A POST-TEST FOR DRIVER EDUCATION BASED ON: A RESOURCE CURRICULUM IN DRIVER AND TRAFFIC SAFETY EDUCATION

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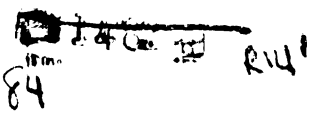

ABSTRACT

A POST-TEST FOR DRIVER EDUCATION BASED ON: A RESOURCE CURRICULUM IN DRIVER AND TRAFFIC SAFETY EDUCATION

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Statement of the Problem

The purpose of this study was to develop a test instrument for driver education based on: A Resource Curriculum in Driver and Traffic Safety Education. The test instrument was designed to measure student ability in relation to the stated objectives of the Resource Curriculum. In this manner teachers will know whether or not their instructional program has been sufficient to enable all students to achieve successfully the stated objectives of the Resource Curriculum, and if the students were not successful, in which specific objectives they need additional preparation.

Methods of Procedure

In order to develop the test instrument, it was necessary to determine the criticality of each instructional unit in the Resource Curriculum. This criticality rating was sent to a panel of judges for their

review. Based on their comments, modifications were made in criticalities assigned to various units.

Based on the criticality determined for each unit, from one to three test items were developed for each episode and then sent to the panel of judges to establish their validity and objectivity. Based on comments received from the judges, the test items were revised as needed. The test instrument was then administered to high school students to determine its reliability.

The Major Findings

The following is a summary of the major findings of this study. They are reported in terms of the judges' responses to the criticality rating, judges' response to the test development and the estimated reliability of the test instrument.

Two or more judges agreed with the criticality assigned to eight of the units of the Resource Curriculum. They were:

Introduction--The Highway Transportation System--LOW

Section I--On Highway Tasks

Unit A - Basic Control Tasks--MODERATE

Unit B - Interaction with Other Highway Users--HIGH

Unit C - Critical Situations--HIGH

Unit D - Control the Consequences of Highway Collisions--MODERATE

Section II--Readiness Tasks

Unit A - Operator Fitness--HIGH

Section III--Improvement Tasks

Unit A - Self-Improvement--HIGH

Unit B - System Improvement--LOW

The judges disagreed with the criticality assigned to the following two units, and they were revised based on the judges' suggestions. They were:

Section II--Readiness Tasks

Unit B - Vehicle Readiness--Rated LOW
Changed to--MODERATE

Unit C - Trip Plan--Rated LOW
Changed to--MODERATE

Seventy-seven test items were developed for the post-test. Two or more judges indicated that sixty-one test items were appropriate. Three of the test items were identified as lacking validity by two or more judges, and they were revised. Thirteen test items were identified as appropriate, but the judges did suggest specific changes that would improve the test item. Those changes were made in the test items. There were no test items identified as lacking objectivity by two or more judges.

The estimated reliability of the test instrument was .732.

A POST-TEST FOR DRIVER EDUCATION BASED ON: A RESOURCE CURRICULUM IN DRIVER AND TRAFFIC SAFETY EDUCATION

By

Allen Robinson

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Finally, my deepest thanks to Mom and Dad for all of their encouragement and assistance throughout

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CHAPTER I

THE PROBLEM

Driver education programs continue to expand throughout the nation. In 1969-70, 13,200 high schools provided driver education courses for 2,283,294 students. In addition, 1,655 commercial driving schools teach over two million young people and adults the skills of driving each year.[1]

An activity of such magnitude is bound to draw the critical attention of the public, which is called upon to support it. In February, 1968, Dr. Daniel P. Moynihan took a critical look at driver education. In his Report to the Secretary's Advisory Committee on Traffic Safety, he stated that:

> Unfortunately, the present state of knowledge as to the effectiveness of driver education provides no certainty, and much doubt that the return on this enormous prospective effort will be commensurate with the investment. A broad and systematic inquiry

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[1]National Safety Council, 1970-71, Driver Education Status Report (prepared by School and College Department, Driver Education Section, Chicago, Illinois, 1972).

> is needed into the general question of how driving behavior is acquired, and how drivers can be taught not only to operate automobiles, but also to understand the major problems of highway safety.[2]

Dr. Leon Brody, Research Director of the N.Y.U. Center for Safety stated:

> 1. No clear proof has yet been produced showing that driver education, as presently constituted, has a significant favorable effect on driver performance.
> 2. No clear proof has yet been produced showing that driver education, as presently constituted, does not have a significant favorable effect on driver performance.[3]

The goals and objectives of driver education programs must first be identified before an attempt is made to measure the effectiveness of the program. In effect, what are we attempting to accomplish?

Criteria which has been used in the past to measure the effectiveness of driver education has been the reduction of accidents over varying periods of time. It is not the writer's intent to claim these are the most realistic or appropriate criteria for evaluating driver education effectiveness, but they have been widely employed in the field.

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[2]U.S., Department of Health, Education, and Welfare, Report of the Secretary's Advisory Committee on Traffic Safety, February 29, 1968, p. 107.

[3]Leon Brody, Driver Education and Training--Plans for Evaluating the Effectiveness of Programs (New York: The Center for Safety, New York University, under contract No. FH-11-6560, National Highway Safety Bureau, Washington, D.C., January, 1970).

A project designed to identify the goals and objectives of driver and traffic safety education was the Automotive Safety Foundation's A Resource Curriculum in Driver and Traffic Safety Education. As stated by Dr. Charles Hartman:

> The project arose from a recognition that preparation to drive, through effective education and training programs is basic to safe motor vehicle operation. And, that safe and efficient movement of persons and goods over the nation's highway transportation system is fundamental to social and economic progress in the United States. Highway collisions and congestion needlessly and tragically retard this progress through deaths, injuries and economic losses among highway users. Driver and traffic safety education, along with other counter measures such as enforcement and engineering, must be thoughtfully planned and vigorously applied to reverse the trend of these human and material losses.[4]

The project's purpose was to determine the cognitive, affective and psycho-motor learning involved in desirable driver performance, and develop a curriculum which would produce such performance. Briefly stated: first determine what actions when well performed, make up the driving task, and then design an instructional program that will result in such action being learned and used. As stated in the Resource Curriculum: "The overarching goal of Driver and Traffic Safety Education is to improve the quality of human decisions and

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[4]Automotive Safety Foundation, A Resource Curriculum in Driver and Traffic Safety Education, p. ii.

performance tasks related to the system in a manner that encourages continuing improvement."[5]

More specifically, the primary aims of secondary school driver and traffic safety education as stated in the Resource Curriculum are to:

- Prepare students with at least minimum performance capabilities for entry into the highway traffic system as vehicle operators;
- Equip students with knowledge and thought processes that will enable them to make wise decisions in situations that could lead to impaired driver performance (alcohol, drugs, fatigue, emotions and vehicle maintenance); and
- Help students acquire the insights and motivations needed to become fully functioning operators and responsible members of the system.[6]

The curriculum structure, unit objectives, and content items are derived from and grouped around what people do, both on and off the highway, as they relate to the highway transportation system. Objectives are stated in terms of measurable learner performance required to operate as a part of the system. Most of the objectives are measurable immediately and are required in "real-world" performance. Others could be termed "behavior potentials" or "enabling objectives" predictive of how a student might handle "real-world" situations when they arise. All objectives are related to the driver's ability to identify, predict, decide, and act as a member of the highway transportation system.

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[5] Ibid., p. 4.

[6] Ibid., p. 2.

It has been the writer's privilege to be closely associated with this Resource Curriculum. Since joining the staff of the Automotive Safety Foundation, the author critiqued content materials during the final year of the project and was one of the two primary staff persons assigned to curriculum implementation. This implementation consisted of introducing the new curriculum to national, regional, and state driver education associations through their annual meetings. Considerable time was also spent with state directors of driver and traffic safety education, as well as teacher preparation institutions, whose primary aim was to prepare new driver education teachers. Additional implementation involved assisting state agencies and local school districts in developing their own curriculum guides, based on the Resource Curriculum.

During the three years of this implementation, one question was continually asked. This question concerned a planned evaluation of the curriculum itself, as well as evaluation instruments which will indicate whether or not students have successfully achieved the stated objectives of the Resource Curriculum.

In 1970 three critiques were prepared on the Resource Curriculum and presented at the Committee 3, Highway Research Board meeting held in Chicago, Illinois. These critiques were written by: Dr. Leon G. Goldstein,

National Transportation Safety Board; Dr. Earl D. Heath, Research Institute, National Highway Safety Bureau; and Dr. Robert H. Kirk, Professor, University of Tennessee. These critiques provided the first thorough analysis of the Resource Curriculum. As beneficial as these critiques have been to those implementing the Resource Curriculum, they are only a small step toward the thorough evaluation of the new curriculum.

Purpose of Study

The purpose of this study was to develop a test instrument for driver education based on: A Resource Curriculum in Driver and Traffic Safety Education. The test instrument was designed to measure student ability in relation to the stated objectives of the Resource Curriculum. In this manner teachers will know whether or not their instructional program has been sufficient to enable all students to successfully achieve the stated objectives of the Resource Curriculum, and if the students were not successful, in which specific objectives they need additional preparation.

Study Design and Data Collection

The evaluation instrument was designed to measure whether or not a student had successfully achieved the stated objectives of the Resource Curriculum. Test items were designed to: require the

student to perform the same behavior under the same conditions specified in the instructional objectives (validity); provide a consistent measure of the student's ability to demonstrate achievement of an instructional objective (reliability); and to meet the criteria stated in the instructional objective (objectivity).

Limitations

Successful completion of this test alone does not necessarily prove the student will perform accordingly in actual driving situations. The Resource Curriculum is designed with the intent that the concepts included in the curriculum are in fact those that are needed to perform the driving task. This test was designed to demonstrate that a particular driver or student has the enabling ability to perform the driving task successfully as defined by the Resource Curriculum.

Tests in general are only predictive indicators of individual behavior. Therefore, analysis of the results cannot be considered as conclusive evidence of individual behavior.

Study design has also added limitations to this particular test instrument. Depending on the rated criticality of a particular unit, from one to three test items were developed for each episode, but in some cases, there were more segment objectives in the episode than there were test items as determined by study design.

In these instances the author was forced to select the most critical of these objectives to test, thus, there may be segment objectives that are not tested. However, since this test was designed as an instrument to measure a student's ability at the completion of a driver education course, the author feels the most critical concepts have been tested.

Other limitations may be found in new terminology which was used in the Resource Curriculum. Schools that do not employ a task analysis approach to driver education, through the human functions of driving, may not find this a beneficial test to use.

Importance of the Study

The importance of this study is to make driver education relevant to student needs. A significant aspect of this relevancy is a test instrument that will measure student competencies. The test instrument will be used to measure student ability in relation to the stated objectives of the Resource Curriculum. In this manner teachers will know whether or not their instructional program has been sufficient to enable all students to successfully achieve the stated objectives of the Resource Curriculum, and if the students were not successful, in which specific objectives they need additional preparation.

The most ideal curriculum can be developed incorporating the most specific instructional objectives desired to produce a competent driver, but if these objectives are not measured effectively or accurately to determine if the student has achieved their specific level of performance stated in the instructional objective, the instructor may not know if the students have accomplished the stated goals and objectives of his driver education program.

Scope of Study

This test instrument will be applicable to school systems which have implemented the Resource Curriculum. It will also assist those schools that are planning curriculum changes. With a specific test instrument to measure the stated objectives of the curriculum, schools presently using the Resource Curriculum will be able to more effectively measure student progress. Schools planning curriculum changes will be able to see the type of student ability that can be achieved by using the Resource Curriculum.

Definition of Terms

Criticality.--The impact an objective has upon the overall transportation system.

High Criticality.--An item a student must know if he is going to successfully perform the driving task within the highway transportation system.

Moderate Criticality.--An item a student should know, but is not absolutely essential to know, if he is going to successfully perform the driving task within the highway transportation system.

Low Criticality.--An item that is helpful, but not necessary, for a student to know if he is going to successfully perform the driving task within the highway transportation system.

Resource Curriculum.--A Resource Curriculum in Driver and Traffic Safety Education, published by the Automotive Safety Foundation in 1970.

Instructional Objective.--Consists of a description of the stimulus being responded to and an indication of the desired adequacy of the action.

Validity.--The test item requires the student to perform the same behavior under the same conditions specified in the instructional objective.

Reliability.--The test item provides a consistent measure of a student's ability to demonstrate achievement of an instructional objective.

Objectivity.--The test item meets the criteria stated in the instructional objective.

Driving Task.--Consists of taking skilled and properly timed actions under varying road and traffic conditions based on decisions which are dependent upon accurate identifications, sound predictions, and learned information.

Organization of Remaining Chapters

Chapter II contains a review of the literature. The review of literature consists of task description, analysis of the driving task, human functions and evaluation, driver education and evaluation, the HUMRRO Driver Education Task Analysis, and test development. Chapter II contains a more detailed description of the curriculum which the post-test will be evaluating. Also presented in Chapter III are the steps taken in the test development. These include the criticality development, test development, and the tasks of the judges. Chapter IV contains the findings based on the judges' responses, as well as the results of administering the test to determine reliability. Presented in Chapter V are the summary, conclusions, recommendations for further study and a discussion.

CHAPTER II

REVIEW OF LITERATURE

The review of literature revealed several areas which related to the development of a post-test for driver education. These areas are classified into task description, analysis of the driving task, human functions and evaluation, driver education and evaluation, the HUMRRO Driver Education Task Analysis, and test development.

Task Descriptions

As stated in "Description of the Driving Task," Illinois State University:

> The driving task consists of complex coordinated tasks involving both hands, both feet, vision and hearing. In order to operate a vehicle in traffic with any degree of safety, the driver must develop this coordination to a point where it becomes automatic. The driver must learn to: make judgments of changing space-time relationship; and, operate his vehicle in close proximity to other vehicles of different sizes and speeds, in fore and aft relationships.[7]

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[7] "Description of the Driving Task," Illinois State University, unpublished.

The time intervals within which a driver must react forces him to anticipate conditions and situations. Therefore, factors of foresight, planning, and appreciation of hazards are involved to a great extent in the driving task.[8]

All drivers have certain capacities that are utilized in the driving task. If this task imposes restrictions and demands upon the driver which are at or beyond the limits of his capacities, accidents will result.[9]

Michaels stated:

> Driving requires the human to guide his vehicle. This means he must operate upon his perception. For example, if a curve is perceived while driving, it is necessary to operate upon that perception to determine the corrective action that must be taken to stay on the road. Thus, some kind of analysis must be performed in order to determine the kinds of responses required. In the present example, the human is required to estimate the degree of curvature in the road, the speed that will be required--to mention just a few.[10]

Gibson and Crooks compared driving a car to that of other forms of locomotion. With this comparison in mind, the principle of guidance through perception would

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[8] Ibid.

[9] U.S., House Document No. 93, "The Federal Role in Highway Safety," pp. 30-31.

[10] R. M. Michaels, "Human Factors in Highway Safety," Traffic Quarterly, October, 1961, pp. 593-94.

be employed so that paths are found in the visual field which lead to the destination without colliding with obstacles. Therefore, the perceptual motor skills would be more critical in driving than the motor skills of controlling the vehicle.[11]

Forbes had discussed the driving task in terms of the human functions required in performing the task. His analysis is in terms of perceptions, judgments, and responses.[12] He stated:

> In analyzing the driver's task, we find that perception of rapidly changing situations, judgments based on these perceptions, plus background knowledge, and responses adequate for each situation are the essentials. The judgments made by the driver are based upon information about the highway situation and about possible hazards which may be so well learned that it is automatically rather than consciously used.[13]

The problem of risk and hazard has often been suggested as an important element of the driving task. Fox[14] suggested that "hazard" be the term for objective

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[11]J. J. Gibson and Laurence E. Crooks, "A Theoretical Field-Analysis of Automobile Driving," The American Journal of Psychology, LI, No. 3 (July, 1938), 353-71.

[12]T. W. Forbes, "Human Factors in Highway Safety," Traffic Safety Research Review, IV, No. 1 (March, 1960), 8-11; T. W. Forbes, "Traffic Engineers and Driver Behavior," Traffic Safety Research Review, IX, No. 3 (September, 1965), 87-89.

[13]Forbes, "Human Factors," op. cit., p. 8.

[14]B. H. Fox, Alcohol and Traffic Safety (U.S. Public Health Service Publication, No. 1043), Chapter 8.

danger and "risk" the term for perceived danger. An individual cannot assume the risk unless he has made some estimate of the hazard of the situation. If he perceives no hazard, he takes no risk. In some cases, hazards are accurately estimated and risks are taken. In other cases hazards are incorrectly estimated, and therefore, it cannot be said that risks were taken.

Ross[15] viewed driving as the interaction of operator-vehicle and road. This he illustrated by developing driving models to explain the causes of highway collisions. His definition of driving was:

> The task of driving is to get cargo to a spatio-temporal goal. The cargo may be people, goods or both. The goal is arrival at a geographical location within some limited period of time, although the location may be stated broadly (e.g. "the country") and the time limits may be very flexible (e.g. "this afternoon").[16]

Skillful driving as stated by Schlesinger and Safren[17] was described in terms of the critical tasks to be performed by the driver and critical behaviors required to perform these tasks effectively.

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[15]H. L. Ross, "Schematic Analysis of the Driving Situation" (Traffic Institute, Northwestern University, 1960).

[16]Ibid., pp. 12-14.

[17]L. E. Schlesinger and M. A. Safren, "Perceptual Analysis of the Driving Task" (Highway Research Board Record 84, January, 1964), pp. 54-61.

Quensel described driving as:

> Skilled and properly timed actions, under varying road and traffic conditions, based on sound judgment and decisions. These decisions are, in turn, dependent upon previously acquired knowledge and the gathering of accurate information pertinent to the immediate traffic situation.[18]

Analysis of the Driving Task

The task description which preceded this section is the first step undertaken by instructional planners when determining what, in fact, should be taught in a particular course. Task descriptions provide an overview of what an individual should be able to do. Task analysis provides the instructional planner with such information as--how the individual will perform the task and what degree of proficiency he should possess.

Analysis of the driving task identifies two classes of characteristics. One class is required of all drivers and the second class is specific to various individuals. These classes are not totally independent and they do interact with each other. The first class consists of sensory function, perception, judgment, analysis, decision-making, integration, and translation into action. Characteristics specific to the individual in the second class consist of intelligence, personality, emotion, and social factors. These factors continually

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[18] W. Quensel, "A Concept of the Driving Task" (unpublished writings on the driving task).

operate to determine the ultimate response a driver will make in various driving situations.[19]

Further analysis of the first class of characteristics provides the following:

> . . . the human being has definite limits in the amount of information he can utilize per unit of time. His ability to make accurate judgments of speed or change in speed is very limited, as is his ability to translate them into motor responses. His capacity to make optimum decisions depends on the quantity and quality of information available to him. . . . The more complex the situation, the more time he must have to carry out his decisions.[20]

When man functions as a guidance system, as stated by Michaels, he must make judgments of various kinds to carry out this guidance. He must compare and correlate the current information with his past experiences and make decisions based on his past experiences.[21]

This analysis of the driving task emphasizes the importance of driver preparation. Appropriate preparation develops the expectations, correlations, and judgments needed to make sound decisions in various traffic situations.

When analyzing the critical tasks performed by skillful drivers, Schlesinger and Safren developed a

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[19] The Federal Role in Highway Safety, op. cit.

[20] Ibid.

[21] Michaels, op. cit.

model of the critical tasks to be performed and the conditions to be optimized.

The critical tasks were:

(1) the perceptual organization from moment to moment of a path or series of paths, the "field of safe travel," where the driver can move without colliding with obstacles or leaving the roadway. This field as perceived by the driver should be in reasonable accord with objective reality.
(2) the perceptual organization from moment to moment of the smallest region within which the driver could come to a full stop if necessary, the "minimum stopping zone." This should also be in reasonable accord with reality for the speed at which the car is moving, the condition of the brakes and the roadway surface.
(3) the comparison of these two fields in order to assess the optimal state, i.e., the minimum stopping zone at a given moment is less than the field of safe travel. . . .
(4) the translation of the overall route leading to the destination into a series of momentary courses to follow, with planning far enough in advance so that at any instant the course lies within the field of safe travel. For example, if a driver wants to make a right turn from a fast moving stream of traffic, then he must move into the proper lane well ahead of time. If he hasn't done this, the driver must either give up his desired course, which now lies outside the field of safe travel, or take a risk that might be dangerous.
(5) while carrying out the tasks specified above, a driver is continually making compensatory changes in the car's direction and speed to achieve an optimal state, namely; (a) the car should be headed within the field of safe travel, (b) the minimum stopping zone should be less than the field of safe travel; (c) the car should be moving on a course leading to the ultimate destination.[22]

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[22] L. Schlesinger, "Objectives, Methods and Criterion Tests in Driver Training," Traffic Safety Research Review, XI, No. 1 (March, 1967), 18-24.

These critical tasks were grouped in terms of human functions. The functions consisted of sensing, identification, and interpreting. Through experience, the driver develops an efficient scanning procedure to enable him to sense changes in his environment. This scanning procedure is a prerequisite to identification. Scanning procedures must be learned and should be an integral part of any driver preparation program. Sensing skills further identify stimuli and classify them into meaningful categories such as: stationery objects, moving obstacles, barriers to sight, legal obstacles, and the speed of his own vehicle.[23]

Interpreting skills translates the acquired information into possible actions.

The basic assumption of the model was:

> That the driving scene changes from moment to moment . . . the driver tries to compensate for or match these changes by his control responses to the vehicle in order to maintain an optimal state.[24]

Optimal driver performance would be measured by the accuracy of the drivers identified field of safe travel and his minimum stopping zone. In addition driving skill could be measured by the driver's output to the vehicle.[25]

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[23] Schlesinger and Safren, op. cit., p. 55.

[24] Ibid., p. 61.

[25] Ibid.

Ross stated that the task of the operator is:

> To control the relationship of the vehicle to the roadway. This may be divided into two parts: the obtaining of accurate information concerning this relationship, and the effecting of appropriate action based on this information.[26]

The first step is perception, which is intended to prevent the vehicle from leaving the roadway or colliding with an obstacle. This requires that previous perceptions be accurate. Based on this perception, the driver must interpret accurate information concerning the relationship of his vehicle and the road. Based on accurate information, the operator must take appropriate actions. Having made the appropriate decision, he must implement this decision through vehicle controls.[27]

Human Functions and Evaluation

Schlesinger divided the human functions into two categories. Guidance, or the perceptual aspect of the functions, is divided into: search, identification, and predictions. This provides the driver with information about his environment, as well as an estimation of how this will affect his driving.

The second category is called control, and consists of decision-making and execution. Here the driver

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[26] Ross, op. cit.

[27] Ibid.

must determine what to do, based on his predictions, and then execute this decision through vehicle controls.[28]

These categories and sub-categories of the human functions are defined here for the purpose of reviewing how they contribute to successful performance of the driving task.

Search

"Search" may be defined as the observational procedures to note the presence or absence of critical objects or differences in the driving scene.[29]

According to Smith, accident-free drivers can be distinguished from accident-producing drivers by their methods of observation. Smith stated that accident-free drivers have developed systematic observational routines, while poorer drivers pay more attention to vehicular controls and non-driving stimuli.[30]

Studies summarized by Goldstein have not shown any relationships between sensory capacities, such as visual acuity, and successful driver performance.[31]

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[28]Schlesinger, op. cit., p. 19.

[29]Ibid.

[30]H. L. Smith and J. J. Cummings, "Let's Teach Drivers How To See," Traffic Digest and Review, IV (1956), 7-13.

[31]L. G. Goldstein, "Research On Human Variables in Safe Motor Vehicle Operation: A Correlation Summary

According to Goldstein, the critical factor seemed to be the ability of the driver to use his sensing capacities in a systematic manner.[32] Gange[33] indicated this systematic sensing can be accomplished if the individual continues to "tell himself where to look." In any case, some kind of scanning is a requirement for efficient driving. These scanning and search routines are an essential prerequisite to detection of critical information.

Identification

Identification is the classification of environmental stimuli into recognizable and meaningful categories based on past experiences. Gange[34] reported that training in identification of the visual input cues has had marked effects on the performance of tracking tasks. Spicer[35] reported that better performing drivers can

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of Predictor Variables and Criterion Measures" (Driver Behavior Research Project, George Washington University, Washington, June, 1961).

[32] Ibid.

[33] R. M. Gange, "Human Functions in Systems," Psychological Principles in System Development (New York: Holt, Rinehart and Winston, 1962).

[34] Ibid.

[35] R. Spicer, "Human Factors in Traffic Accidents" (Honolulu: Department of Health, State of Hawaii, 1964), pp. 7-30.

more successfully identify the salient features of a driving scene presented in a motion picture taken from the driver's seat.

Prediction

Prediction is the translation of current stimulus into possible future actions based on stored information.[36]

A few studies have examined the accuracy with which drivers make predictions. Olson, Wachsler, and Bauer[37] found that drivers tended to underestimate the speed differential between their car and the car they were following. Wright and Sleight[38] found that drivers were unable to estimate distances in car length between their car and the car they were following. Bjorkman[39] found that a driver who is required to judge where he will meet an oncoming car makes errors that are systematically related to the velocities of the cars and the distances between them. However, he stated that these

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[36]Schlesinger, op. cit., p. 21.

[37]Paul Olson, et al., "Driver Judgments of Relative Car Velocities," Journal of Applied Psychology, XLV, No. 3 (1961), 161-64.

[38]Stuart Wright and Robert B. Sleight, "Influence of Mental Set and Distance Judgment Aids on Following Distance," Highway Research Board Bulletin, XXL (1962), 52-59.

[39]M. Bjorkman, "An Explatory Study of Predictive Judgments in a Traffic Situation" (Sweden, University of Stockholm, 1963).

subjects were able to improve the accuracy of their predictions by comparing the actual meeting place to their predictions.

Decision-Making

Decisions are the formulated courses of action that a driver makes with the intent to execute. Decisions a driver makes are many and varied. They range from simple to highly complex, depending on the criticality of the situation.[40]

The Columbia Driver Judgment Test, developed by Fine, Malfetti, and Shoben[41] was designed to measure whether or not a driver could select the appropriate response to a number of driving problems. The test was based on a collection of critical incidents of driver behavior.

Driver decisions may be evaluated through driver actions. If the appropriate action is undertaken, it is assumed that the appropriate decision was made.

Execution

Execution of performance refers to the basic control actions the driver makes: steering wheel

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[40] Schlesinger, op. cit., p. 22.

[41] J. L. Fine, J. I. Malfetti, and E. J. Shoben, Development of the Columbia Driver Judgment Test (Safety Research Education Project, Teachers College, Columbia University, 1964).

manipulation, brake, and accelerator application and their influence on the vehicle.[42]

Studies do support the assumption that driving skill can be objectively measured by the smoothness of vehicle control, and that this vehicle control depends largely upon perceptual abilities. Bartlett[43] stated that the most important characteristic of body skill is "timing." Good timing in turn depends upon the regulation of flow from procedure to procedure in such a way that the response is a well-coordinated series of responses without hurry or prolonged delay. Garner[44] also stated that a major factor in good motor responses is the ability of the driver to maintain a smooth coordinated sequence of responses, which requires perpetual anticipation. Greenshield[45] in his experiments with the Drivometer, which measures steering wheel reversals, accelerator depressions, brake applications, and frequency of speed changes, stated that "better-than-average" drivers performed quite differently than "poorer-than-average" drivers.

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[42]Schlesinger, op. cit., p. 23.

[43]F. C. Bartlett, Thinking: An Experimental and Social Study (New York: Basic Book, Inc., 1958).

[44]W. R. Garner, Uncertainty and Structure as Psychological Concepts (New York: Wiley and Sons, 1962).

[45]B. D. Greenshields, "Investigating Traffic Highway Events in Relation to Driver Actions," Traffic Quarterly (October, 1961), pp. 664-76.

Driver Education and Evaluation

In 1968, the National Highway Safety Bureau, now the National Highway Traffic Safety Administration, awarded four contracts to develop methods and plans for evaluating the effectiveness of current or proposed driver education and training programs and to develop improved programs, which contribute more substantially to our accident control programs. These contracts were awarded to: the Center for Safety, New York University; the Institute for Educational Development; Dunlap and Associates, Inc.; and the American University Development and Education Training Research Institute in Washington, D.C.

As stated by the National Highway Traffic Safety Administration, the researchers were to:

> Develop methods and plans for evaluating the effectiveness of current or proposed driver education and training programs at state and local levels, and thereby to identify areas of needed improvements, including new driver education and training techniques and procedures.[46]

These four studies provided a comprehensive review of driver education and its relationship to traffic safety. As comprehensive as these studies were, the main conclusion drawn by each was:

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[46]William E. Tarrants, "Current Research in Driver Ed." (presented at the Summer meeting, Highway Research Board, National Academy of Sciences, 1969), pp. 4-5.

> It is evident that at the present time it is impossible to draw valid scientific inferences regarding the impact of driver education or subsequent driving performance.[47]

In addition all four studies emphasized that the objectives of driver education must aim at the ultimate development of driver proficiency in the real world, as reflected in efficient traffic flow, as well as accident reduction.

Following the completion of the four studies evaluating the effectiveness of driver education, a fifth study from the National Highway Traffic Safety Administration was undertaken by the Highway Research Board of the National Academy of Science.

> The study was conducted for the purpose of providing a selection and/or synthesis of instruments used to evaluate various types of driver education and training programs and to develop validation plans for these instruments.[48]

Evaluation of driver education was to be completed through a short-term and long-term evaluation plan. The short-term plan is of particular interest to this study.

As stated by the Highway Research Board of the National Academy of Science, the following steps are prerequisite to later work on the problem:

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[47] Harry H. Harman, et al., Evaluation of Driver Education and Training Programs (Princeton, N.J.: Educational Testing Service, March, 1969), p. 15.

[48] Ibid., p. 1.

1. Identify the traffic related driving tasks and the knowledge, skills and attitudes required to perform these tasks.
2. From the preceding task analysis and the objectives of the highway traffic system, determine what the objectives of driver education should be.
3. Develop a short term evaluation instrument for measuring the attainment of the objectives as reflected in the control of driver education programs.[49]

The National Academy of Science continually focused on the goal of sound evaluation of driver education programs and the effectiveness of drivers produced by them. In order to accomplish this, preliminary work was needed in:

1. Performing the driving task analysis;
2. Defining the objectives of driver education;
3. Developing an instrument for the evaluation of program content;
4. Preparing specifications for possible instruments to measure driving performance; and
5. Preparing specifications for evaluation information requirements.[50]

HUMRRO Driver Education Task Analysis

Since these recommendations were made to the National Highway Safety Bureau, many of them have, in fact, been completed under additional contracts. A review of these completed contracts is pertinent to this study.

The Driver Education Task Analysis is a four-volume report dealing with the development of driver education objectives through an analysis of the driving

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[49] Ibid., pp. 24-25.

[50] Ibid., p. 31.

task. It contains a detailed description of the behaviors required of passenger car drivers, rated criticalities of these behaviors, and items of supporting information relating to driver performance and performance limits, enabling driver knowledges and skills, and behavior criticality. This report was completed by the Human Resources Research Organization (HUMRRO) under contract with the Department of Transportation in 1971.

The four volumes of the Driver Education Task Analysis are: Volume I, Task Descriptions; Volume II, Task Analysis Methods; Volume III, Instructional Objectives; and Volume IV, The Development of Instructional Objectives.

Volume I, Task Description deal with the development of driver education objectives by first describing in detail the behaviors required of passenger car drivers. Also included are rated criticalities of these behaviors, supporting information related to driver performance and performance limits, enabling driver knowledges and skills, and behavior criticality.[51] These enabling driver knowledges and behavior criticality are of particular importance to this study.

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[51]A. James McKnight, et al., Driver Education Task Analysis, Vol. I, Task Description (Virginia: Human Resources Research Organization, November, 1970), p. vii.

Task descriptions included in this report were organized in terms of situations giving rise to the behaviors. The categories were as follows:

> Basic Control - those behaviors involved in controlling movement of the vehicle, without regard to any specific situation.
> General Driving - those behaviors that must be performed continuously or periodically while driving, rather, in response to any specific situation.
> Situational Behaviors - those behaviors that are required in response to specific situations including the following: traffic induced behaviors, environmentally induced behaviors and car induced behaviors.
> Pre-driving Behaviors - those behaviors undertaken prior to driving to assure safe and efficient operation.
> Maintenance - those behaviors directed toward the vehicle to assure safe and efficient operation.
> Legal Responsibilities - those legally imposed behaviors required to assure that drivers are responsible for the consequences of their action.[52]

The primary objective of Volume II, Task Analysis Methods was to analyze the driver's task and evaluate the criticality of behavior identified in the previous volume.

In order to obtain a comprehensive identification of driving behaviors, an analysis was made of the driver, the vehicle he operates, the highway he travels, the traffic encountered, and the environment in which he travels.

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[52] A. James McKnight, et al., Driver Education Task Analysis, Vol. II, Task Analysis (Virginia: Human Resources Research Organization, November, 1970), p. vi.

The criticality of behaviors identified varied in terms of their contribution to the safety and efficiency of the highway transportation system. Therefore, "An efficient program of driver education must account for this variation."[53] Criticality ratings were determined by a group of authorities in the field. These authorities were from the areas of traffic safety-driver education, enforcement officers, license officials, and fleet safety personnel.

This rating process specified the minimum number of objectives to be performed at each level of criticality. The standards were as follows:

> High criticality - 95% correct
> Moderately high criticality - 85% correct
> Moderate and moderately low criticality - 70% correct
> Low criticality - 50% correct
> Standards relating to quantitative levels of performance (i.e., measurable as to degree or amount), were found to be not appropriate, and therefore, standards were treated as qualitative, "pass, fail."[54]

In order to determine a criticality index, the ratings were transformed into standard scores with a mean of zero and a standard deviation of 10 and then averaged. An analysis of variance showed a high degree of agreement among the evaluators.[55]

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[53] Ibid.

[54] A. James McKnight, et al., Driver Education Task Analysis, Vol. IV, The Development of Instructional Objectives, p. 14.

[55] McKnight, Vol. II, op. cit.

The development of performance objectives required the authors to combine the 1,700 specific driving behaviors into 45 tasks. These 45 tasks were selected with the assistance of highway safety authorities and were identified as performance objectives. Individual "learning units" were developed by grouping objectives having common or similar purposes.[56]

Instructional objectives developed were of two types:

> Performance objectives - descriptions of terminal performances expected of students as a result of instruction.
> Enabling objectives - descriptions of knowledges and skills that are believed to enable a student to meet performance objectives.[57]

These performance objectives were a result of the task analysis. Behaviors identified here did define what an instructional program should consist of, and be evaluated against.

In order for a student to be considered a minimally qualified driver, he must be capable of exhibiting the behavior specified in the performance objective. For curriculum development purposes, these behaviors must include quantitative standards which state how well they should be achieved. This level of attainment would

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[56] Ibid.

[57] McKnight, Vol. IV, op. cit.

include the performance required for each objective, as well as the number of behaviors that should be performed.[58]

The authors did not believe it was possible to furnish quantitative performance levels to cover real-world driving. However, they did state that when driving tasks are reduced to behavioral elements, these elements are found to be discreet responses, in that they either occur or do not occur. Where behaviors are combined into situational responses, it was the opinion of driver educators that they can easily establish a performance level that is appropriate to the specific situation, i.e., it is possible to judge if a student entered a curve at too high a speed, if he stopped too abruptly, or if he accelerated too fast for existing conditions.[59]

It is the use of these performance standards that are of particular importance in this study. As stated by the authors:

> The purpose in preparing a set of performance objectives was to provide driver education instructors with a specification of performance on the basis of which courses could be developed and administered, and by means of which both the courses and students could be evaluated.[60]

System designers first determine what is desirable, and what can be reasonably expected in a particular course.

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[58] Ibid.

[59] Ibid., p. 11.

[60] Ibid., p. 14.

Based on this need, acceptable student performance is determined. Individual teachers apply the same process in their teaching. However, they may or may not have identified explicit standards by which they operate. Therefore, the performance standards supplied by McKnight and Hundt have the following value:

(1) A basis for optimizing allocation of available resources. Where explicit standards are lacking, the efforts devoted to various subjects in subsequent performance of students are generally not in line with the criticality of the subjects overall goals of the course.
(2) A basis for establishing total resource requirements. Most driver educators feel that the 30 hours of classroom and six hours of the on-the-road instruction that has become a standard in many states, is not adequate to prepare a driver fully. Yet, without some specification of what needs to be done that is not now being accomplished, there is nothing substantial on which to base a plan for more resources.
(3) A basis for evaluating the qualifications of students. Each driver education instructor is confronted with the problem of deciding whether a student has made too many mistakes to be allowed to "pass" the course. This decision will become even more important when completion of a driver education course replaces some components of the licensing procedure. The standards provide an outside reference to which instructors may turn in deciding on "pass" or "fail." The fact that standards are explicit, renders them capable of being tested; those standards found to be too severe or too lax may be modified. This cannot be done with standards that exist only in the minds of individual instructors.[61]

"An instructional program does not manipulate performance directly, but endows the students with those

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[61] Ibid.

knowledges and skills that enable them to perform."[62] Therefore, the development of enabling knowledge and skill objectives was necessary so that the student would be able to carry out the performance objectives.

These objectives contained two areas of factual information. One area contained information that enables a student to carry out procedures, and a second area of information intended to increase the likelihood that students will carry out activities required to meet performance objectives. A third area contained knowledge described as conceptual, or information dealing with relationships.

Many driving procedures are developed on such relationships through trial and error. Objectives in this area will better prepare a student to deal with new situations in his driving environment that are impractical to actually provide him in a driver education class. An understanding of these relationships will also help him grasp the reasons why procedures have been developed, and thereby influence his attitudes concerning their use.

Three types of skill objectives were identified which will enable an individual to carry out the activities required to fulfill a performance objective. They were:

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[62] Ibid., p. 15.

> Perceptual skills - the ability to interpret stimuli correctly, e.g., the judgment of passing distance.
> Motor skills - the ability to execute motor responses rapidly and smoothly, e.g., coordinating clutch and accelerator.
> Intellectual skills - the ability to see relationships, e.g., interpreting information on a road map to select an efficient route.[63]

Improvement in perceptual skills involves the person's ability to identify relevant cues from his environment and make appropriate predictions. Motor skills involve subconscious actions of both external and internal stimuli. Much of this is habitual or procedural in nature. Intellectual skills in driving are not too demanding on the driver.

The objectives of the Driver Education Task Analysis required the development of an evaluation instrument capable of assessing the degree to which students had met the objectives of a driver education course.[64]

The evaluation instrument consisted of: a Driving Fundamentals Test; a Driving Situations Test; and a Knowledge Test. The fundamentals test was designed to assess the student's ability to control the speed and direction of the automobile and consisted of a series of standardized off-road maneuvers. The situations test was essentially a checklist designed to assist in observing and recording the student's responses to

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[63] Ibid., p. 18.

[64] Ibid., p. 19.

driving situations that occur in a normal trip. The knowledge test consisted of 105 questions derived from the enabling objectives that were rated from moderate to high criticality and was designed to measure the attainment of factual information.[65]

The authors made no attempt to assess the "validity" or "reliability" of the evaluation instrument or to compile norms. They considered the instrument to have content validity because it constituted a representative sample of the class of behaviors it was devised to measure. The validity of the instrument was determined by the tests' ability to measure the set of driver performances and knowledges that had been defined through the task analysis.

Traditional concepts of psychometric reliability were not considered appropriate since the test was not to measure a unitary characteristic, but was designed to sample from populations of performances and knowledges that are not necessarily correlated with one another.

Normative data were not obtained for two reasons. The knowledge test was designed to measure the attainment of performance and enabling objectives by students whose instruction had been directly related to the objectives defined in the Task Analysis. Norms based on student scores whose instruction was not based

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[65] Ibid., pp. 20-27.

on these objectives, were considered inappropriate by the authors. The authors also stated that driver education courses should enable graduates to meet specified minimum standards of qualification for entry into the highway transportation system, and, therefore, students should be evaluated against a set of absolute standards.[66]

Test Construction

A satisfactory test must give us evidence of the amount of progress which students have made. A satisfactory test in a given subject is an instrument which has given evidence of the degree to which students have achieved the stated objectives. An examination is, essentially, a means for getting valid evidence of the degree to which students have attained the desired objectives of instruction. Therefore, a test instrument must correspondingly be derived from and developed around the stated objectives of instruction.

Examinations are used for a variety of reasons, but the two most common uses are: the ranking of students tested in the order of their total achievement in a given subject; and, the discovering of specific weaknesses, errors, or gaps in the students' achievement.[67]

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[66] Ibid., p. 19.

[67] Herbert E. Hawks, et al., The Construction and Use of Achievement Examinations, A Manual for Secondary School Teachers (Cambridge, Mass.: American Council on Education, 1936), p. 496.

Unfortunately, most tests, in the author's view, are developed for the prior use. It was the intention of this study to develop a test instrument which would indicate when a student has successfully completed the stated objectives of the Resource Curriculum, or in which specific objectives a student needs additional preparation.

Principles underlying test development determine the extent to which achievement tests contribute to improved learning. As stated by Gronlund, the following principles of achievement testing provide a firm base for constructing and using classroom tests as a positive force in the teaching process. They are:

1. Achievement tests should measure clearly defined learning outcomes that are in harmony with the instructional objectives.
2. Achievement tests should measure an adequate sample of the learning outcomes and subject-matter content included in the instruction.
3. Achievement tests should include the types of test items which are most appropriate for measuring the desired learning outcomes.
4. Achievement tests should be designed to fit the particular uses to be made of the results.

5. Achievement tests should be made as reliable as possible, and should then be interpreted with caution.

6. Achievement tests should be used to improve student learning.[68]

In order to develop achievement tests, the instructional objectives which can be measured must be stated in a manner useful for testing. One useful guide for this purpose is the Taxonomy of Educational Objectives by Benjamin S. Bloom. This is a comprehensive system for classifying objectives within each of the three domains: cognitive, affective, and psychomotor.

The cognitive domain of the Taxonomy is concerned with intellectual outcomes, the affective domain with interests and attitudes, and the psychomotor domain with motor skills. The cognitive domain was further divided into two major classes: knowledge and intellectual abilities and skills. These two categories were further subdivided into the following six areas: knowledge, comprehension, application, analysis, synthesis, and evaluation.[69] The cognitive domain of the

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[68]Norman E. Gronlund, Constructing Achievement Tests (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1968).

[69]Benjamin S. Bloom, ed., Taxonomy of Educational Objectives, Handbook I: Cognitive Domain (New York: David McKay Company, Inc., 1956), p. 206.

Taxonomy and its various sub-classifications are of primary importance in this study.

After the specific outcomes have been identified, they should then be stated in specific behaviors which are to be accepted as evidence that the outcomes have been achieved.

Mager has suggested that in stating specific learning outcomes, the objective should include three elements: the specific student behavior, the conditions under which the behavior is to be demonstrated, and the standard of acceptable performance. Mager further defined these concepts in a programmed text entitled, Preparing Instructional Objectives. Mager concluded his book by stating, "Once armed with objectives that communicate and an intent to demonstrate their achievement, you are ready to accomplish the next step in instructional design--that of preparing your criterion examination."[70]

When constructing an evaluation instrument, the writer should be concerned with the properties of a good test. One such property is validity. In essence, the test measures what it is designed to measure. A test is valid when it requires the learner to perform the same behavior under the same conditions specified in a

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[70]Robert F. Mager, Preparing Instructional Objectives (Palo Alto, Calif.: Fearon Publishers, 1962).

learning objective. Another property is reliability. The test should provide a consistent measure of a student's ability to demonstrate achievement of an objective. Still another property of a good test is objectivity. Objectivity requires that the student's test performance meet the criterion stated in the learning objective.[71]

A good test has properties that enable one to obtain accurate information about student achievement of objectives. A test that is valid, reliable, and objective will enable one to use the information to improve student learning.

A post-test should be designed to measure student achievement of a representative sample of the learning outcomes. A pre-determined number of test items should be developed for each area. Relative weights should be assigned to each content area. These weights can be used to determine the number of test items that should be developed for each area or can be used to establish point values for the questions that are developed. These weights are determined by:

How important is each area in the total learning experience?

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[71]Robert H. Davis, et al., Learning System Design (New York: McGraw-Hill Book Company, 1970), chapter 4.

How much time was devoted to each area during instruction?

What outcomes have the greatest retention and transfer value?

What relative importance do curriculum specialists assign to each area?[72]

Cognitive domain objectives are typically measured by objective test items because they can be more easily adapted to the specific learning outcomes to be measured, provide for more adequate sampling of student behavior, and can be more quickly and objectively scored.

When developing multiple-choice items for an objective test, the following rules should serve as a guide:

1. Design each item to measure an important learning outcome.
2. Present a single, clearly formulated problem in the stem of the item.
3. State the stem of the item in simple, clear language.
4. Put as much of the wording as possible in the stem of the item.

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[72]Gronlund, op. cit., pp. 25-26.

5. State the stem of the item in positive form, wherever possible.

6. Emphasize negative wording whenever it is used in the stem of an item.

7. Make certain that the intended answer is correct or clearly best.

8. Make all alternatives grammatically consistent with the stem of the item and parallel in form.

9. Avoid verbal clues which might enable students to select the correct answer or to eliminate an incorrect alternative.

10. Make the distractors plausible and attractive to the uniformed.

11. Vary the relative length of the correct answer to eliminate length as a clue.

12. Avoid use of the alternative "all of the above" and use "none of the above" with caution.

13. Vary the position of the correct answer in a random manner.

14. Control the difficulty of the item either by varying the problem in the stem or by changing the alternatives.

15. Make certain each item is independent of the other items in the test.

16. Use an efficient item format.

When constructing true-false items consider the following items:

1. Include only one central significant idea in each statement.

2. Word the statement so precisely that it can be judged unequivocally true or false.

3. Keep the statements short and use simple language structure.

4. Use negative statements sparingly and avoid double negatives.

5. Statements of opinions should be attributed to some source.

6. Avoid extraneous clues to the answer.[73]

The above rules for test construction are stated rather dogmatically. It should be noted that there are exceptions to some of the rules, and that minor modifications may be desirable.

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[73] Ibid., pp. 29-45.

Summary

This chapter consisted of a review of the literature pertaining to: task descriptions, analysis of the driving task, human functions and evaluation, driver education and evaluation, HUMRRO Driver Education Task Analysis, and test development. Chapter III contains a definition of the Resource Curriculum and the steps undertaken in the test development.

CHAPTER III

TEST DEVELOPMENT

The preceding chapter contained a review of the literature concerning several topics related to the development of a post-test for driver education based on: A Resource Curriculum in Driver and Traffic Safety Education. This chapter contains: a definition of the Resource Curriculum and the steps undertaken in the test development.

The Resource Curriculum

The following description contains highlights of the curriculum which the post-test was designed to evaluate. This will include the overall curriculum structure and key aspects of the curriculum as they related to: human functions, behavioral objectives, and learning domains.

Tasks that individuals perform related to driver and traffic safety served as the focal points around which the curriculum was structured. Objectives and content items were derived from and grouped around what

drivers do, on and off the highway, in relation to the system. Behavioral objectives were included when they contributed to a decision of performance relating to on-highway or off-highway tasks.

The structure of the curriculum contains an Introduction and three sections. The introductory unit is The Highway Transportation System. The stated purposes of this unit were to identify: system components and controls, criteria for judging the effectiveness of the system, and membership responsibilities as an operator and non-operator.

Section I--On Highway Tasks included all tasks that a vehicle operator performs when driving. These on-highway tasks were broken down into four sub-tasks. Unit A--Basic Control Tasks were those tasks which control the relationship of the vehicle to the roadway through proper selection and speed alternatives. Unit B--Interacting With Other Highway Users consisted of tasks dealing with the effective interaction of highway users in routine and difficult highway and traffic situations. Unit C--Critical Situations included those tasks which help vehicle operators to cope with critical situations triggered by loss of traction or vehicle failure. Unit D--Controlling Consequences of Collisions dealt with the realization that accidents do happen and that all drivers have certain responsibilities when

directly involved in a highway collision, or if they are the first one to come upon the accident scene.

Section II--Readiness Tasks dealt with those decisions and actions that take place before a trip starts, or during routine stops along the route to insure successful completion of the trip. Unit A--Operator Fitness identified those concepts that help an individual assess his own physical, mental, and emotional fitness for driving. Unit B--Vehicle Readiness identified the various methods available to the vehicle operator to determine if his vehicle is appropriate and in good condition for the trip. Unit C--Trip Planning identified the necessary considerations concerning selection of the best routes, times to travel, places to stop, and needed emergency equipment.

Section III--Improvement Tasks dealt with how the individual works toward system improvement. Unit A--Self-Improvement identified concepts designed to develop an expert driver through self-analysis and self-improvement. Unit B--System Improvement identified programs the individual can actively support which are designed to improve the quality and coordination of system components. These sections and their corresponding units are outlined in Figure 1.[74]

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[74]Automotive Safety Foundation, A Resource Curriculum in Driver and Traffic Safety Education (Washington, D.C., 1970), pp. 8-9.

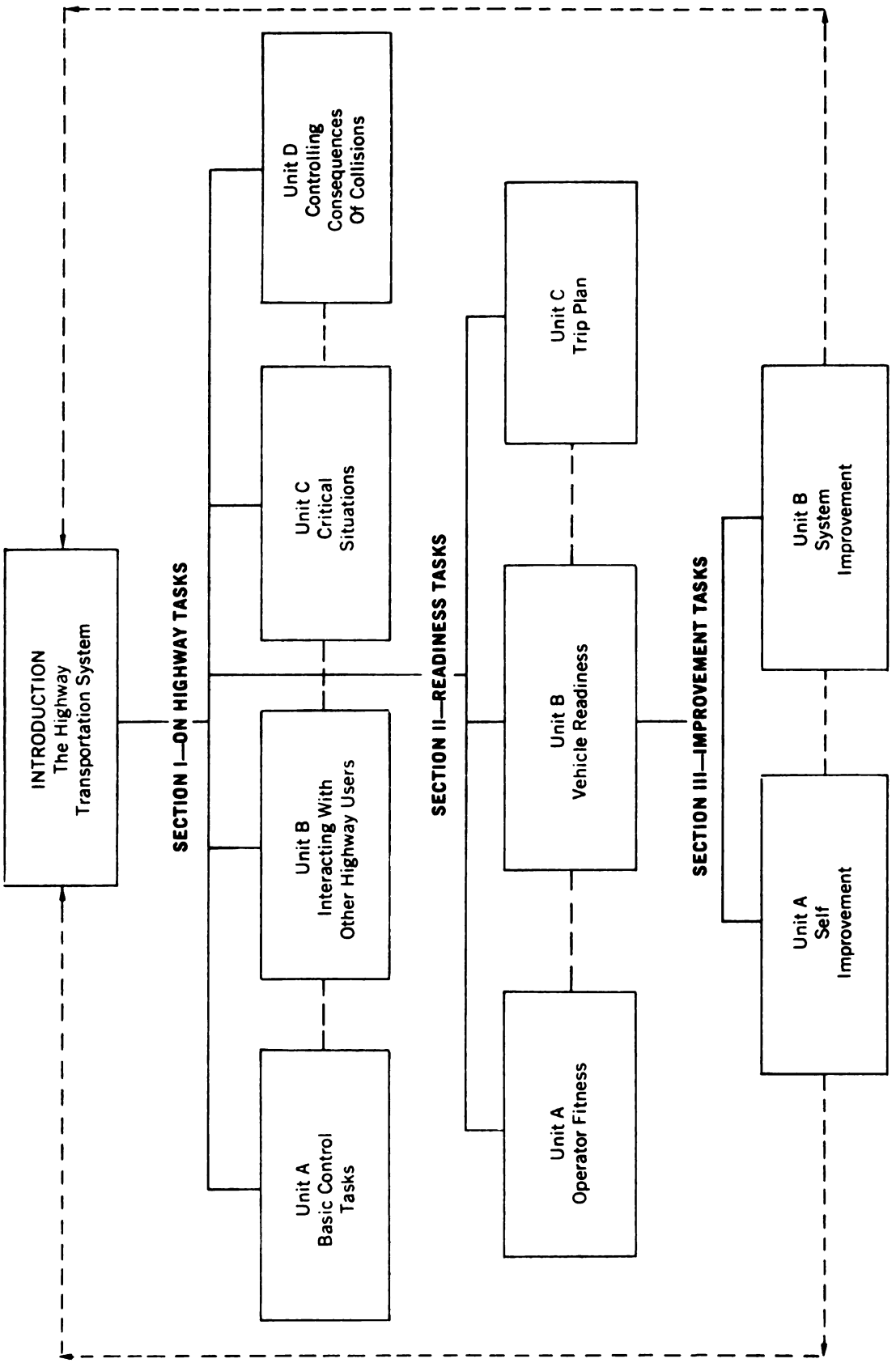

Figure 1.--Driver and traffic safety education curriculum structure

Human functions provided the basic points of contact and connection for the curriculum. Driver performance depends on the efficiency and effectiveness of human functions applied to driving, therefore, the curriculum was developed on that basis. As previously reviewed in Chapter II, researchers have classified these functions somewhat differently. The terms used in the Resource Curriculum are somewhat similar to those proposed by Schlesinger.[75] They are: "Identify the relevant cues; predict their significance; decide what to do; and execute your decision."[76]

These functions blend together and overlap in the rapidly changing traffic environment. None of them are independent of each other, but are separated in the curriculum to stress the mental as well as the physical functions of driving, plus helping to identify techniques for developing the functions. The functions are illustrated in Figure 2.[77]

Every concept in the curriculum can be related to these functions. Alcohol, drugs, emotions, and fatigue are considered in terms of how they affect the driver's ability to identify, predict, decide, and

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[75]Schlesinger, op. cit.

[76]Automotive Safety Foundation, op. cit., p. 9.

[77]Ibid., p. 10.

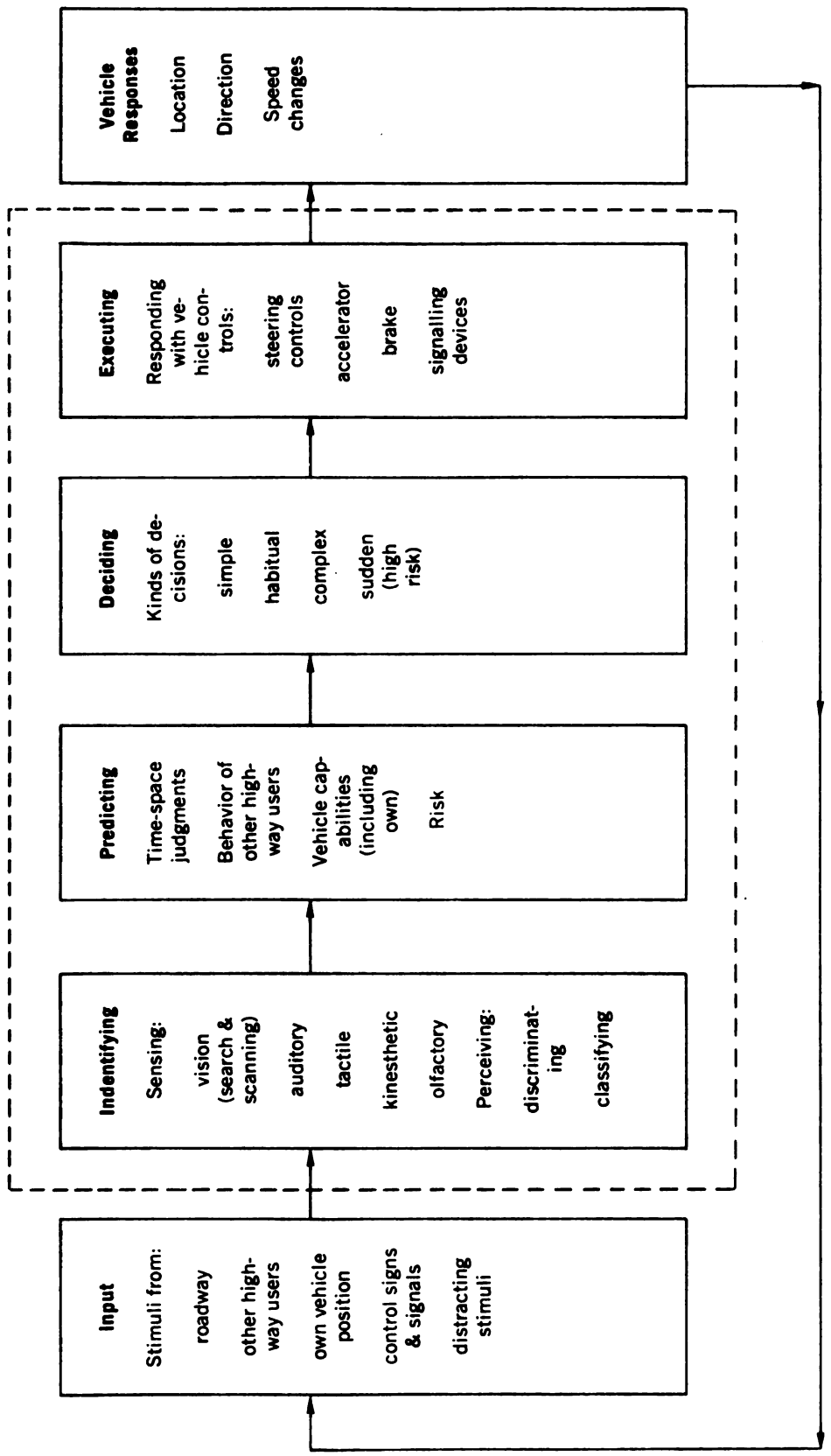

Figure 2.--Man-machine-environment analysis; Human functions

execute. In relation to improvement tasks as stated in the Resource Curriculum: "You must first identify your weakness, predict the consequences this will have on your driving, decide what you will do to remedy this situation and then execute the decision you made."[78]

Behavioral objectives in the curriculum defined the capabilities expected of students as a result of the curriculum. All objectives were termed behavioral objectives, even though the learning is not so easily observed. Objectives in the affective domain of beliefs, attitudes, and values are rather difficult to appraise. Other objectives dealt with behavior potentials and, therefore, the curriculum can only evaluate the degree to which students have acquired this potential.[79]

As stated in the Resource Curriculum, there are three advantages of stating objectives in terms of student performance. They are:

> First, wise teachers know the motivational value of telling students what they will be able to do when a particular topic is completed. Secondly, measurable objectives enable teachers and researchers to design instruments by which instructional procedures can be evaluated. The third advantage relates to the "image" of driver and traffic safety education. Those who make curriculum decisions, support groups and the public-at-large, need and deserve to know what can and cannot be accomplished through a given subject. Expressing the content in measurable terms provides a base for demonstrating the learning outcomes to these various "publics." In sum, behavioral objectives are potentially

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[78] Ibid., p. 9.

[79] Ibid.

> valuable for (1) motivating the students, (2) helping teachers and researchers evaluate content and process as a means to curriculum improvement, and (3) creating a better understanding of the nature and scope of driver and traffic safety education.[80]

The objectives, content, and learning activities of the curriculum interact through the various learning domains of cognitive learning-knowledge, comprehension, and intellectual skills; affective learning-interests, beliefs, attitudes, and values; and psychomotor learning-motor skills. This interaction contributes toward operator task proficiency as illustrated in Figure 3.[81]

In summary, the content section of the Resource Curriculum has the following characteristics:

1. Highway traffic related tasks serve as criteria for judging the relevance of curriculum elements.
2. Human functions related to motor vehicle operation (identify, predict, decide and execute) are basic points of contact and connection for the curriculum.
3. Objectives are stated in terms of student behavior which can furnish guidance for teaching and evaluation.
4. Content emphasizes concepts and principles that influence traffic related decision making and performance.
5. Cognitive (knowledge) and affective (attitudes) learnings combine to determine how psychomotor skills are used.[82]

Test Development

The evaluation instrument was developed to measure whether or not a student has successfully

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[80] *Ibid.*

[81] *Ibid.*, p. 13.

[82] *Ibid.*, p. 14.

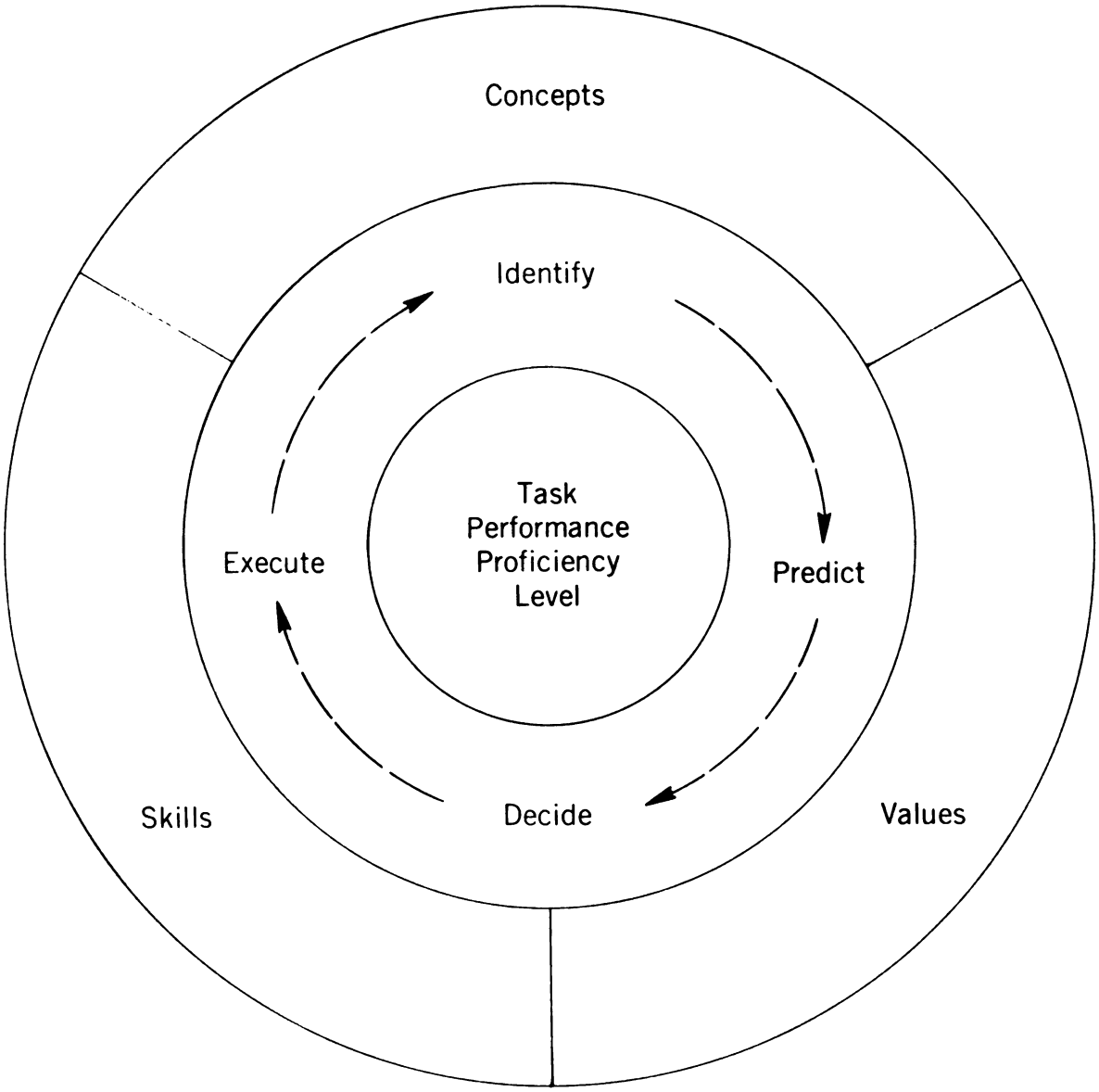

Figure 3.--Factors influencing operator performance

achieved the stated objectives of the Resource Curriculum. This evaluation instrument was designed to: require the student to perform the same behavior under the same conditions specified in the behavioral objective (validity); provide a consistent measure of a student's ability to demonstrate achievement of a behavioral objective (reliability); and meet the criteria stated in the behavioral objective (objectivity).

In order to develop the test instrument, it was necessary to: select a panel of judges to review the steps in the test development; determine the criticality of each unit objective; develop an appropriate number of test items for each episode; and administer the test to determine its reliability.

Judges

The judges were Dr. Richard W. Bishop, Dr. Kenard McPherson, and Mr. Eugene D. Carney.

Dr. Richard W. Bishop, professor, Florida State University, holds a Bachelor of Science from Millersville State College in Pennsylvania, a Master of Science from Pennsylvania State University, and a Ph.D. from New York University. Dr. Bishop has taught in the secondary schools, as well as more than twenty years of teaching experience in colleges and universities in Pennsylvania, Michigan, and Florida. Dr. Bishop served as project director of the Automotive Safety Foundation's

curriculum study: A Resource Curriculum in Driver and Traffic Safety Education. He also assisted in several state curriculum development projects, and served on the project advisory panel for the HUMRRO Driver Education Task Analysis.

Dr. Kenard McPherson, Supervisor, Safety Education Programs, State Department of Public Instruction, State of Washington, is presently on a sabatical from the state of Washington and is working in the Research Institute of the National Highway Traffic Safety Administration of the Department of Transportation. He holds a Bachelor of Science and a Master of Science from Illinois State University, and he received his Ed.D. from Michigan State University. Dr. McPherson has served on the faculty at Illinois State University, worked as co-author on curriculum guides for Illinois, Michigan, and the state of Washington. He is presently a member of the Allstate Advisory Board.

Mr. Eugene D. Carney, driver education teacher, Bethesda-Chevy Chase High School, Montgomery County, Maryland, has a Bachelor of Science in Education from the University of Maryland and a Master of Science in Education from Frostburg State College. Mr. Carney taught driver education in Prince Georges and Montgomery County for twenty-three years and has been prominent in the Maryland Driver Education Association. He has

written several articles in national magazines and is a member of the Aetna Advisory Board. Mr. Carney served as a reviewer and experimenter with the Resource Curriculum materials as they were being developed.

All judges were first contacted in person or by telephone to determine their willingness to assist in the developmental aspect of this study. At that time, they received a general explanation of their tasks and were told that specific instructions would be included with the criticality step and the test review step.

Criticality Rating

The first step in the development of the test instrument was to apply the rated criticality of behavior identified in the HUMRRO Driver Education Task Analysis to each of the stated instructional units. Criticalities were classified as high, moderate, and low. The criticality assigned to each of the instructional units was designed to reflect the rated criticalities of behavior identified in the HUMRRO Driver Education Task Analysis, and the best judgment of the author, based on past experiences.

Criticalities were identified at the unit level because this group of tasks and sub-tasks were capable of standing alone in the course of instruction. The episodes that made up each unit were interrelated and all contributed toward the unit objective. Therefore,

it was not necessary to determine the criticality of each episode separately.

Upon completion of the criticality rating the materials were assembled and mailed to the judges. The materials included the eleven instructional units from A Resource Curriculum in Driver and Traffic Safety Education. The unit objective was identified for each unit, along with the appropriate criticality rating.

Low criticality was defined as an item that is helpful, but not necessary, for a student to know if he is going to successfully perform the driving task within the highway transportation system. Moderate criticality was defined as an item a student should know, but is not absolutely essential to know, if he is going to successfully perform the driving task within the highway transportation system. High criticality was defined as an item a student must know if he is going to successfully perform the driving task within the highway transportation system.

The judges were asked to indicate whether or not they agreed with the criticality assigned to each unit. They did this by checking the appropriate box. If they did not agree with the criticality rating, they were asked to check the appropriate criticality for the unit.

Based on the responses from the judges, the criticality assigned to various units was revised if two or more judges indicated that it should be.

The criticality rating sent to the judges can be found in Appendix B.

This criticality step was undertaken in order to determine the number of test items that were written. Since this was designed as a post-test, it was essential that the more important units in the Resource Curriculum receive the greater number of test items. When developing a more comprehensive test, it would be desirable to write one test item for each segment level objective, and then assign points to that test item based on the previously determined criticality.

Test Item Construction

Based on the revised criticality, three test items were developed for each episode contained in a unit which was classified as high; two test items were developed for each episode contained in a unit which was classified as moderate; and one test item was developed for each episode in a unit classified as low.

The episode objectives were identified and appropriate test items were written for each one based on the criticality of the unit. Test items were constructed which reflected the identified behavior of the episode objective. Segment level objectives were also taken into consideration when writing test items. In many cases, several segment level objectives were

combined into one test item which would demonstrate student achievement of the episode objective.

Where possible, terminology was used which should be familiar to those enrolled in high school driver education courses. In some cases, terms which were specific to the Resource Curriculum were used because these terms serve as basic concepts for the entire curriculum.

Upon completion of the first draft of the test items, each episode objective was identified on a typed page followed by the appropriate number of test items based on the previously determined criticality.

The test items were then assembled and mailed to the judges for their review. They were asked: Do you feel this is an appropriate test item for this episode? If no, check from the following those items that are insufficient and which need revisions: validity or objectivity. The judges were also asked to make any changes or comments which they felt would help improve the test instrument. These test items can be found in Appendix D.

Based on the judges' responses, the test items were revised. In some cases it was necessary to write an entirely new test item; in other instances specific words were changed to improve the test item. Still other changes required the rewriting of the question stem or the foils which accompanied a particular test

question. All items were revised which the judges indicated should be. The test items were then typed and reviewed again by the author for clarity, reading level, and proper grammar.

The revised test items were not sent to the judges for a second review since a majority of the changes made in the test items were based directly on their comments. In the remaining test items, it was felt that the test item had been revised in accordance with the judges' suggestions.

Test Construction

Test items were typed in a random order so that a preceding question might not give a clue to the following question. Upon completion of this step, arrangements were made to administer the test to high school students to determine the reliability of each test item. The test instrument can be found in Appendix E.

Test Administration

The primary purpose of administering the post-test to high school students was to establish its reliability. Reliability refers to the consistency of test scores, that is, how consistent they are from one measure to another. One can expect a certain amount of variation in test performance from one time to another, from one sample to another, and from one part of the

test to another. Reliability measures provide an estimate of how much variation one might expect under different conditions. The internal consistency method and the Spearmarr Brown prophesy formula were used to estimate the reliability of the test instrument.

Administration of the post-test for driver education took place at Northwestern High School, Flint, Michigan. The five sophomore driver education classes enrolled during the 1972 Fall semester were given the post-test. Each student was supplied an answer sheet and pencil with which to write. They were asked not to write on the test booklet, but to indicate their answer by circling or darkening the correct answer on the answer sheet.

Upon completion of the test administration, all tests were scored. Then the odd items and the even items were separated and a correlation determined between the two sets of scores. This correlation coefficient indicates the degree to which the two arbitrarily selected halves of the test provide the same results.

Since the correlation coefficient, based on the odd and even items indicates the relationship between two halves of the test, the reliability coefficient for the whole test was determined by applying the Spearman-Brown prophesy formula.

Summary

This chapter reviewed the curriculum which the post-test was designed to measure, as well as the test development. The test development consisted of defining the criticality of each instructional unit, the writing of test items, and the review of both of these steps by a panel of judges. The final step was the administration of this test to high school students to determine its reliability.

In the following chapter, the findings will be reported. This will include the judges' responses to the criticality rating of each unit; the judges' comments on the test items; and the estimated reliability of the test instrument.

CHAPTER IV

THE FINDINGS

The preceding chapter reviewed the curriculum which the post-test was designed to measure and identified the steps undertaken in the test development. This chapter contains the results of the unit criticality rating, the result of the test item review, and the estimated reliability of the test instrument.

Criticality Rating

This section contains the responses of the judges concerning the criticality of each unit objective. The objective will be identified along with the assigned criticality. Following this will be the judges' comments.

The Resource Curriculum begins with an introductory unit entitled: The Highway Transportation System. The purpose of this unit is to identify system components and controls, criteria for judging the effectiveness of the system, and membership responsibilities as an operator and non-operator.

The unit objective is:

> Students will be able to define the highway transportation system in terms of its components, goals, management forces, criteria for evaluating its effectiveness, operator and non-operator tasks, and membership requirements.[83]

A low criticality was assigned to this unit. Based on an analysis of the driving task this unit would not be absolutely essential in driver preparation. However, since a driver is going to function within the highway transportation system, he should have a basic understanding of the system.

All three judges were in agreement with this criticality. However, one judge did indicate that if the objective was to help the students become informed, active and responsible citizens with respect to the highway transportation system, then this unit would have a high criticality.

Section I--On Highway Tasks includes all tasks which a vehicle operator performs when driving. Unit A--Basic Control Tasks deals with those tasks which control the relationship of the vehicle to the roadway. The unit objective is:

> Students will be able to control the vehicle and perform basic maneuvers to the point where they can enter light traffic under teacher supervision.[84]

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[83]Automotive Safety Foundation, op. cit., p. 17.

[84]Ibid., p. 23.

The criticality assigned to this unit was moderate. Even though all concepts in this unit affect a driver's ability to perform the driving task, they are not necessarily the most important. Insufficient knowledge in this unit would not necessarily indicate that a driver would be unable to perform the driving task.

Two of the three judges agreed with this criticality. One judge indicated that the criticality should be high. It was his feeling that a driver could not do anything else (for example--interact with other highway users) unless he could control the speed and direction of his vehicle.

Unit B--Interacting With Other Highway Users consists of tasks dealing with the effective interaction of highway users in routine and difficult highway and traffic conditions. The human functions contained in this unit serve as a focal point for the entire curriculum. The unit objective is:

> Students will be able to demonstrate a level of proficiency in the human functions (identification, prediction, decision and execution) sufficient to perform legally and safely as they interact with other highway users in routine and difficult system environments.[85]

A high criticality was assigned to this unit. All three judges agreed with this criticality rating.

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[85] Ibid., p. 38.

Unit C--Critical Situations includes those tasks which help vehicle operators to cope with critical situations triggered by loss of traction or vehicle failure. The unit objective is:

> Students will be able to demonstrate the correct techniques for coping with critical situations (some under simulated conditions).[86]

A high criticality was also assigned to this unit. Again, all three judges agreed with this criticality rating.

Unit D--Controlling Consequences of Collisions acknowledges that accidents do happen and that all drivers have certain responsibilities when directly involved in a highway collision, or if they are the first to come upon the scene of an accident. The unit objective is:

> Students will be prepared to assume their moral, legal and financial responsibilities if they are involved in, or come upon the scene of a highway collision.[87]

A moderate criticality was assigned to this unit. Many of the tasks are not on-highway tasks and, in fact, they deal with the economics of driving and not the driving task. Two of the three judges agreed with this criticality rating. However, one judge felt it should be rated low. He commented that the moral, legal, and financial responsibilities are off-road activities and, therefore, should be a low criticality.

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[86] Ibid., p. 61.

[87] Ibid., p. 72.

Section II deals with those off-road tasks that are directly related to a driver's ability to perform the driving task. Unit A--Operator Fitness helps the driver determine if he is personally fit to drive a motor vehicle. Alcohol, drugs, emotions, motivations, and fatigue are frequent contributing factors in highway crashes. The unit objective is:

> Students will be able (1) to identify and appraise physical, physiological, mental and psychological factors that influence the behavior of highway users; and (2) to determine appropriate courses of action to minimize the hazard caused by these factors.[88]

A high criticality was assigned to this unit. All three judges were in agreement with this criticality.

Unit B--Vehicle Readiness helps the vehicle operator determine if his vehicle is appropriate and in good operation for travel. Vehicle sub-systems and vehicle management are included in this unit. The unit objective is:

> Students will be able to develop a vehicle maintenance and selection program that will facilitate optimum performance from a vehicle suitable for trip requirements.[89]

A low criticality was assigned to this unit. Only one judge agreed with this criticality rating. One judge indicated that even the most capable driver must be able to depend on optimum performance from his vehicle or his chances of successful "execution" are severely limited.

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[88] Ibid., p. 91.

[89] Ibid., p. 109.

He indicated the criticality should be moderate. The other judge stated that this unit does not necessarily help improve driving skills, but it can help improve the safety and efficiency of the trip. He also indicated that the unit should be rated a moderate criticality. Based on the judges' responses, the criticality for this unit was changed from low to moderate.

Unit C--Trip Planning deals with plans concerning the selection of the best routes, times to travel, and places to stop. The unit emphasizes principles and practices related to trip planning and the pre-driving inventory that reduce the demands on the operator once the trip is underway. The unit objective is:

> Students will be able to plan both short and long trips allowing adequate time, knowing the precise route, selecting appropriate equipment and considering other factors that will increase the chances of completing the mission safely, conveniently and economically.[90]

A low criticality was assigned to this unit. One judge was in agreement with this criticality, while the other two felt it should be rated moderate because the unit can help improve the safety and efficiency of a trip, and because it dealt with many concepts related to operator fitness in determining whether or not an operator should undertake a trip. Based on the

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[90] Ibid., p. 116.

judges' comments, the criticality for this unit was changed from low to moderate.

Section III--Improvement Tasks identifies the various ways in which an individual can contribute toward system improvement. Unit A--Self Improvement strives to develop an expert driver through self-analysis and self-improvement, and thereby improve the system. The important factor in this unit is that it is designed to help students discover why they behave as they do. The unit objective is:

> Students will be able to (1) realistically assess their present capabilities to function as highway users, (2) appropriately compensate for their shortcomings, and (3) move toward excellence through a continuing self-evaluation and learning process.[91]

A high criticality was assigned to this unit. All three judges agreed with this criticality rating.

Unit B--System Improvement identifies programs the individual can actively support which are designed to directly improve the quality and coordination of system components. The unit objective is:

> Students will be capable of identifying their role, and assuming their responsibilities in a constructive manner, as they relate to traffic law enforcement, traffic engineering and other forces that dominate the highway transportation system.[92]

A low criticality was assigned to this unit. All three judges agreed with this criticality rating. However,

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[91] Ibid., p. 122.

[92] Ibid., p. 130.

one judge indicated that even though this unit will not greatly influence operator performance, it is highly critical in relationship to citizenship responsibilities.

Test Item Development

When the test items for driver education were completed, the correct answer was indicated beside the test item and they were mailed to the judges for their review. They were asked: Do you feel this is an appropriate test item for this episode? If no, check from the following items those that are insufficient: validity or objectivity. Validity was previously defined as--the test item requires the student to perform the same behavior under the same conditions specified in the instructional objective. Objectivity was defined as--the test item meets the criteria stated in the instructional objective. If there are any changes or comments which you feel will improve the test item, please indicate these suggestions along with the appropriate test item.

The findings of the test item review will be reported in terms of: (1) identifying test items which two or more judges indicated were appropriate; (2) identifying test items two or more judges indicated lacked validity and the actions that were taken to modify these test items; (3) identifying those test items identified

as appropriate by two or more judges, but which the judges suggested certain changes that would improve the test item.

The following test items are those that the judges indicated were appropriate. They are listed with their unit and episode titles so that the reader can correlate the test items with the appropriate episode.

Unit--The Highway Transportation System

Episode 1.0--Man and the System

The three (3) components of the highway transportation system are:

1. _____ Man
2. _____ Machine
3. _____ Highway

Section I--On Highway Tasks

Unit A--Basic Control Tasks

Episode 1.0--Vehicle and Road Surface Interaction: Basic Concepts.

Control of a car, in general, depends on the amount of friction between the tires and the road surface:

x True _____

False _____

When a road becomes bumpy, friction between tire and road:

A. increases
x B. decreases
C. remains unaffected
D. Both A & B

Episode 2.0--Directional Control

Oversteering and understeering can be prevented by:

A. Looking down the center of your projected path of travel;
B. Sitting erect and squarely behind the wheel;
C. Steering toward the center of your projected path of travel;
x D. All of the above;
E. A & C

Shock absorbers have limited life and lose effectiveness gradually. However, this can be detected by?

A. Swaying on curves;
B. Pushing up and down on the car to determine the strength of the shock absorbers;
C. Looking under your car to inspect the shock absorbers;
D. Lack of vehicle stability at high speed;
x E. A & D

Episode 3.0--Speed Control

Downshifting or shifting to a lower gear with no additional pressure on the accelerator will:

A. Not make any difference in braking the car to a stop;
B. Make it more difficult to brake the car to a stop;
x C. Assist in bringing the car to a stop;
D. Increase the speed of the car.

Episode 4.0--Braking and Stopping

When is kenetic energy of a car most rapidly used up?

A. In swerving back and forth;
B. In coasting;
x C. In applying a braking force;
D. In climbing a hill.

You applied your brakes and the wheels locked. What should you do now?

A. Apply the parking brakes;
B. Shift to lower gear;
x C. Pump your brakes;
D. Concentrate on steering.

Episode 5.0--Maneuvers

When parking on an upgrade, in what position should you leave your front wheels?

A. Pointing straight ahead, where there is no curb;
B. Turned sharply away from the side, where there is no curb;
C. Turned sharply toward the curb;
x D. Turned sharply away from the side, where there is a curb.

Before starting the engine, you should:

A. Place parking brake in the off position;
B. Use appropriate directional signal;
x C. Adjust seat and mirrors;
D. Check traffic.

Unit B--Interacting With Other Highway Users

Episode 1.0--Human Functions and Motor Vehicle Operation

The most important factor in what a driver identifies or what predictions he makes is:

x A. What action he takes as a result of it;
  B. How well he retains it;
  C. How well he recognizes it;
  D. How fast his resulting action is.

In order to identify key segments of the traffic environment, most of a driver's attention should be focused on:

  A. Traffic moving in the same direction;
  B. Approaching and oncoming vehicles;
  C. The movement of pedestrians;
x D. The projected path his car will travel.

Episode 2.0--Impediments to Vision

Which of the following driving actions should you take when you encounter heavy fog?

  A. Turn on your high beam lights;
x B. Turn on your low beam lights;
  C. Turn on your parking lights;
  D. Turn off all your lights.

One should avoid wearing tinted eyeglasses when driving at night because they:

  A. Limit side vision
x B. Further restrict his ability to identify relevant traffic clues;
  C. Tend to lower driver alertness;
  D. Are dangerous to the eyes.

To improve a driver's chances of seeing through his rear-view mirror and checking blind spots, it is better to:

  A. Seat three in the back and two in the front;
x B. Seat two in the back and three in the front.

Episode 3.0--Distractions

The danger of inattention can be minimized by:

A. Disregarding distracting environmental factors;
x B. Developing mental habits to prevent it from interfering with driving performance;
C. Both A & B;
D. Neither A or B.

Episode 4.0--Movement Within Traffic Flow

If a driver is travelling on a long trip and traffic is becoming congested on a rural highway, he should:

x A. After making several unsuccessful attempts to pass another vehicle, drop back and wait a while;
B. Decrease following distance in order to communicate your attention to pass;
C. Continue to attempt to pass, since failure to do so will cause a decrease in your average mile per hour rate;
D. None of the above.

Which of the following statements about acceleration lanes is correct?

A. There are yield signs at the end of acceleration lanes;
B. The driver should build up his speed to about 30-40 mph.;
x C. The driver should prepare to adjust his speed to fit in with the flow of traffic;
D. None of the above.

Based on previous identifications, you predict that the driver passing you may create a conflict situation. Which of the following would be the best decision and action for you to make?

A. Keep to the right side of your lane;
B. Cover your brake;
C. Continue predicting driver's actions;
x D. All of the above.

Episode 5.0--Intersections

On a two-lane road, an approaching car is starting a left turn at the same time you are turning left.

What do you do?

A. Turn in front of the other car;
B. Turn behind the other car;
x C. Wait until the intersection clears;
D. Wait until the light is just ready to change and then turn.

Which of the following best explains why there are so many accidents at railroad crossings?

A. A train that has just gone by conceals a second train approaching the crossing from the opposite direction;
B. Cars stalling on the tracks;
C. Drivers not allowing sufficient following distance when crossing the tracks;
x D. All of the above.

You are driving on a one-way street and you are preparing to make a left turn. In which lane should you have your car before starting to make the turn?

A. The center lane;
B. The right hand lane;
C. The lane right of center;
x D. The lane closest to the left curb.

Episode 6.0--Pedestrians and Animals

Pedestrians and animals are both maneuverable and predictable in their actions.

True _____

x False _____

As a driver, you should be especially alert for pedestrians when passing parked cars and delivery trucks.

x True _____

False _____

When children are playing at the curb, you should:

A. Concentrate all of your identifications and predictions on the children;
B. Sound the horn to chase them back;
x C. Watch the children and continue to identify other vehicular traffic in front and back of you;
D. Ignore the children and concentrate on your projected path of travel.

Unit C--Critical Situations

Episode 1.0--Response Analysis

In order for a driver to successfully handle critical situations:

A. He must have experienced the critical situation before;
x B. He must have developed pre-conditional responses;
C. He must be an expert driver;
D. None of the above.

Episode 2.0--Traction Loss

Which is the best procedure for slowing down on a wet or slippery road?

x A. Shift to a lower gear, then brake;
B. Brake, then shift to a lower gear;
C. Brake, don't shift to a lower gear;
D. Shift to a lower gear, don't brake.

Your right front wheel runs off the pavement.

What do you do first?

x A. Decrease speed without applying the brakes;
B. Apply the brakes;
C. Steer left;
D. Steer right.

Shifting to a lower gear in order to get up a snow-

covered hill should be done:

x A. Before starting up the hill;
B. When you start up the hill;
C. About half-way up;
D. As soon as power loss becomes noticeable.

Episode 3.0--Vehicle Malfunctions and Failures

As you are passing another car on a 2-lane road, and

the engine falters and your acceleration decreases,

what do you do first?

A. Shift to a lower gear;
B. Pump the gas pedal;
C. Push the gas pedal to the floor;
x D. Remove foot from gas pedal and return to your lane.

You are driving on a straight road and your right

front tire blows out. What do you do first?

A. Turn the steering wheel to the left;
B. Apply the brakes hard;
x C. Keep the steering wheel straight;
D. Turn off the ignition.

Your gas pedal sticks when you remove your foot,
What do you do first?

A. Apply the brakes;
B. Blow the horn;
x C. Turn off the ignition;
D. Pry the pedal loose with your foot.

Unit D--Controlling the Consequences of Highway Collisions

Episode 1.0--Highway Accidents

Most accidents are caused by a combination of driver errors, vehicle failures and highway deficiencies.

x True _____

False _____

The main purpose of a good accident records system is to:

A. Identify all problem drivers;
x B. Identify critical problems in the system;
C. Identify total number of accidents;
D. Identify total number of fatal accidents.

Fatal accidents are only a small percentage of the total number of accidents.

x True _____

False _____

Episode 2.0--Minimizing Impact Forces

From a motorcycle rider protection viewpoint, which of the following is most important?

A. Directional signals;
B. Heavy clothing;
C. Horn;
x D. Helmet.

Episode 3.0--At the Collision Scene

You have just had an accident. Your car has considerable damage, but you are not injured. To help prevent fire:

A. Call the fire department;
B. Raise the hood and open the doors;

x C. Turn off the ignition of any car involved in the collision;
D. Make sure the gas cap is on tight.

The most important thing to do when involved in an accident is:

A. To furnish proof of license to the investigating police officer;
x B. To check for injured persons and summon assistance if necessary;
C. To remove your car from the lane of traffic;
D. To exchange insurance information with the other driver.

Episode 4.0--Financial Responsibility

If you have comprehensive coverage insurance on your automobile, you are covered for:

A. Damage to your car resulting from an accident;
B. Damage to other cars resulting from an accident;
x C. Fire, theft and vandalism;
D. All of the above.

The basic principle of automobile insurance is:

x A. Spread the risk:
B. Reduce the risk;
C. Reduce liability;
D. Fix responsibility.

Section II--Readiness Tasks

Unit A--Operator Fitness

Episode 1.0--Alcohol

The elimination of alcohol from the body can be quickened by:

A. Coffee
B. Drugs
C. Sleep
x D. None of the above.

Episode 2.0--Drugs

How do prescription or non-prescription drugs affect your ability to perform the driving task?

A. It only affects the part of the body it is intended to heal;
B. Drugs stimulate your ability to identify, predict, decide and execute;
C. Drugs have no affect on your driving;
x D. Drugs hinder your ability to identify, predict, decide and execute.

The impairment of body functions may be far greater when:

x A. Drugs are taken in combination;
B. Drugs are used for the first time;
C. Drugs are taken when you are sleepy;
D. None of the above.

Episode 3.0--Emotions and Motivations

It is not possible to control the effects of strong emotions and inappropriate motivations for driving through self-discipline and self-control.

True _____

x False _____

Accidents are not caused by emotional situations alone, but rather by how individuals handle emotional situations.

x True _____

False _____

Emotions (fear, love, hate, anxiety, joy, excitement) have a profound effect on behavior in general and driving in particular.

x True _____

False _____

Episode 4.0--Fatigue and Carbon Monoxide

Fatigue does not affect the driver's ability to identify, predict, decide and execute.

True _____

x False _____

Carbon Monoxide, the exhaust gas:

A. Smells like burning leaves;
B. Smells like burning oil;
C. Smells like raw gasoline;
x D. Has no odor.

Which of the following would do most to offset driver fatigue?

A. Rub the eyes and shift the gaze;
B. Play the radio;
x C. Pull off the road, get out and stretch;
D. Try to solve a riddle or difficult problem.

Episode 5.0--Other Impairments

If you have a physical condition which may affect your driving, you should:

x A. See your physician to try and have the condition corrected;
B. Compensate for the condition;
C. Avoid heavy traffic;
D. Quit driving.

Unit B--Vehicle Readiness

Episode 1.0--Vehicle Sub-Systems--Prerequisite Knowledge

The production of power in an automobile engine is dependent upon what two basic systems?

A. Ignition and electrical;
x B. Ignition and fuel;
C. Fuel and electrical;
D. All of the above.

Which of the following would not cause an engine to overheat?

A. Slipping fan belt;
B. Clogged radiator;
C. Insufficient oil;
x D. Missing thermostat.

Episode 2.0--Vehicle Management--Selection and Maintenance

When the temperature gauge indicates the water in the engine is boiling, you should:

A. Drive very slowly without stalling the engine and stop at the first service station;
B. Turn the engine off and add water slowly;
x C. Turn the engine off and let it cool down, then add water while the engine is running;
D. Stop and run the engine at a fast idle.

You have driven your new car a total of 12,000 miles. Now it is starting to run roughly. You probably need:

A. An oil change;
x B. New spark plugs and points;
C. A carburetor cleaning;
D. A carburetor adjustment.

Unit C--Trip Planning

Episode 1.0--Trip Planning and Pre-Driving Inventory

When planning a trip, you determine:

A. Is the trip necessary?
B. What is the best route to arrive there?

C. When will you travel?
x D. All of the above.

Pre-driving inventory:

A. Is only necessary for older model cars;
x B. Can prevent inconveniences, frustrations and unsafe conditions;
C. Would not be needed for short trips;
D. Will reduce the probability of driver errors.

Section III--Improvement Tasks

Unit A--Self-Improvement

Episode 1.0--Risk Acceptance

A driver's decision to accept risk when driving may be influenced by his:

A. Desire for status within a preferred group;
B. Willingness to assume more risk at one time than another;
x C. Both A & B;
D. Neither A or B.

Risk acceptance is influenced by the amount of gain a driver will expect when assuming the risk.

x True _____

False _____

Episode 2.0--Self-Analysis and Improvement

Your driving behavior is most significantly influenced by:

A. Your parents or other adults;
x B. Your self-concept;
C. Your social status;
D. None of the above.

Unit B--System Improvement

Episode 1.0--Traffic Law Enforcement

The principle advantage of strict law enforcement, as a means of collision prevention, is that the:

A. Cost is less than education;
x B. Results are usually immediate;
C. Policemen get along well with traffic court judges;
D. Policemen can apprehend almost all violators.

Episode 3.0--Suggestions, Guidelines and Resources For Action

The decision-making process involved in improving the highway transportation system can be influenced by:

A. Civic organizations;
B. Individuals functioning alone;
C. Small groups of people;
x D. All of the above.

From the judges' responses, three test items were identified that lacked validity. The test items and the actions that were taken to modify them are as follows:

Section I--On Highway Tasks

Unit A--Basic Control Tasks

Episode 3.0--Speed Control

In order for a car to turn a corner safely, friction between the tires and roadway must overcome the:

A. Force of momentum;
x B. Centrifugal force;
C. Kenetic energy;
D. Inertia

The comments from the judges stated that this test item should require the student to make judgments concerning appropriate speed for roadway conditions. Therefore, the test item was rewritten as follows:

In order for a car to turn a corner safely, the driver must:

A. Overcome the force of momentum;
B. Be able to stop prior to turning;
x C. Predict the amount of friction between the roadway and his tires;
D. Be able to turn the steering wheel rapidly.

Unit B--Interacting With Other Highway Users

Episode 3.0--Distractions

Two of the three judges indicated that the following question lacked validity.

The passenger on a two-wheeled vehicle can affect steering and stability through his body position and movements.

x True _____

False _____

This question was not revised, since the Resource Curriculum stated that the use of the term motor vehicle includes cars, trucks, and motorcycles. Therefore, passenger actions on a two-wheeled vehicle are a distraction to the vehicle operator as stated in the episode objective.

Unit C--Critical Situations

Episode 1.0--Response Analysis

Potentially dangerous situations can best be overcome by:

x A. Careful analysis and correct response;
B. Rapid identification and avoidance;
C. Development of driving skills and coordination;
D. Obeying traffic rules and regulations.

One judge indicated that choices A and B were too similar and the choices should be changed. Another judge stated that the student should be given specific critical situations in which to respond. Therefore, the test item was revised to read as follows:

Potentially dangerous situations such as brake failure can best be overcome by:

x A. Careful analysis and correct response;
B. Good driving skills and coordination;
C. Quick reactions;
D. Common sense.

The following test items were identified as appropriate by two or more judges, however, the judges suggested certain changes that they felt would improve the test item.

Section I--On Highway Tasks

Unit B--Interacting With Other Highway Users

Episode 1.0--Human Functions and Motor Vehicle Operation

Predictions are a result of a driver's analysis or judgment of:

A. Behavior of other highway users;
B. His own risk acceptance;
C. Time-space relationships;
x D. All of the above.

Based on judges' comments, this question was revised to read:

Predictions are a result of a driver's analysis or judgment of:

A. Behavior of other highway users;
B. Roadway-environmental conditions;
C. Time-space relationships;
x D. All of the above.

Episode 3.0--Distractions

Which of the following is a distraction to the driver when using human functions of driving (IPDE)?

A. Passenger reading maps and looking for destination or turn off points;
x B. Passenger carrying on conversation with driver;
C. Passenger adjusting the radio;
D. Passenger taking care of children in the car.

This question was rewritten as follows:

Which of the following is most likely to be a distraction to the driver when using the human functions of driving (IPDE)?

A. Passenger reading maps and looking for destination or turn off points;
x B. Passenger carrying on conversation with driver;
C. Passenger adjusting the radio;
D. Passenger taking care of children in the car.

Unit C--Critical Situations

Episode 1.0--Response Analysis

Near panic occurs when a driver is surprised by a hazard.

x True _____

False _____

The revised question is:

When a driver is surprised by unexpected actions of other highway users, he is likely to panic.

x True _____

False _____

Unit D--Controlling the Consequences of Highway Collisions

Episode 2.0--Minimizing Impact Forces

The primary purpose of seat belts is to:

A. Reduce impact with the dashboard and windshield;
B. Prevent contact with sharp objects inside the car;
x C. Keep occupants inside the car;
D. Reduce the vehicles force of impact.

The revised question reads:

Which of the following is the least important reason for using seat belts?

A. Reduce impact with the dashboard and windshield;
B. Prevent contact with sharp objects inside the car;
C. Keep occupants inside the car;
x D. Reduce the vehicles force of impact.

Section II--Readiness Tasks

Unit A--Operator Fitness

Episode 1.0--Alcohol

Select the best statement of the effects of alcohol:

A. Alcohol first depresses and accelerates judgment, reason and coordination;

x B. Alcohol dulls center controlling judgment and reason, then coordination, and finally speech and vision;
C. Alcohol stimulates, then dulls centers controlling first speech and vision, then coordination, and finally reason and judgment;
D. Alcohol affects coordination and speech first, but finally reason and judgment.

The word finally was omitted from the correct response because one judge indicated that other effects do follow those listed.

Select the best statement of the effects of alcohol:

A. Alcohol first depresses and accelerates judgment, reason, and coordination;
x B. Alcohol dulls center controlling judgment and reason, then coordination, and speech and vision;
C. Alcohol stimulates, then dulls centers controlling first speech and vision, then coordination, and finally reason and judgment;
D. Alcohol affects coordination and speech first, but finally reason and judgment.

Alcohol acts as a:

A. Medication
x B. Depressant
C. Stimulant
D. Stimuli

All three judges indicated that this was an appropriate test item based on the objective. However, this answer is implicit in the first question. A new question was substituted and it reads as follows:

The young or inexperienced driver is affected _____ than the experienced driver when drinking the same amount of alcoholic beverage:

x A. More
B. The same
C. Less

Episode 2.0--Drugs

There is little scientific evidence as to the extent to which drugs and medicine (with the exception of alcohol) contribute to the prevention of highway accidents.

x True _____

False _____

The judges said that the causes of highway accidents should be included in this statement. The question was rewritten as follows to also include causes of highway accidents:

There is little scientific evidence as to the extent to which drugs and medicine (with the exception of alcohol) contribute to the prevention or causes of highway accidents.

x True _____

False _____

Episode 5.0--Other Impairments

Which of the following handicaps cannot be effectively compensated for by the driver?

A. Color blindness
x B. Fatigue
C. Tunnel vision

Two of the three judges indicated this test item was appropriate, but that it should be revised as follows:

Which of the following handicaps is most difficult to compensate for by the driver?

A. Color blindness
x B. Fatigue
C. Tunnel vision

A deaf driver compensates for this handicap by:

A. Using proper seeing habits and well-developed perceptions;
B. Complete concentration on the driving task;
C. Driving only when necessary;
x D. Both A & B

All three judges stated that this test item was appropriate, but should be revised to state that the deaf driver can compensate. The question was rewritten as follows:

A deaf driver can compensate for this handicap by:

A. Using proper seeing habits and well-developed perceptions;
B. Complete concentration on the driving task;
C. Driving only when necessary;
x D. Both A & B

Section III--Improvement Tasks

Unit A--Self-Improvement

Episode 1.0--Risk Acceptance

Young drivers are not as greatly influenced by risk as are older drivers.

True _____

x False _____

All three judges stated this was an appropriate test item, but from their suggestions for improvements, it was rewritten as follows:

Young drivers are likely to accept greater risks than are older drivers.

x True _____

False _____

Episode 2.0--Self-Analysis and Improvement

Which of the following behaviors interfere with a driver's performance?

x A. Over-confidence;
B. Patience
C. Pride in competent driving;
D. All of the above.

The test item was identified as appropriate by two judges and one judge indicated it lacked objectivity. Based on the judges' comments, the test item was rewritten as follows:

Which of the following behaviors interfere with a driver's personal guidelines for self-improvement:

x A. Over-confidence
B. Patience
C. Pride in competent driving;
D. All of the above.

The most important factor in reducing young driver accidents is:

A. Greater skill development;
x B. Self-discipline by young drivers;
C. Raising the age to obtain a license;
D. None of the above.

This test item was also marked appropriate by two judges, and the third judge indicated it lacked objectivity. To improve the test item, it was rewritten as follows:

When developing personal guidelines for self-improvement, the most significant factor to consider is:

A. Greater skill development;
x B. Self-discipline;
C. Self-confidence;
D. All of the above.

Unit B--System Improvement

Episode 2.0--Traffic Engineering

The traffic engineer is primarily concerned with:

A. Interpreting complex traffic laws and regulations to drivers;
B. Reconstructing certain traffic facilities;
C. Installing signs and signals as recommended by police agencies;
x D. Decision-making based on studies of needed traffic improvements.

All three judges stated the test item was appropriate, and that the correct response should be revised. Therefore, the test item was revised as follows:

The traffic engineer is primarily concerned with:

A. Interpreting complex traffic laws and regulations to drivers;
B. Reconstructing certain traffic facilities;
C. Installing signs and signals as recommended by police agencies;
x D. Improving traffic flow based on studies of needed traffic improvements.

Reliability of Test Instrument

After completing the criticality rating of each unit and developing an appropriate number of test items for each unit, the test items were typed in a random order to constitute the test instrument. The test

instrument was administered to high school students in Flint, Michigan to determine the estimated reliability of the test instrument.

This was accomplished by administering the test to 151 high school students. Each test was numbered and then scored. The internal consistency method of determining reliability was used. The odd scores and even scores were totaled and a correlation coefficient was determined. The correlation coefficient was then applied to the Spearman-Brown prophesy formula to estimate the reliability.

The correlation between the odd scores and the even scores was .572. The reliability of the test instrument was .726. For classroom tests, the reliability coefficients typically range between .60 and .80.[93] This post-test for driver education, based on the estimated reliability, would provide similar results when administered to similar groups of high school students.

Summary

The preceding chapter contained the results of the criticality rating based on the judges' responses, the appropriateness of the test items based on the judges' responses, and the reliability of the test

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[93]Gronlund, op. cit., p. 96.

instrument based on the internal consistency method of determining reliability. Chapter V will contain the summary, conclusions, and recommendations.

CHAPTER V

SUMMARY, FINDINGS, AND RECOMMENDATIONS

The preceding chapter contained the findings based on the judges' responses to the criticality rating of each unit, whether or not the test items developed for each unit were appropriate, and the reliability of the test instrument. This chapter contains the summary, findings, recommendations, recommendations for further research, and discussions.

Summary

Statement of the Problem

The purpose of this study was to develop a test instrument for driver education based on: A Resource Curriculum in Driver and Traffic Safety Education. The test instrument was designed to measure student ability in relation to the stated objectives of the Resource Curriculum.

Procedures of Test Development

In order to develop the test instrument, it was necessary to determine the criticality of each instructional unit in the Resource Curriculum. This criticality rating was then sent to a panel of judges for their review. Based on their comments, modifications were made in the criticalities assigned to various units.

For each episode objective, one to three test items were written, depending on the assigned criticality. Upon completing the first draft of these test items, they were sent to the panel of judges for their review. Based on comments received from the judges, the test items were revised as needed.

The test was then typed and arrangements were made to administer the test in the Flint, Michigan public secondary schools in order to determine the reliability of the test instrument.

Findings

The following is a summary of the major findings of this study. Findings are reported in terms of the results of the criticality rating, results of test development, and the determined reliability of the test instrument.

Results of Criticality Rating

The judges agreed with the assigned criticality rating of eight of the units of the Resource Curriculum, and disagreed with the criticality assigned to two of the units. They agreed with units:

Introduction--The Highway Transportation System--LOW

Section I--On Highway Tasks

Unit A--Basic Control Tasks--MODERATE

Unit B--Interacting With Other Highway Users--HIGH

Unit C--Critical Situations--HIGH

Unit D--Controlling the Consequences of Highway Collisions--MODERATE

Section II--Readiness Tasks

Unit A--Operator Fitness--HIGH

Section III--Improvement Tasks

Unit A--Self-Improvement--HIGH

Unit B--System Improvement--LOW

The judges disagreed with the criticality assigned to the following two units, and they were revised based on the judges' suggestions.

Section II--Readiness Tasks

Unit B--Vehicle Readiness--Rated LOW--Changed to MODERATE

Unit C--Trip Plan--Rated LOW--Changed to MODERATE

Results of Test Development

A total of seventy-seven test items was developed for this post-test. They were then reviewed by three expert judges who were asked to indicate whether or not they thought the test item was appropriate. If the test item was not appropriate, they were asked to indicate if the test item lacked validity or objectivity, or what other suggestions might improve the test questions.

From the judges' response, sixty-one test items were indicated as appropriate by two or more judges. Two or more judges stated that three of the test items lacked validity and they were revised. There were no test items where two or more judges stated that they lacked objectivity. Thirteen test items were indicated as appropriate, but the judges did suggest certain changes that would improve the test items. Those changes were incorporated into the test items.

The finalized test instrument was administered to a group of high school students to estimate reliability. This was accomplished by estimating the internal consistency of the test instrument. The estimated reliability was .732.

Recommendations

During the development of this post-test it was obvious to the author that additional steps should be

undertaken to improve the test instrument. These suggested steps for test improvement are as follows:

Additional administrations of the test should be undertaken so that an item analysis could be used to further improve the test instrument.

The present test instrument should be given to high school students who have completed a driver education course to again estimate reliability.

Recommendations for Further Research

The completion of this project will enable others to carry on research studies utilizing the post-test for driver education. These suggested research studies are as follows:

Based on a large sample administration of the post-test to beginning driver education students, those items that a significant number of students demonstrate acceptable performance on, should be identified so that appropriate curriculum revisions can be undertaken.

Based on a large sample administration of the post-test to students completing a driver education course, those items that are significantly missed should be identified so that those areas of the curriculum can be improved.

This post-test, as well as other tests designed to measure knowledge, should be administered to the same

groups of students to determine how the various tests correlate with each other.

The results of this post-test should be compared to the results of driver performance tests.

Since this study dealt with only one type of measurement device encompassing knowledge, efforts must be continued to develop comparable instruments to measure driver behavior such as personality characteristics and actual performance tests. In order to accomplish this, research should be undertaken to:

(1) Identify personality characteristics which influence driver behavior and develop appropriate test instruments to measure the degree to which individual operators demonstrate these behaviors;

(2) Identify the essential psycomotor skills which encompass the driving task and develop test instruments which will measure a driver's ability to perform these skills; and

(3) Develop an instrument or test procedure which will measure the fundamental actions a driver performs in executing the human functions of driving.

Discussion

Some further points should be brought out in this discussion concerning tests and testing procedures. These points are presented in order to give the reader assistance in using this post-test.

As individual teachers use this post-test, they will undoubtedly discover various ways to improve individual test items. The writer attempted to clearly state each test item so that there would not be any misinterpretation as to the meaning of the question. However, students may not interpret various questions in the same manner the writer intended. Other questions may have insufficient information in them to be clear to all students. As these test items are identified, the test item should be revised to clarify its meaning.

This test instrument also has limitations which were created by the study design. Depending on the rated criticality of a particular unit, from one to three test items were developed for each episode, but in some cases, there were more segment objectives in the episode than there were test items as determined by study design. In these instances the author was forced to select the most critical of these objectives to test, thus, there may be segment objectives that are not tested.

An alternate study design would insure that all objectives are included in the post-test. This would be accomplished by writing a test item for each segment objective. Each segment objective should be weighted according to its relative importance. The importance of an objective would be determined by its contribution to successful performance of the driving task. Increased weight would be given to an objective by assigning a greater number of points to the correct answer.

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APPENDICES

APPENDIX A

LETTER TO JUDGES CONCERNING REVIEW OF UNIT CRITICALITIES

June 27, 1972

_____

_____

_____

Dear _____,

Earlier this year you agreed to assist me in the developmental stage of my research dissertation: "The Development of A Test Instrument for Driver Education Based on A Resource Curriculum in Driver and Traffic Safety Education." At the time of our discussion, I asked if you would assist by varifying the criticality I assigned to each unit objective of the Resource Curriculum, as well as reviewing the test items that I have written for each episode objective. The criticality rating is now complete and I would appreciate your assistance. Following the completion of this step, I will send to you for your review the test items which I have developed.

Enclosed you will find eleven instructional units from A Resource Curriculum in Driver and Traffic Safety Education. Each unit has been assigned a criticality rating of low, moderate, or high.

Low criticality is defined as an item that is helpful for a student to know if he is going to successfully perform the driving task within the highway transportation system. Moderate criticality is defined as an item a student needs to know if he is going to successfully perform the driving task within the highway transportation system. High criticality is defined as an item a student must know in order to successfully perform the driving task within the highway transportation system.

Would you please indicate whether or not you agree with the criticality assigned to each unit? Do so by checking the appropriate box. If you answer no, please check what you feel is an appropriate criticality.

Your earliest possible assistance with this criticality rating will be greatly appreciated, as this step must be completed before I finalize my post-test for driver education based on the Resource Curriculum.

Best regards,

Allen Robinson

APPENDIX B

UNIT CRITICALITIES REVIEWED

BY JUDGES

APPENDIX B

UNIT CRITICALITIES REVIEWED

BY JUDGES

Introduction

Unit--The Highway Transportation System

Unit Objective:

> Students will be able to define the highway transportation system in terms of its components, goals, management forces, criteria for evaluating its effectiveness, operator and non-operator tasks, and membership requirements.

Criticality--Low

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Moderate _____

High _____

Section I--On Highway Tasks

Unit A--Basic Control Tasks

Unit Objective:

> Students will be able to control the vehicle and perform basic maneuvers to the point where they can enter light traffic under teacher supervision.

Criticality--Moderate

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Low _____

High ____

Section I--On Highway Tasks

Unit B--Interacting With Other Highway Users

Unit Objective:

> Students will be able to demonstrate a level of proficiency in the human functions (identification, prediction, decision and execution) sufficient to perform legally and safely as they interact with other highway users in routine and difficult system environments.

Criticality--High

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Low _____

Moderate _____

Section I--On Highway Tasks

Unit C--Critical Situations

Unit Objective:

> Students will be able to demonstrate the correct techniques for coping with critical situations (some under simulated conditions).

Criticality--High

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Low _____

Moderate _____

Section I--On Highway Tasks

Unit D--Controlling the Consequences of Highway Collisions

Unit Objective:

> Students will be prepared to assume their moral, legal and financial responsibilities if they are involved in, or come upon the scene of a highway collision.

Criticality--Moderate

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Low _____

High ____

Section II--Readiness Tasks

Unit A--Operator Fitness

Unit Objective:

Students will be able (1) to identify and appraise physical, physiological, mental and psychological factors that influence the behavior of highway users; and (2) to determine appropriate courses of action to minimize the hazard caused by these factors.

Criticality--High

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Low _____

Moderate ____

Section II--Readiness Tasks

Unit B--Vehicle Readiness

Unit Objective:

Students will be able to develop a vehicle maintenance and selection program that will facilitate optimum performance from a vehicle suitable for trip requirements.

Criticality--Low

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Moderate ____

High _____

Section II--Readiness Tasks

Unit C--Trip Plan

Unit Objective:

Students will be able to plan both short and long trips allowing adequate time, knowing the precise route, selecting appropriate equipment and considering other factors that will increase the chances of completing the mission safely, conveniently and economically.

Criticality--Low

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Moderate _____

High _____

Section III--Improvement Tasks

Unit A--Self-Improvement

Unit Objective:

Students will be able to (1) realistically assess their present capabilities to function as highway users, (2) appropriately compensate for their shortcomings, and (3) move toward excellence through a continuing self-evaluation and learning process.

Criticality--High

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Moderate _____

Low _____

Section III--Improvement Tasks

Unit B--System Improvement

Unit Objective:

Students will be capable of identifying their role, and assuming their responsibilities in a constructive

manner, as they relate to traffic law enforcement, traffic engineering and other forces that dominate the highway transportation system.

Criticality--Low

Do you agree with this criticality? Yes ___ No ___

If no, the criticality should be: Moderate _____

High _____

APPENDIX C

LETTER TO JUDGES CONCERNING REVIEW OF TEST ITEMS

July 15, 1972

_____

_____

_____

_____

Dear _____,

I would first like to thank you for your immediate response to the criticality rating of the unit objectives contained in the Resource Curriculum.

It is now time for you to assist me in the second step of the development of a post-test for driver education. Based on the revised criticality of each unit, three test items were developed for each episode contained in a unit which was classified as high; two test items were developed for each episode contained in a unit which was classified as moderate; and one test item was developed for each episode in a unit classified as low.

Would you please indicate whether or not you feel each item is an appropriate test item for the identified episode. If you do not feel the test item is appropriate, please check from the following those items that are insufficient and which need revisions: validity or objectivity. Validity is defined as: the test item requires the student to perform the same behavior under the same conditions specified in the instructional objective. Objectivity is defined as: the test item meets the criteria stated in the instructional objective.

If there are any other changes or comments which you feel will help improve the test item, please indicate these suggestions along with the appropriate test item so they may be used when rewriting the test items.

Your immediate response to this test item review will be greatly appreciated.

Sincerely,

Allen Robinson

APPENDIX D

TEST ITEMS REVIEWED

BY JUDGES

APPENDIX D

TEST ITEMS REVIEWED

BY JUDGES

Introduction

Unit--The Highway Transportation System

Episode 1.0--Man and the System

Episode Objective: Students will acquire a comprehensive picture of the goals, components, and forces involved in the highway transportation system and identify the varied ways in which they can contribute to system efficiency and improvement.

Test item:

The three (3) components of the highway transportation system are:

1. _____ Man

2. _____ Machine

3. _____ Highway

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity ____.

Section I--On Highway Tasks

Unit A--Basic Control Tasks

Episode 1.0--Vehicle and Road Surface Interaction: Basic Concepts

Episode Objective: Students will identify the concepts and principles related to tire-roadway interaction which will help drivers maintain equilibrium between their vehicles and the roadway.

Test items:

When a road becomes bumpy, friction between tire and road:

A. increases
x B. decreases
C. remains unaffected
D. Both A & B

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Control of a car, in general, depends on the amount of friction between the tires and the road surface:

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 2.0--Directional Control

Episode Objective: Students will examine the man-machine-roadway interaction with respect to directional control, as a means of developing his capability to position his vehicle in selected paths on straight and curved roadways.

Test items:

Shock absorbers have limited life and lose effectiveness gradually. However, this can be detected by:

A. Swaying on curves;
B. Pushing up and down on the car to determine the strength of the shock absorbers;
C. Looking under your car to inspect the shock absorbers;
D. Lack of vehicle stability at high speed;
x E. A & D.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Oversteering and understeering can be prevented by:

A. Looking down the center of your projected path of travel;
B. Sitting erect and squarely behind the wheel;
C. Steering toward the center of your projected path of travel;
x D. All of the above;
E. A & C.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 3.0--Speed Control

Episode Objective: Students will examine the man-machine-roadway interaction with regard to rate of movement, as a means of developing the capability to judge appropriate speeds for roadway conditions.

Test items:

In order for a car to turn a corner safely, friction between the tires and roadway must overcome the:

A. Force of momentum;
x B. Centrifugal force;
C. Kenetic energy;
D. Inertia.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Downshifting or shifting to a lower gear with no additional pressure on the accelerator will:

A. Not make any difference in braking the car to a stop;
B. Make it more difficult to brake the car to a stop;
x C. Assist in bringing the car to a stop;
D. Increase the speed of the car.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 4.0--Braking and Stopping

Episode Objective: Students will examine the man-machine-roadway interaction with respect to braking and stopping a motor vehicle and demonstrate skills basic to precise and well-timed braking.

Test items:

You applied your brakes and the wheels locked. What should you do now?

A. Apply the parking brakes;
B. Shift to lower gear;
x C. Pump your brakes;
D. Concentrate on steering.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

When is kenetic energy of a car most rapidly used up?

A. In swerving back and forth;
B. In coasting;
x C. In applying a braking force;
D. In climbing a hill.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 5.0--Maneuvers

Episode Objective: To manipulate the vehicle in situations requiring sharp turning movements (particularly in tight quarters), on hills and in other situations requiring precise movements--students will be able to coordinate use of vehicle controls and make skilled and properly timed actions based on sound judgments and decisions.

Test items:

When parking on an upgrade, in what position should you leave your front wheels?

A. Pointing straight ahead, where there is no curb;
B. Turned sharply away from the side, where there is no curb;
C. Turned sharply toward the curb;
x D. Turned sharply away from the side, where there is a curb.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Before starting the engine, you should:

A. Place parking brake in the off position;
B. Use appropriate directional signal;
x C. Adjust seat and mirrors;
D. Check traffic.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Section I--On Highway Tasks

Unit B--Interacting With Other Highway Users

Episode 1.0--Human Functions and Motor Vehicle Operation

Episode Objective: Students will acquire a mental picture of the functions (identify, predict, decide and execute) as they relate to the driving task.

Test items:

In order to identify key segments of the traffic environment, most of a driver's attention should be focused on:

A. Traffic moving in the same direction;
B. Approaching and oncoming vehicles;
C. The movement of pedestrians;
x D. The projected path his car will travel.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

The most important factor in what a driver identifies or what predictions he makes is:

x A. What action he takes as a result of it;
B. How well he retains it;
C. How well he recognizes it;
D. How fast his resulting action is.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Predictions are a result of a driver's identification of:

A. Behavior of other highway users;
B. His own risk acceptance;
C. Time-space relationships;
x D. All of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 2.0--Impediments to Vision

Episode Objective: Given various impediments to vision which affect a driver's ability to perform the driving task, students will identify various methods which may be used to eliminate or compensate for these impediments.

Test items:

To improve a driver's chances of seeing through his rear-view mirror and checking blind spots, it is better to:

A. Seat three in the back and two in the front;
x B. Seat two in the back and three in the front;

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity ____.

Which of the following driving actions should you take when you encounter heavy fog?

A. Turn on your high beam lights;
x B. Turn on your low beam lights;
C. Turn on your parking lights;
D. Turn off all your lights.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

One should avoid wearing tinted eyeglasses when driving at night because they:

A. Limit side vision;
x B. Further restrict his ability to identify relevant traffic clues;
C. Tend to lower driver alertness;
D. Are dangerous to the eyes.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 3.0--Distractions

Episode Objective: Students will identify distracting influences, both inside and outside the vehicle, and develop mental habits to prevent them from interfering with effective driving performance.

Test items:

Which of the following is a distraction to the driver when using the human functions of driving (IPDE)?

A. Passenger reading maps and looking for destination or turn off points;
x B. Passenger carrying on conversation with driver;
C. Passenger adjusting the radio;
D. Passenger taking care of children in the car.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

The danger of inattention can be minimized by:

A. Disregarding distracting environmental factors;
x B. Developing mental habits to prevent it from interfering with driving performance;
C. Both A & B;
D. Neither A or B.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

The passenger on a two-wheeled vehicle can affect steering and stability through his body position and movements.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 4.0--Movement Within Traffic Flow

Episode Objective: Using the human functions of driving, drivers will identify relevant cues and select measures under operator control that will reduce the probability of conflict with other highway users in "fore and aft" relationships.

Test items:

Based on previous identifications, you predict that the driver passing you may create a conflict situation. Which of the following would be the best decision and action for you to make?

A. Keep to the right side of your lane;
B. Cover your brake;
C. Continue predicting driver's actions;
x D. All of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

If a driver is travelling on a long trip and traffic is becoming congested on a rural highway, he should:

x A. After making several unsuccessful attempts to pass another vehicle, drop back and wait a while;
B. Decrease following distance in order to communicate your intention to pass;
C. Continue to attempt to pass, since failure to do so will cause a decrease in your average mile per hour rate;
D. None of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Which of the following statements about acceleration lanes is correct?

A. There are yield signs at the end of acceleration lanes;
B. The driver should build up his speed to about 30-40 mph.;
x C. The driver should prepare to adjust his speed to fit in with the flow of traffic;
D. None of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 5.0--Intersections

Episode Objective: To avoid conflict and to negotiate intersections, vehicle operators must apply all of their mental and physical skills, promptly and precisely.

Test items:

You are driving on a one-way street and you are preparing to make a left turn. In which lane should you have your car before starting to make the turn?

A. The center lane;
B. The right hand lane;
C. The lane right of center;
x D. The lane closest to the left curb.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Which of the following best explains why there are so many accidents at railroad crossings?

A. A train that has just gone by conceals a second train approaching the crossing from the opposite direction;
B. Cars stalling on the tracks;
C. Drivers not allowing sufficient following distance when crossing the tracks;
x D. All of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

On a two-lane road, an approaching car is starting a left turn at the same time you are turning left.

What do you do?

A. Turn in front of the other car;
B. Turn behind the other car;
x C. Wait until the intersection clears;
D. Wait until the light is just ready to change and then turn.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 6.0--Pedestrians and Animals

Episode Objective: Students identify driver pedestrian conflicts and develop perceptual skills and judgment with respect to pedestrians' actions.

Test items:

Pedestrians and animals are both maneuverable and predictable in their actions.

True _____

x False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

When children are playing at the curb, you should:

A. Concentrate all of your identifications and predictions on the children;
B. Sound the horn to chase them back;
x C. Watch the children and continue to identify other vehicular traffic in front and back of you;
D. Ignore the children and concentrate on your projected path of travel.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

As a driver, you should be especially alert for pedestrians when passing parked cars and delivery trucks.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Section I--On Highway Tasks

Unit C--Critical Situations

Episode 1.0--Response Analysis

Episode Objective: Vehicle operators will be able to respond to critical situations caused by hazardous environmental conditions, mechanical malfunctions and/or unexpected action by other highway users.

Test items:

Potentially dangerous situations can best be overcome by:

x A. Careful analysis and correct response;
B. Rapid identification and avoidance;
C. Development of driving skills and coordination;
D. Obeying traffic rules and regulations.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

In order for a driver to successfully handle critical situations:

A. He must have experienced the critical situation before;
x B. He must have developed pre-conditional responses;
C. He must be an expert driver;
D. None of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Near panic occurs when a driver is surprised by a hazard.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 2.0--Traction Loss

Episode Objective: Classify the causes, preventions and corrections for traction loss caused by adverse conditions and during emergency stops.

Test items:

Your right front wheel runs off the pavement. What do you do first?

x A. Decrease speed without applying the brakes;
B. Apply the brakes;
C. Steer left;
D. Steer right.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Which is the best procedure for slowing down on a wet or slippery road?

x A. Shift to a lower gear, then brake;
B. Brake, then shift to a lower gear;
C. Brake, don't shift to a lower gear;
D. Shift to a lower gear, don't brake.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Shifting to a lower gear in order to get up a snow-covered hill should be done:

x A. Before starting up the hill;
B. When you start up the hill;
C. About half-way up;
D. As soon as power loss becomes noticeable.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 3.0--Vehicle Malfunctions and Failures

Episode Objective: Through simulated drill, students will respond quickly and effectively to critical situations "triggered" by vehicle malfunctions, so as to minimize the dangers.

Test items:

As you are passing another car on a 2-lane road,

and the engine falters and your acceleration decreases,

what do you do first?

A. Shift to a lower gear;
B. Pump the gas pedal;
C. Push the gas pedal to the floor;
x D. Remove foot from gas pedal and return to your lane.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Your gas pedal sticks when you remove your foot.

What do you do first?

A. Apply the brakes;
B. Blow the horn;
x C. Turn off the ignition;
D. Pry the pedal loose with your foot.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

You are driving on a straight road and your right

front tire blows out. What do you do first?

A. Turn the steering wheel to the left;
B. Apply the brakes hard;
x C. Keep the steering wheel straight;
D. Turn off the ignition.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Section I--On Highway Tasks

Unit D--Controlling the Consequences of Highway Collisions

Episode 1.0--Highway Accidents

Episode Objective: Students will analyze traffic accident data in terms of: how accident records can be used to remove deficiencies in the system; accidents are due to inefficiencies and therefore can be controlled; and, that traffic accidents are due to multiple causes and therefore need multiple solutions.

Test items:

Fatal accidents are only a small percentage of the total number of accidents.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

The main purpose of a good accident records system is to:

A. Identify all problem drivers;
x B. Identify critical problems in the system;
C. Identify total number of accidents;
D. Identify total number of fatal accidents.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Most accidents are caused by a combination of driver errors, vehicle failures, and highway deficiencies.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 2.0--Minimizing Impact Forces

Episode Objective: Students will identify "pre-crash" measures that will minimize the consequences of collisions.

Test items:

The primary purpose of seat belts is to:

A. Reduce impact with the dashboard and windshield;
B. Prevent contact with sharp objects inside the car;
x C. Keep occupants inside the car;
D. Reduce the vehicles force of impact.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

From a motorcycle rider protection viewpoint, which of the following is most important?

A. Directional signals;
B. Heavy clothing;
C. Horn;
x D. Helmet.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 3.0--At the Collision Scene

Episode Objective: Students will define the duties and responsibilities of persons involved in or arriving at a traffic accident scene so that needless human suffering, financial loss, legal complications and other undesirable consequences can be prevented.

Test items:

You have just had an accident. Your car has considerable damage, but you are not injured. To help prevent fire:

A. Call the fire department;
B. Raise the hood and open the doors;
x C. Turn off the ignition of any car involved in the collision;
D. Make sure the gas cap is on tight.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

The most important thing to do when involved in an accident is:

A. To furnish proof of license to the investigating police officer;
x B. To check for injured persons and summon assistance if necessary;
C. To remove your car from the lane of traffic;
D. To exchange insurance information with the other driver.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 4.0--Financial Responsibility

Episode Objective: Students will acquire information needed to make intelligent decisions regarding the reduction of highway collision consequences through insurance.

Test items:

The basic principle of automobile insurance is:

x A. Spread the risk;
B. Reduce the risk;
C. Reduce liability;
D. Fix responsibility.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

If you have comprehensive coverage insurance on your automobile, you are covered for:

A. Damage to your car resulting from an accident;
B. Damage to other cars resulting from an accident;
x C. Fire, theft and vandalism;
D. All of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Section II--Readiness Tasks

Unit A--Operator Fitness

Episode 1.0--Alcohol

Episode Objective: Students will acquire information about the alcohol-driving problem so that they can: examine and clarify their feelings and attitudes toward drinking and driving; develop a realistic plan for handling social situations involving alcohol and driving; and recognize the need for effective legislation and enforcement.

Test items:

Select the best statement of the effects of alcohol:

A. Alcohol first depresses and accelerates judgment, reason, and coordination;
x B. Alcohol dulls center controlling judgment and reason, then coordination, and finally speech and vision;
C. Alcohol stimulates, then dulls centers controlling first speech and vision, then coordination, and finally reason and judgment;
D. Alcohol affects coordination and speech first, but finally reason and judgment.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

The elimination of alcohol from the body can be

quickened by:

A. Coffee
B. Drugs
C. Sleep
x D. None of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Alcohol acts as a:

A. Medication
x B. Depressant
C. Stimulant
D. Stimuli

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 2.0--Drugs

Episode Objective: Students will identify the effects of various types of drugs and predict the possible consequences of combining drugs with driving.

Test items:

How do prescription or non-prescription drugs affect your ability to perform the driving task?

A. It only affects the part of the body it is intended to heal;
B. Drugs stimulate your ability to identify, predict, decide and execute;
C. Drugs have no affect on your driving;
x D. Drugs hinder your ability to identify, predict, decide and execute.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

The impairment of body functions may be far greater when:

x A. Drugs are taken in combination;
B. Drugs are used for the first time;
C. Drugs are taken when you are sleepy;
D. None of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

There is little scientific evidence as to the extent to which drugs and medicine (with the exception of alcohol) contribute to the prevention of highway accidents.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 3.0--Emotions and Motivations

Episode Objective: Students will identify frustrating situations in the driving environment which can induce strong emotions, such as, actions of other highway users, roadway factors, traffic laws and enforcement, and determine appropriate courses of action to minimize the hazards caused by these situations.

Test items:

Accidents are not caused by emotional situations alone, but rather by how individuals handle emotional situations.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

It is not possible to control the effects of strong emotions and inappropriate motivations for driving through self-discipline and self-control.

True _____

x False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Emotions (fear, love, hate, anxiety, joy , excitement) have a profound effect on behavior in general and driving in particular.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 4.0--Fatigue and Carbon Monoxide

Episode Objective: Students will be able to identify and appraise physical factors that influence the behavior of highway users and determine appropriate courses of action to minimize the hazard caused by these factors.

Test items:

Carbon monoxide, the exhaust gas:

A. Smells like burning leaves;
B. Smells like burning oil;
C. Smells like raw gasoline;
x D. Has no odor.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Which of the following would do most to offset driver fatigue?

A. Rub the eyes and shift the gaze;
B. Play the radio;
x C. Pull off the road, get out and stretch;
D. Try to solve a riddle or difficult problem.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Fatigue does not affect the driver's ability to identify, predict, decide and execute.

True _____

x False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 5.0--Other Impairments

Episode Objective: In order to minimize highway hazards created by physically and mentally unfit drivers, individual operators must recognize and compensate for their impairments.

Test items:

Which of the following handicaps cannot be effectively compensated for by the driver?

A. Color blindness;
x B. Fatigue;
C. Tunnel vision

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

A deaf driver compensates for this handicap by:

A. Using proper seeing habits and well-developed perceptions;
B. Complete concentration on the driving task;
C. Driving only when necessary;
x D. Both A & B

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

If you have a physical condition which may affect

your driving, you should:

x A. See your physician to try and have the condition corrected;
B. Compensate for the condition;
C. Avoid heavy traffic;
D. Quit driving.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Section II--Readiness Tasks

Unit B--Vehicle Readiness

Episode 1.0--Vehicle Sub-Systems--Prerequisite Knowledge

Episode Objective: Students will identify vehicle sub-systems so that he will be able to select and maintain a vehicle properly.

Test item:

The production of power in an automobile engine is

dependent upon what two basic systems?

A. Ignition and electrical;
x B. Ignition and fuel;
C. Fuel and electrical;
D. All of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 2.0--Vehicle - Management--Selection and Maintenance

Episode Objective: Given a list of signs and symptoms of vehicle malfunctions, students will predict probable cause and consequence if not corrected and determine how to prevent the trouble in the first place.

Test item:

When the temperature gauge indicates the water in the engine is boiling, you should:

A. Drive very slowly without stalling the engine and stop at the first service station;
B. Turn the engine off and add water slowly;
x C. Turn the engine off and let it cool down, then add water while the engine is running;
D. Stop and run the engine at a fast idle.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Section II--Readiness Tasks

Unit C--Trip Plan

Episode 1.0--Trip Planning and Pre-Driving Inventory

Episode Objective: The operator will select a route, decide when to travel, and consider special equipment for a given driving situation.

Test item:

When planning a trip, you determine:

A. Is the trip necessary?
B. What is the best route to arrive there?
C. When will you travel?
x D. All of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Pre-driving inventory:

A. Is only necessary for older model cars;
x B. Can prevent inconveniences, frustrations and unsafe conditions;
C. Would not be needed for short trips;
D. Will reduce the probability of driver errors.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Section III--Improvement Tasks

Unit A--Self-Improvement

Episode 1.0--Risk Acceptance

Episode Objective: Students will discuss their personal decision-making process, particularly with regard to risk and will be able to develop internal standards for their own behavior.

Test items:

A driver's decision to accept risk when driving may be influenced by his:

A. Desire for status within a preferred group;
B. Willingness to assume more risk at one time than another;
x C. Both A & B;
D. Neither A or B.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Risk acceptance is influenced by the amount of gain a driver will receive when assuming the risk.

x True _____

False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Young drivers are not as greatly influenced by risk as are older drivers.

True _____

x False _____

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 2.0--Self-Analysis and Improvement

Episode Objective: Students, through class discussion, will identify behavioral factors which influence an operator's performance and develop personal guidelines for self-improvement as a vehicle operator.

Test items:

Your driving behavior is most significantly influenced by:

A. Your parents or other adults;
x B. Your self-concept;
C. Your social status;
D. None of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Which of the following behaviors interfere with a driver's performance?

x A. Over-confidence;
B. Patience;
C. Pride in competent driving;
D. All of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

The most important factor in reducing young driver accidents is:

A. Greater skill development;
x B. Self-discipline by young drivers;
C. Raising the age to obtain a license;
D. None of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Section III--Improvement Tasks

Unit B--System Improvement

Episode 1.0--Traffic Law Enforcement

Episode Objective: Students will identify the benefits that individuals and society derive from traffic law enforcement and how highway users can influence the quality of traffic laws, police traffic supervision and traffic courts.

Test item:

The principle advantage of strict law enforcement, as a means of collision prevention, is that the:

A. Cost is less than education;
x B. Results are usually immediate;
C. Policemen get along well with traffic court judges;
D. Policemen can apprehend almost all violators.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 2.0--Traffic Engineering

Episode Objective: Students will identify the various ways that the traffic engineering function directly and persistently affects the highway users (driver and pedestrian) tasks, and predict how they can help improve traffic engineering in their community.

Test item:

The traffic engineer is primarily concerned with:

A. Interpreting complex traffic laws and regulations to drivers;
B. Reconstructing certain traffic facilities;
C. Installing signs and signals as recommended by police agencies;
x D. Decision-making based on studies of needed traffic improvements.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

Episode 3.0--Suggestions, Guidelines and Resources For Action

Episode Objective: Students will be able to identify weakness in the highway transportation system and suggest possible alternatives for improving these weaknesses.

Test item:

The decision-making process involved in improving the highway transportation system can be influenced by:

A. Civic organizations;
B. Individuals functioning alone;
C. Small groups of people;
x D. All of the above.

Test item is appropriate _____.

Test item lacks: Validity _____ Objectivity _____.

APPENDIX E

TEST INSTRUMENT ADMINISTERED TO HIGH SCHOOL STUDENTS

APPENDIX E

Post Test for Driver Education

Select the correct answer for the following questions:

1. **The three (3) components of the highway transportation system are:**
   1. _____
   2. _____
   3. _____

2. **When a road becomes bumpy, friction between tire and road:**
   A. **increases**
   B. **decreases**
   C. **remains unaffected**
   D. **Both A & B**

3. **In order for a car to turn a corner safely, friction between the tires and roadway must overcome the:**
   A. **Force of momentum;**
   B. **Centrifugal force;**
   C. **Kenetic energy;**
   D. **Inertia.**

4. **When parking on an upgrade, in what position should you leave your front wheels?**
   A. **Pointing straight ahead, where there is no curb;**
   B. **Turned sharply away from the side, where there is no curb;**
   C. **Turned sharply toward the curb;**
   D. **Turned sharply away from the side, where there is a curb.**

5. Predictions are a result of a driver's analysis of:
   A. Behavior of other highway users;
   B. Roadway-environmental conditions;
   C. Time-space relationships;
   D. All of the above.

6. Which of the following is most likely to distract the driver when using the human functions of driving (IPDE)?
   A. Passenger reading maps and looking for destination or turn off points;
   B. Passenger carrying on conversation with driver;
   C. Passenger adjusting the radio;
   D. Passenger taking care of children in the car.

7. You are driving on a one-way street and you are preparing to make a left turn. In which lane should you have your car before starting to make the turn?
   A. The center lane;
   B. The right hand lane;
   C. The lane right of center;
   D. The lane closest to the left curb.

8. When a driver is surprised by unexpected action of other highway users, he is likely to panic.
   True _____
   False _____

9. You are driving on a straight road and your right front tire blows out. What do you do first?
   A. Turn the steering wheel to the left;
   B. Apply the brakes hard;
   C. Keep the steering wheel straight;
   D. Turn off the ignition.

10. Which of the following is the least important reason for using seat belts?
    A. Reduce impact with the dashboard and windshield;
    B. Prevent contact with sharp objects inside the car;
    C. Keep occupants inside the car;
    D. Reduce the vehicles force of impact.

11. The young or inexperienced driver is affected _____ the experienced driver when drinking the same amount of alcoholic beverage.
    A. More than
    B. The same as
    C. Less than

12. There is little scientific evidence as to the extent to which drugs and medicine (with the exception of alcohol) contribute to the prevention or cause of highway accidents.
    True _____
    False _____

13. Which of the following handicaps is most difficult to compensate for by the driver?
    A. Color blindness;
    B. Fatigue;
    C. Tunnel vision;

14. Which of the following would <u>not</u> cause an engine to overheat?
    A. Slipping fan belt;
    B. Clogged radiator;
    C. Insufficient oil;
    D. Missing thermostat.

15. You have driven your new car a total of 12,000 miles. Now it is starting to run roughly. You probably need:
    A. An oil change;
    B. New spark plugs and points;
    C. A carburetor cleaning;
    D. A carburetor adjustment.

16. Young drivers are likely to accept greater risks than are older drivers.
    True _____
    False _____

17. Which of the following behaviors interfere with a driver's personal guidelines for self-improvement?
    A. Over-confidence;
    B. Patience;
    C. Pride in competent driving;
    D. All of the above.

18. The traffic engineer is primarily concerned with:
    A. Interpreting complex traffic laws and regulations to drivers;
    B. Reconstructing certain traffic facilities;
    C. Installing signs and signals as recommended by police agencies;
    D. Improving traffic flow based on studies of needed traffic improvement.

19. Control of a car, in general, depends on the amount of friction between the tires and the road surface.
    True _____
    False _____

20. Shock absorbers have limited life and lose effectiveness gradually. However, this can be detected by:
    A. Swaying on curves;
    B. Pushing up and down on the car to determine the strength of the shock absorbers;
    C. Looking under your car to inspect the shock absorbers;
    D. Lack of vehicle stability at high speed;
    E. A & D.

21. You applied your brakes and the wheels locked. What should you do now?
    A. Apply the parking brakes;
    B. Shift to lower gear;
    C. Pump your brakes;
    D. Concentrate on steering.

22. In order to identify key segments of the traffic environment, most of a driver's attention should be focused on:
    A. Traffic moving in the same direction;
    B. Approaching and oncoming vehicles;
    C. The movement of pedestrians;
    D. The projected path his car will travel.

23. The passenger on a two-wheeled vehicle can affect steering and stability through his body position and movements.
    True _____
    False _____

24. As a driver, you should be especially alert for pedestrians when passing parked cars and delivery trucks.
    True _____
    False _____

25. Oversteering and understeering can be prevented by:
    A. Looking down the center of your projected path of travel;
    B. Sitting erect and squarely behind the wheel;
    C. Steering toward the center of your projected path of travel;
    D. All of the above;
    E. A & C.

26. Downshifting or shifting to a lower gear with no additional pressure on the accelerator will:
    A. Not make any difference in braking the car to a stop;
    B. Make it more difficult to brake the car to a stop;
    C. Assist in bringing the car to a stop;
    D. Increase the speed of the car.

27. When is kenetic energy of a car most rapidly used up?
    A. In swerving back and forth;
    B. In coasting;
    C. In applying a braking force;
    D. In climbing a hill.

28. Before starting the engine, you should:
    A. Place parking brake in the off position;
    B. Use appropriate directional signal;
    C. Adjust seat and mirrors;
    D. Check traffic.

29. The most important factor in what a driver identifies or what predictions he makes is:
    A. What action he takes as a result of it;
    B. How well he retains it;
    C. How well he recognizes it;
    D. How fast his resulting action is.

30. One should avoid wearing tinted eyeglasses when driving at night because they:

A. Limit side vision;

B. Further restrict his ability to identify relevant traffic clues;

C. Tend to lower driver alertness;

D. Are dangerous to the eyes.

31. The danger of inattention can be minimized by:

A. Disregarding distracting environmental factors;

B. Developing mental habits to prevent it from interfering with driving performance;

C. Both A & B;

D. Neither A or B.

32. Which of the following statements about acceleration lanes is correct?

A. There are yield signs at the end of acceleration lanes;

B. The driver should build up his speed to about 30-40 mph;

C. The driver should prepare to adjust his speed to fit in with the flow of traffic;

D. None of the above.

33. On a two-lane road, an approaching car is starting a left turn at the same time you are turning left. What do you do?

A. Turn in front of the other car;

B. Turn behind the other car;

C. Wait until the intersection clears;

D. Wait until the light is just ready to change and then turn.

34. It is not possible to control the effects of strong emotions and inappropriate motivations for driving through self-discipline and self-control.

True _____

False _____

35. Potentially dangerous situations can best be overcome by:
    A. Careful analysis and correct response;
    B. Rapid identification and avoidance;
    C. Development of driving skills and co-ordination;
    D. Obeying traffic rules and regulations.

36. Shifting to a lower gear in order to get up a snow-covered hill should be done:
    A. Before starting up the hill;
    B. When you start up the hill;
    C. About half-way up;
    D. As soon as power loss becomes noticeable.

37. Your gas pedal sticks when you remove your foot. What do you do first?
    A. Apply the brakes;
    B. Blow the horn;
    C. Turn off the ignition;
    D. Pry the pedal loose with your foot.

38. Most accidents are caused by a combination of driver errors, vehicle failures and highway deficiencies.
    True _____
    False _____

39. From a motorcycle rider protection viewpoint, which of the following is most important?
    A. Directional signals;
    B. Heavy clothing;
    C. Horn;
    D. Helmet.

40. The most important thing to do when involved in an accident is:

A. To furnish proof of license to the investigating police officer;

B. To check for injured persons and summon assistance if necessary;

C. To remove your car from the lane of traffic;

D. To exchange insurance information with the other driver.

41. If you have comprehensive coverage insurance on your automobile, you are covered for:

A. Damage to your car resulting from an accident;

B. Damage to other cars resulting from an accident;

C. Fire, theft and vandalism;

D. All of the above.

42. The elimination of alcohol from the body can be quickened by:

A. Coffee

B. Drugs

C. Sleep

D. None of the above.

43. The impairment of body functions may be far greater when:

A. Drugs are taken in combination;

B. Drugs are used for the first time;

C. Drugs are taken when you are sleepy;

D. None of the above.

44. Emotions (fear, love, hate, anxiety, joy, excitement) have a profound effect on behavior in general and driving in particular.

True _____

False _____

45. Fatigue does not affect the driver's ability to identify, predict, decide and execute.

True _____

False _____

46. If you have a physical condition which may affect your driving, you should:

A. See your physician to try and have the condition corrected;

B. Compensate for the condition;

C. Avoid heavy traffic;

D. Quit driving.

47. The production of power in an automobile engine is dependent upon what two basic systems?

A. Ignition and electrical;

B. Ignition and fuel;

C. Fuel and electrical;

D. All of the above.

48. When the temperature gauge indicates the water in the engine is boiling, you should:

A. Drive very slowly without stalling the engine and stop at the first service station;

B. Turn the engine off and add water slowly;

C. Turn the engine off and let it cool down, then add water while the engine is running;

D. Stop and run the engine at a fast idle.

49. Pre-driving inventory

A. Is only necessary for older model cars;

B. Can prevent inconveniences, frustrations and unsafe conditions;

C. Would not be needed for short trips;

D. Will reduce the probability of driver errors.

50. Risk acceptance is influenced by the amount of gain a driver will receive when assuming the risk.
True _____
False _____

51. The most important factor in reducing young driver accidents is:
A. Greater skill development;
B. Self-discipline by young drivers;
C. Raising the age to obtain a license;
D. None of the above.

52. The principle advantage of strict law enforcement, as a means of collision prevention, is that the:
A. Cost is less than education;
B. Results are usually immediate;
C. Policemen get along well with traffic court judges;
D. Policemen can apprehend almost all violators.

53. Which of the following would do most to offset driver fatigue?
A. Rub the eyes and shift the gaze;
B. Play the radio;
C. Pull off the road, get out and stretch;
D. Try to solve a riddle or difficult problem.

54. The decision-making process involved in improving the highway transportation system can be influenced by:
A. Civic organizations;
B. Individuals functioning alone;
C. Small groups of people;
D. All of the above.

55. Which of the following driving actions should you take when you encounter heavy fog?

A. Turn on your high beam lights;

B. Turn on your low beam lights;

C. Turn on your parking lights;

D. Turn off all your lights.

56. If a driver is travelling on a long trip and traffic is becoming congested on a rural highway, he should:

A. After making several unsuccessful attempts to pass another vehicle, drop back and wait awhile;

B. Decrease following distance in order to communicate your intention to pass;

C. Continue to attempt to pass, since failure to do so will cause a decrease in your average mile per hour rate;

D. None of the above.

57. Which of the following best explains why there are so many accidents at railroad crossings?

A. A train that has just gone by conceals a second train approaching the crossing from the opposite direction;

B. Cars stalling on the tracks;

C. Drivers not allowing sufficient following distance when crossing the tracks;

D. All of the above.

58. In order for a driver to successfully handle critical situations:

A. He must have experienced the critical situation before;

B. He must have developed pre-conditional responses;

C. He must be an expert driver;

D. None of the above.

59. Pedestrians and animals are both maneuverable and predictable in their actions.
True _____
False _____

60. Your right front wheel runs off the pavement. What do you do first?
A. Decrease speed without applying the brakes;
B. Apply the brakes;
C. Steer left;
D. Steer right.

61. As you are passing another car on a 2-lane road, and the engine falters and your acceleration decreases, what do you do first?
A. Shift to a lower gear;
B. Pump the gas pedal;
C. Push the gas pedal to the floor;
D. Remove foot from gas pedal and return to your lane.

62. Fatal accidents are only a small percentage of the total number of accidents.
True _____
False _____

63. You have just had an accident. Your car has considerable damage, but you are not injured. To help prevent fire:
A. Call the fire department;
B. Raise the hood and open the doors;
C. Turn off the ignition of any car involved in the collision;
D. Make sure the gas cap is on tight.

64. The basic principle of automobile insurance is:

A. Spread the risk;

B. Reduce the risk;

C. Reduce liability;

D. Fix responsibility.

65. Select the best statement of the effects of alcohol:

A. Alcohol first depresses and accelerates judgment, reason, and coordination;

B. Alcohol dulls center controlling judgment and reason first, then coordination, speech and vision.

C. Alcohol stimulates, then dulls centers controlling first speech and vision, then coordination, and finally reason and judgment;

D. Alcohol affects coordination and speech first, but finally reason and judgment.

66. How do prescription or non-prescription drugs affect your ability to perform the driving task?

A. It only affects the part of the body it is intended to heel;

B. Drugs stimulate your ability to identify, predict, decide and execute;

C. Drugs have no affect on your driving;

D. Drugs hinder your ability to identify, predict, decide and execute.

67. Accidents are not caused by emotional situations alone, but rather by how individuals handle emotional situations.

True _____

False _____

68. Carbon monoxide, the exhaust gas:

A. Smells like burning leaves;

B. Smells like burning oil;

C. Smells like raw gasoline;

D. Has no odor.

69. A deaf driver compensates for this handicap by:
    A. Using proper seeing habits and well developed perceptions;
    B. Complete concentration on the driving task;
    C. Driving only when necessary;
    D. Both A & B.

70. When planning a trip, you determine:
    A. Is the trip necessary?
    B. What is the best route to arrive there?
    C. When will you travel?
    D. All of the above.

71. A driver's decision to accept risk when driving may be influenced by his:
    A. Desire for status within a preferred group;
    B. Willingness to assume more risk at one time than another;
    C. Both A & B;
    D. Neither A or B.

72. Your driving behavior is most significantly influenced by:
    A. Your parents or other adults;
    B. Your self-concept;
    C. Your social status;
    D. None of the above.

73. To improve a driver's chances of seeing through his rear-view mirror and checking blind spots, it is better to:
    A. Seat three in the back and two in the front;
    B. Seat two in the back and three in the front.

74. Based on previous identifications, you predict that the driver passing you may create a conflict situation. Which of the following would be the best decision and action for you to make?

A. Keep to the right side of your lane;

B. Cover your brake;

C. Continue predicting driver's actions;

D. All of the above.

75. When children are playing at the curb, you should:

A. Concentrate all of your identifications and predictions on the children;

B. Sound the horn to chase them back;

C. Watch the children and continue to identify other vehicular traffic in front and back of you;

D. Ignore the children and concentrate on your projected path of travel.

76. Which is the best procedure for slowing down on a wet or slippery road?

A. Shift to a lower gear, then brake;

B. Brake, then shift to a lower gear;

C. Brake, don't shift to a lower gear;

D. Shift to a lower gear, don't brake.

77. The main purpose of a good accident records system is to:

A. Identify all problem drivers;

B. Identify critical problems in the system;

C. Identify total number of accidents;

D. Identify total number of fatal accidents.