake fails, chances are that the parking brake has also failed. Answer True or False.

Correct Answer: (False)

Source: Driver Education and Traffic Safety, p. 113.

5. If your brakes fail completely, you should

a) Apply the parking brake, turn off the engine and shift into park

b) Shift into neutral, turn off the engine, and slowly apply the parking brake

c) Pump the brake, shift into a lower gear and slowly apply the parking brake.

d) Press the brake all the way down, shift into neutral, and apply the parking brake.

Correct Answer: (c)

Source: Michigan Driver Education, Book 9, p. 13.

* * * * * * * * * *

Objective 4 of Book 7

Shell Answer Book: The Driving Emergency Book

Objective: The student will correctly describe driver actions for maintaining control during a blowout.

The five questions from the Mastery Test relating to above objective are:

1. In case of a blowout, steering control is the principal consideration. Answer True or False.

Objective 4 of Book 7 (cont.)

Correct Answer: (True)

Source: Driver Education and Traffic Safety, p. 113.

2. If you have a blowout, it is BEST to

a) Apply the parking brake immediately

b) Grip the wheel firmly and slow down slowly

c) Apply the foot brake with a pumping motion

d) Grip the wheel firmly and slow down quickly

Correct Answer: (b)

Source: Michigan Driver Education, Book 9, p. 12.

3. If a tire blows out, the driver should grasp the steering wheel firmly and steer in a straight line while slowly reducing your speed. Answer True or False.

Correct Answer: (True)

Source: Tests for Driver Education, p. 45.

4. If you have a blowout while driving, you should

a) Look for a safe place to drive off the road

b) Apply the brakes as soon as you notice the blowout

c) Keep going at the same speed until you can get get off the road

d) Continue driving on the shoulder until you get to the next exit

Correct Answer: (a)

Source: Handbook for Driver Knowledge Testing, p. 125, #433.

5. If a tire is going flat while you are driving, you should

a) Speed up in order to get to a service station quickly

b) Look for a safe place to get off the road

Objective 4 of Book 7 (cont.)

c) Come to a quick stop and then pull off the road

d) Stop where you are and signal other traffic to go around you

Correct Answer: (b)

Source: Handbook for Driver Knowledge Testing, p. 125, #434.

* * * * * * * * * * *

Objective 5 of Book 7

Shell Answer Book: The Driving Emergency Book

Objective: The student will correctly identify an alternate (or emergency) path when a head-on collision is apparent.

The five questions from the Mastery Test relating to above objective are:

1. If a vehicle is coming straight at you and you cannot stop, you should

   a) Continue slowing down and hope that the driver will turn away

   b) Look for an open space to your right of the oncoming vehicle

   c) Move away fromthe steering wheel and cover your face

   d) Turn off the engine and apply the brakes as hard as possible

   Correct Answer: (b)

   Source: Handbook for Driving Knowledge Testing, p. 158, #575.

2. If it looks like you will be in a head-on crash with another vehicle, you should

   a) Remove your seat belt and try to jump out of your vehicle

   b) Try to sideswipe rather than hitting the vehicle head-on

Objective 5 of Book 7 (cont.)

c) Lean forward over the steering wheel

d) Turn your wheels sharply to one side and apply the brakes hard

Correct Answer: (b)

Source: Handbook for Driving Knowledge Testing, p. 159, #585.

3. If an oncoming vehicle is forced across the center line because of popholes or road repair, you should

a) Slow down and move to the right, if possible

b) Speed up and get out of the way fast

c) Turn to the left to get around the oncoming vehicle

d) Blow your horn and continue at normal speed

Correct Answer: (a)

Source: Handbook for Driving Knowledge Testing, p. 157, #571.

4. If an oncoming vehicle starts to move across the center line, do not

a) Flash your headlights and blow your horn

b) Quickly remove your foot from the gas pedal

c) Steer your vehicle sharply to the left

d) Tap your brakes to warn following traffic

Correct Answer: (c)

Source: Handbook for Driving Knowledge Testing, p. 157, #572.

5. If an oncoming vehicle crosses the center line and drives into you lane, you should

a) Speed up and drive onto the shoulder

b) Stop as quickly as you can

c) Drive into the oncoming vehicle's lane if it is empty

Objective 5 of Book 7 (cont.)

d) Slow down and steer to the right

Correct Answer: (d)

Source: Handbook for Driving Knowledge Testing, p. 157, #573.

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Objective 6 of Book 7

Shell Answer Book: The Driving Emergency Book

Objective: The student will correctly describe possible actions to take when an accelerator sticks.

The five questions from the Mastery Test relating to above objective are:

1. If there is no traffic and your gas pedal gets stuck down, you should first (in an automatic shift car)

   a) Reach down and try to pry it up with your hand

   b) Try to pry it up with your foot

   c) Apply the brakes and look for a safe place to leave the roadway

   d) Turn the ignition off

   Correct Answer: (b)

   Source: Handbook for Driving Knowledge Testing, #417.

2. If your gas pedal gets stuck in heavy traffic while driving and you cannot fee the pedal with your foot (in an automatic shift car), you should

   a) Apply your brakes as hard as possible

   b) Reach down and try to pull it up

   c) Turn off the engine

   d) Shift into neutral

   Correct Answer: (c)

   Source: Handbook for Driving Knowledge Testing, #418.

Objective 6 of Book 7 (cont.)

3. When the accelerator sticks to the floor while driving a gearshift transmission car, the first move should be to push the clutch pedal down. Answer True or False.

   Correct Answer: (True)

   Source: Driver Education and Traffic Safety, p. 113.

4. When the accelerator sticks while you are driving (in an automatic shift car) the

   a) Vehicle will stop

   b) Vehicle will not slow down

   c) Vehicle will shift to neutral

   d) Driver will lose all control of the vehicle

   Correct Answer: (b)

   Source: Michigan Driver Education, Book 15, p. 10.

5. If the accelerator sticks, the driver should bend over and try to free the pedal before stopping (in an automatic shift car). Answer True or False.

   Correct Answer: (False)

   Source: Drive Right, p. 251.

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Objective 9 of Book 7

Shell Answer Book: The Driving Emergency Book

Objective: The student will identify the actions required for skid recovery.

The five questions from the Mastery Test relating to above objective are:

1. In case of a skid in which the rear of a car is moving to a driver's left, the steering wheel should be turned to the driver's left. Answer True or False.

   Correct Answer: (True)

   Source: Driver Education and Traffic Safety, p. 113.

Objective 9 of Book 7 (cont.)

2. In case of a skid

   a) Turn slightly towards the skid

   b) Turn away from the skid

   c) Hold wheels straight

   d) Put on brakes forcefully

   Correct Answer: (a)

   Source: Tomorrow's Drivers (1958 edition), Test B.

3. If you start to skid on a wet or icy street, you should

   a) Steer in the direction of the skid

   b) Brake quickly

   c) Gently apply the brakes

   d) Increase speed and keep wheel straight

   Correct Answer: (a)

   Source: Safe Performance Curriculum, Student Off-Street Guide.

4. If your car begins to skid, you should turn the wheel in the direction the rear of the car is skidding and

   a) Remove your foot from the accelerator

   b) Press down hard on the brake pedal

   c) Accelerate slightly

   d) Downshift

   Correct Answer: (a)

   Source: Exercises for Driver Education, p. 84.

5. To correct a power skid, ease up on the accelerator until the wheels stop spinning. Answer True or False.

   Correct Answer: (True)

   Source: Safe Performance Driving, p. 256.

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Objective 1 of Book 11

Shell Answr Book: The Foul Weather Driving Book

Objective: The student will identify driver actions to improve visibility while driving in fog.

The five questions from the Mastery Test relating to above objective are:

1. You can improve visibility when driving in fog by

   a) Using your sun visor

   b) Dimming your headlights

   c) Checking your rear-view mirror

   d) Watching the middle of the road

   Correct Answer: (b)

   Source: Michigan Driver Education, Book 8, p. 12.

2. When driving through fog at night, you should use your

   a) High beam headlights

   b) Parking lights

   c) Low beam headlights

   d) Four-way flashers

   Correct Answer: (c)

   Source: Handbook for Driving Knowledge Testing, p. 119, #407.

3. In thick fog, a drier should use the

   a) High beam headlights

   b) Parking lights

   c) Low beam headlights

   d) Interior lights

   Correct Answer: (c)

   Source: Exercises for Driver Education, p. 83.

Objective 1 of Book 11 (cont.)

4. You are driving in a heavy morning fog. Which of your car's lights will most help you to see ahead better?

   a) Low beams

   b) High beams

   c) Parking lights

   Correct Answer: (a)

   Source: Building Safe Driving Skills, Chapter 14.

5. If you must travel in fog, you should use

   a) Low beam headlights

   b) High beam headlights

   c) Headlights and interior lights

   d) Headlights and emergency flashers

   Correct Answer: (a)

   Source: Michigan Driver Education, Book 8, p. 18.

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Objective 3 of Book 11

Shell Answer Book: The Foul Weather Driving Book

Objective: The student will correctly identify factors associated with hydroplaning.

The five questions from the Mastery Test relating to above objective are:

1. Hydroplaning of an auto's tires usually occurs at about 10 mph on a very wet road. Answer True or False.

   Correct Answer: (False)

   Source: Tests for Driver Education, p. 37.

2. Hydroplaning usually takes place at a speed of about

   a) 25 mph

   b) 35 mph

Objective 3 of Book 11 (cont.)

c) 50 mph

d) 30 mph

Correct Answer: (c)

Source: Exercises for Driver Education, p. 83.

3. Hydroplaning can be caused by driving too fast on a wet road surface. Answer True or False.

Correct Answer: (True)

Source: Tomorrow's Driver (1974 edition), p. 27.

4. Hydroplaning can take place only when there is water or slush on the road surface. Answer True or False.

Correct Answer: (True)

Source: Drive Right, Chapter 13.

5. If rain sits on a road surface, your tires will ride on a thin film of water. This is called

a) Skimming

b) Traction

c) Hydroplaning

d) Bottoming out

Correct Answer: (c)

Source: Michigan Driver Education, Book 12, p. 14.

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Objective 3 of Book 14

Shell Answer Book: The Driving Skills Book

Objective: The student will correctly identify good defensive driving techniques.

The five questions from the Mastery Test relating to above objective are:

Objective 3 of Book 14

1. Driving so as to protect yourself from the hazards of errors, either your own or those of other drivers, is called defensive driving. Answer True or False.

   Correct Answer: (True)

   Source: Tests for Driver Education, p. 5.

2. Which of the following statements best describes how a defensive driver acts?

   a) He watches out for himself and his passengers

   b) He watches out for other drivers

   c) He watches out for himself and all other drivers

   Correct Answer: (c)

   Source: Building Safe Driving Skills, Chapter 14.

3. The defensive driver seldom attempts to protect himself by providing a cushion of space on all sides of his car. Answer True or False.

   Correct Answer: (False)

   Source: Tests for Driver Education, p. 31.

4. The defensive driver leaves himself an out by

   a) Tailgating

   b) Providing a space cushion

   c) Following closely

   d) Being "boxed in"

   Correct Answer: (b)

   Source: Exercises for Driver Education, p. 72.

5. A responsible driver will

   a) Never take the right of way

   b) Always take the right of way

   c) Cooperate with other drivers on the road

   d) Always think of driving as a game or contest

Objective 3 of Book 14 (cont.)

Correct Answer: (c)

Source: Michigan Driver Education, Book 14, p. 17.

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Objective 7 of Book 14

Shell Answer Book: The Driving Skills Book

Objective: The student will correctly identify the proper lane position while making a turn.

The five questions from the Mastery Test relating to abov objective are:

1. When you are turning left onto a one-way street you should enter the left lane of the street into which you are turning. Answer True or False.

   Correct Answer: (True)

   Source: Safe Performance Driving, p. 233.

2. A driver should not pull left of center while waiting to make a left turn at a green light. Answer True or False.

   Correct Answer: (True)

   Source: Drive Right, p. 121.

3. When turning left from a one-way street to another one-way street, the motorist should turn from the

   a) Left lane into the left lane

   b) Left lane into the right lane

   c) Right lane into the left lane

   d) Right lane into the right lane

   Correct Answer: (a)

   Source: Tests for Driver Education, p. 34.

4. After making a left turn onto a two-way street, which lane should your car be in?

Objective 7 of Book 14 (cont.)

a) Right lane

b) Lane nearest the curb

c) Lane nearest the center line

Correct Answer: (c)

Source: Building Safe Driving Skills, Chapter 9.

5. Before turning right onto a two-way street, you should get into

a) The right lane

b) The left lane

c) Between the two lanes

d) Follow the car ahead of you

Correct Answer; (a)

Source: Tomorrow's Drivers (1958 edition), p. 103.

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Objective 8 of Book 14

Shell Answer Book: The Driving Skills Book

Objective: The student will correctly identify the recommended following distance and how it may be maintained.

The five questions from the Mastery Test relating to above objective are:

1. What is the best way to keep a safe following distance?

a) Use the two to four second rule

b) Always drive slower than the car ahead

c) Stay close enough to the car ahead so no one can pull in front of you

Correct Answer: (a)

Source: Building Safe Driving Skills, Chapter 10.

2. Car X passes over a line in the road. Car Y passes over the same line three second later. Conditions are good. Is car Y following at a safe distance?

   a) No, car Y is too close

   b) Yes, car Y is leaving more than enough space

   c) No, car Y is not keeping up with traffic

   Correct Answer: (b)

   Source: Building Safe Driving Skills, Chapter 12.

3. The two to four second rule applies at all speeds. Answer True or False.

   Correct Answer: False

   Source: Drive Right

4. To judge safe following distance accurately, use

   a) Two car lengths for every 10 mph

   b) Stopping distance charts as a guide

   c) The rule that specifies the following distance in seconds

   d) Rule A but increase the distance to three car lengths for every 10 mph over 50 mph

   Correct Answer: (c)

   Source: Tomorrow's Driver (1974 edition), p. 111.

5. For safety, the size of the space cushion between you and another car, depending on speed, should be a minimum of

   a) One second

   b) Two seconds

   c) Three seconds

   d) Four seconds

   Correct Answer: (b)

   Source: Safe Performance Driving, p. 27.

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Objective 4 of Book 15

Shell Answer Book: The Accident Book

Objective: The student will correctly identify basic actions to take if involved in an accident.

The five questions from the Mastery Test relating to above objective are:

1. If you are involved in a traffic accident in which people have been injured, you should obtain aid for those people. Answer True or False.

   Correct Answer: (True)

   Source: Tests for Driver Education, p. 13.

2. The MOST important thing to do when you are in an accident is to

   a) Move your car away from traffic

   b) See if anyone is hur and needs help

   c) Show your license to a police officer

   d) Tell the other driver your insurance company's name

   Correct Answer: (b)

   Source: Michigan Driver Education, Book 16, p. 8.

3. When involved in a collision, you should first determine who was at fault. Answer True or False.

   Correct Answer: (False)

   Source: Drive Right, p. 329.

4. If you are in an accident, what is the first thing you should do?

   a) Go for help

   b) Stop at once

   c) Call the police

   Correct Answer: (b)

   Source: Building Safe Driving Skills, Chapter 5.

Objective 4 of Book 15 (cont.)

5. If you are involved in a slight accident but nobody is hurt, you do not need to identify yourself. Answer True or False.

   Correct Answer: False

   Source: Safe Performance Driving, p. 260.

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Objective 6 of Book 17

Shell Answer Book: The Self-Service Book

Objective: The student will correctly describe practices related to proper tire maintenance.

The five questions from the Mastery Test relating to above objective are:

1. The best time to check the air pressure in your tires is

   a) Before driving in the morning

   b) After you have driven 25 miles

   c) After you have driven 50 miles

   d) After you have been driving all day and the tires are warm

   Correct Answer: (a)

   Source: Program Research in Driver Education, Pre-test 34.

2. The air pressure of tires should be checked

   a) Only when the tires are dry

   b) By kicking the tires

   c) After riding for at least one hour

   d) When the tires are not hot from driving

   Correct Answer: (d)

   Source: Handbook for Driving Knowledge, #703.

Objective 6 of Book 17 (cont.)

4. What is the most important tire maintenance procedure that you can perform?

   a) Checking the wheel alignment

   b) Checking the tire balance

   c) Checking the air pressure

   d) Checking the tire trends for wear

   Correct Answer: (c)

   Source: Program Research in Driver Education, Post-Test, p. 63.

5. Correct air pressure of the tires is a key factor in preserving the life of the tires and insuring the safety of the driver and his passengers. Answer True or False.

   Correct Answer: (True)

   Source: Tests for Driver Education, p. 17.

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Objective 10 of Book 17

Shell Answer Book: The Self-Service Book

Objectives: The student will correctly describe the proper method for checking the transmission fluid.

The five questions from the Mastery Test relating to above objective are:

1. Since transmission fluid expands, it is important to check the transmission fluid level when your car's engine is cold. Answer True or False.

   Correct Answer: (False)

   Source: Program Research in Driver Education, Pre-test, p. 32.

2. The transmission fluid level is determined by checking the dipstick with the engine running. Answer True or False.

   Correct Answer: (True)

Objective 10 of Book 17 (cont.)

Source: Drive Right, p. 315.

3. Transmission fluid level should be checked before starting the engine. Answer True or False.

Correct Answer: False

Source: Drive Right, p. 315.

4. When adding transmission fluid to a vehicle, a driver should be sure that the

a) Engine is running

b) Transmission is in neutral

c) Transmission is in park

d) Engine is not running

Correct Answer: (a)

Source: Tomorrow's Drivers, p. 194, (1979 edition).

5. The engine should always be running when fluid is added to

a) A hot radiator

b) The windshield-washer fluid container

c) The battery

d) The automatic transmission

Correct Answer: (d)

Source: Tomorrow's Drivers, p. 194 (1979 edition).

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Objective 1 of Book 21

Shell Answer Book: The Driving Hazards Book

Objective: The student will correctly identify hazardous traffic situation.

The five questions from the Mastery Test relating to above objective are:

Objective 1 of Book 21 (cont.)

1. Which of the following areas presents the greatest risk of accidents?

   a) Freeways

   b) Intersections

   c) Two lane roads

   d) Mountain roads

   Correct Answer: (b)

   Source: Michigan Driver Education, Book 12, p. 7.

2. Which of the following would be the most dangerous?

   a) Driving with worn-out windshield wiper blades

   b) Driving through a busy intersection

   c) Going 10,000 miles without an oil change

   d) Making a U-turn from a left or U-turn only lane

   Correct Answer: (b)

   Source: Michigan Driver Education, Book 12, p. 8.

3. There is little, if any, danger at a seldom used intersection. Answer True or False.

   Correct Answer: (False)

   Source: Tomorrow's Drivers, (1974 edition), p. 127.

4. In the city, where do most traffic accidents happen?

   a) At intersections

   b) In the middle of the block

   c) At railroad crossings

   Correct Answer: (a)

   Source: Building Safe Driving Skills, Chapter 10.

5. It is a good rule to reduce speed before entering an intersection. Answer True or False.

   Correct Answer: (True)

Objective 1 of Book 21 (cont.)

Source: Tomorrow's Drivers, (1974 edition), p. 127.

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Objective 4 of Book 23

Shell Answer Book: The How Your Car Works Book

Objective: The student will correctly identify the four basic parts of piston movement in providing power.

The five questions from the Mastery Test relating to above objective are:

1. The stroke during which the fuel burns and expands in the cylinder to force the piston down is the

   a) Exhaust stroke

   b) Power stroke

   c) Compression stroke

   d) Intake stroke

   Correct Answer: (c)

   Source: Tests for Driver Education, p. 16.

2. As the piston moves down on the first stroke, the intake valve opens and

   a) The fuel is compressed

   b) Fuel is drawn into the cylinder

   c) A hot spark is produced

   d) The fuel burns and expands

   Correct Answer: (b)

   Source: Tests for Driver Education, p. 16.

3. The part of the cylinder in which the fuel is ignited is called the

   a) Cylinder head

   b) Engine block

Objective 4 of Book 23 (cont.)

c) Piston

d) Combustion chamber

Correct Answer: (d)

Source: Exercises for Driver Education, p. 35.

4. The stroke of the four stroke cycle in which fuel is squeezed to about one-tenth its original volume is the

a) Intake

b) Compression

c) Power

d) Exhaust stroke

Correct Answer: (b)

Source: Exercises for Driver Education, p. 36.

5. Hot gases left in the cylinders after the fuel has been ignited are discharged on which stroke of the four stroke cyle?

a) First

b) Second

c) Third

d) Fourth

Correct Answer: (d)

Source: Exercises for Driver Education, p. 36.

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Objective 8 of Book 24

Shell Answer Book: The More Miles for Your Money Book

Objective: The student will correctly identify energy conservation reasons for combining trips.

The five questions from the Mastery Test relating to above objectives are:

Objective 8 of Book 24

1. A want list will not help you save fuel. Answer True or False.

   Correct Answer: (False)

   Source: Iowa Energy Project, Planning for Economy.

2. The cost of driving a cold vehicle one mile can be triple the cost of a warmed-up vehicle. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Projects, Planning for Economy.

3. With cold starts, you will get better gas mileage on a five mile trip than you would on five one-mile trips. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Temperature.

4. One trip for each thing is not conservation. Answer True or False.

   Correct Answr: (True)

   Source: Iowa Energy Project, Planning for Economy.

5. Gas mileage of cold vehicles driven on short trips is not only reduced in winter. Answer True or False.

   Correct Answer: (True)

   Source: Iowa Energy Project, Planning for Economy.

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Objective 10 of Book 24

Shell Answer Book: The More Miles for your Money Book

Objective: The student will correctly identify the three forms of "alternate" transportation discussed in the book.

The five questions from the Mastery Test relating to above objective are:

1. A van (by van-pooling) can be an economy vehicle. Answer True or False.

Objective 10 of Book 24

Correct Answer: (True)

Source: Iowa Energy Project, Exploring Alternate Means

2. Alternate means refers to driving a different kind of vehicle. Answer True or False.

Correct Answer: (False)

Source: Iowa Energy Project, Exploring Alternate Means

3. In most cases, driving to school is cheaper than riding the school bus. Answer True or False.

Correct Answer: (False)

Source: Iowa Energy Project, Exploring Alternate Means

4. Two wheel vehicles are a good choice for short trips. Answer True or False.

Correct Answer: (True)

Source: Iowa Energy Project, Exploring Alternate Means

5. There are times when a full size car can be more fuel efficient than a sub-compact. Answer True or False.

Correct Answer: (True)

Source: Iowa Energy Project, Exploring Alternate Means

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# APPENDIX D

# POST-TEST INSTRUMENT

POST-TEST INSTRUMENT

MASTERY TEST

Answer the following statements either TRUE (T) or FALSE (F). Record your answers on a separate answer sheet. DO NOT MARK ON THIS TEST!

1. Hydroplaning of an auto's tires usually occurs at about 10 mph on a very wet road.

2. The transmission fluid level is determined by checking the dipstick with the engine running.

3. There are times when a full size car can be more fuel efficient than a sub-compact.

4. The extra weight of power steering and other power options takes extra fuel.

5. If you are involved in a slight accident, but nobody is hurt, you do not need to identify yourself.

6. To correct a power skid, ease up on the accelerator until the wheels stop spinning.

7. In a full size car, sudden hard acceleration can drop gas mileage to three or four miles per gallon.

8. In case of a skid in which the rear of a car is moving to a driver's left, the steering wheel should be turned to the driver's left.

9. By van-pooling, a van can be an economy vehicle.

10. During ordinary driving conditions, the alternator or generator light/ammeter should show red.

11. Two wheel vehicles are a good choice for short trips.

12. You can wait a full minute at a stop sign and not burn as much fuel as you would speeding up rapidly.

13. In most cases, driving to school is cheaper than riding the school bus.

14. The oil pressure indicator shows the level of oil in the automobile engine while the engine is running.

15. "Alternate Means" refers to driving a different kind of vehicle.

Mastery Test (cont.)

16. An owner's manual is an important part of a maintenance program.

17. A steady speed is one of our best fuel savers.

18. If the temperature warning light or gauge shows "hot," you should immediately drive to the nearest service station for repairs.

19. You get better gas mielage by accelerating briskly instead of gradually.

20. The defensive driver seldom attempts to protect himself by providing a cushion of space on all sides of his car.

21. If you are involved in a traffic accident in which people have been injured, you should administer first aid to those people.

22. For best fuel economy, it is better to change path than it is to change speed.

23. The oil pressure light/gauge indicates when the oil should be changed.

24. A cold start has no effect on summer-time fuel economy.

25. If a car is operated for a period of time while the alternator light remains on, the battery may go dead.

26. A want list will not help you save fuel.

27. The best guide for an adequate preventive maintenance program for a particular car is contained in the owner's manual for that car.

28. Driving so as to protect yourself from the hazards of errors, either your own or those of other drivers, is called defensive driving.

29. Your reason for driving can strongly influence your gas mileage.

30. If your engine overheats, you should slow down.

31. Gas mileage of cold vehicles driven on short trips is not only reduced in winter.

32. Transmission fluid level should be checked before starting the engine.

Mastery Test (cont.)

33. When you are turning left onto a one-way street, you should enter the left lane of the street into which you are turning.

34. Best fuel economy results when each person drives his/her own car.

35. In case of a blowout, steering control is the principal consideration.

36. Hydroplaning can take place only when there is water or slush on the road surface.

37. The cost of driving a cold vehicle one mile can be triple the cost of a warmed-up vehicle.

38. The two-to-four second rule applies at all speeds.

39. If the oil pressure warning light/gauge stays on while the car is running, it should receive attention the next time the car is in for a lubrication and oil change.

40. A driver should not pull left of center while waiting to make a left turn at a green light.

41. Correct air pressure in the tires is a key factor in preserving the life of the tires and insuring the safety of the driver and his passengers.

42. Five speed transmissions are always more economical than a four speed transmission.

43. When the foot brake fails, chances are that the parking brake has also failed.

44. Since transmission fluid expands, it is important to check the transmission fluid level when your car's engine is cold.

45. It is a good rule to reduce speed before entering an intersection.

46. Snow tires take more fuel than do regular tires.

47. One trip for each thing is not fuel conservation.

48. When your brakes fail, try slowing the car by shifting to a lower gear.

49. The larger the engine, the poorer the fuel economy.

Mastery Test (cont.)

50. When involved in a collision, you should first determine who was at fault.

51. If the accelerator sticks in an automatic shift car, the driver should bend over and try to free the pedal before stopping.

52. If a tire blows out, the driver should grasp the steering wheel firmly and steer in a straight line while slowly reducing your speed.

53. With cold starts, you will get better gas mileage on a five mile trip than you would on five one-mile trips.

54. Hydroplaning can be caused by driving too fast on a wet road surface.

55. Check your tire pressure in the morning before driving your car.

56. The greater the frontal area of a vehicle, the poorer your gas mileage.

57. When the accelerator sticks to the floor while driving a gearshift transmission car, the first move should be to push the clutch pedal down.

58. A want list can help you save fuel.

59. Gas mileage of cold vehicles driven on short trips is only reduced in the winter.

60. There is little, if any, danger at a seldom used intersection.

MASTERY TEST
PART B

Select the statement which best answers the following questions. Record your answers on a separate answer sheet. DO NOT MARK ON THIS TEST!

61. When the oil light/gauge comes on, it means the

a) Oil is too hot
b) Oil level is low
c) Oil pressure is low
d) Oil pressure is high

62. The best place to find information on maintaining your vehicle is from

a) A car magazine
b) The owner's manual
c) A gas station mechanic
d) Somebody who knows a lot about cars

63. If the brakes of the car fail, a good thing for a driver to do is

a) Apply the parking brake
b) Downshift to neutral
c) Sound the horn

64. If you have a blowout, it is best to

a) Apply the parking brake immediately
b) Grip the wheel firmly and slow down slowly
c) Apply the foot brake with a pumping motion
d) Grip the wheel firmly and slow down quickly

65. If a vehicle is coming straight at you and you cannot stop, you should

a) Continue slowing down and hope that the driver will turn away
b) Look for an open space to your right of the oncoming vehicle
c) Move away from the steering wheel and cover your face
d) Turn off the engine and apply the brakes as hard as possible

66. If there is no traffic and your gas pedal get stuck down while driving an automatic shift car, you should first

a) Reach down and try to pry it up with your hand

Mastery Test (cont.)

b) Try to pry it up with your foot
c) Apply the brakes and look for a safe place to leave the roadway
d) Turn the ignition off

67. In case of a skid

a) Turn slightly towards the skid
b) Turn away from the skid
c) Hold the wheels straight
d) Put on the brakes forcefully

68. You can improve visibility when driving in fog by

a) Using your sun visor
b) Dimming your headlights
c) Checking your rear-view mirror
d) Watching the middle of the road

69. Hydroplaning usually takes place at a speed of about

a) 25 mph
b) 35 mph
c) 50 mph
d) 30 mph

70. Which of the following statements best describes how a defensive driver acts?

a) He watches out for himself and his passengers.
b) He watches out for other drivers.
c) He watches out for himself and all other drivers.

71. When turning left from a one way street to another one way street, the motorist should turn from the

a) Left lane into the left lane
b) Left lane into the right lane
c) Right lane into the left lane
d) Right lane into the right lane

72. What is the best way to keep a safe following distance?

a) Use the two-to-four second rule
b) Always driver slower than the car ahead
c) Stay close enough to the car ahead so no one can pull in front of you

73. The <u>most</u> important thing to do when you are in an <u>accident</u> is to

Mastery Test (cont.)

a) Move your car away from traffic
b) See if anyone is hurt and needs help
c) Show your license to a police officer
d) Tell the other driver your insurance company's name

74. The best time to check the air pressure in your tires is

a) Before driving in the morning
b) After you have driven 25 miles
c) After you have driven 50 miles
d) After you have been driving all day and the tires are warm

75. When adding transmission fluid to a vehicle, a driver should be sure that the

a) Engine is running
b) Transmission is in neutral
c) Transmission is in park
d) Engine is not running

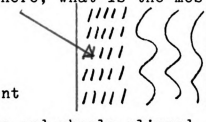
76. Which of the following areas presents the greatest risk of accidents

a) Freeways
b) Intersections
c) Two lane roads
d) Mountain roads

77. The stroke during which the fuel burns and expands in the cylinder to force the piston down is the

a) Exhaust stroke
b) Power stroke
c) Compression stroke
d) Intake stroke

78. If your tires are worn as shown here, what is the most likely cause?



a) Overinflation
b) Underinflation
c) Wheels out of balance
d) Front wheels out of alignment

79. It is important to keep the tires and wheels aligned properly because improper alignment causes

a) Overheating problems
b) Poor and uneven tire wear

Mastery Test (cont.)

c) Heavy pressure on the brakes
d) Danger to the exhaust system

80. When the temperature gauge shows that the coolant in the engine is boiling, or over 200 degrees, you should

a) Stop the car and run the engine at a fast idle
b) Turn the engine off and add water slowly while the engine is off
c) Drive very slowly without stalling the engine and stop at the first service station
d) Turn the engine off and let it cool down, then add water while the engine is running

81. When the engine is running and the alternator light/ ammeter is on, it is most likely that

a) The battery is over-charged
b) The capacitor is burned out
c) The engine is running too fast
d) The alternator is not producing enough current

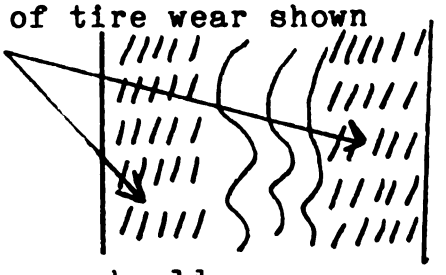
82. What should a driver do if the oil pressure warning light/gauge comes on?

a) Slow down to keep the pressure from becoming too great
b) Drive to a service station or garage for help
c) Pull off the road at once and turn off the engine

83. A periodic maintenance check of your car should be done

a) Every three months
b) Every six months
c) When the warning lights come on
d) According to the owner's manual suggestions

84. What is the reason for the type of tire wear shown here?



a) Overinflation
b) Underinflation
c) Wheels out of balance
d) Wheels out of alignment

85. If the temperature light is on, you should

a) Drive in low gear until the light goes out
b) Stop immediately and check the coolant level
c) Have the coolant checked when you next buy gas

Mastery Test (cont.)

d) Stop the car at a service station as soon as possible

86. What should a driver do if the alternator light/ ammeter comes on?

a) Drive to a service station or garage for help
b) Pull off the road at once and turn off the engine
c) Check to see if there is enough oil in the engine

87. Which of the following would generally not be found in a new car owner's manual?

a) Proper tire pressure to be maintained
b) Suggested retail price of the car
c) Engine oil requirements
d) Time and mileage spans for periodic check-up

88. Pumping your brakes rapidly is a good emergency response when

a) Your car stalls
b) A tire blows out
c) The gas pedal sticks
d) Your brakes fail on a downgrade

89. If you have a blowout while driving, you should

a) Look for a safe place to drive off the road
b) Apply the brakes as soon as you notice the blowout
c) Keep going at the same speed until you can get off the road
d) Continue driving on the shoulder until you get to the next exit

90. If it looks like you will be in a head-on crash with anothr vehicle, you should

a) Remove your seat belt and try to jump out of your vehicle
b) Try to sideswipe rather than hit the vehicle head-on
c) Lean forward over the steering wheel
d) Turn your wheels sharply to one side and apply the brakes hard

91. If you gas pedal gets stuck in heavy traffic while driving an automatic shift car, and you cannot free the pedal with your foot, you should

Mastery Test (cont.)

a) Apply your brakes as hard as possible
b) Reach down and try to pull it up
c) Turn off the engine
c) Shift into neutral

92. If you start to skid on a wet or icy street, you should

a) Steer in the direction of the skid
b) Brake quickly
c) Gently apply the brakes
d) Increase speed and keep the wheel straight

93. When driving through fog at night, you should use your

a) High beam headlights
b) Parking lights
c) Low beam headlights
d) Four-way flashers

94. If rain sits on a road surface, your tires will ride on a thin film of water. This is called

a) Skimming
b) Traction
c) Hydroplaning
d) Bottoming out

95. The defensive driver leaves himself an out by

a) Tailgating
b) Providing a space cushion
c) Following closely
d) Being "boxed in"

96. After making a left turn onto a two-way street, which lane should your car be in?

a) Right lane
b) Lane nearest the curb
c) Lane nearest the center line

97. Car X passes over a line in the road. Car Y passes over the same line three seconds later. Conditions are good. Is car Y following at a safe distance?

a) No, car Y is too close
b) Yes, car Y is leaving more than enough space
c) No, car Y is not keeping up with traffic

Mastery Test (cont.)

98. If you are in an accident, what is the first thing you should do?

a) Go for help
b) Stop at once
c) Call the police

99. The air pressure of tires should be checked

a) Only when the tires are dry
b) By kicking the tires
c) After riding for at least an hour
d) When the tires are not hot from driving

100. The engine should always be running when fluid is added to

a) A hot radiator
b) The windshield-washer fluid container
c) The battery
d) The automatic transmission

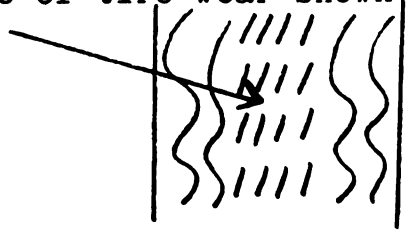
101. Which of the following would be the most dangerous?

a) Driving with worn-out wiper blades
b) Driving through a busy intersection
c) Going 10,000 miles without an oil change
d) Making a U-turn from a left or U-turn only lane

102. The part of the cylinder in which the fuel is ignited is called the

a) Cylinder head
b) Engine block
c) Piston
dO Combustion chamber

103. What is the reason for the type of tire wear shown here?



a) Overinflation
b) Underinflation
c) Wheels out of balance
d) Wheels out of alignment

104. If your brakes fail completely, you should

a) Apply the parking brake, turn off the engine and shift into park
b) Shift into neutral, turn off the engine and slowly apply the parking brake

Mastery Test (cont.)

c) Pump the brake, shift into a lower gear and slowly apply the parking brake
d) Press the brake all the way down, shift into neutral and apply the parking brake

105. If an oncoming vehicle is forced across the center line because of potholes or road repair, you should

a) Slow down and move to the right, if possible
b) Speed up and get out of the way fast
c) Turn to the left to get around the oncoming vehicle
d) Blow your horn and continue at normal speed

106. When the accelerator sticks while you are driving in an automatic shift car, the

a) Vehicle will stop
b) Vehicle will not slow down
c) Vehicle will shift to neutral
d) Driver will lose all control of the vehicle

107. If your car begins to skid, you should turn the wheel in the direction the rear of the car is skidding and

a) Remove your foot from the accelerator
b) Press down hard on the brake pedal
c) Accelerate slightly
d) Downshift

108. In thick fog, a driver should use the

a) High beam headlights
b) Parking lights
c) Low beam headlights
d) Interior lights

109. A responsible driver will

a) Never take the right of way
b) Always take the right of way
c) Cooperative with other drivers on the road
d) Always think of driving as a game or contest

110. When turning right onto a two-lane, two-way street, you should get into

a) The right lane
b) The left lane
c) Between the two lanes
d) Follow the car ahead of you

Mastery Test (cont.)

111. To judge safe following distance accurately, use

a) Two car lengths for every 20 mph
b) Stopping distance charts as a guide
c) The rule that specifies the following distance in seconds
d) Rule A but incrase the distance to three car lengths for every 10 mph over 50 mph

112. What is the most important tire maintenance procedure that you can perform?

a) Checking the wheel alignment
b) Checking the tire balance
c) Checking the air pressure
d) Checking the tire treads for wear

113. In the city, where do most traffic accidents happen?

a) At intersections
b) In the middle of the block
c) At railroad crossings

114. As the piston moves down on the first stroke, the intake valve opens and

a) The fuel is compressed
b) Fuel is drawn into the cylinder
c) A hot spark is produced
d) The fuel burns and expands

115. If a tire is going flat while you are driving, you should

a) Speed up in order to get to a service station quickly
b) Look for a safe place to get off the road
c) Come to a quick stop and then pull off the road
d) Stop where you are and signal other traffic to go around you

116. If an oncoming vehicle starts to move across the center line, do not

a) Flash your headlights and blow your horn
b) Quickly remove your foot from the gas pedal
c) Steer your vehicle sharply to the left
d) Tap your brakes to warn following traffic

117. You are driving n a heavy morning fog. Which of your car's lights will most help to see ahead better?

Mastery Test (cont.)

a) Low beams
b) High beams
c) Parking lights

118. For safety, the size of the space cushion between you and another car, depending on speed, should be a minimum of

a) One second
b) Two seconds
c) Three seconds
d) Four seconds

119. The stroke of the four stroke cycle in which fuel is squeezed to about one-tenth its orginal volume is the

a) Intake
b) Compression
c) Power
d) Exhaust stroke

120. If an oncoming vehicle crosses the center line and drives into your lane, you should

a) Speed up and drive onto the shoulder
b) Stop as quickly as you can
c) Drive into his lane if it is empty
d) Slow down and steer to the right

121. If you must travel in fog, you should use

a) Low beam headlights
b) High beam headlights
c) Headlights and interior lights
d) Hedlights and emergency flashers

122. Hot gases left in the cylinders after the fuel has been ignited are discharged on which stroke of the four stroke cycle?

a) First
b) Second
c) Third
d) Fourth

123. If "wear bars" are showing when you check the tires, it means that they

a) Are nearly new and in good condition
b) Are in poor condition and need replacement
c) Have about 5,000 miles left before needing replacement

Mastery Test (cont.)

d) Have about 10,000 miles left before needing replacement

124. When the temperature light comes on as you are driving down the road, it usually means that the

a) Water pump is not working properly
b) Temperature inside the car is dangerously warm
c) The fan belt is tight and causing too much friction
d) Engine operating temperature has risen above the safe level

125. If the alternator light does not go out when the engine starts, you should

a) Pump the accelerator to make the alternator charge more
b) Check the condition of the battery with the engine shut off
c) Check the condition of the fan belt with the engine running
d) Have the alternator checked by a mechanic as soon as possible

# APPENDIX E

# SELECTED OBJECTIVES WITH TEST INSTRUMENT ITEM NUMBERS

TABLE VIII

SELECTED OBJECTIVES WITH
TEST INSTRUMENT ITEM NUMBERS

| Objective | Book | Mastery Test Question Numbers |
|---|---|---|
| 11 | 1 | 27, 79, 84, 103, 123 |
| 4 | 2 | 18, 30, 80, 85, 124 |
| 5 | 2 | 10, 25, 81, 86, 125 |
| 6 | 2 | 14, 23, 39, 61, 82 |
| 5 | 3 | 7, 12, 17, 19, 22 |
| 7 | 3 | 4, 42, 46, 49, 56 |
| 10 | 3 | 24, 29, 31, 34, 58 |
| 1 | 5 | 16, 27, 62, 83, 87 |
| 1 | 7 | 43, 48, 63, 88, 104 |
| 4 | 7 | 35, 52, 64, 89, 115 |
| 5 | 7 | 65, 90, 105, 116, 120 |
| 6 | 7 | 51, 57, 66, 91, 106 |
| 9 | 7 | 6, 8, 67, 92, 107 |
| 1 | 11 | 68, 93, 108, 117, 121 |
| 3 | 11 | 1, 36, 54, 69, 94 |

TABLE VIII (continued)

| Objective | Book | Mastery Test Question Numbers |
|---|---|---|
| 3 | 14 | 20, 28, 70, 95, 109 |
| 7 | 14 | 33, 40, 71, 96, 110 |
| 8 | 14 | 38, 72, 97, 111, 118 |
| 4 | 15 | 5, 21, 50, 73, 98 |
| 6 | 17 | 41, 55, 74, 99, 112 |
| 10 | 17 | 2, 32, 44, 75, 100 |
| 1 | 21 | 45, 60, 76, 101, 113 |
| 4 | 23 | 77, 102, 114, 119, 122 |
| 8 | 24 | 26, 37, 47, 53, 59 |
| 10 | 24 | 3, 9, 11, 13, 15 |