



DRIVER EDUCATION FOR SAFETY IN ADVERSE DRIVING CONDITIONS

Final Report 609

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<p>16. Abstract</p> <p>Under certain adverse driving conditions, often times the driver of a vehicle has inadequate training or education and ends up taking wrongful action leading to severe crashes. The purpose of this research was to determine the state-of-the-art practices in educating drivers for safety in certain adverse driving conditions and to develop a realistic module of a driver education program addressing that topic. In addition, the research sought to determine whether any relevant laws and regulations related to driving in the State of Arizona need to be changed in order to properly address safety under adverse driving conditions.</p> <p>The study consisted of four main tasks, which included a literature review, statistical analysis of Arizona crash data, a survey of other states regarding their driver education programs, and targeted case studies of selected states and other private or semi-government agencies involved in driver education curriculum development and implementation.</p> <p>It is the recommendation of this report that Arizona continue its on-going efforts to convene a driver education task force consisting of both Arizona Department of Education and Motor Vehicle Department representatives with the goal of developing uniform standards for both driver education curriculum and training for driver education instructors to apply to both the public school driver education program and the professional driver training schools.</p> <p>In addition, because Arizona does not have an existing state-level driver education curriculum, the state should adopt a complete driver education curriculum as opposed to a module geared towards adverse driving conditions. That said, should that effort not be possible, it is the recommendation of this report that one of the two adverse conditions related modules (Montana or Texas/Virginia). Both of these modules are well designed and thorough and both would serve Arizona well. They are similar in their coverage of adverse driving conditions. The choice between the two would come down to Arizona's preference between the NIDB model with which the Montana curriculum is more closely aligned, and the ADTSEA model with which the Virginia/Texas module is more closely aligned.</p>			
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fl	foot-Lamberts	3.426	candela/m ²	cd/m ²	cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
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lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa	kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380

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GLOSSARY OF ACRONYMS

AAA	American Automobile Association
AAMVA	American Association of Motor Vehicle Administrators
ABS	Anti-locking Brake System
ADE	Arizona Department of Education
ADTSEA	American Driver and Traffic Safety Education Association
AzDOT	Arizona Department of Transportation
BTW	Behind the Wheel
CD-ROM	Compact Disc Read-Only Memory
DDSEA	Delaware Driver Safety Education Association
DE	Driver Education
DEPIA	Driver Education Provider and Instructor Act of October 2006
DETA	Driver Education and Training Administrators
DMV	Department of Motor Vehicles
DOE	Department of Education
DOT	Department of Transportation
DSAO	Diocesan Social Action Offices
DSFL	Driving Skills for Life
DVD	Digital Video Disc
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FTE	Full-Time Equivalent
GDL	Graduated Licensing Program
GHSA	Governor's Highway Safety Association
HB	House Bill
JFA	Jack Faucett Associates
MMUCC	Model Minimum Uniform Crash Criteria Guidelines
MTV	Music Television
MVD	Motor Vehicle Division
NDTI	National Driver Training Institute
NHTSA	National Highway Traffic Safety Association
NIDB	National Institute for Driver Behavior
LOS-POT	Line-of-Sight and/or Path-of-Travel
OAR	Oregon Administrative Rules
ODE	Oregon Department of Education
ODOT	Oregon Department of Transportation
OPI	Office of Public Instruction
OTESA	Oregon Traffic Safety Education Association
OTSC	Oregon Transportation Safety Committee
PDE	Pennsylvania Department of Education
PTDE	Parent Taught Driver Education
RMV	Registry of Motor Vehicles
SDE	State Department of Education
TAC	Technical Advisory Committee

TEA	Texas Education Agency
TRB	Transportation Research Board
TSD	Transportation Safety Division
TTI	Texas Transportation Institute
WOU	Western Oregon University
ZED	Zero Error Driving

EXECUTIVE SUMMARY

Introduction

Under certain adverse driving conditions, often times the driver of a vehicle has inadequate training or education and ends up taking wrongful actions leading to severe crashes and injuries. Examples of such situations include a tire blowout in the middle of a high speed facility, driving during a dust storm, driving too closely behind a large truck, approaching a sudden bottleneck or emergency vehicle in the roadway, etc. Not knowing how to avoid an impending collision, many drivers do not take the right emergency action in such situations. Moreover, any inappropriate action by a single driver on a roadway facility can result in crashes of various severities involving one or more vehicles and other road users.

Poor driver behaviors that lead to crashes and injuries cannot be prevented by highway design or traffic control devices. This study sought to identify those driver behaviors that lead to crashes and that could be added to Arizona's driver education program to train the reasonable driver on how to avoid such crashes.

Purpose of This Study

The purpose of this research was to determine the state-of-the-art practices in educating drivers for safety in certain adverse driving conditions and to develop a realistic module of a driver education program addressing that topic. In addition, the research sought to determine whether any relevant laws and regulations related to driving in the State of Arizona should be changed in order to properly address safety under adverse driving conditions.

How This Study Was Conducted

The study consisted of four main tasks, which included a literature review, statistical analysis of Arizona crash data, a survey of other states regarding their driver education programs, and targeted case studies of selected states and other private or semi-government agencies involved in driver education curriculum development and implementation.

Literature Review

The literature review compiled and summarized the current body of technical reports, educational materials, papers and articles pertaining to adverse driving conditions and the impacts of driver education on adverse driving conditions-related crashes. The purpose of the literature review was three-fold:

- 1) To amalgamate the leading definitions of the term "adverse driving conditions" and create an operational definition to be applied in the quantitative analysis of Arizona crash data;
- 2) To collect examples of model curriculum addressing driver education for adverse driving conditions; and

- 3) To summarize the knowledge gained through a literature search on crash cause statistics, the impacts of driver education on crashes and adverse driving conditions-related crashes in particular, and policy issues related to highway safety in general.

Analysis of Arizona Crash Data

The statistical analysis of Arizona crash data was conducted to extract whatever information may be available relative to crashes under adverse driving conditions. This data was analyzed to ascertain whether any sort of driver training might have reduced the frequency or severity of these crashes.

State Survey and Case Study

The survey of officials from other states was conducted to ascertain information on each state's existing driver education program and the estimated effectiveness of those programs. Information was also solicited on desired or planned improvements that may not yet have been made. More detailed information on driver education for safety in adverse conditions was also collected.

Points of contact were obtained for all 50 states. A cover letter and link to the online survey were then e-mailed to each state contact. Survey responses were received electronically via online response over a period of 5 weeks with additional responses obtained as a result of follow-up phone calls.

The second part of this task involved conducting more detailed follow-up case studies of six states, in addition to a more detailed analysis of Arizona's program. These case studies examined the following attributes of the programs in the selected states:

- Mission and rationale,
- Program description,
- Implementation and participation,
- Training materials and methods,
- Effectiveness and related factors.

States were selected based on geographical factors, innovative approaches, measured or anecdotal success in improving traffic safety and availability of well-formulated curriculum or training module materials. States interviewed in addition to Arizona included: Montana, Texas, Michigan, Oregon, Delaware and Idaho.

Other Entity Case Study

Private or semi-government agencies were interviewed to ascertain what driver education programs currently exist and to gather their opinions and willingness to sponsor an improved driver education program that includes an added element for driving in adverse conditions.

The entities interviewed were selected based on information gained through the literature review and other subsequent research into the primary entities engaged in either the research or development of driver education curricula. They included:

- Governor's Highway Safety Association (GHSA),
- National Institute for Driver Behavior (NIDB),
- National Highway Traffic Safety Administration (NHTSA),
- American Driver and Traffic Safety Education Association (ADTSEA),
- AAA (American Automobile Association) Foundation for Traffic Safety.

Study Findings

The literature review revealed that based on existing, albeit limited research, driver education is not terribly effective in reducing crashes by novice drivers. However, it was also a point in the literature that evaluating the effectiveness of driver education is difficult in that driver education has traditionally not been tasked with teaching or specifically influencing traffic safety. Rather, it has taken on the role of teaching driving skills. Consequently, crash rates are not necessarily a reasonable measure of the traditional driver education program's performance or effectiveness. Moreover, the literature revealed that there appear to be many educational tools, driver safety behaviors and other identifiable factors that could be incorporated into driver education in order to make it more responsive to the outcome of reducing crashes should we, as a society, decide that should be an intended purpose of driver education.

In looking at Arizona vehicle crash statistics between 2001 and 2005, it was found that adverse conditions are present in just fewer than 40 percent of accidents and approximately 60 percent of fatalities. When cross-tabulated with identified driver education indicators, this strong correlation is maintained. The results indicate that both adverse conditions and driver education indicators are present in about a third of accidents and half of fatalities.

The survey and case study exercises revealed there is a great disparity amongst states in terms of how driver education is addressed and the specific topics that are covered under driver education programs. In addition, there is a groundswell of individuals particularly active in the area of driver education that is working hard to change that fact. Not only do many proponents of driver education reform seek some uniformity amongst driver education programs, or at least the standards on which they are based, but many also seek to promote the basic premise that driver education needs to address certain key driver behaviors that should be taught and reinforced through proper training and education in order to minimize the risky behaviors that lead to crashes.

There exist high quality and fully applicable driver education curricula as well as stand alone driver education modules addressing driving under adverse conditions that Arizona could adopt to enhance the state's driver education program. There is no compelling reason to develop a completely new curriculum or module.

There are two primary national level sources of driver education curriculum and/or standards including the Driver Education and In-Car Curriculum developed by ADTSEA and the Driving

Behaviors for Risk Prevention developed by Fred Mottola of NIDB. Moreover, a number of states have recently developed driver education curricula, some of which specifically address the topic of safety under adverse driving conditions. Some of these curricula align themselves directly with either the NIDB risk prevention model or the ADTSEA model, others have adopted some aspects of these models, while still others have been developed independently.

The research identified four of the best examples of these modules and curricula. The recommendation on which to use is dependent on several factors that only the Arizona Department of Transportation (AzDOT) can determine including:

- the level of effort the state wishes to expend on the issue of improving driver education,
- the legal or regulatory actions the state is interested in pursuing, and
- the nature of the reform the state is interested in addressing, *i.e.* comprehensive program changes, limited program changes including adoption of full driver education curriculum, limited program changes including adoption of one module of a driver education curriculum addressing adverse conditions.

The recommendations and the rationale for adopting each option are summarized in the table below.

Exhibit 1-1: Module Recommendations

Curriculum/Module Recommendations	Circumstances Under Which to Implement	Required Resources
1) Oregon Driver Risk Prevention Curriculum	Desire to implement a full and complete national level driver education curriculum based on NIDB driver risk prevention model that is readily available, but which will require some consultation with developer.	Full CD-ROM containing all curriculum materials, student activities, quizzes, etc. provided with this report and available on line. Oregon DOT estimates 100 hours necessary to train instructors who will use curriculum. Developer of curriculum, however, must grant permission for use of materials. Conversations indicate that permission would be granted only with some fee-based consultation (minimum hourly fee is \$125) on his part regarding use, understanding and implement of the materials.

Curriculum/Module Recommendations	Circumstances Under Which to Implement	Required Resources
2) ADTSEA Curriculum	Desire to implement a full and complete driver education curriculum based on national standard which is readily available at a fixed price and limited consultation with developer.	<p>CD-ROM can be ordered online including all curriculum discs, recommended videos, printed materials, and parent mentor guide for \$225 (ADTSEA members \$175) plus \$25 shipping and handling.</p> <p>Limited consultation (no fee) would be required in order to obtain usage rights and to discuss distribution and attribution.</p>
<p>3) Montana Driver Education and Training Curriculum Guide</p> <p>-----</p> <p>3a) Montana Module 14, Strategies for Adverse Conditions</p>	<p>Desire to implement full and complete driver education curriculum incorporating some NIDB driver risk prevention concepts, but organized in more traditional fashion and including a module on adverse conditions.</p> <p>-----</p> <p>Desire to adopt a stand-alone module on adverse conditions that incorporates many driver risk prevention concepts and covers adverse conditions topics including: glare, low light, darkness, fog, smoke, dust, rain, winter weather and reduced traction.</p>	<p>All materials available for download free of charge.</p> <p>Developer willing to provide fee based consultation for training, curriculum modification or other purposes.</p>
4) Texas/Virginia, Module 8, Driver Responsibilities: Adverse Conditions	Desire to adopt stand-alone module on adverse conditions that includes the adverse conditions topics of: visibility, extreme weather, vehicle restraints, roadway and vehicle technologies, traction loss and that incorporates some driver risk prevention concepts and is part of a curriculum that largely follows the ADTSEA curriculum model.	All materials available for download online free of charge.

Recommendations

It is the recommendation of this report that Arizona continue its on-going efforts to convene a driver education task force consisting of both Arizona Department of Education and Motor Vehicle Division representatives with the goal of developing uniform standards for both driver education curriculum and training for driver education instructors to apply to both the public school driver education program and the professional driver training schools.

In addition, because Arizona does not have an existing state-level driver education curriculum, the state should adopt a complete driver education curriculum as opposed to a module geared towards adverse driving conditions. That said, should that effort not be possible, it is the recommendation of this report that a training module very similar to one of the two adverse conditions related modules (Montana or Texas/Virginia) presented in the table above be implemented. Arizona may need to tailor its modules to take care of the local or regional conditions. Both of these modules are well designed and thorough and both would serve Arizona well. They are similar in their coverage of adverse driving conditions. The choice between the two would come down to Arizona's preference between the NIDB model with which the Montana curriculum is more closely aligned, and the ADTSEA model with which the Virginia/Texas module is more closely aligned.

CHAPTER 1: INTRODUCTION

Under certain adverse driving conditions, often times the driver of a vehicle has inadequate training or education and ends up taking inappropriate action leading to severe crashes. Examples of such situations include a tire blow-out in the middle of a high speed facility, driving during a dust storm, driving too closely behind a large truck, approaching a sudden bottleneck or emergency vehicle in the roadway, etc. Not knowing how to avoid an impending collision, many drivers do not take the right emergency action in such situations. Moreover, any erroneous action by a single driver on a roadway facility can result in crashes of various severities involving one or more vehicles and other road users.

Poor driving behaviors cannot be prevented by highway design or traffic control devices. This study sought to identify those driver behaviors that lead to crashes and that need to be added to Arizona's driver education program to train the reasonable driver on how to avoid such crashes.

The purpose of this research was to determine the state-of-the-art practices in educating drivers for safety in certain adverse driving conditions and to find a realistic module of a driver education program addressing that topic. In addition, the research sought to determine whether any relevant laws and regulations related to driving in the State of Arizona need to be changed in order to properly address safety under adverse driving conditions.

This was accomplished through the conduct of four primary tasks including a literature review, statistical analysis of Arizona crash data, a survey of other states regarding their driver education programs, and targeted case studies of selected states and other private or semi-government agencies involved in driver education curriculum development and implementation. Consequently, the remainder of this report is organized into the following chapters:

- Chapter 2: Literature Review - compiles and summarizes the current body of technical reports, educational materials, papers and articles pertaining to adverse driving conditions and the impacts of driver education on adverse driving conditions-related crashes and establishes a working definition of "adverse driving conditions."
- Chapter 3: Statistical Analysis of Arizona Accident Data - provides the results of a statistical study of Arizona crash data including information relative to crashes under adverse driving conditions; and analysis to ascertain whether driver training might have reduced the frequency or severity of these crashes.
- Chapter 4: Survey of State Officials – presents results of survey conducted to ascertain information on each state's existing driver education program and the estimated effectiveness of those programs.
- Chapter 5: Case Studies of Best Practice States – documents case studies of six states with exemplary driver education programs and/or driver education curriculum in addition to a more detailed analysis of Arizona's driver education program.
- Chapter 6: Case Studies of Private or Semi-Government Agencies – documents case studies of five entities actively engaged in the development and/or implementation of driver education curriculum.
- Chapter 7: Conclusions and Recommendations – provides recommendations on the implementation of a realistic driver education curriculum and/or module to address the

state's desire to focus on improving safety under adverse driving conditions and addresses other actions that could be taken by the state of Arizona in terms of implementing certain laws or regulations related to driving in the state.

The conduct of this study was guided by a Technical Advisory Committee (TAC). The responsibilities of the TAC included:

- Provide guidance to the project by making timely responses to any relevant questions posed by the project researcher.
- Assist in obtaining access to any official data, records, or information needed for research.
- Review progress reports in a timely manner to provide feedback and ensure that the project stays on course.
- Review and approve (if satisfactory) the final report.
- Provide reasonable assistance in the oral presentation to the Research Council or other designated audience.
- Make the best effort to implement recommendations that would be beneficial to the Department or other government agencies and/or the traveling public.

As part of this process, TAC members have provided comments on this report. Where possible those comments have been used to guide revisions to the report. In some instances, especially where the changes requested in the comments could not be incorporated or otherwise accommodated, a footnote was added to discuss the comment.

CHAPTER 2: LITERATURE REVIEW

This chapter presents the findings of a literature review designed to compile and summarize the current body of technical reports, educational materials, papers and articles pertaining to adverse driving conditions and the impacts of driver education on adverse driving conditions-related crashes. The purpose of this literature review is three-fold:

- 1) To amalgamate the leading definitions of the term “adverse driving conditions” and create an operational definition that can be applied in the quantitative analysis of Arizona Crash Data;
- 2) To collect examples of model curriculum addressing driver education for adverse driving conditions; and
- 3) To summarize the knowledge gained through the literature search in the areas of crash cause statistics, the impacts of driver education on crashes and adverse-driving-conditions-related crashes in particular, and policy issues related to highway safety in general.

Consequently, this chapter is organized into the following three sections:

- **Section 1** summarizes the common definitions of adverse driving conditions used by the Federal government, State Departments of Transportation (DOTs), Departments of Motor Vehicles (DMVs), and other driver safety organizations and training modules, and presents a suggested working definition for purposes of this project.
- **Section 2** presents a list of model curricula addressing driver education for adverse driving conditions and provides a preliminary review of the applicability to this project of each item on that list.
- **Section 3** provides a discussion of various issues related to driver education for adverse driving conditions including policy issues, crash statistics and the results of research in the area of driver education impacts on driver behavior and crashes.

2.1: Definition of “Adverse Driving Conditions”

A review of all available literature found that the term “adverse driving conditions” is a phrase often used, but never thoroughly or consistently defined. The meaning of adverse driving conditions is most commonly associated with poor weather conditions or poor visibility. In fact, several drivers’ training manuals often use the term interchangeably with the term “adverse weather conditions.”

The excerpt below from Hours of Service regulations established by the Federal Motor Carrier Safety Administration provides an example of the commonly used weather-based definition.

“Adverse driving conditions mean snow, sleet, fog, other adverse weather conditions, a highway covered with snow or ice, or unusual road and traffic conditions, none of which were apparent on the basis of information known to the person dispatching the run at the time it was begun.”¹

¹ Federal Motor Carrier Safety Administration, Hours of Service Regulations, 49 CFR, §395.2 Definitions

However, the literature review revealed that adverse driving conditions are not strictly limited to weather and its impact on road conditions. Adverse driving conditions may include any number of unfavorable and unexpected driving circumstances that affect the driver's ability to see and control the vehicle such as poor lighting conditions, road/construction debris, road congestion or other traffic conditions, road construction or other road surface issues, and vehicle malfunction.

An example of this type of expanded definition comes from the NHTSA, which defines adverse driving conditions through a set of five conditions including:

- Slippery roads: mud, rain, ice, snow, wet leaves, hailstones, sleet, sand or gravel
- Limited visibility: fog, smoke, dust, snow, rain, sunlight, dawn and dusk
- Vehicle control problems: wind
- Extreme temperatures: heat and cold
- Catastrophic weather conditions, e.g. situations that occur occasionally without much warning; flooding and flash floods, lightning, tornado, earthquake²

An example of a State Department of Transportation definition of “adverse conditions” which is currently used by both the State of Texas³ and the State of Virginia⁴ is:

- Visibility in Adverse Conditions – e.g. glare, darkness (night-time driving), weather-related visibility issues such as rain, fog, smoke, snow
- Extreme Weather Conditions – e.g. flash-flooding and low water crossings, extreme temperatures, strong winds,
- Protecting Occupants – e.g. seat belt use, airbag protection, proper steering wheel and headrest adjustment, proper hand position
- Roadway and Vehicle Technology – e.g. intersections, guard rails, crash attenuators, rumble strips, traffic calming devices, shoulders, medians, message signs, turn bay lanes, anti-lock brakes, traction control devices, suspension control devices, electronic stability/active handling systems, crumple zones, door latches, glass, headlights.
- Traction Loss Concerns – e.g. uneven road surfaces, wet leaves, rain or standing water, ice and snow, mud, sand/gravel, negative-banked curves.

Operational Definition Adverse Driving Conditions

Through review of the definitions of adverse conditions found in the literature, consideration of the discussion of adverse conditions in the project Statement of Work, and the data available

² “Driving Under Adverse Weather Conditions” School Bus Driver In-Service Safety Series, NHSTA. <http://www.nhtsa.gov/people/injury/buses/UpdatedWeb/index.html>. Note: This definition comes from a school bus driver education manual. The “vehicle control problems” and “extreme temperature” conditions relate more to school bus operations than to regular vehicle situations.

³ “Texas Driver Education Classroom and In-Car Instruction Model Curriculum, Module Eight: Texas Driver Responsibilities: Adverse Conditions.” Texas Education Agency, Texas Department of Public Safety, Texas Department of Transportation.

⁴ “Curriculum Scope and Sequence Modules for Driver Education in Virginia, Module Eight Driver Responsibilities: Adverse Conditions.” Virginia Department of Education and Virginia Department of Motor Vehicles, August 2001

from the Arizona State Crash Forms, the following operational definition of adverse driving conditions is suggested:

"Environmental and other factors affecting visibility and traction including: 1) darkness, 2) weather conditions (*e.g.* fog, rain, snow, flood, smoke, severe wind, extreme temperatures, *etc.*), 3) road conditions and construction, and 4) vehicle stability and traction control (*e.g.* tire pressure and wear, and brake issues)."

This definition includes driver error, vehicle maintenance and road conditions *only* as they relate to visibility, vehicle stability and/or traction control. More specifically, this includes the following driver actions and circumstances and/or driver reactions to those circumstances:

- Breaking or accelerating too hard/fast;
- Over-steering;
- Worn or improperly inflated tires;
- Improper steering with Anti-locking Brake Systems (ABSs) and other differences in performance between vehicles equipped with ABSs versus non-ABSs;
- Misadjusted brakes;
- Defective headlights or taillights;
- Defective windshield wipers;
- Defective steering; and
- Construction or road conditions involving uneven road surfaces, sand or gravel, obstructions, defective shoulders, negatively banked curve, temporary lane changes.

Though not defining the term specifically, the Statement of Work for this project indicates a preference that the definition be inclusive of certain driver behaviors and vehicle maintenance issues beyond those associated solely with weather and lighting conditions. The proposed operational definition, therefore does not follow the strictly weather-related definitions occasionally found in the literature, but rather extends into many of the other areas found in the literature to be considered "adverse conditions." Moreover, the proposed operational definition recognizes the inherent overlap between the concepts of driving under adverse conditions and driver error and is consequently, inclusive of certain driver errors.

In its report *Remedies for Driver Error*,⁵ Jack Faucett Associates include a taxonomy of driver errors attributed to Wierwille *et al.*, 2002. That taxonomy illustrates this overlap in its inclusion of "infrastructure, environment problems" including traffic control device related, roadway related (alignment, sight distance and delineation) and weather/visibility related problems. The proposed operational definition stops short of including many other driver errors because we believe focusing only on those areas of driver error involving circumstances largely out of the control of the driver is compatible with the definitions of adverse conditions found in the literature.

To allow for the type of statistical analysis required in this project, the definition of adverse driving conditions needed to be operationalized *vis-à-vis* the available data. That data comes

⁵ Hutabarat, R., J. Lam, and M. Lawrence. *Remedies for Driver Error*. FHWA AZ 04 567. Arizona Department of Transportation, August 2004.

from the Arizona State Crash Forms Page 3 diagram (See Appendix A). Following that diagram and the definition discussed above, the following fields of information were utilized in performing the statistical analysis for this project:⁶

16 Light Condition

- 16.2 Dawn or dusk
- 16.3 Darkness

17 Weather Condition

- 17.2 Cloudy
- 17.3 Sleet/hail
- 17.4 Rain
- 17.5 Snow
- 17.6 Severe Crosswinds
- 17.7 Blowing Sand, Soil, Dirt, Snow
- 17.8 Fog, Smog, Smoke

22 Unusual Road Condition

- 22.1 Under Construction, Traffic Allowed
- 22.2 Under Construction, No Traffic Allowed
- 22.3 Under Repairs
- 22.4 Holes, Ruts, Bumps
- 22.5 Obstruction, Protected
- 22.6 Obstruction, Unprotected
- 22.7 Obstruction, Unlighted at Night
- 22.8 Defective Shoulders
- 22.9 Changing Road Width
- 22.10 Water (Standing or Moving)
- 22.11 Temporary Lane Closure

26 Road Surface Condition

- 26.2 Wet
- 26.3 Sand, Mud, Dirt, Oil, Gravel
- 26.4 Snow
- 26.5 Slush
- 26.6 Ice
- 26.7 Other
- 26.8 Unknown

⁶ This list was reviewed and approved by the TAC. After the statistical analysis was complete, several additional comments on the list were received from TAC members that, while valid, were not timely enough to be included in the analysis. For example, it was mentioned by a TAC member that perhaps more vehicle maintenance conditions could have been included, although no specific data were identified. Another TAC member suggested the definition should include wind, trailer sway crashes, and shoulder drop off. Note that severe crosswinds are already included in the analysis and accounted for a total of 80 crashes in 2005. There are also statistics included on defective shoulders, which accounted for 41 total crashes. There was also a comment on micro level data, including overcorrecting, skidding or other maneuvers that could have been prevented through driver training although there was no data on the crash forms to qualify these measures.

28 Violations/Behavior

28.2 Speed Too Fast for Conditions

28.10 Knowingly Operated With Faulty or Missing Equipment

29 Vehicle Conditions

29.2 Defective Brakes

29.3 Defective Steering

29.4 Defective Headlights

29.5 Defective Tail Lights

29.7 Puncture or Blowout

29.8 One or More Smooth Tire

29.10 Defective Windshield Wipe

2.2: Example Curriculum Addressing Adverse Driving

This section presents a review of nine documents that could serve as models for the module (or modules) of a driver education element focused on driving in adverse conditions that will be developed under this project. Each document is discussed in terms of the definition of adverse conditions utilized in the module and an assessment of the degree to which the document is applicable to development of the module for this project.

- 1) Lonerio, L., Clinton, K., Brock, J., Wilde, G., Laurie, I. Black, D. "Novice Driver Education Model Curriculum Outline." AAA Foundation for Traffic Safety. 1995.

The AAA Foundation for Traffic Safety sponsored a project to "reinvent" driver education into a form that reduces crashes by novice drivers. This paper identifies way to restructure driver education to realize its potential for improving safety. It includes discussion of the needs of novice drivers; novice driver skills and abilities; novice drivers' choices and behavior; hazard perception, risk evaluation and risk acceptance; parent/guardians and novice drivers; integrating complementary skills and values; developing supporting influences for novice drivers; graduated licensing and driver education links; and strategic directions for driver education.

Recommendations include:

- Develop software for teaching and testing knowledge and skills in an individual, self-paced, automated way.
- Develop interactive multi-media units for training and testing driver attention and visual detection as well as risk perception and evaluation.
- Develop software based on game-theory models to diagnose, clarify, and reinforce modification of new drivers' risk-taking styles and to demonstrate their consequences.
- Develop improved in-car instruction and instrumentation to teach driving and perception skills and provide feedback on driver performance.
- Develop participative classroom units for peer-focused seminars, individual study projects, and group work. These are needed to clarify health and safety values and to enhance personal motivation and social responsibility.

- Develop instructor training to support the use of new interactive media, participative classroom units, and in-car perception units. The need is to reinvent the teacher and instructor's role, enriching the job by shifting the emphasis from information provider to that of coach or mentor for health and safety motivation, social values, and life skills.
- Develop tools, models, and instruction units that support parent involvement in young driver education.
- Develop models and incentives that mobilize community, industry, and government support for coordinating positive influences on novice drivers. These should include links between the driver education and health promotion communities and between driver education and insurance providers.
- Coordinate development of graduated licensing systems with driver education. Move to multi-stage education in the graduated licensing jurisdictions. These driver education formats should also be pilot tested for effectiveness and market acceptance in non-graduated jurisdictions.
- Expand the integration of driver education topics into other school subjects, particularly health, community service, and other values-related activities.

Though this paper is not specifically directed toward driving in “adverse conditions”, many of the identified behaviors and risk factors for novice drivers are related to adverse driving conditions. Section 4 of the paper addresses instructional methods and activities and relates them to performance objectives.

- 2) “Montana Driver’s Manual for Obtaining a License to Drive, Chapter 6 Adverse Driving Conditions and Driver Emergencies.” Montana Office of Public Instruction, Division of Health Enhancement and Safety, Montana Department of Justice, Motor Vehicle Division. 2004 Edition. www.opi.mt.gov/pdf/drivered/manual/ch6.pdf

This is Chapter 6 of 7 in the State of Montana’s *Driver’s Manual for Obtaining a License to Drive*. The sub-heading for the Chapter states “adverse driving conditions require additional knowledge and skills,” which is noteworthy in and of itself as a stated assumption.

The chapter covers night driving, including a discussion of speed reduction, when to turn on headlights; weather; road conditions including discussion of wet roads, fog, snow and ice; driving emergencies including failed brakes, stuck gas pedals, running off the pavement, vehicle becoming disabled, skidding and flat tire/blowout.

The Chapter is very brief—14 pages inclusive of a number of diagrams and a self-test—and not particularly well organized. For example, the format of the headings and subheadings make it difficult to determine if the chapter has moved on to a new topic or if a topic is considered a part of the previous discussion. The discussion within each section of the chapter is presented in a “short sentence and bullet-point” format that provides little description.

Beyond noting the topics included, this chapter is too brief and not broad enough to be particularly well suited as a model for building the curriculum required under this project.

- 3) “New Mexico Driver Education Curriculum, Unit 3: The Driving Environment, Chapter 9 Adverse Driving Conditions.” <http://ipl.unm.edu/traf/pubs/DECurr/chpp.pdf>

This is Chapter 9 of 10 chapters making up the New Mexico Driver Education Curriculum. Topics covered include weather conditions only – rain, mud, snow and ice, fog, dust storms and glare. The Chapter is very brief (4 pages) and provides reference to NHTSA’s tips on snow and winter driving.

Beyond noting the topics included, this chapter is too brief and not broad enough to be a particularly useful model for the development of the driver education module required for this project.

- 4) “School Bus Driver In-Service Safety Series, Administrator Guide for Pupil Transportation Supervisors, Adverse Conditions Module.” http://www.nhtsa.gov/people/injury/buses/UpdatedWeb/topic_8/agenda.html

Adverse conditions discussed include: slippery roads, limited visibility, vehicle control problems, extreme temperatures, catastrophic conditions. Each is discussed in terms of what causes the condition, what the driver should know about the condition, and how to handle the condition. The module is very detailed and includes a detailed lesson plan and instructor notes including slides and handouts.

Though the module is geared towards school buses, much of the subject matter is relevant, although some topics, *e.g.* wind and how to handle passengers in extreme weather conditions are geared towards school buses in particular. In addition, the format is potentially relevant to the development of the driver education module envisioned for this project.

- 5) “Texas Driver Education Classroom and In-Car Instruction Model Curriculum, Module Eight Texas Driver Responsibilities: Adverse Conditions.” Texas Education Agency, Texas Department of Public Safety, Texas Department of Transportation.

This is Module 8 out of 10 in the Texas Driver Education Classroom and In-Car Instruction Model Curriculum. Topics covered include:

- Visibility in Adverse Conditions – *e.g.* glare, darkness (night-time driving), weather-related visibility issues such as rain, fog, smoke, snow;
- Extreme Weather Conditions – *e.g.* flash-flooding and low water crossings, extreme temperatures, strong winds;
- Protecting Occupants – *e.g.* seat belt use, airbag protection, proper steering wheel and headrest adjustment, proper hand position;
- Roadway and Vehicle Technology – *e.g.* intersections, guard rails, crash attenuators, rumble strips, traffic calming devices, shoulders, medians, message signs, turn bay lanes, anti-lock brakes, traction control devices, suspension control devices, electronic stability/active handling systems, crumple zones, door latches, glass, headlights; and
- Traction Loss Concerns – *e.g.* uneven road surfaces, wet leaves, rain or standing water, ice and snow, mud, sand/gravel, negative-banked curves.

The manual is quite detailed (60 pages in length) and includes description of module prerequisites, time frames for coverage of information per topic and per activity/discussion within each topic, needed resources, instructor activities including accompanying transparencies, worksheets, fact sheets and review sheets, videos, etc.

The objective of the module is stated as, “The student appraises inclement and extreme weather conditions and formulates predictions on vehicular and driver limitations before developing and executing response; investigates roadway and vehicle technology including occupant protection to develop an understating of the related uses as crash and injury protections; demonstrates proper use of occupant protection devices and utilizes map reading and route planning techniques to avoid adverse driving conditions.”

This document is detailed, well thought out and would be a good model for the type of driver education module that could be developed under this project.

- 6) “Curriculum Scope and Sequence Modules for Driver Education in Virginia, Module Eight Driver Responsibilities: Adverse Conditions.” Virginia Department of Education and Virginia Department of Motor Vehicles, August 2001.

The Virginia Module Eight appears to be exactly the same curriculum as that used by the Texas Education Agency. The chapter covers the exact same topics as those listed above, in the exact same order and detail, and references the same instructor activities including accompanying transparencies, worksheets, fact sheets, review sheets and videos, etc. The Virginia module does not, however, include a stated objective.

The assessment, therefore, is the same. This document is detailed, well thought out and would be a good model for the type of driver education module that could be developed under this project.

- 7) “Driver Education Classroom and In-Car Curriculum, Unit 7 Environmental Conditions That Affect Safe Vehicle Operation and Unit 8 Vehicle Functions and Malfunctions, and Collision Reporting.” American Driver & Traffic Safety Education Association.

The “Driver Education Classroom and In-Car Curriculum” was developed to provide current information and techniques on teaching novice drivers the basics of motor vehicle operation. It was designed to be used specifically with and references the following textbooks:

- *Drive Right. 10th edition.* Prentice Hall
- *Handbook Plus. 1999 edition.* Propulsion International, Inc.
- *How to Drive. 9th Edition.* American Automobile Association
- *Responsible Driving. 2006 edition.* Glencoe/McGraw-Hill

The choice of text is left up to each individual school. The Curriculum is divided into 10 units and is designed to cover 45 hours of classroom instruction. Eight hours of in-car instruction are grouped into the In-Car guide and alternative forms of the final exam are provided along with unit exams.

Unit 7 is written to introduce students to the problems associated with driving under conditions in inclement weather, limited visibility and limited traction. The Unit includes reference to accompanying videos, slides and worksheets and also provides optional videos to be presented with each subject. The goals of the Unit state that students should:

- Participate in teacher-led discussion of the problems associated with driving at night, in fog, rain, snow, smoke, hot and cold temperatures and when there are strong cross winds;
- Complete worksheet 7.1, which asks how can each of sun glare, sunrise/sunset, fog, rain and snow affect a driver's ability to see? What adjustments should a driver make to better cope with the problem? What adjustments or checks other than driving, can be made to help compensate for the condition?
- Participate in teacher-led discussions of the advances in occupant protection, including automotive technology designed to protect vehicle occupants or enhance a driver's ability to respond in the event of loss of traction or other emergency;
- Participate in teacher-led discussion of traction and how it affects the movement and control of your vehicle, how to detect and respond to various types of traction loss and how to safely return to the paved roadway after drifting or steering onto the shoulder; and
- Complete Unit 7 test.

Unit 8 presents drivers with information about vehicle system functions and malfunctions and what to do if involved in a collision. It is applicable to adverse conditions in that it covers techniques used to respond to various vehicle malfunctions including loss of brakes and tire blowouts.

The stated goals of the Unit are that the student should:

- Participate in teacher-led discussion dealing with vehicle systems and system malfunction;
- Participate in teacher-led discussion on performance characteristics of various types of vehicles;
- Participate in teacher-led discussion on responding to various emergencies caused by vehicle malfunctions;
- Participate in teacher-led presentation on collision reporting requirements and behavior at the scene of a collision; and
- Complete Unit 8 test.

Although the two Units combined do not cover all of the topics included in the operational definition of adverse conditions developed for this project, the two documents appear to have some useful information in terms of serving as a model for the development of the driver education module envisioned for this project.

- 8) “Aware Driver Defensive Driving Course, Module 7 – Environmental Hazards & Vehicle Emergencies,” www.awaredriver.com.

Sponsored by American Institute for Public Safety and designed and implemented by Improv Traffic School, this instruction module is provided either on-line, through distance learning (videos or Digital Video Discs (DVDs)) or in four hour classroom formats. Improv offers State and Court approved interactive traffic safety programs in many states. The curriculums are designed to change students’ attitudes toward driving in order to become more knowledgeable and responsible drivers. Improv’s approach is interactive and utilizes entertainment values to present an educational message known as “edu-tainment” and reflective of the advent of such media as Music Television (MTV) and interactive Compact Discs read-only memory (CD-ROMs) and DVDs. The primary focus of their program is behavior modification related to traffic safety in order to reduce injuries and fatalities.

The Aware Driver Defensive Driving Course includes 10 Modules including:

- Module 1 – Appropriate Attitude
- Module 2 – Licensing Control & Actions
 - Licensing Control Measures
 - Canceled, Suspended & Revoked Licenses
- Module 3 – Signals, Signs & Road Markings
 - Lane Use and Road Markings
- Module 4 – Speeding
 - Basic Speed Law
 - Stopping Distances & Force of Impact
- Module 5 – Sharing the Road
 - Turns & Special Lanes, Carpool lanes, Highways and City Streets
- Module 6 – Crash Prevention
 - Defensive Driving Techniques
 - Passing
 - Collision
 - Financial Responsibility
 - Collision Case Reviews
- Module 7 – Environmental Hazards & Vehicle Emergencies
 - Adverse Driving Conditions
 - Driving Emergencies
- Module 8 – Safety Equipment & Vehicle Maintenance
 - Vehicle Maintenance
 - Passenger Restraints
- Module 9 – Driving Under the Influence
 - Driving Under the Influence
 - DUI Penalties
- Module 10 – Other Impairments

Module 7 includes discussion of adverse driving conditions and driving emergencies. The adverse driving conditions portion of the module includes discussion of fog conditions, darkness, and driving in the rain or on slick roads. The driving emergencies portion of the module includes discussion of brake failure, fire, mechanical breakdown, right wheels going off the shoulder, gas pedal sticking, power steering failure, tire blowouts, and hood flying up.

Though the coverage of the adverse conditions-related topics is not particularly detailed or broad, the interactive, “edu-tainment” format of this program is an interesting concept to consider in terms of the possibility of incorporating some features in to a model curriculum for AzDOT.

Summary

In summary, a number of documents were reviewed that could serve as models for the module(s) anticipated to be developed under this project. These documents provide both substantive content-related information and useful ideas for format and instructional and delivery methods.

Specifically, the Virginia Department of Motor Vehicles and Texas Education Agency documents provide detailed topical information and provide an organized layout and approach to the presentation of the material. Similarly, the “School Bus Driver In-Service Safety Series” and the “Driver Education Classroom and In-Car Curriculum” appear to have some useful content that should be considered in the development of the module(s) for this project. Both the “Aware Driver Defensive Driving Course” and the “Novice Driver Education Model Curriculum Outline” provide useful guidance on instructional methods, methods of delivery and performance objectives. The “Aware Driver Defensive Driving Course” in particular provides unique examples of interactive delivery methods and ways of utilizing entertainment values to present an educational message.

2.3: Summary of Research on Issues Related to Adverse Driving Conditions and Driver Education

This section presents a discussion of various issues related to the topic of adverse driving conditions and driver education including review of national crash and crash cause statistics, research on the impacts of driver education on crashes and highway safety policy issues in general.

Crash Statistics

According to the AAA Foundation for Traffic Safety in a paper prepared in collaboration with the Federal Highway Administration (FHWA) and NHTSA,⁷ traffic safety progress in the U.S. has slowed considerably over the past dozen years. From 1992 to 2004, the traffic fatality rate dropped 17 percent, from 1.75 per 100 million vehicle miles of travel to 1.46, and traffic injuries dropped 9 percent, but total traffic fatalities increased by 9 percent. In contrast, over the previous dozen years from 1980 to 1992, the fatality rate dropped 48 percent and total traffic fatalities dropped 17 percent. In 2004, there were 1.46 traffic fatalities per 100 million vehicle

⁷ *Traffic Safety Issues of the Future: A Long Range Research Agenda*. AAA Foundation for Traffic Safety. January 2006.

miles, which translates into 42,636 fatalities in that year. The U.S. Department of Transportation has the stated goal of reducing the rate of motor vehicle traffic fatalities to 1.0 per 100 million vehicle miles traveled by 2008, or roughly 30,000 fatalities per year. As of 2007, it would appear it is unlikely this goal will be achieved. In its *Traffic Safety Facts 2005*,⁸ NHTSA's National Center for Statistics and Analysis reports that deaths and injuries resulting from motor vehicle crashes are the leading cause of death for persons of every age from 3 through 33 (based on 2003 data).

There are not many statistics available regarding the causes of crashes, especially as related to the topic of this report (e.g. adverse conditions), but NHTSA's 2004 *Traffic Safety Annual Report* does include a table on Crashes by Weather Condition, Light Condition and Crash Severity.⁹ The table reveals that 40 percent of all crashes in 2004 (includes fatal crashes, injury crashes and property-damage only crashes) occurred during non-daylight hours (including dark but lighted, dark or dawn/dusk) and under some type of weather condition (either rain, snow/sleet or other). Of rain, snow/sleet and other, rain was the weather condition involved in the greatest percentage of weather-involved crashes at 71 percent. Looking exclusively at the lighting conditions of "dark, but lighted" and "dark and dawn/dusk;" "dark, but lighted" was the lighting condition under which the greatest percentage of lighting-involved crashes occurred at 48 percent.

The only other research reviewed that included statistics on the causes of crashes concluded that driver inattention is the leading factor in most crashes and near-crashes.¹⁰ In this study, the behaviors of the drivers of 100 vehicles equipped with video and sensor devices were tracked for more than one year. The study concluded that nearly 80 percent of crashes and 65 percent of near-crashes involved some form of driver inattention within three seconds before the event. The primary causes of driver inattention identified in the study included cell phone use and drowsiness.

In general, studies of actual driver behavior are difficult because of the complications associated with data collection. Drivers may or may not accurately report on their own behavior when asked after the fact, and there is the argument that drivers will not behave in the same manner as they normally would if they know they are being monitored.

Two of four broad research areas requiring further study were crash causation data in particular and crash data in general.¹¹ According to the participants in this workshop, the more that is known about the causes of crashes, the more this knowledge can help develop and implement crash avoidance countermeasures. Specific crash causation research issues identified included those associated with highway and environment issues such as geometric design, crash location,

⁸ *Traffic Safety Facts 2005 Data*. DOT HS 810 623. National Highway Traffic Safety Administration (NHTSA) National Center for Statistics and Analysis.

⁹ *Traffic Safety Facts 2004 A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System*. DOT HS 809 919, NHTSA National Center for Statistics and Analysis. Table 25.

¹⁰ *The 100-Car Naturalistic Driving Study*, NHTSA and Virginia Tech Transportation Institute (VTTI), 2006.

¹¹ *Traffic Safety Issues of the Future: A Long Range Research Agenda*. AAA Foundation for Traffic Safety, Federal Highway Administration, National Highway Traffic Safety Administration. January 2006.

pavement (friction) condition; and those associated with human factors such as distinguishing causes by crash severity and driver demographics, and studying near crashes.

Efforts to help improve crash data collection include the Model Minimum Uniform Crash Criteria Guidelines (MMUCC)¹² developed as a collaborative effort of the NHTSA, FHWA, the Federal Motor Carrier Safety Administration (FMCSA) and the Governors Highway Safety Association (GHSA – formerly NAGHSR). The purpose of MMUCC is to provide a data set for describing crashes of motor vehicles that will generate the information necessary to improve highway safety within each state and nationally. MMUCC recommends voluntary implementation of a “minimum set” of standardized data elements to promote comparability of data within the highway safety community. It serves as a foundation for state crash data systems and was first recommended as a voluntary guideline in 1998. The Second Edition of MMUCC (published in 2003) represents an update to this “minimum set” of data elements in response to emerging issues and other highway safety needs. The five new data elements added to the Second Edition include: distracted drivers, special use vehicles, roadway information at the vehicle level, hit and run crashes and vehicle contributing circumstances.

Impacts of Driver Education on Crashes

Though a subtle point, a general observation of the literature on the subject of driver education impact on crashes is that almost all driver education curricula are geared towards novice drivers. Consequently, most research on the impacts of driver education programs relate specifically the impacts of these programs on novice drivers. So, though many studies have found driver education to be ineffective in reducing crashes, they are really concluding that driver education is ineffective in reducing crashes amongst novice drivers. In addition, many studies have concluded that inexperience, not lack of skill, is the primary cause of novice driver crashes. Consequently, a review of the literature makes it difficult to isolate the impact of driver education on the actual behaviors of drivers in general, let alone on crashes.

This begs the question, would a driver education module on driving under adverse conditions given to more experienced drivers be more effective than the same module presented to novice drivers? The literature would suggest, yes, the outcome would be different because inexperience is the biggest factor impacting crashes, not necessarily a lack of skill.

It is generally agreed in the literature that inexperience is the greatest contributor to crashes. Novice drivers experience serious crash losses far beyond their representation in the driver population or their proportion of mileage driven.¹³ According to the AAA Foundation for Traffic Safety, new drivers lack important skills, particularly those needed to acquire and process information. They are not as effective as experienced drivers in scanning the environment, recognizing potential hazards while they are still at a safe distance, and making difficult decisions quickly. They tend to underestimate the danger of certain risky situations and overestimate the danger in others.

¹² “*Improving Crash Data for Safer Roadways, Model Minimum Uniform Crash Criteria Guideline (MMUCC).*” Second Edition, 2003.

¹³ *Novice Driver Education Module Curriculum Outline*, AAA Foundation for Traffic Safety, 1995

Decades of research indicate that driver education does not reduce crash involvement among beginning drivers. According to an Insurance Institute for Highway Safety article,¹⁴ several comprehensive international reviews of the best scientific evaluations of driver education programs for novice drivers all came to the same conclusion: “There is no difference in the crash records of driver education graduates compared with equivalent groups of beginners who learned to drive without formal education.”¹⁵ Beyond this, the article concludes that there is also little evidence that courses teaching advanced driving maneuvers such as skid control improve driver safety, and further that these courses appear to actually increase rather than reduce the crash risk of young males. Similarly, the AAA Foundation for Traffic Safety has found in other research,¹⁶ that there is not much compelling evidence that young people who complete driver education programs drive more safely or have fewer crashes than those who receive less formal driver instruction.

According to the Insurance Institute’s article, the international driver education literature summarizes the effects of driver education as follows:

“The research literature suggests that, beyond imparting basic car control and road law knowledge skills, pre-license driver training/education contributes little to post-license reductions in casualty crashes or traffic violations among novice drivers. In addition, mandatory pre-license training or even formal pre-license training/education, such as high school driver education programs in the USA, may contribute to increase exposure-to-risk for young drivers, particularly females, by encouraging early solo licensing. There is also considerable evidence that driver training that attempts to impart advanced skills such as skid control to learner drivers may contribute to increased crash risk, particularly among young males. This pattern of results has been confirmed and replicated across numerous studies conducted in Australia, New Zealand, North American, Europe and Scandinavia during the last 30 years.”¹⁷

The literature suggests that some reasons driver education has not historically produced safer drivers include:

- The courses are generally of short duration (for example 30 hours in-class and six hour in-vehicle) and can therefore only address basic driving skills;

¹⁴ Ferguson, S.A. and Williams, A.F. *Driver Education Renaissance*. Insurance Institute for Highway Safety, 2004.

¹⁵ Ferguson, S.A. and Williams, A.F. *Driver Education Renaissance*. Insurance Institute for Highway Safety, 2004 citing Christie R. *The effectiveness of driver training as a road safety measure: a review of the literature*. Victoria, Australia: Royal Automobile Club of Victoria Ltd, 2001. and Mayhew DR, Simpson HM, Williams AF, *et al*. Effectiveness and role of driver education and training in a graduated licensing system. *J Public Health Policy* 1998;19:51–67 and Vernick JS, Li G, Ogaitis S, *et al*. Effects of high school driver education on motor vehicle crashes, violations, and licensure. *Am J Prev Med* 1999;16:40–6. and Woolley J. *In-car driver training at high schools: a literature review*. Walkerville, South Australia: Transport SA, Safety Strategy, 2000. and Roberts I, Kwan I, Cochrane Injuries Group Driver Education Reviewers. *School based driver education for the prevention of traffic crashes (Cochrane review)*. The Cochrane Library, Issue 1. Oxford, UK: Update Software Ltd, 2002.

¹⁶ *Evaluating Driver Education Programs*. AAA Foundation for Traffic Safety, August 2006.

¹⁷ Ferguson, S.A. and Williams, A.F. *Driver Education Renaissance*” Institute for Highway Safety, 2004 page 3 citing Christie R. *The Effectiveness of Driver Training as a Road Safety Measure: A Review of the Literature*. Victoria, Australia: Royal Automobile Club of Victoria Ltd, 2001.

- Driver education is primarily given to young, novice drivers who are experiencing on-going peer, parental, personal and other social influences that shape their driving styles and crash involvement more than the driver education they are receiving;
- Driver education is primarily given to young, novice drivers who are typically unmotivated by safety concerns, e.g. the goal of most driver education students is learning enough skills to pass the driving test (as opposed to learning the skills that will make them a safe driver); and
- Driver education is primarily given to young adolescents who typically possess development and lifestyle features including risk taking, feelings of invulnerability, and immature decision-making, all of which make it difficult to use safety messages in order to influence the way they drive.

In *Evaluating Driver Education Programs: Management Overview*,¹⁸ the AAA Foundation for Traffic Safety highlights a key point in the general debate over driver education impact on traffic safety, which is that how driver education is evaluated depends on the objectives chosen for that education. For example, is the proper success criterion for driver education safer mobility or a safer youth population? If road safety is the primary concern, that is, safer mobility, then crash rates per miles driven could be an appropriate performance measure. If concerned primarily with the overall safety of the youth population, crash rates per teen would be a more appropriate measure. The article concludes that, while evaluation is important to improving the effectiveness and efficiency of driver education, it is also important to recognize its limitations. “Evaluation of driver education, like driver education itself, is evolving and still has far to go” the article maintains.

Despite these findings presented in the paragraphs above, the literature also suggests that there are specific reasons driver education has failed in terms of reducing crashes and, more importantly, that there are steps that can and should be taken to change that. For example, in the opinion of the AAA Foundation for Traffic Safety, the main function of current driver education is to support mobility, not to improve the safety performance of novice drivers.¹⁹ In the introduction to its paper, *Driver Education: The Path Ahead*, the Transportation Research Board’s Operator Education and Regulation Committee says that, “the failure of present-day instruction to provide a convincing demonstration of its ability to reduce accidents establishes the need for change.”²⁰ Views such as these, point to the need for research projects like the one being undertaken by AzDOT. The AAA Foundation for Traffic Safety notes in its’ document, *Evaluating Driver Education Programs: Management Overview*, that driver education is changing rapidly due to graduated licensing and other factors. For example, in some jurisdictions, such as Finland and Michigan, new drivers are required to take a second stage of training after they have been driving as licensed drivers for a short period of time.

According to the AAA Foundation for Traffic Safety, if driver education is to produce safer drivers it must reinforce the individual and community factors that positively influence personal

¹⁸ *Evaluating Driver Education Programs: Management Overview*. AAA Foundation for Traffic Safety. August 2006. Page 54.

¹⁹ *Novice Driver Education Model Curriculum Outline*. AAA Foundation for Traffic Safety, 1995.

²⁰ *Driver Education: The Path Ahead*. Transportation Research Board, Operator Education and Regulation Committee, Transportation Research Circular E-C101, August 2006.

motivation and social responsibility. In their opinion, “knowledge of how to control a car is not as critical to safety as individual motivation: Strong motivation makes up for weak skills better than strong skills make up for weak motivation.”²¹

The literature suggests that driver education can be made more effective in positively impacting safety if it is coordinated with graduated licensing (to combat the behaviors associated with inexperience) and inclusive of advances in interactive learning technology. Specifically, for example, the AAA Foundation for Traffic Safety makes the following recommendations:²²

- Develop software for teaching and testing knowledge and skills in an individual, self-paced, automated way.
- Develop interactive multi-media units for training and testing driver attention and visual detection as well as risk perception and evaluation.
- Develop software based on game-theory models to diagnose, clarify, and reinforce modification of new drivers' risk-taking styles and to demonstrate their consequences.
- Develop improved in-car instruction and instrumentation to teach driving and perception skills and provide feedback on driver performance.
- Develop participative classroom units for peer-focused seminars, individual study projects, and group work. These are needed to clarify health and safety values and to enhance personal motivation and social responsibility.
- Develop instructor training to support the use of new interactive media, participative classroom units, and in-car perception units. The need is to reinvent the teacher and instructor's role, enriching the job by shifting the emphasis from information provider to that of coach or mentor for health and safety motivation, social values, and life skills.
- Develop tools, models, and instruction units that support parent involvement in young driver education.
- Develop models and incentives that mobilize community, industry, and government support for coordinating positive influences on novice drivers. These should include links between the driver education and health promotion communities and between driver education and insurance providers.
- Coordinate development of graduated licensing systems with driver education. Move to multi-stage education in the graduated licensing jurisdictions. These driver education formats should also be pilot tested for effectiveness and market acceptance in non-graduated jurisdictions.
- Expand the integration of driver education topics into other school subjects, particularly health, community service, and other values-related activities.

Following on the conclusion that education in coordination with graduated licensing is a way to positively impact traffic safety, the Insurance Institute for Traffic Safety article cited earlier suggests that education for parents, as the primary providers of supervision, could be effective. The idea is that a coordinated approach including driver education for novice drivers, a

²¹ *Novice Driver Education Model Curriculum Outline*. AAA Foundation for Traffic Safety, 1995. page 3.

²² *Ibid.*

graduated licensing program that extends the learner period and is facilitated by parents guided by professional instruction could produce safer drivers.

According to Raymond Peck in his paper *Novice Training Effectiveness Evaluation*, “If driver training is to have a measurable effect on crash rates, it should impact those intermediate or mediating factors that are most highly associated with crash causation and which potentially are modifiable through training.”²³ The paper goes on to identify such factors as search and scan strategies, critical cue perception, and hazard recognition as being particularly critical to crash avoidance.

The AAA Foundation for Traffic Safety notes in both *Novice Driver Education Model Curriculum Outline* and *Evaluating Driver Education Programs: Management Overview*, that driver education programs are given a tougher mission than most education programs in that they are expected to produce improved driving and measurable reductions in crashes. Consequently, the former article maintains, driver education programs should become a leader in participatory education in the classroom and self-paced, automated training in the lab. The Foundation notes that it is important to keep in mind the specific problems that driver education should help solve, e.g. what is it about young drivers and their crash risk that we can actually expect education to be able to change?

Highway Safety Policy Issues

The topic of this project is part of the larger public policy question as to what is the proper course of action for the U.S. to take in terms of traffic safety. Is traffic safety a federal government responsibility or a state-level issue? What methods have proven effective in improving traffic safety from a policy standpoint? What levels of traffic safety are we as a society willing to consider acceptable? How does the U.S. compare to other countries in their approach to traffic safety and their achievements in improving it?

In his book, *Traffic Safety*,²⁴ Leonard Evans, a former General Motors research scientist and current researcher, writer and lecturer on traffic safety and president of Science Serving Society, compares the U.S. to other countries in terms of policies aimed at reducing traffic fatalities and concludes that U.S. traffic safety policy has been a “dramatic failure.”²⁵ Looking at three traffic fatality rates – fatalities per year (the raw fatality rate), fatalities per 1,000 registered vehicles (the vehicle rate), and fatalities per 100 million vehicle-miles of travel (the distance rate) – Evans demonstrates that there has been a decline in U.S. safety relative to other countries over the period 1972 to 2002. The book acknowledges that the declines achieved in fatality rates in the U.S. when viewed absent of the comparison to other countries appear impressive, but uses the comparison to make the point that changes in U.S. policies enacted in the mid-1970s made the U.S. fall behind other countries in terms of the percentage declines in fatality rates that could have been achieved had the U.S. followed similar policy actions.

²³ *Driver Education: The Path Ahead*. Transportation Research Board, Operator Education and Regulation Committee, Transportation Research Circular E-C101, August 2006, page 13.

²⁴ Evans, Leonard. *Traffic Safety*. (Science Serving Society, Bloomfield Hills, Michigan). 2004.

²⁵ Evans, Leonard. *The Dramatic Failure of U.S. Traffic Safety Policy: Engineering is Important, Public Policy is Crucial*. *Signals: TR News* 242. January-February 2006.

Evans maintains that public policy aimed at driver behavior can and does make a difference. More specifically, Evans contends that U.S. policy has focused on vehicle factors – even those factors that research has shown are of minor importance in terms of crash causation – while largely ignoring policies aimed at road-user behaviors, which research has shown to be effective in reducing crashes. The road-user behaviors that Evans believes can be impacted through appropriate policy actions include speeding, alcohol use, traffic law violation and belt wearing. Evans contends that the U.S. has wrongly focused on improving survivability from crashes (*e.g.* through the use of airbags and other vehicle technologies) in order to achieve ground transportation safety improvements instead of on preventing crashes.

Brian O’Neill, President of the Insurance Institute for Highway Safety and the Highway Loss Data Institute, chronicles traffic fatality rates and Federal and state traffic safety legislation from the late 1960s through 2004 in his article *Improving U.S. Highway Safety, Have We Taken the Right Road?*²⁶ O’Neill takes the stance that the 42,000 deaths from crashes each year is too big a price to pay for personal mobility. He documents in his article that in the 1960s and 1970s, the U.S. established federal motor vehicle safety standards, issued standards to address road user issues at the state level (*e.g.* driver licensing requirements, motorcycle helmet use and countermeasures for alcohol-impaired driving), and at the same time established standards for new road construction. O’Neill states, “In the 1970s federally mandated countermeasures addressed problems related to road users, vehicles and the road environment, and more countermeasures were expected.” Then in 1975, Congress overturned the legislation authorizing the federal mandates for road user behavior, eliminating the federal government’s ability to coerce states, through the withholding of federal highway construction funds, to establish effective programs and laws addressing road user behavior. As an example of a negative impact, O’Neill demonstrates the effect this policy action had on the number of states with universal helmet laws from 1966 to 2005 – a number that fell from 47 states in 1975 to 20 states in 2004.

O’Neill notes in the article that two portions of the federal highway safety program – NHTSA and FHWA – have remained in place and have been generally successful in continuing to address vehicle and road design safety issues, respectively, at the federal and state level. The article acknowledges that even without federal requirements to address road user issues – seat belt use, speeding and alcohol-impaired driving – the U.S. has realized some successes in these areas. He points out, however, that though policy makers tend to recognize scientific measures to determine which countermeasures work and which do not for vehicle designs and for road designs, *e.g.* the physics, engineering and biomechanics are well understood, they appear to ignore the scientific evidence related to countermeasures aimed at road user behavior. Different science disciplines are involved, but there are scientific measures available for determining which road user behavior countermeasures are more and which are less effective in reducing traffic fatalities. The article uses driver education as an example stating that even though many studies have shown education by itself rarely changes road user behavior, many decision-makers continue to maintain that more education is all that is needed.

O’Neill takes issue with Evans’ claim that this history of federal legislation represents a “dramatic failure” in U.S. safety policy, but rather that it demonstrates a dramatic failure in the

²⁶ O’Neill, Brian. *Improving U.S. Highway Safety, Have we Taken the Right Road? Signals*. TR News 239. July-August 2005.

safety policy of some states, pointing out that many states in the U.S. have fatality rates that meet or exceed the comparative rates of the other countries Evans uses in his comparisons. Evans, in response, maintains in his book that this fact merely emphasizes his underlying point that public policy aimed at driver behavior really does make a difference. O'Neill concludes that progress on road user issues in the U.S. will depend on political action at the state level.

In his article, *Eliminating the Annual Highway Safety Tragedy*,²⁷ Samuel C. Tignor agrees with O'Neill's assessment that State DOTs and local agencies must be more proactive in addressing highway safety problems and implementing proven safety infrastructure countermeasures. Tignor states in his article that there have been few attempts to bring national attention to the highway safety problem in the U.S. and that, "The primary safety problem in the United States is the lack of commitment to solve the problem."

Specifically, Tignor believes state DOTs and local agencies need to:

- Sensitize field staff and managers to find, report, and eliminate safety problems;
- Increase public awareness of safety by publishing the portion and the amount of improvement project funds that are spent on safety enhancements;
- Demonstrate that many safety solutions are simple and inexpensive; and
- Require highway safety impact studies for all highway projects.

Tignor agrees with the Evans argument that too much of the highway safety emphasis in the U.S. has been placed on surviving crashes as opposed to preventing crashes. He notes as a deficiency in both the Evans and O'Neill arguments that neither mentions that 25 percent of highway crashes relate to interaction problems between users and highway features. Tignor maintains that eliminating these problems alone could reduce fatalities by more than 10,000 annually. Generally, Tignor believes that, "The systematic use of engineering oversight, safety audits and human factors analyses can identify many problems and lead to simple and inexpensive corrections."

In conclusion, like many other public policy issues, there are a variety of solutions to increase traffic safety. It comes down to societal goals and societal acceptance of those various options. For example, how many fatalities are acceptable? Depending on the answer to that question, the U.S. could be considered either successful or unsuccessful in its approach to traffic safety. What types of countermeasures will drivers (and consequently elected officials and vehicle manufacturers) find palatable and which will be deemed unacceptable given our societal desire for increased mobility? For example, manufacturers could certainly build vehicles and the government – federal or state – could mandate that manufacturers must build vehicles that do not go over a certain speed, or that do not operate without a safety belt engaged or that do not operate before performing an alcohol "breathalyzer" test, but would we as a society find that acceptable? Should we be focusing on the cost-effectiveness of various solutions? Certainly the above stated examples would be cheaper than implementing long-term, nationwide belt-law publicity campaigns and enforcement measures, but is cost-effectiveness our primary goal?

²⁷ Tignor, Samuel C. *Eliminating the Annual Highway Safety Tragedy. Point of View*. TR News 245. July August 2006.

Public policy always has to consider the cost effectiveness of various solutions and weigh that against societal goals, objectives and tolerances. Highway safety issues are no different. In order to be able to perform this type of analysis, data must be available to support it. In addition, methods and technologies are constantly evolving that impact this available data. This is why continued research is always essential and why projects such as the one being undertaken by AzDOT are so important.

CHAPTER 3: STATISTICAL ANALYSIS OF ARIZONA ACCIDENT DATA

The purpose of this chapter is to provide the results of a statistical study of Arizona crash data. This statistical analysis was conducted for two purposes:

- 1) To extract information relative to crashes under adverse driving conditions; and
- 2) To analyze the data to ascertain whether driver training might have reduced the frequency or severity of these crashes.

This chapter is divided into the following five sections:

Section 3.1 reviews the Arizona crash data. This includes a review of the data collection forms, the crash database used in this study and the annual publication “Arizona Crash Facts.”

Section 3.2, describes the methodology used in the statistical analysis. Included is a description of the time period covered, a review of the definition of adverse conditions that is used, a review of the definition of driver education indicators that is used, and an overview of the data sorts that were developed.

Section 3.3 presents the data on the extent of accidents and fatalities involving adverse driving conditions. Included is an analysis of the number of accidents and fatalities by type of adverse condition and a summary of the total extent of accidents involving adverse conditions. Detailed data for 2005 is presented along with summary time-series data.

Section 3.4 presents data on the extent of accidents and fatalities involving adverse driving conditions where there is also an indicator that driver training might have reduced the frequency or severity of these crashes. Included is an analysis of the number of accidents and fatalities by type and a summary of the total extent of accidents involving both adverse conditions and an indicator that driver training might have reduced the frequency or severity. Detailed data for 2005 is presented along with summary time-series data.

Section 3.5 provides conclusions based on the statistical analysis and recommendations for further analysis.

3.1: Arizona Crash Data

Statistical data on motor vehicle crashes in Arizona are compiled from Arizona Traffic Accident Reports submitted to the Arizona Department of Transportation by state, county, city, tribal, and other law enforcement agencies. Within the Arizona Department of Transportation, the Arizona Traffic Accident Reports are compiled by the Traffic Records Section, Motor Vehicle Crash Statistics Unit. The Arizona Department of Transportation’s Motor Vehicle Division publishes an annual statistical review of the motor vehicle crashes in the State of Arizona. This publication is known as the *Motor Vehicle Crash Facts for the State of Arizona*.²⁸ In order to provide the most current information, preliminary data is utilized when necessary. For this reason, previous

²⁸ *Motor Vehicle Crash Facts for the State of Arizona*, Arizona Department of Transportation, Motor Vehicle Division, <http://www.azdot.gov/mvd/statistics/crash/index.asp>.

or future reports differ slightly. For example, the number of accidents and fatalities reported in this analysis are slightly different than the published estimates, although the differences are quite small. For example, the numbers of fatalities agree exactly in three of the five years and differ by only 3 and 4 in 2003 and 2005, respectively

Exhibit 3-1 provides a summary table from the 2005 Crash Facts, which was the most recent version available for the purposes of this study. Both the number of crashes and the number of fatalities have increased over the period 2001 to 2005, although the pattern was uneven, with a decline in 2003.

Exhibit 3-1: Summary Table from the 2005 Arizona Crash Facts

Year	Total Crashes	Fatal Crashes	Injury Crashes	Property Damage Crashes	Total Persons Killed	Total Persons Injured	Total Licensed Drivers	Total Registered Vehicles
2001	131,899	944	46,234	84,726	1,057	74,110	3,550,765	4,031,359
2002	134,228	984	46,209	81,045	1,132	14,230	3,668,104	4,089,002
2003	130,895	911	45,117	84,147	1,118	11,001	3,819,823	4,193,262
2004	138,547	990	46,674	80,883	1,151	73,415	3,784,365	4,364,851
2005	139,265	1,038	45,361	92,800	1,119	10,293	3,963,005	4,556,448

The data used in this study were provided by the Arizona Department of Transportation in five separate Microsoft Access databases, one for each of the years 2001-2005. For the purposes of this study, the data in each year were provided in four primary tables:

- 1) Incident;
- 2) Traffic Unit;
- 3) Vehicle; and
- 4) Person.

There is one Incident record per accident. There is one Traffic Unit record per unit involved in the accident (this can include non-vehicles). There is one Vehicle record per Traffic Unit, except when a traffic unit is not a motor vehicle. Finally, there is one Person record per person involved in the accident. For purposes of this study, the analysis of Traffic Units was limited to vehicles and Person records were limited to drivers. These restrictions do not affect the count of injuries and fatalities since these are recorded in the Incident table.

In order to process and tabulate the data for this study, two tables were created for each year, with each containing only the relevant data. The tables are:

- The Adverse Condition Incidents Table – This table contains each reported adverse condition for each driver in each incident. Incident-level conditions, such as road condition, are reported once for each vehicle involved.

- The Education Indicator Incidents Table – This table contains each reported education indicator for each driver in each incident.
- These tables were created using a query that was added to the databases. These macros are important because a variety of adjustments were made to the data mainly due to the complication that the data fields are reported at various levels (Incident, Traffic Unit, Vehicle, and Person). For example, the macros used for the 2005 data included the following:
 - AZDOT_2005.AdverseConditions.Count of Occurrences, Unadjusted – In this macro each adverse condition is counted once for each time it is associated with a vehicle in an incident (accident). Since some conditions are associated with incidents rather than vehicles, those incidents are counted by a multiple of the number of vehicles in the accident.
 - AZDOT_2005.AdverseConditions.Count of Occurrences, Adjusted - In this macro conditions that are associated with vehicle or driver are counted once per vehicle, conditions associated with the incident are counted once per incident.
- AZDOT_2005.AdverseConditions.Count of Incidents - In this macro all conditions are counted once per incident.
- AZDOT_2005.AdverseConditions.Count of Fatal Occurrences, Unadjusted - In this macro each adverse condition is counted once for each time it is associated with a vehicle in an incident (accident). Since some conditions are associated with incidents rather than vehicles, those incidents are counted by a multiple of the number of vehicles in the accident. Includes only incidents involving fatalities.
- AZDOT_2005.AdverseConditions.Count of Fatal Occurrences, Adjusted - In this macro conditions that are associated with vehicle or driver are counted once per vehicle, conditions associated with the incident are counted once per incident. Includes only incidents involving fatalities.
- AZDOT_2005.AdverseConditions.Count of Fatal Incidents - In this macro all conditions are counted once per incident. Includes only incidents involving fatalities.
- AZDOT_2005.AdverseConditions.Count of Fatalities - In this macro fatalities are counted once per incident, per adverse condition.
- AZDOT_2005.Education_PivotTable - In this macro a cross-tabulation of Adverse Conditions and Education Indicators is developed. Each count represents the number of vehicles for which the adverse condition and the education indicator were true. Incident-level conditions are counted multiple times when multiple vehicles are involved. The totals for the rows and columns are adjusted to represent unique incidents (accidents) for each factor. However, these totals still result in multiple counting of incidents since an incident can have multiple factors in either the adverse condition category and/or the

education indicator category. The grand total in the pivot table represents the unique number of incidents involving any adverse condition and any education indicator.

- AZDOT_2005.Education_PivotTable_Fatal - In this macro a cross-tabulation of Adverse Conditions and Education Indicators is created for fatal accidents only. This is similar to the previous tabulation but is for fatal accidents only. An additional outermost column and row represents number of fatalities for each category.

3.2: Methodology

This subsection describes the methodology used in the statistical analysis. Included is a description of the time period covered, a review of the definition of adverse conditions that is used, a review of the definition of driver education indicators that is used, and an overview of the data sorts that were developed.

Time Period Analyzed

The Arizona crash data is maintained in yearly files and 2005 data became available in mid-summer of 2006. In order to process the data, one question that was addressed was the time period to be analyzed. Since recent data are the most relevant data, it was determined that the data for 2005 were the most important for the study. However, it was also determined that it would be relevant to examine how adverse driving condition related accidents are changing. It was also possible that there is a significant difference in the prevalence of accidents in different years. As a result, it was determined that it would improve the analysis of the data to include multiple years. Therefore, data were analyzed for a full five year period including 2001, 2002, 2003, 2004 and 2005. This use of a five year time period is consistent with the historical data presented in the Arizona Crash Facts publication.

Definition of Adverse Conditions

The Literature Review provided in Chapter 2 of this report included a proposed definition for “adverse driving conditions” to be used for this project. Chapter 2 also presented a definition of “adverse driving conditions” operationalized in terms of the Arizona State Crash Forms.

According to the literature review, the fields of data shown in Exhibit 3-2 were proposed and accepted as the basis for the definition of adverse conditions. If any incident was coded on the crash form and in the database as involving one or more of the following conditions it was defined as involving “adverse driving conditions.”

Exhibit 3-2: Adverse Condition Data Fields

Variable	Data Field
16 Light Condition	16.2 Dawn or dusk 16.3 Darkness
17 Weather Condition	17.3 Sleet/hail 17.4 Rain 17.5 Snow 17.6 Severe Crosswinds 17.7 Blowing Sand, Soil, Dirt, Snow 17.8 Fog, Smog, Smoke
22 Unusual Road Condition	22.1 Under Construction, Traffic Allowed 22.2 Under Construction, No Traffic Allowed 22.3 Under Repairs 22.4 Holes, Ruts, Bumps 22.5 Obstruction, Protected 22.6 Obstruction, Unprotected 22.7 Obstruction, Unlighted at Night 22.8 Defective Shoulders 22.9 Changing Road Width 22.10 Water (Standing or Moving) 22.11 Temporary Lane Closure
Road Surface Condition	26.2 Wet 26.3 Sand, Mud, Dirt, Oil, Gravel 26.4 Snow 26.5 Slush 26.6 Ice
Vehicle Condition	29.2 Defective Brakes 29.3 Defective Steering 29.4 Defective Headlights 29.5 Defective Tail Lights 29.7 Puncture or Blowout 29.8 One or More Smooth Tire 29.10 Defective Windshield Wiper
Vision Obscurement	31.10 By Headlight 31.11 By Sun Glare 31.12 Because of Bad Weather 31.14 Rain, Snow, Fog on Windshield 31.15 Windshield obscured - Other

Sort of Data by Type of Adverse Condition

The first sort of the data was designed to provide a compilation of accident data for each of the adverse conditions. For example, data were developed on the number of accidents where the item (16 Light Condition - 16.2 Dawn or dusk) was checked on the accident report. It was also determined that it would be useful to tabulate data on the number of fatalities where the item was

checked. In addition, a control total on the number of accidents and number of fatalities in the year was developed. This allowed for the calculation of the percent of accidents that involved a dawn or dusk light condition. As described above, data were developed for each of five years.

Totals for All Adverse Conditions

One shortcoming of the first sort is that many accidents could involve more than one adverse condition. For example, an accident could occur with the boxes checked for (16 Light Condition - 16.2 Dawn or dusk), (17 Weather Condition - 17.3 Sleet/hail), and (26 Road Surface Condition - 26.2 Wet). It is certainly possible for an accident to occur at dusk with sleet falling on a wet road.

Therefore, in this sort, data were developed for the number of accidents that occurred where any of the adverse driving conditions were present. As described above, it was determined that it would also be useful to have data on the number of fatalities and that data be developed for each of five years.

Definition of Driver Education Indicators

As described in the introduction to this Chapter, the purpose of this task is not only to analyze information relative to crashes under adverse driving conditions, but also to ascertain whether driver education might have reduced the frequency or severity of these crashes.

Unfortunately for the purposes of this study, the Arizona State Crash Forms do not contain an entry by the police officer indicating that driver education might have reduced the frequency or severity of the accident. However, a thorough review of the Arizona State Crash Forms uncovered a large number of variables that identified dangerous characteristics of the driver, the drivers behavior or vehicle condition. In these situations it can be argued that there is at least an indication that driver training would be a potential solution.²⁹ The data fields shown in Exhibit 3-3 were considered to meet these conditions.

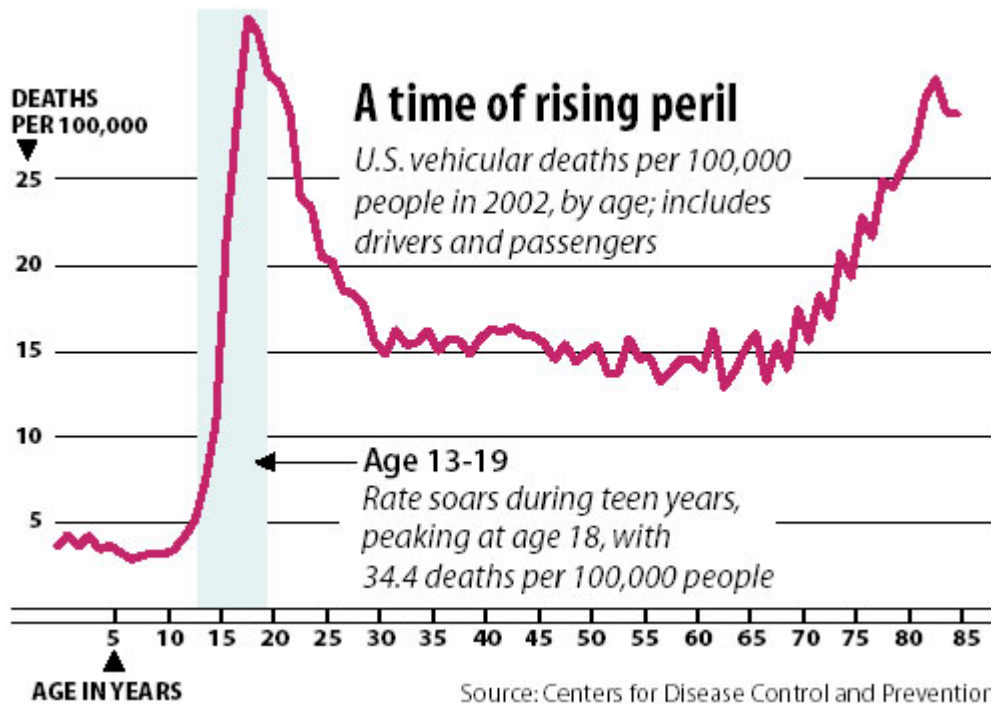
In addition to these items, it was recognized that driver training is often seen as especially important and targeted toward two age groups, younger and older drivers. As a result, the “Date of Birth” field on the Arizona State Crash Forms was used to develop an indicator as to whether younger or older drivers were involved in the accident and, therefore, whether driver education might have reduced frequency or severity. Based on the literature review and Exhibit 3-4, which shows the U.S. Vehicular Deaths per 100,000 People by Age, it was determined that the age cutoffs should be 25 and under and 75 and over. At these ages, the fatality rate was about 25 percent higher than the rates between 30 and 70 years old.

²⁹ It was suggested by a member of the TAC that driving under the influence should not be considered an indicator that driver education could reduce the number or severity of accidents involving adverse driving conditions. However, it is observed that it is an established practice to require drivers convicted of driving under the influence to participate in a driver education program. Therefore, it is presumed that driver education could impact a person’s ability to avoid driving under the influence and improve his or her ability to respond to adverse driving conditions or to improve his or her ability to respond to adverse conditions despite his or her impairment.

Exhibit 3-3: Driver Education Data Fields

Variable	Data Field
27 Conditions Influencing Driver	27.2 Had Been Drinking 27.3 Use of Illicit Drugs 27.4 Illness 27.5 Fell Asleep / Fatigued 27.7 Prescription Drugs
28 Violations/Behavior	28.2 Speed Too Fast for Conditions 28.3 Exceeded Lawful Speed 28.4 Failed to Yield Right-of-way 28.5 Followed Too Closely 28.6 Ran Stop Sign 28.7 Disregarded Traffic Signal 28.8 Made Improper Turn 28.9 Drove on Opposing Traffic Lane 28.10 Knowingly Operated With Faulty or Missing Equipment 28.11 Required Motorcycle Safety Equipment Not Used 28.12 Passed in No Passing Zone 28.13 Unsafe Lane Change 28.14 Other Unsafe Passing 28.15 Inattention

Figure 3-4: U.S. Vehicular Deaths per 100,000 People by Age, 2002



Graphic Courtesy of the Chicago Tribune as reprinted at <http://journeysafe.org:80/JourneySafe/index.asp>

It was therefore determined that the presence of one of the variables that identified dangerous characteristics of the driver or the driver's behavior or the presence of a driver 25 or under or 75 and over, become the definition of a "driver training indicator." An accident involving any one of these driver or age conditions are considered an indicator that driver training might have reduced the frequency or severity.

Sort of the Impact of Driver Education on Individual Adverse Conditions

In this sort, data were developed for a cross-tabulation. Data were sorted to provide a compilation of the number of accidents for each of the adverse conditions where one of the driver education indicators including age (≤ 25 or ≥ 75) was also checked. For example, data would be provided on the number of accidents where the item (16 Light Condition - 16.2 Dawn or dusk) was checked on the accident report while at the same time the item (27 Conditions Influencing Driver - 27.2 Had Been Drinking) was checked.

It was also determined that it would be useful to tabulate data on the number of fatalities and that data be developed for each of five years.

Impact of Driver Education on All Adverse Conditions

As was the case with the sort of adverse conditions, one shortcoming of the combined sort of adverse conditions against driver education indicators is that many accidents could involve more than one adverse condition and more than one driver training indicator. For example, an accident could occur with the boxes checked for (16 Light Condition - 16.2 Dawn or dusk), (17 Weather Condition - 17.3 Sleet/hail), and (26 Road Surface Condition - 26.2 Wet) as well as (27 Conditions Influencing Driver - 27.2 Had Been Drinking), and (Under 25). It is certainly possible for an accident to occur at dusk with sleet falling on a wet road where the driver had been drinking and was under 25.

Therefore, in this sort, data were developed for the number of accidents that occurred where any of the adverse driving conditions and any of the driver training indicators including age (≤ 25 or ≥ 75) were present. Note that there would have to be at least one of the conditions required for each of the two groups of indicators. The total of these observations would represent the best available estimate of the number of accidents involving adverse conditions where driver education might have reduced the frequency or severity.

As described above, it was again determined that it would be useful to have data on the number of fatalities and that data be developed for each of five years.

3.3 Accidents and Fatalities Involving Adverse Driving

As stated above, one purpose of this chapter is to provide the results of a statistical analysis of information relative to crashes under adverse driving conditions. Exhibit 3-5 summarizes the number of incidents (accidents) that involved each of the various adverse conditions identified in the literature review and Exhibit 3-2. Included is a percentage that indicates the percent of all

incidents for which that adverse condition was reported for the incident or at least one driver involved in that incident.³⁰ Data are provided for each of the years 2001 through 2005.

Exhibit 3-5: Number and Percent of Incidents by Type of Adverse Condition (2001-2005)										
Condition	2001		2002		2003		2004		2005	
	#	%	#	%	#	%	#	%	#	%
Dawn or Dusk	6,914	5.24	6,816	5.05	6,669	508	7,317	5.28	7,904	5.65
Darkness	30,935	23.43	31,539	23.38	30,759	23.45	32,371	23.35	31,995	22.89
Sleet/Hail	1,055	0.80	322	0.24	288	0.22	211	0.15	229	0.16
Rain	4,973	3.77	3,078	2.28	5,302	4.04	6,109	4.41	5,780	4.13
Snow	1,058	0.80	672	0.50	601	0.46	923	0.67	571	0.41
Severe Crosswinds	98	0.07	155	0.11	125	0.10	131	0.09	80	0.06
Blowing Sand, Soil, Dirt, Snow	106	0.08	191	0.14	122	0.09	128	0.09	78	0.06
Fog, Smog, Smoke	68	0.05	73	0.05	91	0.07	67	0.05	38	0.03
Under Construction, Traffic Allowed	3,877	2.94	4,463	3.31	3,700	2.82	3,346	2.41	3,301	2.36
Under Construction, Traffic Not Allowed	92	0.07	98	0.07	69	0.05	73	0.05	98	0.07
Under Repairs	138	0.10	120	0.09	82	0.06	91	0.07	99	0.07
Holes, Ruts, Bumps	372	0.28	352	0.26	358	0.27	308	0.22	311	0.22
Obstruction (protected)	45	0.03	35	0.03	41	0.03	30	0.02	33	0.02
Obstruction (unprotected)	120	0.09	124	0.09	102	0.08	118	0.09	104	0.07
Obstruction (unlighted at night)	113	0.09	112	0.08	130	0.10	144	0.10	112	0.08
Defective Shoulders	29	0.02	22	0.02	38	0.03	36	0.03	41	0.03
Changing Road Width	359	0.27	299	0.22	357	0.27	289	0.21	275	0.20
Flooded	453	0.34	363	0.27	495	0.38	499	0.36	489	0.35
Temporary Lane Closure	463	0.35	465	0.34	356	0.27	380	0.27	353	0.25
Wet	7,515	5.69	4,529	3.36	7,558	5.76	8,655	6.24	8,124	5.81

³⁰ One comment submitted by a member of the TAC noted that indicators/variables that relate to crashes might be underreported on crash report forms.

Exhibit 3-5: Number and Percent of Incidents by Type of Adverse Condition (2001-2005)										
Condition	2001		2002		2003		2004		2005	
	#	%	#	%	#	%	#	%	#	%
Sand, Mud, Dirt, Oil or Gravel	939	0.71	823	0.61	744	0.57	743	0.54	648	0.46
Snow - on road	713	0.54	320	0.24	331	0.25	553	0.40	359	0.26
Slush	215	0.16	112	0.08	108	0.08	172	0.12	195	0.14
Ice	1,162	0.88	840	0.62	539	0.41	568	0.41	460	0.33
Defective Brakes	1,065	0.81	998	0.74	938	0.72	955	0.69	941	0.67
Defective Steering	193	0.15	199	0.15	162	0.12	164	0.12	159	0.11
Defective Headlights	60	0.05	72	0.05	61	0.05	75	0.05	74	0.05
Defective Tail Lights	88	0.07	76	0.06	70	0.05	66	0.05	71	0.05
Puncture or Blowout	1,165	0.88	1,396	1.03	1,284	0.98	1,239	0.89	1,110	0.79
One or More Smooth Tires	152	0.12	147	0.11	147	0.11	164	0.12	126	0.09
Defective Windshield Wiper	32	0.02	26	0.02	21	0.02	20	0.01	16	0.01
Headlight Glare	104	0.08	99	0.07	95	0.07	95	0.07	72	0.05
Sun Glare	1,414	1.07	1,416	1.05	1,248	0.95	1,406	1.01	1,309	0.94
Because of Bad Weather	292	0.22	241	0.18	260	0.20	279	0.20	256	0.18
Rain, Snow, Fog on Windshield	424	0.32	290	0.21	392	0.30	474	0.34	418	0.30
Windshield Obscured, Other	119	0.09	107	0.08	90	0.07	99	0.07	107	0.08

One of the most salient features of Exhibit 3-5 is that the number and percentage of incidents involving the various adverse conditions are fairly stable from year-to-year. Approximately 31,000 to 32,000 incidents representing about 23 percent of all incidents involve driving during darkness. This is by far the largest of the adverse conditions. Three additional adverse conditions: dawn or dusk, rain, and wet roads appear in about four to six percent of incidents. “Under construction with traffic allowed” is another major category of adverse condition and is present in about two to three percent of incidents. Only eight of the remaining 31 categories account for even a half of a percent of incidents in any given year and none of these eight items account for more than 1.07 percent of incidents. These include:

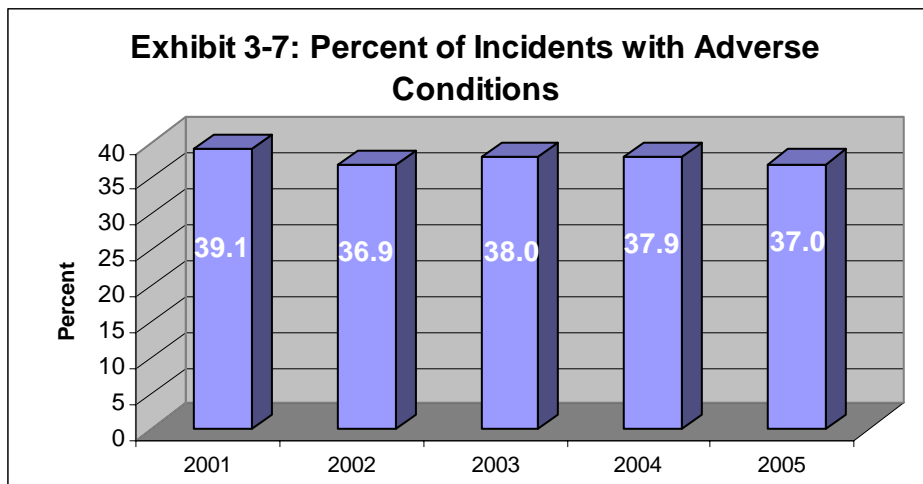
- Sleet/Hail
- Snow
- Sand, Mud, Dirt, Oil or Gravel
- Snow on Road
- Ice
- Defective Brakes
- Puncture or Blowout
- Sun Glare

Note that one or more of these adverse conditions may be present at a given incident. Exhibit 3-6 summarizes overall data on the number of incidents, vehicles involved, and incidents involving one or more adverse condition. Over the period from 2001 to 2005, the number of incidents ranged from 131,000 to 140,000 and, involving 247,000 to 269,000 vehicles. Of these incidents, 50,000 to 53,000 involved one or more adverse condition representing between 36.9 and 39.1 percent. Again, the level of both incidents and incidents involving adverse conditions were relatively stable from year-to year.

Exhibit 3-6: Number of Incidents (2001-2005)

	2001	2002	2003	2004	2005
Number of Incidents	132,042	134,893	131,171	138,645	139,789
Number of Vehicles in all Incidents	248,862	254,241	246,939	262,023	268,795
Incidents With One or More Adverse Conditions	51,573	49,768	49,835	52,600	51,659
Percent	39.1	36.9	38.0	37.9	37.0
Incidents With One or More Education Indicators	117,507	119,999	116,748	123,405	124,691
Incidents With One or More Adverse Conditions and Education Indicators	44,409	42,601	43,030	45,441	44,863
Percent	33.6	31.6	32.8	32.8	32.1

Exhibit 3-7 summarizes the percent of incidents involving adverse conditions. As discussed above, this percentage ranges from 36.9 and 39.1 percent and is relatively stable from year-to year.



Similar data was also developed for fatalities under adverse driving conditions. Exhibit 3-8 summarizes the number of fatalities that involved each of the various adverse conditions. Included is a percentage that indicates the percent of all fatalities for which that adverse condition was reported for the incident or at least one driver involved in that incident. Data are provided for each of the years 2001 through 2005. The year-to-year stability that was evident for incidents is less pronounced for fatalities due mainly to the lower number of observations. Once again, darkness is by far the most prevalent of the adverse conditions and is even more pronounced for fatalities at 44 to 49 percent of the incidents involving adverse conditions. The four additional

adverse conditions: dawn or dusk, rain, wet roads and Under construction with traffic allowed; which accounted for between two to six percent of incidents are again important for fatalities, but are joined by Puncture or Blowout. Only ten of the remaining categories account for even a half of a percent of incidents in any given year and none of these eight items account for more than 1.24 percent of incidents. These include:

- Sleet/Hail
- Snow
- Blowing Sand, Soil, Dirt, Snow
- Holes, Ruts, Bumps
- Flooded
- Sand, Mud, Dirt, Oil or Gravel
- Ice
- Defective Brakes
- One or More Smooth Tires
- Sun Glare
- Bad Weather

Compared to incidents, Snow on Road was the only adverse condition to fall off this list while five new adverse conditions were added including:

- Blowing Sand, Soil, Dirt, Snow
- Holes, Ruts, Bumps
- Flooded
- One or More Smooth Tires
- Bad Weather

Exhibit 3-8: Number and Percent of Fatalities by Type of Adverse Condition (2001-2005)										
Condition	2001		2002		2003		2004		2005	
	#	%	#	%	#	%	#	%	#	%
Dawn or Dusk	57	5.39	79	6.98	92	8.21	66	5.73	75	6.34
Darkness	513	48.53	508	44.88	490	43.71	504	43.79	536	45.31
Sleet/Hail	12	1.14	3	0.27	2	0.18	1	0.09	9	0.76
Rain	28	2.65	19	1.68	22	1.96	51	4.43	37	3.13
Snow	5	0.47	4	0.35	8	0.71	4	0.35	7	0.59
Severe Crosswinds	2	0.19	2	0.18	4	0.36	4	0.35	2	0.17
Blowing Sand, Soil, Dirt, Snow			2	0.18	4	0.36	7	0.61	2	0.17
Fog, Smog, Smoke			1	0.09			1	0.09		
Under Construction, Traffic Allowed	21	1.99	11	0.97	20	1.78	8	0.70	15	1.27
Under Construction, Traffic Not Allowed										
Under Repairs	1	0.09					2	0.17	1	0.08
Holes, Ruts, Bumps	5	0.47	7	0.62	4	0.36	4	0.35	8	0.68

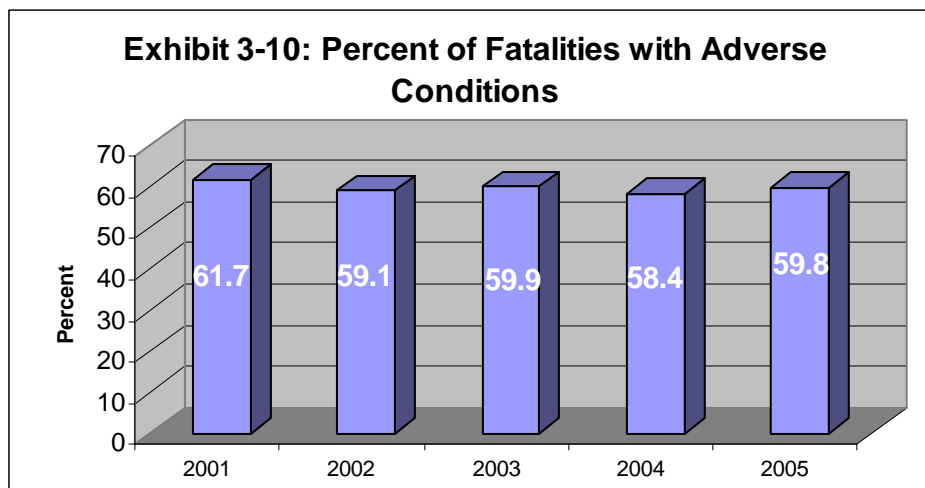
Exhibit 3-8: Number and Percent of Fatalities by Type of Adverse Condition (2001-2005)										
	2001		2002		2003		2004		2005	
Obstruction (protected)	2	0.19	1	0.09			1	0.09		
Obstruction (unprotected)	1	0.09					2	0.17		
Obstruction (unlighted at night)	2	0.19	4	0.35			3	0.26	6	0.51
Defective Shoulders			3	0.27						
Changing Road Width	4	0.38			4	0.36	1	0.09	4	0.34
Flooded	5	0.47	8	0.71	6	0.54	5	0.43	8	0.68
Temporary Lane Closure	1	0.09	3	0.27	2	0.18	1	0.09	3	0.25
Wet	36	3.41	28	2.47	31	2.77	63	5.47	55	4.65
Sand, Mud, Dirt, Oil or Gravel	8	0.76	14	1.24	10	0.89	7	0.61	4	0.34
Snow - on road	3	0.28	1	0.09	5	0.45			4	0.34
Slush	1	0.09	3	0.27	1	0.09	4	0.35	2	0.17
Ice	10	0.95	11	0.97	9	0.80	4	0.35	4	0.34
Defective Brakes	8	0.76	6	0.53	5	0.45	10	0.87	8	0.68
Defective Steering							2	0.17	2	0.17
Defective Headlights	3	0.28	2	0.18	2	0.18	2	0.17		
Defective Tail Lights							2	0.17		
Puncture or Blowout	30	2.84	31	2.74	45	4.01	47	4.08	33	2.79
One or More Smooth Tires	4	0.38	3	0.27	6	0.54	9	0.78	7	0.59
Defective Windshield Wiper									1	0.08
Headlight Glare	2	0.19	4	0.35	2	0.18	3	0.26	2	0.17
Sun Glare	6	0.57	7	0.62	7	0.62	6	0.52	11	0.93
Because of Bad Weather					5	0.45	10	0.87	3	0.25
Rain, Snow, Fog on Windshield	4	0.38	6	0.53	5	0.45	4	0.35	1	0.08
Windshield Obscured, Other	2	0.19			1	0.09	1	0.09		

Again, one or more of these adverse conditions may be present at a given fatality. Exhibit 3-9 summarizes overall data on the number of fatalities, vehicles involved, and fatalities involving one or more adverse condition. Over the period from 2001 to 2005, the number of fatalities ranged from 1,057 to 1,183, involving 1,447 to 1,183 vehicles. Of these incidents, 652 to 707 involved one or more adverse condition representing between 58.4 and 59.8 percent.

Exhibit 3-9: Number of Fatalities (2001-2005)

	2001	2002	2003	2004	2005
Number of Fatalities	1,057	1,132	1,121	1,151	1,183
Number of Vehicles in all Fatal Incidents	1,447	1,496	1,516	1,532	1,621
Fatalities With One or More Adverse					
Conditions	652	669	671	672	707
Percent	61.7	59.1	59.9	58.4	59.8
Fatalities With One or More Education					
Indicators	879	911	914	925	942
Fatalities With One or More Adverse					
Conditions and Education Indicators	536	515	539	526	559
Percent	50.7	45.5	48.1	45.7	47.3

Exhibit 3-10 summarizes the percent of fatalities involving adverse conditions. As discussed above, this percentage ranges from 58.4 to 59.8 percent. The level of fatalities and the percent involving adverse conditions were relatively stable from year-to-year. The percent of fatalities involving adverse conditions is significantly higher, than the percentage of incidents involving adverse conditions by about twenty percent.



3.4 Accidents and Fatalities Involving Adverse Driving and Driver Education

The second stated purpose of this chapter is to analyze the data to ascertain whether driver training might have reduced the frequency or severity of the crashes that occurred under adverse driving conditions. As discussed in an earlier section of this chapter, while the Arizona State Crash Forms do not contain an entry by the police officer indicating that driver education might have reduced the probability or severity of the accident, there are a number of variables that identify dangerous characteristics of the driver, the drivers behavior or vehicle condition. In

addition to these items, it was recognized that driver training is often seen as especially important and targeted toward two age groups, younger and older drivers.

Exhibit 3-11 provides a cross-tabulation of these driver training indicators with the indicators of adverse conditions discussed in the previous section. Data in the main body of the tabulation represent the number of vehicles for which the adverse condition and the education indicator were true. Incident-level conditions are counted multiple times when multiple vehicles are involved. The totals for the rows and columns are adjusted to represent unique incidents (accidents) for each factor. For example, 6,972 is the number of unique accidents involving at “dawn or dusk” and at least one education indicator. However, these totals still result in multiple counting of incidents, since an incident can have multiple factors in either the adverse condition category and/or the education indicator category. The grand total of 44,863, provided in the lower right corner of the pivot table, represents the unique number of incidents involving any adverse condition and any education indicator.

In total, young drivers were involved in 55.0 percent of the incidents that involved both adverse conditions and a driver training indicator, the highest percentage attributable to any of the driver training indicators. Several other driver training indicators were also highly represented including drinking at 12.8 percent, speed too fast for conditions at 41.4 percent, failure to yield right-of-way at 19.0 percent and inattention at 28.9 percent. Note that the percentages add to more than 100 percent, as incidents may involve more than one driver training indicator.

Exhibit 3-11: Number and Percent of Incidents by Type of Adverse Condition and Driver Education Indicator (2005)

Adverse Condition	Driver Education Indicator											Total Incidents, Any Education Indicator	Percent of Total Incidents Having Adverse Condition and Any Education Indicators										
	Age <=25	Age >=75	Had Been Drinking	Appeared to be Under Influence of Drugs	Ill-Ability Influenced	Sleepy-Fatigued	Prescription Drugs	Speed Too Fast for Conditions	Exceeded Lawful Speed	Failed to Yield Right-Of-Way	Followed Too Closely			Ran Stop Sign	Disregarded Traffic Signal	Made Improper Turn	Drove in Opposing Traffic Lane	Knowingly Operated with Faulty or Missing Equipment	Required Motorcycle Safety Equipment Not Used	Pass in No-Passing Zone	Unsafe Lane Change	Other Unsafe Passing	Inattention
Dawn or Dusk	4,256	255	371	39	18	174	28	2,861	105	1,596	323	122	340	271	136	26	4	12	370	91	2,388	6,972	15.5
Darkness	18,929	695	5,266	214	71	762	137	11,383	808	5,025	910	550	1,704	1,236	794	142	17	42	1,617	237	7,970	27,644	61.6
Slush/Hail	87	12	9	4	1	3	3	122	5	20	10	5	3	3	5	7	1	7	7	1	41	185	0.4
Rain	3,370	257	336	19	7	52	7	2,815	57	1,006	301	57	213	192	98	11	2	8	220	35	1,339	5,254	11.7
Snow	244	7	13	1	1	1	1	400	3	15	16	6	2	4	5	2	1	9	4	95	493	1.1	
Severe Crosswinds	21	5	2	2	2	2	2	26	4	4	3	2	2	2	2	1	1	1	1	1	15	48	0.1
Blowing Sand, Soil, Dirt, Snow	32	2	5	1	1	1	1	38	1	8	1	1	2	1	2	1	1	4	1	20	58	0.1	
Fog, Smog, Smoke	13	2	1	1	1	1	1	14	2	4	2	1	2	2	2	1	1	3	1	9	31	0.1	
Under Construction, Traffic Allowed	1,686	202	164	16	10	38	7	1,161	38	528	201	33	115	192	53	10	1	3	307	38	1,077	2,991	6.7
Under Construction, Traffic Not Allowed	37	7	7	2	2	2	2	38	1	18	3	2	7	4	4	3	1	3	3	1	35	86	0.2
Under Repairs	48	6	2	2	2	2	2	30	2	17	9	4	5	7	2	2	1	5	2	38	83	0.2	
Holes, Ruts, Bumps	117	8	29	1	1	5	1	139	19	14	6	4	2	7	12	4	1	1	2	84	237	0.5	
Obstruction (protected)	14	1	2	1	1	1	1	15	1	3	1	1	1	2	1	1	1	2	1	12	27	0.1	
Obstruction (unprotected)	39	1	1	1	1	1	1	21	1	2	6	1	2	1	1	1	1	2	1	18	60	0.1	
Obstruction (unlighted at night)	37	1	1	1	1	3	1	35	1	7	2	1	3	3	1	2	1	2	1	29	74	0.2	
Defective Shoulders	16	1	3	3	1	3	1	20	1	2	1	2	1	1	1	1	1	1	35	18	82	238	0.5
Changing Roadwidth	124	16	18	2	4	4	1	91	5	46	10	3	3	10	6	2	1	1	14	14	80	448	1.0
Flooded	285	21	24	1	4	4	1	306	5	44	23	6	10	9	8	2	2	2	43	3	128	324	0.7
Temporary Lane Closure	168	14	22	4	1	4	1	144	2	43	27	1	8	17	4	2	2	2	322	59	1,946	7,358	16.4
Wet	4,685	364	506	28	13	82	17	3,782	82	1,458	420	93	290	271	130	15	3	13	322	59	1,946	7,358	16.4
Sand, Mud, Dirt, Oil or Gravel	249	17	62	3	2	2	3	313	31	48	12	10	7	22	20	6	2	9	5	163	522	1.2	
Snow - on road	150	6	9	1	1	1	1	250	1	15	11	4	2	3	3	3	2	8	2	60	314	0.7	
Slush	75	4	1	1	1	1	1	125	4	5	5	1	1	2	1	1	1	5	1	31	160	0.4	
Ice	186	7	4	4	1	5	5	295	2	18	14	2	2	3	4	2	2	2	4	71	365	0.8	
Defective Brakes	394	18	41	7	5	5	3	389	10	36	56	32	49	7	13	183	1	8	2	119	819	1.8	
Defective Steering	70	2	12	2	2	1	1	27	1	3	1	1	1	4	7	29	1	3	3	11	123	0.3	
Defective Headlights	24	1	6	3	2	1	1	13	1	9	1	1	3	1	3	18	3	1	1	7	68	0.2	
Defective Tail Lights	13	1	3	2	1	1	1	6	1	1	1	1	7	1	20	1	1	1	4	4	66	0.1	
Puncture or Blowout	402	13	37	3	2	4	1	178	14	5	3	3	4	3	7	28	1	15	2	32	589	1.3	
One or More Smooth Tires	58	13	13	3	3	3	3	78	4	6	3	3	3	2	2	22	1	2	2	1	21	121	0.3
Defective Windshield Wiper	7	2	2	2	2	2	2	6	1	1	1	2	1	2	2	2	1	2	2	4	15	0.0	
By Headlight	19	4	4	4	2	2	1	12	2	8	2	2	1	1	2	2	1	1	1	1	11	49	0.1
By Sun Glare	363	79	12	2	2	3	3	303	1	392	50	29	140	49	18	1	1	26	5	339	1,215	2.7	
Because of Bad Weather	93	12	7	1	1	1	1	149	4	21	8	3	2	7	7	7	1	8	2	61	207	0.5	
Rain, Snow, Fog on Windshield	185	17	25	4	1	4	1	179	1	65	13	5	8	16	12	1	1	13	8	98	373	0.8	
Windshield Obscured, Other	38	2	1	1	1	1	1	17	1	19	3	2	3	3	2	2	1	10	1	24	94	0.2	
Total Incidents, Any Adverse Condition	24,657	1,606	5,755	281	108	997	183	18,579	1,023	8,507	1,819	801	2,429	1,917	1,074	350	21	65	2,531	424	12,979	44,863	100.0
Percent of Total Incidents Having Education Indicator and Any Adverse Condition	55.0	3.6	12.8	0.6	0.2	2.2	0.4	41.4	2.3	19.0	4.1	1.8	5.4	4.3	2.4	0.8	0.0	0.1	5.6	0.9	28.9	100.0	

The number of incidents involving any adverse condition and any education indicator has remained fairly consistent from year-to-year. The number and percent of such incidents were previously reported in Exhibit 3-6, and the percentages are summarized in Exhibit 3-12. The number of incidents ranges from a low of 42,601 in 2002 to a high of 45,441 in 2004. The percentage these types of incidents are of all incidents ranges from 31.6 to 33.6 percent.

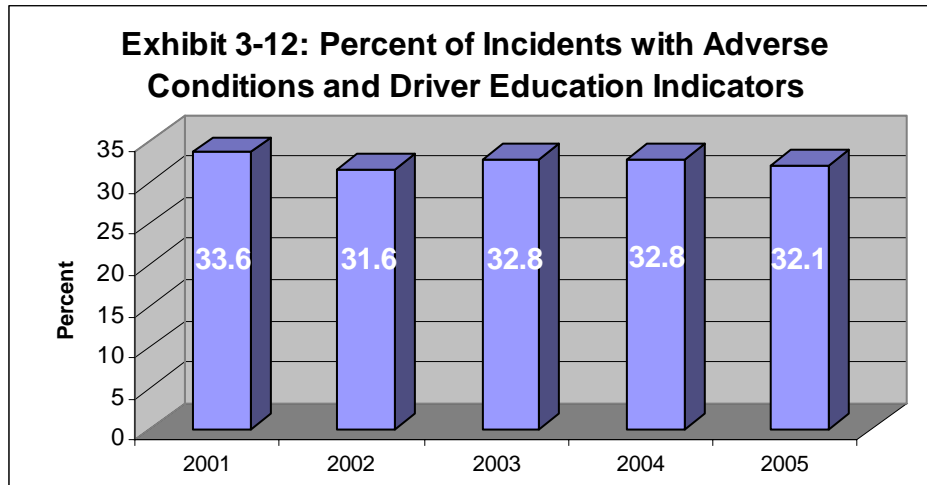


Exhibit 3-13 provides a cross-tabulation of driver training indicators with the indicators of adverse conditions for fatalities. Data in the main body of the tabulation represent the number of fatal incidents for which the adverse condition and the education indicator were true. Incident-level conditions are counted multiple times when multiple vehicles are involved. The totals for the rows and columns are adjusted to represent unique incidents (accidents) for each factor. For example, 61 is the number of unique accidents involving at “dawn or dusk” and at least one education indicator. However, these totals still result in multiple counting of fatalities, since a fatal incident can have multiple factors in either the adverse condition category and/or the education indicator category. The grand total of 559, provided in the lower right corner of the pivot table, represents the unique number of incidents involving any adverse condition and any education indicator.

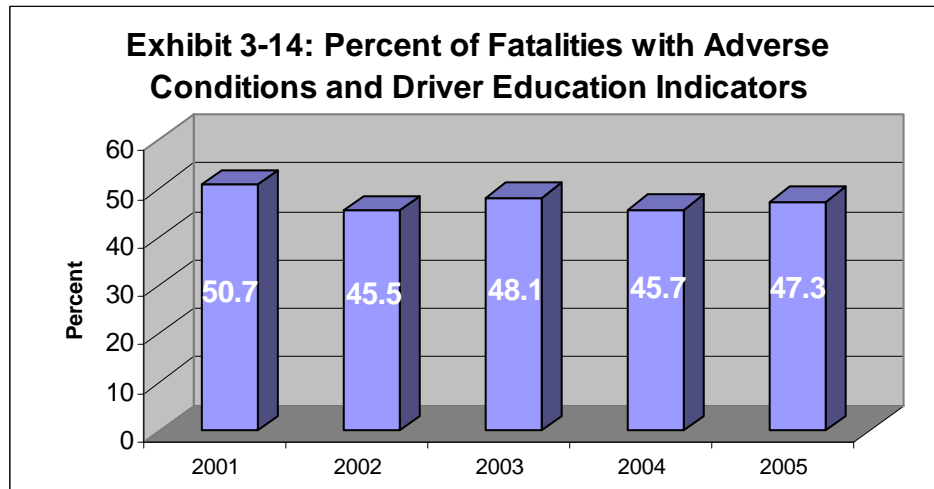
In total, young drivers were involved in 49.9 percent of the incidents that involved both adverse conditions and a driver training indicator, the highest percentage attributable to any of the driver training indicators. Several other driver training indicators were also highly represented including drinking at 30.8 percent, speed too fast for conditions at 47.2 percent, exceeded lawful speed at 10.6 percent, failure to yield right-of-way at 11.4 percent, driving in opposing traffic lane at 11.8 percent and inattention at 18.6 percent. Note that the percentages add to more than 100 percent, as incidents may involve more than one driver training indicator.

For fatalities, driver education indicators that became more important include: had been drinking, speed too fast for conditions, exceeded lawful speed and drove in opposing traffic lane. Indicators that become less important include: age, failure to yield right-of-way, and inattention. The data appear to indicate that the combination of adverse conditions and multiple driver education indicators is often fatal.

Exhibit 3-13: Number and Percent of Fatalities by Type of Adverse Condition and Driver Education Indicator (2005)

Adverse Condition	Driver Education Indicator											Total Fatalities, Any Education Indicators	Percent of Total Fatalities Having Adverse Condition and Any Education Indicators						
	Age <=25	Age >=75	Had Been Drinking	Ill-Ability Influenced	Sleepy-Fatigued	Prescription Drugs	Speed Too Fast for Conditions	Exceeded Lawful Speed	Failed to Yield Right-Of-Way	Followed Too Closely	Ran Stop Sign			Disregarded Traffic Signal	Made Improper Turn	Drove in Opposing Traffic Lane or Missing Equipment	Knowingly Operated with Faulty Equipment Not Used	Required Motorcycle Safety Equipment Not Used	Pass in No-Passing Zone
Dawn or Dusk	21	1	16	3	6	17	1	7	4	3	4	1	10	2	2	61	10.9		
Darkness	225	11	138	14	20	175	43	40	12	16	12	4	36	2	6	61	416	74.4	
Sleet/Hail	2	1	1	1	1	6	2	2							1	1	9	1.6	
Rain	23	3	2	1	1	19	1	5					5			6	37	6.6	
Snow	3					1										1	7	1.3	
Severe Crosswinds						2										1	2	0.4	
Blowing Sand, Soil, Dirt, Snow	1		1		1	1										1	2	0.4	
Fog, Smog, Smoke																			
Under Construction, Traffic Allowed	7	1	5	1		4	2	4			2	1	2			3	15	2.7	
Under Construction, Traffic Not Allowed																			
Under Repairs	1					1													
Holes, Ruts, Bumps	2	2	3			6										4	7	1.3	
Obstruction (protected)																			
Obstruction (unprotected)																			
Obstruction (unlighted at night)	2		2			5										1	6	1.1	
Defective Shoulders																			
Changing Roadwidth						1													
Flooded	5					5										1	3	0.5	
Temporary Lane Closure	2		1			2	1									1	8	1.4	
Wet	34	3	5	1	1	24	2	7			1		7			8	54	9.7	
Sand, Mud, Dirt, Oil or Gravel	1		3			2	1									3	4	0.7	
Snow - on road						1										4	0.7		
Slush	2					1										1	2	0.4	
Ice	1					2										4	0.7		
Defective Brakes	4		1			4										1	8	1.4	
Defective Steering						1													
Defective Headlights																			
Defective Tail Lights																			
Puncture or Blowout	7		1			7	1						1			3	17	3.0	
One or More Smooth Tires	1		1			5	1										7	1.3	
Defective Windshield Wiper	1		1			1										1	1	0.2	
By Headlight	1		1			2	1									1	1	0.2	
By Sun Glare	3		1	1		2	1	4								2	11	2.0	
Because of Bad Weather						2										1	3	0.5	
Rain, Snow, Fog on Windshield	1																		
Windshield Obscured, Other																			
Total Fatalities, Any Adverse Condition	279	23	172	22	2	264	59	64	2	22	17	8	66	4	2	11	104	559	100.0
Percent of Total Fatalities Having Education Indicator and Any Adverse Condition	49.9	4.1	30.8	3.9	0.4	47.2	10.6	11.4	0.4	3.9	3.0	1.4	11.8	0.7	0.4	2.0	18.6	100.0	

The number of fatalities involving any adverse condition and any education indicator has remained fairly consistent from year-to-year. The number and percent of such fatalities were previously reported in Exhibit 3-9, and the percentages are summarized in Exhibit 3-14. The number of fatalities involving both types of indicators ranges from a low of 515 in 2002 to a high of 559 in 2004. The percentage these types of incidents are of all incidents ranges from 45.5 to 50.7 percent.



3.5 Conclusions and Recommendations

This chapter has used Arizona Traffic Accident Reports from 2001 to 2005 to analyze the amount of accidents and fatalities that occur in adverse driving conditions and whether driver training might have reduced the frequency or severity of these incidents. To perform this analysis a definition of adverse conditions was developed along with a list of driver education indicators that included driver characteristics, behaviors and vehicle conditions.

The results indicate that adverse conditions are present in just fewer than 40 percent of accidents and approximately 60 percent of fatalities. Moreover, when cross tabulated with driver education indicators, this strong correlation is still maintained. The results indicate that both adverse conditions and driver education indicators are present in about a third of accidents and half of fatalities.³¹

Exhibit 3-15 provides a table that compares fatality rates between Arizona and the United States from the 2005 Arizona Crash Facts. Overall, the US fatality rate of 1.47 (per 100 million miles traveled) is significantly below Arizona's fatality rate of 2.01 (per 100 million miles). Given the relatively high fatality rate in Arizona, the crucial role played by adverse conditions, and the potential of driver education to reduce the frequency or

³¹ The TAC suggested that crash statistics could also have been presented for 'serious incidents and fatalities' in addition to 'all incidences' and 'fatalities.' The analysis of this midpoint could have proved interesting, but would not have changed the results of the analysis.

severity of these incidents, it appears Arizona should follow the lead provided by several other states and implement a driver education module focused on adverse conditions.

Exhibit 3-15: Arizona and US Comparison Table from the 2005 Arizona Crash Facts

Historical Trends—Arizona and the United States					
Year	U.S. Fatality Rate	Arizona Fatality Rate	Arizona Traffic Deaths	Motor Vehicle Miles Traveled (100 million)	Arizona Fatal Crash Rate
2001	1.50	2.08	1,057	50,861	1.84
2002	1.51	2.17	1,132	52,014	1.89
2003	1.50	2.10	1,118	53,345	1.83
2004	1.44	2.01	1,151	57,260	1.73
2005	1.47	2.01	1,179	58,796	1.77

CHAPTER 4: Survey of State Driver Education Officials

This chapter presents the results of the survey of state representatives involved in the development and implementation of driver education curriculum. The goal of the survey was two-fold. First, it sought to document the state-of-the-practice in developing and administering existing driver education programs throughout the country, and specifically driver education modules focused on adverse driving conditions. This information formed the basis on which driver education programs were selected for more in-depth case study analysis. Summaries of these case studies are provided in Chapter Five. Secondly, the survey identified recent and ongoing efforts to monitor or estimate the effectiveness of driver education programs. Combined, this information was useful for developing an innovative and comprehensive adverse driver education module for AzDOT.

The remainder of this chapter consists of the following three sections:

- Section 4.1 provides an overview of the survey methodology
- Section 4.2 presents the survey results and describes the findings.
- Section 4.3 provides a summary of the key findings

4.1 Survey Methodology

The development and implementation of the driver education survey is described in this section.

Study staff, in consultation with the AzDOT Technical Advisory Committee (TAC), developed a web-based survey instrument targeted at officials in all 50 states familiar with the development and implementation of their state's driver education curriculum. These state officials, in most instances, were state Department of Transportation, Department of Public Safety, Department of Education, or Department of Motor Vehicles employees. Some states have other departments responsible for driver education curriculum development and/or program implementation. When necessary, more than one state official was surveyed in order to accommodate a state's procedures. Study staff identified potential survey respondents through a number of different means including: internet searches of state government websites; communications with driver education-related associations; telephone inquiries to State Departments of Transportation, Education and others; and lists of state traffic safety contacts used for previous research. A full list of survey recipients and a reproduction of the survey instrument are provided as Appendices B and C, respectively.

After receiving approval of the survey instrument from the TAC, candidate respondents were sent an email, which included an introductory letter signed by the AzDOT project manager, an explanation of the project and a request for the recipient to complete the web-based survey including an electronic link to the online survey instrument. The introductory email included a requested response date and contact information for both AzDOT and study staff.

To increase the survey response rate, study staff conducted a number of follow-up activities. A reminder email was sent to all non-respondents after the requested response date had passed to remind them of the survey and request its completion. A second reminder email was sent one week later. After the second reminder email transmission, study staff made phone calls to the remaining non-respondents. At least two phone calls were made to each non-respondent, more in some instances depending on the type of reply received.

4.2 Survey Results

The survey of state representatives in the driver education and curriculum development community achieved an 82 percent response rate (41 of 50 states responding). An analysis of the responses for each question is provided below. Exhibits are also included to graphically illustrate the results where applicable. Note that the total number of responses for each question may not sum to 41 since respondents may have declined to answer certain questions. The percentages presented in the charts and graphs and described in the text generally represent the percent of respondents actually providing a response to that particular question, not the percent of total responses.

Question 1: What agency/department within your state is responsible for *developing* your driver education curriculum?

Question 2: What agency/department within your state is responsible for *implementing* the driver education program?

The responses for Question 1 and 2 are combined in Exhibit 4-1 on the following page. The exhibit identifies the agency responsible for development and implementation of driver education curriculum by state.

Analysis of the data shows that approximately 44 percent of survey respondents (18 states) indicated that no statewide agency is charged with driver education curriculum development. In most of these cases, respondents stated that the driver education curriculum is typically obtained from nationally recognized organizations such as ADTSEA and AAA. These course materials are then approved for use in the classroom by state agencies such as the Department of Transportation (DOT), Department of Motor Vehicles (DMV), or State Department of Education (SDE). For example, Georgia's Department of Education Driver Services Division and Nebraska's DMV Examining Division are responsible for approving driver education course materials used by public and private schools, but do not develop curriculum independently. Other states without a state-level agency involved in curriculum development do have a state-level agency that has approval power over the curriculum developed and implemented by local level agencies.

Thirty-four (34) percent of respondents indicated that their respective SDE or similar statewide educational organization (e.g., Montana's Office of Public Instruction or Texas' Education Agency) is responsible for developing driver education curriculum. Other examples of SDE led curriculum development efforts include: Arizona, Idaho, Texas, West Virginia, and Illinois.

The remaining 25 percent of respondents cited a mix of state departments of transportation, public safety agencies, individual schools and school districts as being responsible for curriculum development. For example, in Pennsylvania each school and/or school district develops its own curriculum. Recently, the Pennsylvania SDE, which is charged with approving driver education programs, adopted content and performance expectations for driver education. The SDE also published an “Enhanced Driver Education Program Guide” to provide general guidelines for course content for use by schools and school districts. Other cases where agencies provide general guidance but have no explicit directive to develop curriculum include: New Mexico DOT’s Traffic Safety Bureau, Oregon DOT’s Safety Division, and Ohio’s Department of Public Safety.

Exhibit 4-1: Agencies Responsible for Curriculum Development & Implementation

State	Curriculum Development Agency	Implementation Agency
Alabama	State Department of Education (SDE)	State Department of Education
Alaska	None	Division of Motor Vehicles
Arizona	None	Professional driver training schools licensed and regulated by MVD. Private schools regulated by the SDE.
California	None	State Department of Education
Colorado	Division of Motor Vehicle, Driver Education Compliance	Department of Revenue, Division of Motor Vehicle
Connecticut	None	Department of Motor Vehicles
Delaware	State Department of Education	State Department of Education
Florida	None	Department of Highway Safety and Motor Vehicles
Georgia	None. (SDE, Driver Services approves driver education courses, but does not develop curriculum.)	Georgia Department of Driver Services
Idaho	State Department of Education	State Department of Education
Illinois	State Board of Education	State Board of Education
Indiana	None (SDE approves curriculum of public schools, Bureau of Motor Vehicles approves curriculum for private driving schools)	State Board of Education & Bureau of Motor Vehicles
Iowa	None	None
Kansas	State Department of Education	State Department of Education
Kentucky	Transportation Cabinet (public schools and private driver training schools offer courses that can be substituted for the Transportation Cabinet course. These curriculum are not developed by, but must be approved by Transportation Cabinet)	Transportation Cabinet, Division of Driver Licensing

State	Curriculum Development Agency	Implementation Agency
Maine	Secretary of State, Bureau of Motor Vehicles	Secretary of State, Bureau of Motor Vehicles
Maryland	Motor Vehicle Administration	Motor Vehicle Administration
Michigan	Department of State	Department of State
Minnesota	Department of Public Safety (Administrative Rules)	Department of Public Safety
Mississippi	State Department of Education, Pupil Transportation	Mississippi Department of Driver Services
Missouri	State Department of Elementary & Secondary Education (DESE)	DESE and Missouri Dept. of Revenue, Student Permit Section
Montana	Montana Office of Public Instruction	Montana Office of Public Instruction
Nebraska	None (DMV Examining Division approves curricula)	Department of Motor Vehicles
New Jersey	None	Department of Motor Vehicles
New Mexico	New Mexico DOT, Traffic Safety Bureau	New Mexico DOT, Traffic Safety Bureau
North Carolina	None (suggested curriculum is provided by state driver education professional association)	State Department of Public Instruction / DMV
North Dakota	None (each school district sets their own curriculum according to course titles and descriptions developed by ND Department of Public Instruction)	Department of Public Instruction, School Approval and Accreditation
Ohio	Department of Public Safety, Governor's Highway Safety Office	Department of Public Safety, Governor's Highway Safety Office
Oklahoma	None (Individual School Districts)	State Department of Education, State Aide Section
Oregon	Department of Transportation, Transportation Safety Division	Department of Transportation, Safety Division
Pennsylvania	None (SDE must approve curriculum used and provides guidelines)	State Department of Education
South Carolina	State Department of Education	State Department of Education
South Dakota	None (Individual School Districts)	None (Individual Schools)
Tennessee	State Department of Safety	State Department of Safety
Texas	Texas Education Agency	Education Agency and Department of Public Safety
Vermont	None (SDE recommends curriculum, but does not mandate)	SDE (Recommends curriculum, not mandates)

State	Curriculum Development Agency	Implementation Agency
Virginia	State Department of Education	Department of Education for public/non public schools Department of Motor Vehicles for commercial
Washington State	None (Individual School Districts)	Public Schools: Superintendent of Public Instruction; Commercial Schools: Department of Licensing
West Virginia	State Department of Education, Office of Healthy Schools	State Department of Education, Office of Healthy Schools
Wisconsin	None (Individual School Districts)	Department of Public Instruction for public and private high school programs; DOT/DMV for commercial driving school programs; Wisconsin Technical College System for Technical College programs.
Wyoming	None (Individual School Districts)	Wyoming Department of Education

Several responses to Question 1 and 2 highlight distinctions between public school versus private driving school instruction and novice versus commercial driver training curriculum development. For example, in Arizona, the State’s professional driver training schools are licensed and regulated by the Motor Vehicle Division (MVD), while high schools providing driver education are regulated by the Department of Education.

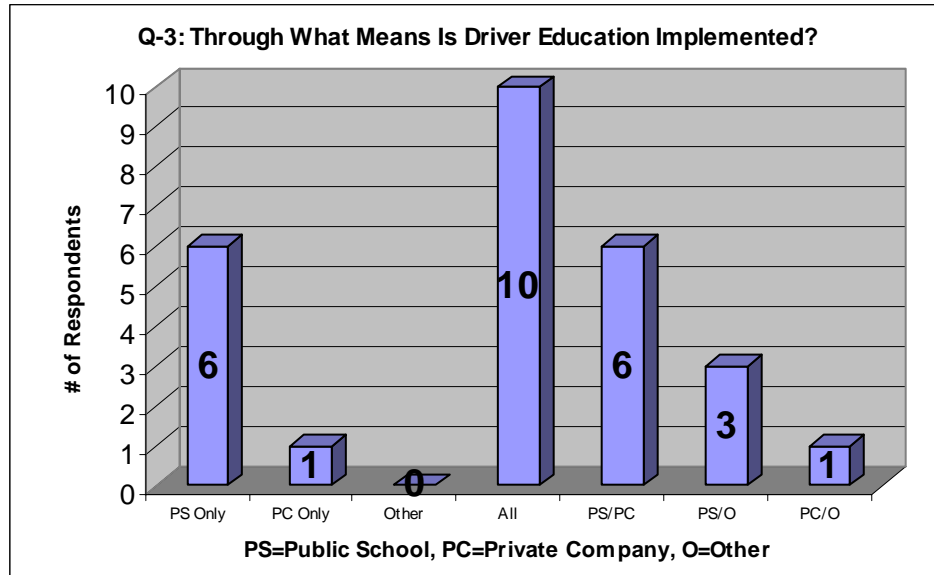
Question 2 sought to identify the agency responsible for implementing the driver education curriculum. The distribution of responses is as follows:

- Fifty-four percent indicated that their respective SDE is charged with applying novice driver education curriculum.
- Twenty-two percent identified their state’s Department/Registry of Motor Vehicles (DMV or RMV) as the agency in charge of driver education implementation.
- Twenty percent show that the State DOT or State Department of Public Safety was responsible for implementation of curriculum. Examples these agencies include the Ohio Department of Public Safety and Oregon Department of Transportation, Safety Division.
- Four percent stated that no specific agency was tasked with implementation.

Question 3: Through what means is driver education implemented in your state?

Question 3 identifies the primary means of driver education program implementation. Respondents were given the following options and could select all that apply: Public School, Private Company or Other, with space provided to explain “other.” As shown in Exhibit 4-2 below, while the majority of respondents said their state used all three mechanisms, the public school and private company driver education programs appear to be the predominant means of instruction.

Exhibit 4-2



Respondents who selected “other” identified these alternative education programs as:

- Driver training programs at non-accredited public, private, and parochial schools;
- Parent-based teaching programs; and
- Computer-based (“virtual”) courses offered at community college, community learning centers or through private website companies.

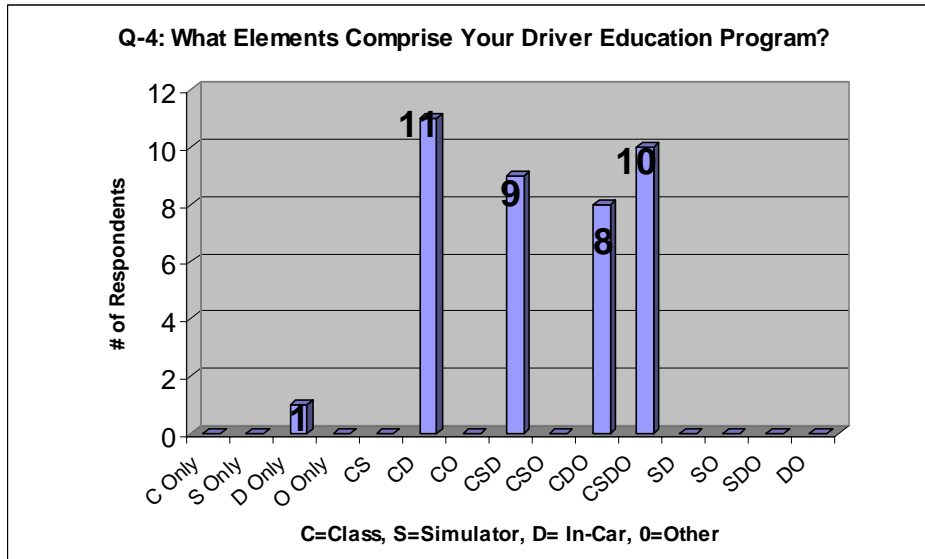
For example, Georgia’s Driver Services approves the use of online courses and courses offered through technical colleges and other colleges. The Community College of Rhode Island’s Lifelong Learning Division, offers three driver education courses for drivers seeking 1) learners permits, 2) provisional licenses, or 3) full operator licenses.

Question 4: What elements comprise your driver education program and what are the hour requirements?

Question 4 identifies the primary elements and number of required hours, if applicable for each of those elements. As shown in Exhibit 4-3, the use of In Class Curriculum, In-car Curriculum (either behind-the-wheel or as a passenger in-car), and Driving Simulation in driver education programs is evenly split among respondents. This demonstrates that most driver education programs rely on a mix of classroom, in-car, and

simulator instruction. Respondents were also given the opportunity to describe “other” driver education elements used in their driver education programs. Those other elements identified included closed-range driving courses and parent-led behind the wheel instruction and observation.

Exhibit 4-3

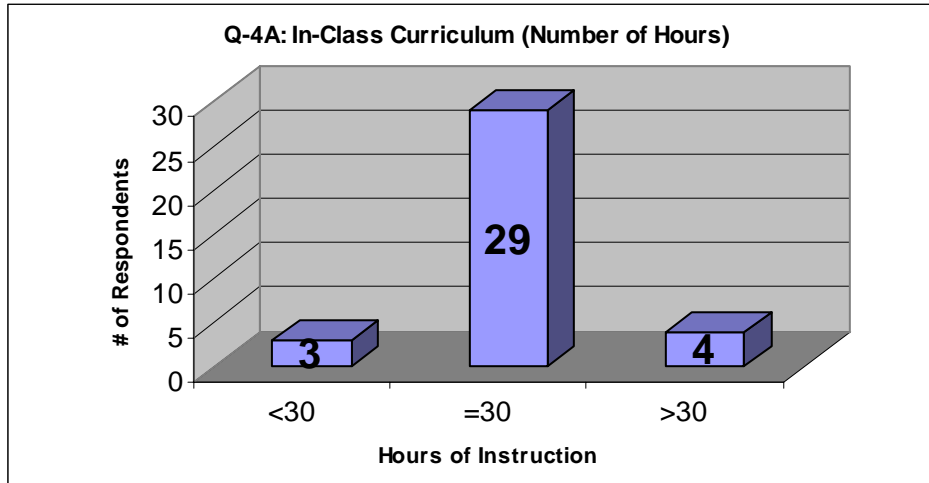


Several respondents noted that closed-ranged driving and simulated driving are not considered equivalent to behind-the-wheel, in-car instruction. Several states have established equivalency ratios for closed-range and simulator instruction times. Fairly standard ratios appear to be 2 hours of closed range driving equals one hour of behind-the-wheel instruction, and 4 hours on a simulator equals 1 hour of behind-the-wheel instruction. For example, in Minnesota, for every two hours of range driving only one hour counts toward the six (6) required hours of on-road instruction. Minnesota also limits range conversions to a maximum of two hours. Other limitations are also sometimes placed on the use of simulators and/or closed range instruction. In North Dakota for example, students must complete a minimum of three hours of behind-the-wheel, in-car driving if simulation or range training is used. Several states also require observed in-car instruction (not behind-the-wheel) hours in addition to the behind-the-wheel requirement. For example, in Idaho, Wisconsin, Vermont, Virginia and Wyoming amongst others, 6 hours of observed in-car driving hours are required in addition to 30 classroom hours and 6 behind-the-wheel hours.

A notable exception is Kansas, which has a competency-based system. In other words, there are no specific number of hours required for any of the driver education program elements, but rather students must demonstrate competency in certain identified areas (presumably through some testing procedure) before obtaining their certificate of completion of the driver education course.

As shown in Exhibit 4-3A below, the survey found that the majority of states that specify a quantity of in-class instruction require 30 hours. Those requiring more than 30 hours of in-class training are: West Virginia (50 hrs.), Montana (42 hrs.), New Jersey (35 hrs.) and Texas (34 hrs.). Those states that require less than 30 hours are Kentucky (4 hrs.), Nebraska (20 hrs.) and Ohio (24 hrs.).

Exhibit 4-3A



The survey results also show that the use of driving simulators represents only a small portion of driver education programs (see exhibit 4-3B). This trend may, in large part, be a result of the limited availability and high costs of simulator equipment. Also, as previously mentioned, states that do use simulators do not consider simulator or closed-range instruction equivalent to behind-the-wheel instruction and therefore programs may place less emphasis on simulator usage. For example, in Nebraska only one hour of behind-the-wheel instruction may be replaced by use of a driving simulator at a proportion of four to one. Each hour of simulated driving is considered equivalent to only 15 minutes of behind-the-wheel drive time.

Exhibit 4-3B

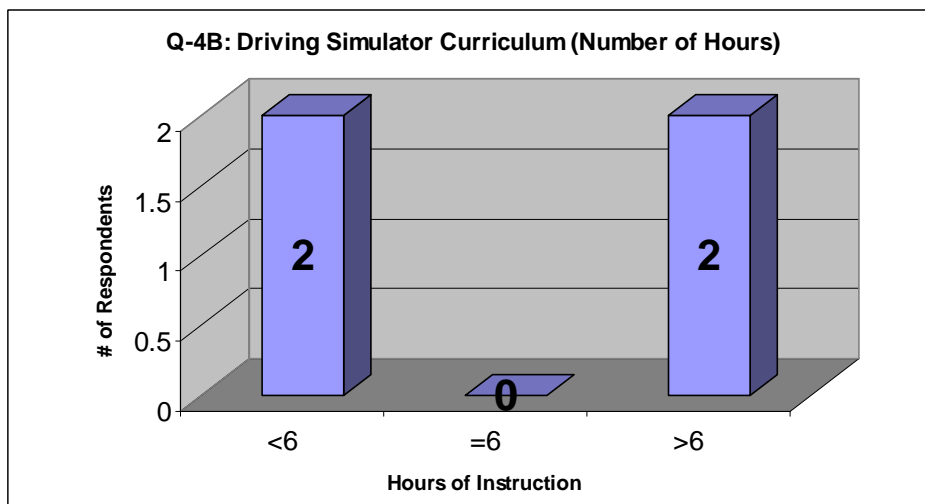
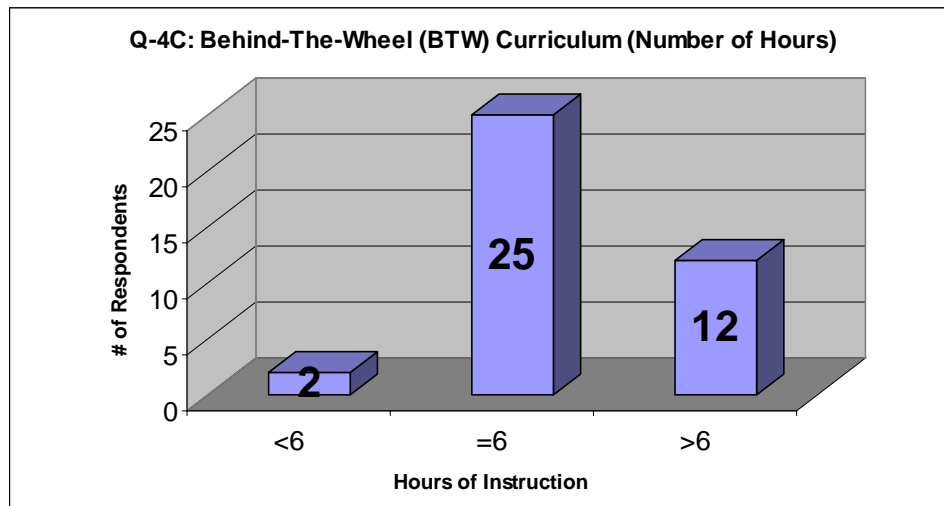


Exhibit 4-3C below shows that the majority (65 percent) of respondents who provided detail on their hours requirements indicated that their driver education curriculum included six hours of behind-the-wheel training. Twenty-eight percent required more than six hours. For example, Alaska’s graduated licensing program requires 40 hours of BTW training as certified by a parent, guardian or employer. Ten of these 40 hours are required to occur when the sky is dark. In Connecticut, new drivers under the age of 18 can take a certified driver education class consisting 20 hours of BTW training or be home trained by a parent, grandparent or legal guardian. If home trained, new drivers must hold the learner’s permit for an extra 2 months (6 months as opposed to 4 months if a course was taken) and the parent must certify that the new driver spent 22 hours BTW.

Exhibit 4-3C

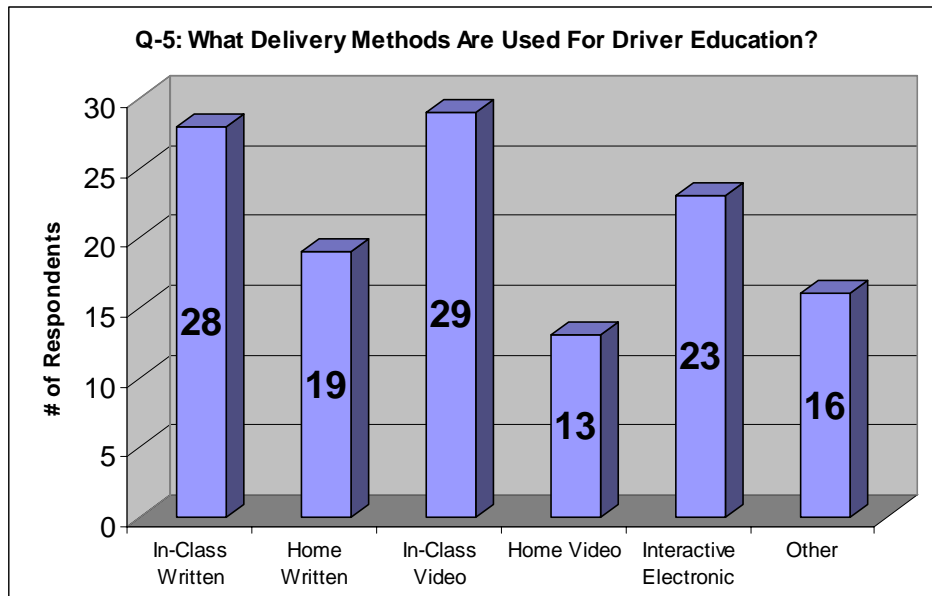


Among other states whose driver education curriculum includes more than six hours of professional or parent-supervised BTW training are Florida (50 hrs.), Kentucky (60 hrs.), New Jersey (50 hrs.), and Maine (10 hrs.). Programs that include less than 6 hours of BTW training include Washington State (4 hrs.) and Nebraska (5 hrs.).

Question 5: What delivery methods does your state employ in implementing your driver education program?

For Question 5, survey recipients were asked to identify the methods used to implement their driver education curriculum. As shown in Exhibit 4-4, the leading instruction approaches are in-class written instruction, in-class video presentations, and interactive electronic/computer training. Interactive electronic methods include simulation equipment, computer programs, and online course instruction such as training and lecture videos, quizzes, and other literature.

Exhibit 4-4

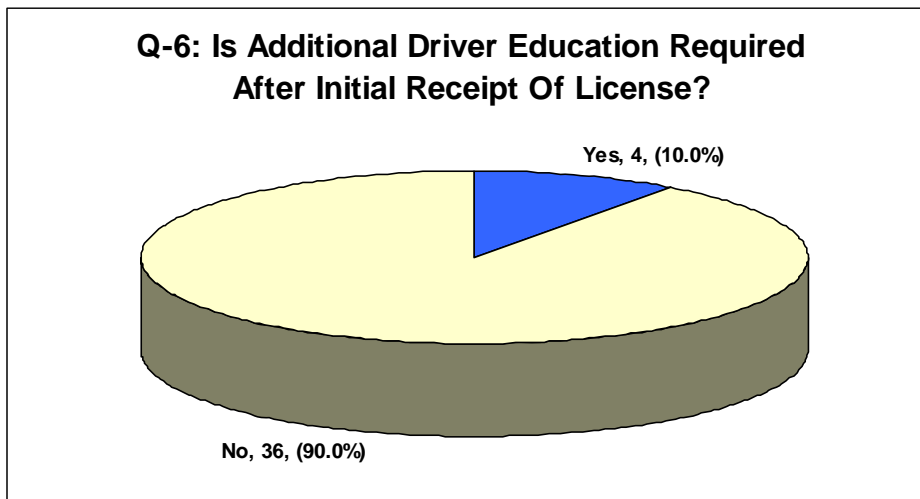


Question 6: Does your state require any additional driver education after initial receipt of license, e.g. possibly through license renewal?

Exhibit 4-5 shows that approximately 90 percent of respondents answering this question stated that post-license education was not required in their state.

States that indicated they require additional driver education for young drivers after initial licensure were Michigan, Virginia, Ohio, and Minnesota. Of these, Michigan is the only state that truly engages in the practice the survey question is attempting to identify. The Michigan driver education program has two segments. Segment one consists of 24 hours of classroom, and 6 hours of BTW instruction. Segment two, which occurs 90 days after licensing and completion of 30 hours of additional adult-supervised driving practice, consists of 6 hours of additional classroom instruction. The additional instruction mentioned by Ohio and Virginia pertains to driver improvement classes that are required for drivers of a certain age (under 18 and under 20, respectively) who have been convicted of a traffic violation. The response from Minnesota pertained to additional instruction required of individuals who fail their required state driving test a fourth time. These are not the types of circumstances the question was attempting to address.

Exhibit 4-5:



Question 7: Are all of the elements of your driver education program implemented concurrently or in immediate succession, *i.e.* no delays or graduations in implementation related to levels of achievement, age, driving experience and/or other factors?

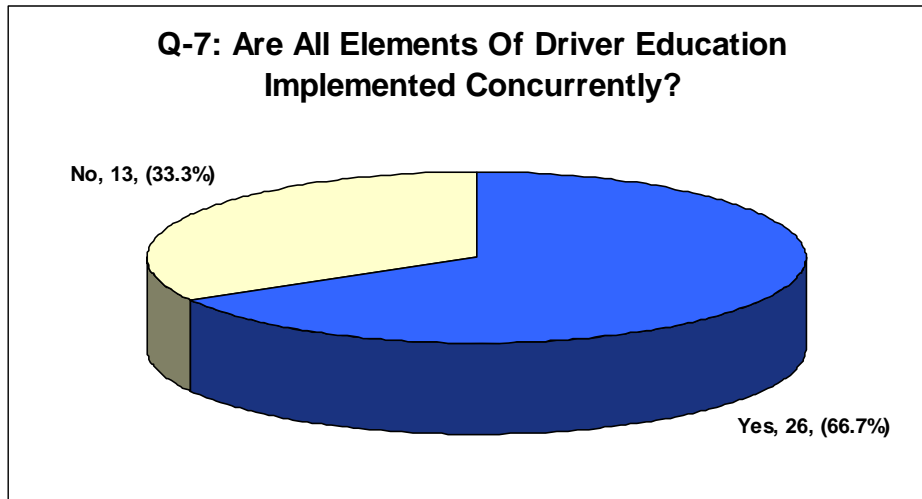
Exhibit 4-6 shows that 67 percent of respondents who answered this question stated their driver education programs are implemented concurrently.

Texas, for example, offers both concurrent and “block” driver education programs. In the concurrent program, classroom instruction begins and continues on a schedule until the student successfully completes and masters each of 12 training modules. Students age 15 or older are eligible to apply for and obtain an Instruction Permit from the Texas Department of Public Safety after they successfully complete and master the Classroom Instructional Phase of Module One. The in-car instruction begins as soon as the student obtains an Instruction Permit and continues on a schedule until the student successfully completes and masters each of remaining training modules. Instructors are required to schedule the classroom and the in-car lessons back to back or very close together. The in-car lessons are paced to match what was recently taught in the classroom.

In the "Block" driver education program, the complete classroom instruction series is taught before the in-car training begins. The classroom instruction begins and continues on a schedule until the student successfully completes and masters 12 classroom modules. The student in a block program is eligible to apply for and obtain an Instruction Permit from the Department of Public Safety at age 15 or older and upon mastery of all classroom lessons. The In-Car instruction begins as soon as the student obtains an Instruction Permit and continues on a schedule until the student successfully completes and masters each in-car skill requirements.

Of the states that answered “no” to this question, many did so because each individual school district had the authority to implement their driver education program in their own fashion and the respondent, therefore, could not give a definitive answer. Other states, North Carolina for example, answered “no,” stating that for driver education (DE) provided through the public schools, classroom instruction was generally offered in the summer with in-car instruction offered the following year.

Exhibit 4-6:



Survey respondents who indicated their state offered delayed or noncontiguous driver education programs, often stated that in-class training courses are conducted during the school year and BTW training is only offered in summer sessions. For example, in North Dakota, BTW training is only implemented in the summer school program while in-class driver education courses occur during the normal school year. In these cases, students may complete the classroom training course several months before receiving BTW training.

Other respondents considered graduated licensing programs (GDLs) a component of a delayed driver education program. For example, in Maine drivers are required to hold an instructional permit for six months and log 35 hours driving including 5 hours of night training. After completing this training and passing the DMV in-car exam, drivers are issued an intermediate license for the first six months. During this time they are not allowed to carry passengers other than family and are prohibited from driving between midnight and 5 AM.

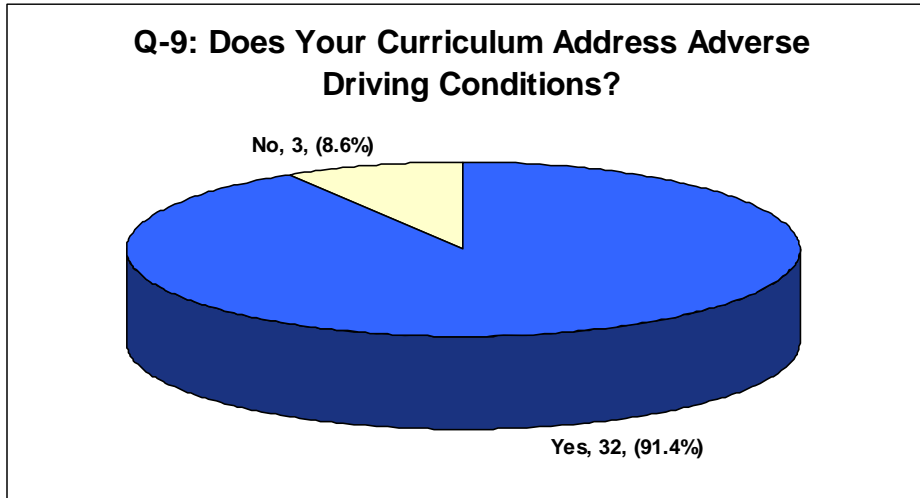
Question 8: What primary subjects are covered in your driver education program, e.g. module titles or chapter headings, etc.?

Question 8 asks respondents to identify the specific subjects covered by their driver education curriculum. This question was designed to provide direct input to the development of the driver education module that is the ultimate goal of this research project. Responses to this question were obviously quite lengthy and, by nature, not suitable for quantifiable analysis. Responses to this question are a part of the analysis included in Chapter 6, which summarizes several pieces of information gathered throughout this research effort and presents the model driver education module.

Question 9: Does your driver education curriculum address driving under adverse conditions?

A goal of this survey was to identify the state of practice in education for driving in adverse conditions. As shown in Exhibit 4-7, the majority of respondents (35 of 41 respondents provided an answer to this question) stated that their driver education curriculum included lessons on how to drive safely in adverse conditions, according to the definition of adverse conditions provided to them for this project.³²

Exhibit 4-7



Respondents were also provided the opportunity to elaborate on the definition of adverse driving conditions used in their respective curriculum. Exhibit 4-7A on the following page summarizes the responses received. Virtually all respondents indicated that adverse driving conditions primarily consisted of inclement weather and road conditions that affected a driver’s ability to maintain traction and visibility. This was consistent with the operational definition established in the literature review.

Vermont was the only exception. Vermont SDE’s description of adverse conditions included driving while drowsy, emotional and fatigued in their description of adverse conditions. These characteristics are typically categorized in the driver education community as types of “driver error.”

Adverse driving condition training modules identified by respondents primarily focused on teaching students driving strategies and risk assessment skills for making safe decisions and coping with road conditions and impaired visibility. For example, the

³² Respondents were instructed that the definition of adverse conditions for purposes of this research was, “Environmental and other factors affecting visibility and traction including: 1) darkness, 2) weather conditions (*e.g.* fog, rain, snow, flood, smoke, severe wind, extreme temperatures, *etc.*), 3) road conditions and construction, and 4) vehicle stability and traction control (*e.g.* tire pressure and wear, and brake issues).”

Montana Office of Public Instruction’s adverse driving conditions training module provides training on:

- Extreme weather driving conditions such as flooding, heat, cold, storms, blizzards and
- Strong wind;
- Risks associated with driving during extreme weather driving conditions;
- Risk strategies to compensate for extreme weather driving conditions;
- Sources of glare and procedures to protect from glare;
- Driving strategies during low light or darkness conditions;
- Laws regarding headlights use;
- Headlight projection and efficient and proper use of vehicle illumination;
- Fog-related reduced visibility conditions and procedures to reduce risk;
- Limited visibility conditions caused by smoke and dust and procedures to reduce risk;
- Rain-related reduced visibility driving conditions and procedures to reduce risk.

Exhibit 4-7A – Summary of Adverse Driving Conditions Definitions & Training Program

Agency	Description of Adverse Driving Conditions Definition & Training Available
Minnesota Department of Public Safety	Adverse conditions are not specifically covered, but lessons include driving in winter conditions, driving at night, and in areas of road construction.
South Carolina Driver & Traffic Safety Education Association	Weather conditions including sun glare, dawn, dusk, and night. Road conditions including gravel and sand. Course covers skidding, controlled braking and ABS braking.
North Dakota Department of Public Instruction	Weather and road conditions including darkness, construction, work zones, car maintenance, ice/breaking through ice, water/driving through water, snow/running car while being stranded, dirt storms/snow storms
Maine Bureau of Motor Vehicles	All weather conditions including snow
Iowa DOT, Driver Services	All weather conditions
Kansas State Department of Education	Rain, snow, fog, sleet, wind, sun glare, night time driving, construction, mechanical problems, hydroplaning, skid recovery, etc.
Missouri Dept. of Elementary & Secondary Education	Environmental Conditions Module covers: Gravity, Friction, Seatbelts, Improperly Inflated Tires, Right/Left Skids, Controlled/Uncontrolled Braking, Inclement Weather Start/Stop/Steer, Use of Headlights, Night Driving, Rain Storm

Agency	Description of Adverse Driving Conditions Definition & Training Available
Idaho Department of Education	Adverse Weather Conditions training includes (a) adverse weather driving conditions (i.e.: flooding, heat, cold, storms, blizzards, strong winds, etc); (b) risks associated with and strategies to compensate for driving during adverse weather driving conditions. Driving at Night and in Other Reduced Visibility Conditions Module covers: (a) sources of glare and procedures to protect from glare; (b) driving strategies during low light or darkness conditions; (c) the laws and the proper use of headlights; (d) limited visibility conditions (i.e.: fog, smoke, snow, rain and rain and dust etc.) and procedures to reduce risk.
Michigan Department of State	Weather conditions (bright sunlight, fog, ice rain, snow, wind); Night-driving (including distortion of speed and distance and headlight glare); Roadway conditions (including wet, icy, gravel); Construction zones
Pennsylvania Department of Education (PDE)	PDE provided schools with classroom programs with the DVD entitled: Drive to Survive Series (2001)"Adverse Conditions" Produced by the 3i Company
West Virginia SDE	Weather conditions (snow, rain, ice, fog, and darkness) and road surface conditions (debris, construction)
Vermont Department of Education	Winter driving techniques, skid avoidance and vehicle control, managing high risk situations, night driving conditions, handling vehicle malfunctions/ emergencies, drowsy driving, emotions & road rage, fatigue and sleep deprivation, following time and space
New Mexico DOT - Traffic Safety Bureau	Light and Weather Conditions, Driving Safely in Low Light and at Night, Visibility - Bright Light and Glare, Minimizing Risk in Rain and Snow
Virginia Department of Education	Visibility in Adverse Conditions, Extreme Weather Conditions, Traction Loss Concerns
Delaware Department of Education	Adapting to weather conditions, identifying different braking systems, identifying road surface, conditions, understanding hydroplaning, driving techniques in snow
Montana Office of Public Instruction	Module 14, which adverse driving conditions, covers a) sources for glare and procedures to protect from glare; (b) driving strategies during low light or darkness conditions; (c) laws regarding headlights use; (d) headlight projection and efficient and proper use of vehicle illumination; (e) fog related reduced visibility conditions and procedures to reduce risk; (g) limited visibility conditions caused by smoke and dust and procedures to reduce risk; and; (h) rain related reduced visibility driving conditions and procedures to reduce risk. Also covered is (a) extreme weather driving conditions such as flooding, heat, cold, storms, blizzards and strong wind; (b) risks associated with driving during extreme weather driving conditions; and (c) reduced risk strategies to compensate for extreme weather driving conditions.

Agency	Description of Adverse Driving Conditions Definition & Training Available
Colorado Motor Vehicle Division Driver Education Compliance	Training provided for winter and other adverse weather driving techniques.
North Carolina - through East Carolina University	Student are trained on defining adverse conditions, explaining the goal of driving in adverse conditions, four ways to deal with reduced visibility, four ways to deal with reduced traction., explaining how to deal with deep water on the road, knowing the difference between using standard brakes and anti-lock brakes, and explaining the three parts of total stopping distance.
Arizona DOT, Motor Vehicle Division	Uses a "special problems and crash avoidance module" that covers reduced traction, reduced visibility (different weather conditions), and night driving.
Nebraska National Safety Council, Greater Omaha Chapter	Adverse conditions include weather, night driving, congested traffic, urban areas, rural areas, expressways, construction zones, emotions, peer pressure, roadway conditions, limited visibility, and limited traction. Also provides the following videos: Breaking the accident Chain of Events - factors that affect the driver including conditions that affect driving such as the vehicle and light, Night Driving, Rain, Snow - visibility and traction, Ice and/or Sleet, Wind, Fog, and "Drive to Survive "Adverse Conditions" 36 traffic Scenes - students view a traffic scene, react and then learn whether they saw/reacted to all the possibilities shown
Ohio Department of Public Safety	Adverse conditions in curriculum include: Low Light and Night Conditions, Dawn and Dusk, Rain, Snow and Ice, Fog/Smog. Other Conditions Affecting Visibility or Traction include: Sand or dust storms, Gravel roadways, Leaves on road surface, Construction areas, High wind areas, Hot and Cold weather.

Question 10: Has your state attempted to measure the effectiveness of your driver education program or any components of your driver education program in any way?

The second goal of this survey was to identify current efforts to measure and evaluate the effectiveness of driver training curriculum. Exhibit 4-8 shows that 74 percent of the respondents who answered this question (35 states responded to this question) stated that they have not attempted to measure the effectiveness of their respective driver education programs.

Exhibit 4-8

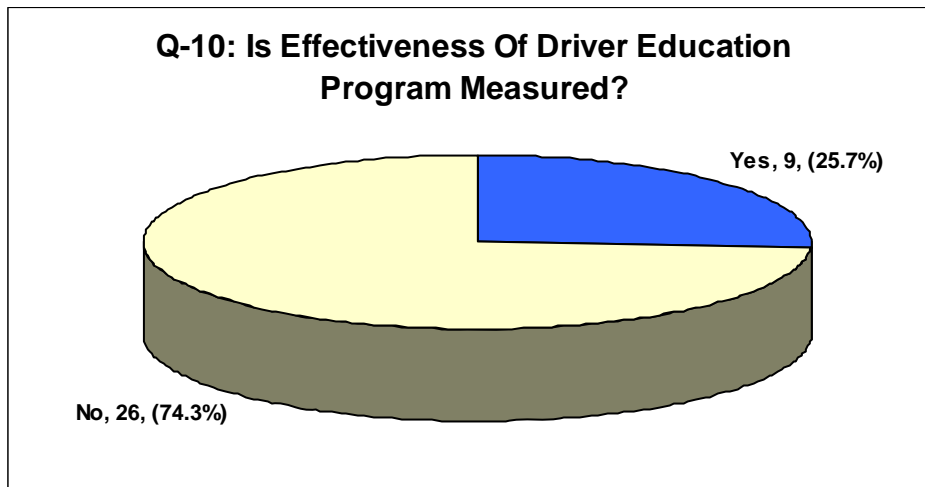


Exhibit 4-9 below summarizes the program evaluation efforts identified by the nine respondents who indicated they had attempted to measure the effectiveness of their driver education program. Performance measurement, discussed in more detail in Chapter 5, appears to focus on conducting course exit surveys of students, evaluating the pass rates of DMV exams, and monitoring crash statistics for new drivers.

Several states indicated there were on-going research projects to evaluate program effectiveness. One example is a statistical study completed by the Nebraska Safety Council. In Nebraska, students are given the option to complete a DMV-approved driver safety course or complete 50-hours of driver training certified by their parents or guardians. The Nebraska National Safety Council completed an analysis of individuals' driving records who took the DMV-approved driver safety course versus those who presented a 50-hour parent supervised driver certification. The study, which examined the accident/fatalities rates of teens since 1999, concluded that students completing a driver education program are less likely to be issued a citation and also less likely to become involved in an accident.

In Montana, the Office of Public Instruction is in the second phase of an advanced driver education instruction project. Researchers have been tracking the traffic records of an intervention and control group since 2005. Montana is using this information to develop materials for a new driver education training module, which will focus on fostering

parent involvement. The representative noted that it is only recently that the nation and the traffic safety community have taken an interest in driver education program monitoring.

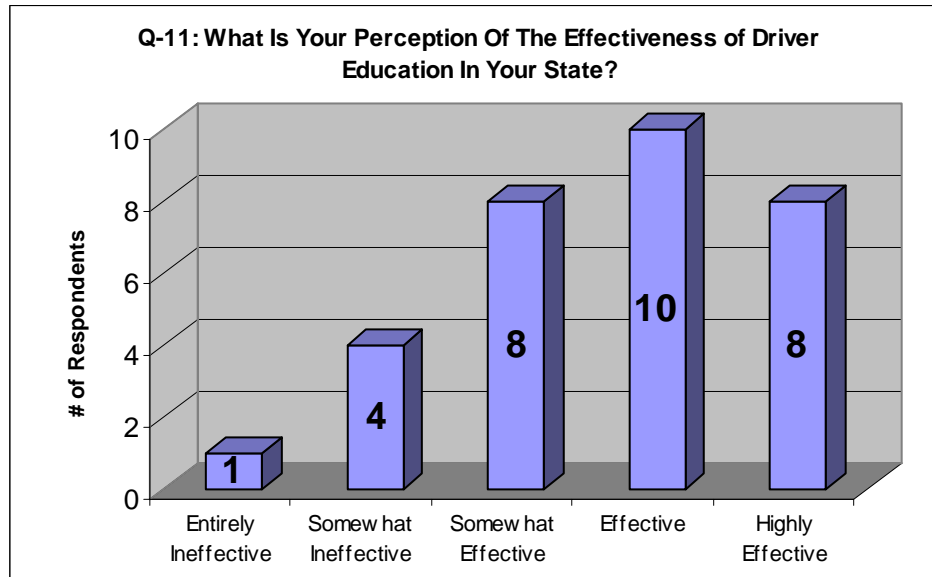
Exhibit 4-9: Summary of Driver Education Program Evaluation Efforts

Agency	Evaluation Method/Process
Minnesota Department of Public Safety	Surveys given to teens that have passed driving tests
Alabama State Department of Education	Examines the number of licenses issued and road tests given
Maine Bureau of Motor Vehicles	Currently developing methodology
Texas Education Agency	Texas Transportation Institute completed a study comparing the crashes between parent taught driver education and commercial/public school driver education.
Virginia Department of Education	Monitors crash rates and conducts training course exit surveys
Delaware Department of Education	Office of Highway Safety monitoring crash data before and after the implementation of the GDL
Montana Office of Public Instruction	All programs must apply for approval to offer traffic education each year and they must provide documentation that they meet minimum standards in order to receive state funds to partially offset the cost of providing driver education. Additionally, the office evaluates the attitudes of the driver education teachers through papers written by the driver education teachers attending the annual traffic education conference.
Alaska Highway Safety Office	Currently collecting data related to the 2006 graduated drivers license regulations to determine the level of effectiveness.
Nebraska National Safety Council, Greater Omaha Chapter	Completed a statistical analysis of individuals' driving records who have taken a DMV-approved driver safety course versus those who have presented a 50 hour driving certification to the DMV each year since 1999. Examination of accident/fatalities in teens show that students completing driver education programs are less likely to be issued a citation and less likely to become involved in an accident. The program is also audited by the State.

Question 11: Whether or not your state has actually attempted to measure the effectiveness of your driver education program, what is your perception of its effectiveness?

As shown in Exhibit 4-8 above, most respondents indicated that they had not completed scientific studies or program analyses on the effectiveness of current driver education training modules and programs. Despite this, responses to Question 11, illustrated in Exhibit 4-10 below, show that most state representatives (32 provided a response to this question) perceive their driver education programs to be at least somewhat effective.

Exhibit 4-10



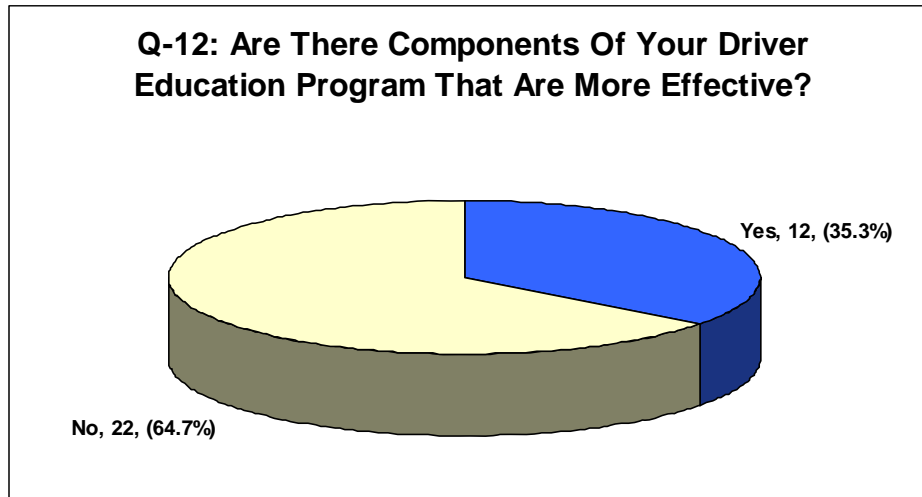
State representatives articulated that program evaluation in driver education programs continues to be a challenge. Their perception of overall program effectiveness is based widely on the impression instructors receive from students, feedback from course exit surveys and analysis of data showing pass rates of DMV exams. Many teachers' perception of effectiveness is developed by observing the attitude and responsiveness of students during in-class participation and during behind-the-wheel training.

One problem faced by evaluators is the inability to create and monitor control and intervention groups. Several respondents noted that creating a true control group is virtually impossible since all students must meet current driver education requirements. An Idaho DOT representative said an additional obstacle faced by evaluators is that students spend only a small amount of time in driver education courses and may or may not be attending the school where they took their original course. This makes following up on student progress and experience a challenge.

Question 12: Are there components of your state's driver education program that you perceive as more effective than others or than the program as a whole?

When asked if they believe if one particular component of their driver education program was more effective than another, the majority of state representatives indicated “No” (34 states responded to this question). However, as shown in Exhibit 4-11, approximately 35 percent stated that there were portions of their curriculum they perceived to be more effective. For example, the Oregon DOT Transportation Safety Division stated that training modules that include risk prevention, parent involvement, and route development (trip planning) are believed to have a greater impact on driver safety. Vermont Department of Education stated that no one component was better than another in improving safety. However, the representative believes having the driver education program in the high schools and taught during the regular school day provides the best learning environment.

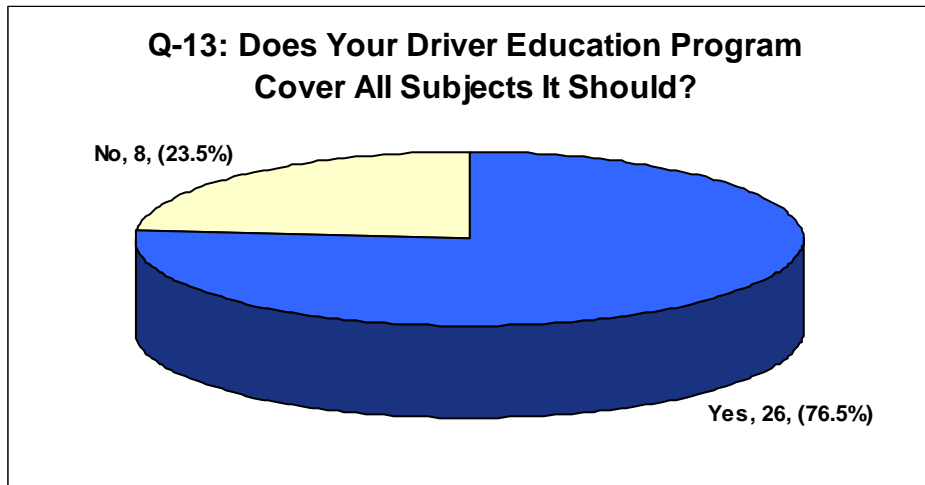
Exhibit 4-11



Question 13: In your opinion, does your state's driver education program cover all the subjects it should?

The majority of state representatives who responded to this question (a total of 34 states) indicated that they believe their respective driver education programs sufficiently cover all areas necessary for training safe drivers. However, almost 24 percent indicated there was room for curriculum improvement and expansion. Some representatives expressed the need for more standardization and guidance. For example, the Indiana Department of Education representative stated that there is no consistency on minimum training hours or required subjects for driver education programs.

Exhibit 4-12



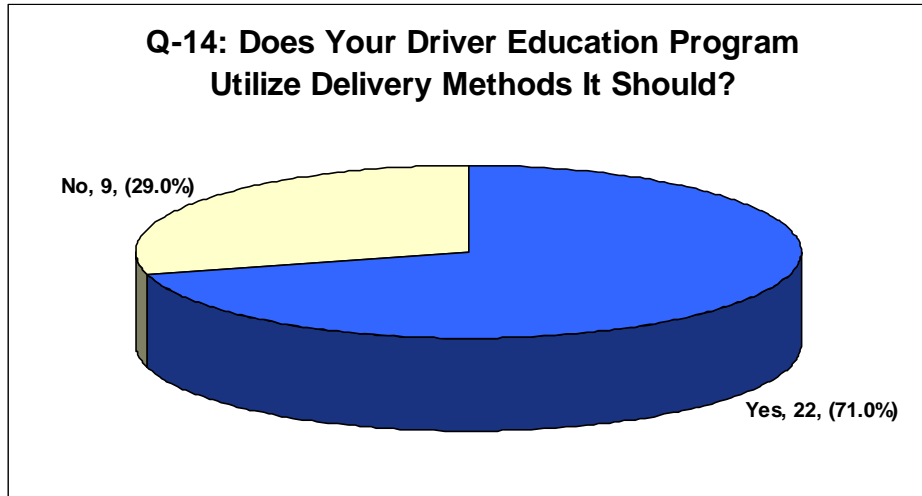
Other respondents indicated that time constraints are a main obstacle. The South Carolina Driver & Traffic Safety Education Association stated that current minimum requirements might limit the ability of instructors to teach students the range of skills needed. The State’s traditional driver training program includes much more information than can be taught in the allotted 30 hours. This concern regarding the lack of sufficient allocated time was also expressed by North Dakota’s Department of Public Instruction, Iowa DOT, and Wisconsin DOT.

The respondent from Montana’s Department of Public Instruction noted that the state’s curriculum might actually cover too many topics. A lengthy curriculum combined with the time constraints may result in less emphasis on teaching students the core competencies and habits needed for safe driving. For example, the respondent asks, “How important is organ donation training toward meeting the objectives of teaching a teen to safely drive... Or how important is insurance training or knowing the numbering scheme of the highways and freeways? Are they important or useful? Yes. Does the time spent on these topics help the teen drive more safely? Likely not.”

Question 14: In your opinion, does your state's driver education program utilize the delivery methods it should?

As shown below, the majority of states responding to this question (31 total) indicated that their driver education program utilizes sufficient instructional mechanism to get the training message across. However, over 30 percent indicated there was room for improvement.

Exhibit 4-13



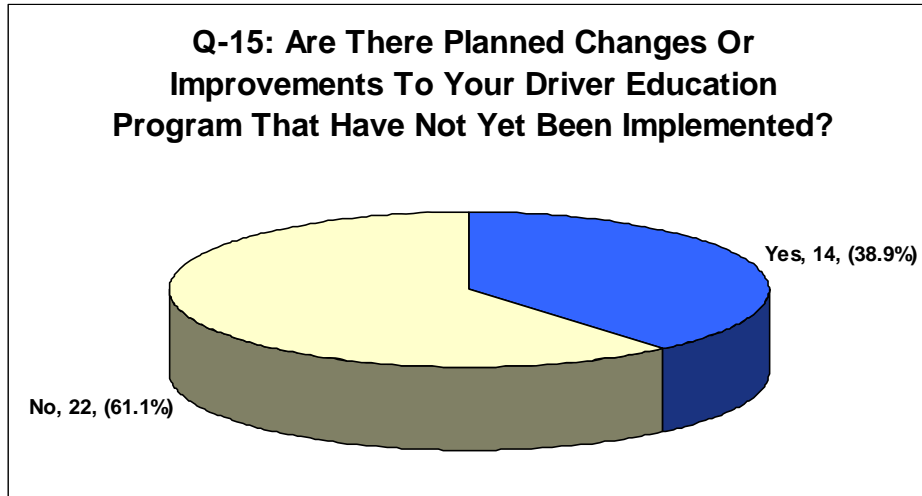
Some potential improvements and additions to driver education delivery methods identified by respondents include:

- Expanding educational content to include interactive video and website content;
- Providing behind the wheel training through more prevalent use of computer simulators and range driving courses that include skid pads, etc.;
- Supporting regular training for instructors to increase their ability to harness modern technologies for instruction;
- Developing and expanding upon state-wide minimum course curriculum and BTW time requirements;
- Facilitating peer-to-peer instruction and parent involvement;
- Providing logbooks for parents to document the number of behind the wheel hours rather than simply requiring a signed certification.

Question 15: Are there any planned changes/improvements to your state's driver education program that have not yet been implemented?

This question sought to identify any emerging changes to the state of practice in the driver education arena. As shown below, approximately 60 percent of respondents addressing this question (36 total) indicated that no major change or improvement was scheduled for implementation.

Exhibit 4-14



Respondents, who said there were plans to change their driver education program, typically cited ongoing efforts to expand the use of online and virtual course materials, the adoption of state-wide standardized curriculum, and amendments to graduated driver license legislation. Key response highlights include the following:

- **The Oregon DOT Traffic Safety Division** required all driver education providers to submit a localized curriculum beginning in September of 2007.
- **The Indiana Department of Education** is planning to implement an enhanced graduated drivers licensing program
- **North Dakota** is exploring the possibility of conducting an annual training seminar for driver education instructors.
- **Iowa DOT** indicates the State legislature may establish a mandatory state-wide standard for driver education curriculum.
- **Kansas SDE** indicates that new curriculum standards were adopted for 2007. It expects to provide additional training to all school districts and instructors.
- **Idaho DOT** is developing a Pre-Driver Education course to address attitudes and behaviors prior to enrollment. The goal is to maximize the required 30 hours of classroom and 6 hours of behind the wheel instruction on core competencies.
- **Michigan's State Department** expects to adopt a state-wide curriculum standard in September 2007. The curriculum will be based on leading programs used nationally and tailored for a Michigan audience.
- **The West Virginia SDE** is developing new interactive virtual course materials.

- **The Vermont SDE** is also moving toward providing curriculum through online websites and computer programs and expects to provide training to instructors.
- **The Delaware Department of Education** expects to amend the GDL program requirements to require parents to provide proof of in-car driving training (e.g. log book or similar ledger).
- **The Montana Office of Public Instruction** is developing a driver education curriculum that seeks to foster parent involvement. The curriculum will include both components for parent monitoring and supervision of their teen's practice driving and professional teaching.
- **The Nebraska Safety Council** is exploring revisions to the GDL program to include more restrictions on night driving and requiring additional supervised driving time. Additionally, virtual driver education courses are in early stages of development.
- **The State of Illinois** is currently exploring changes to GDL legislation that will 1) affect on-street driving requirements, 2) call for program evaluation mechanisms, and 3) require an update of driver education curriculum and behind-the-wheel instruction.

4.3 Summary of Findings

The survey of state representatives in the driver education and curriculum development community achieved an excellent response rate with 82 percent of states providing one or more sets of answers. In all 41 of 50 states responded. The major findings included:

- The public school and private company driver education programs appear to be the predominant means of instruction.
- Most driver education programs rely on a mix of classroom, in-car, and simulator instruction.
- The majority of states that require a certain amount of in-class instruction require 30 hours.
- Driving simulators represents only a small portion of driver education programs.
- The majority of states that require a certain amount BTW training specify six hours of such training.
- The leading instruction approaches are in-class written instruction, in-class video presentations, and interactive electronic/computer training.
- Almost all respondents stated that post-license education was not required in their state.
- Two-thirds of respondents stated that their driver education programs are implemented concurrently.
- The majority of respondents stated that their driver education curriculum included lessons on how to drive safely in adverse conditions.
- Three quarters of the respondents stated that they have not attempted to measure the effectiveness of their respective driver education programs.
- Most state representatives perceive their driver education programs to be at least somewhat effective

- The majority of state representatives believe their respective driver education programs sufficiently cover all areas necessary for training safe drivers although many indicated that time constraints are a main obstacle
- The majority of respondents indicated that their driver education program utilizes sufficient instruction mechanism to get the training message across. However, over 30 percent indicated there was room for improvement
- Approximately 60 percent of respondents indicated that no major change or improvement was scheduled for implementation.

CHAPTER 5: RESULTS OF CASE STUDIES OF “BEST PRACTICE” STATES

Based on the survey analysis detailed in the previous chapter and on other information gained throughout the conduct of this study, seven states with driver education programs worthy of emulation were selected for more in-depth interviews. These brief case studies examine the following attributes of the programs in the selected states:

- Mission and rationale
- Program description
- Implementation and participation
- Training materials and methods
- Effectiveness and related factors

States were selected based on geographical factors, innovative approaches, measured or anecdotal success in improving traffic safety and availability of well-formulated curriculum or training module materials. The states interviewed and a brief explanation of the rationale for their inclusion in the analysis is as follows:

- 1) Oregon – recently worked with NIDB and ADTSEA in developing comprehensive new risk prevention based curriculum.
- 2) Delaware – has a unique mandatory driver education program which is offered in all public schools and is fully funded through the state’s General Assembly. The state links academic performance to a student’s ability to enter into the state’s graduated driver licensing process.
- 3) Idaho – the state is currently the implementation of a “pre-driver education” course that addresses driver attitude and behavior issues.
- 4) Montana – the director of Montana’s driver education program is president-elect of the Driver Education and Training Administrators Association and the state implemented a new risk prevention-based driver education curriculum in 2006 that includes an Adverse Conditions module.
- 5) Michigan – the only state with two segments to their driver education curriculum – the second of which is implemented after a certain level of driving experience is gained.
- 6) Arizona – in order to develop an appropriate driver education module geared towards driving under adverse conditions, it was important to fully understand the driver education program in Arizona.
- 7) Texas – Has a risk prevention-based module geared towards driving under adverse conditions and demonstrates a unique level of integration between the in-class and behind-the-wheel instruction.

The following subsections present the results of the case studies conducted on each of the above mentioned state driver education programs.

5.1 Oregon Department of Transportation (ODOT)

Contact: John Harvey, Program Manager, Driver Education 503-986-4413

Oregon Driver Education Program Overview

Oregon's driver education program was developed and is implemented by the Oregon Department of Transportation, Transportation Safety Division. The program is implemented through approved driver education providers that include public schools, community colleges, educational service districts and private commercial driving schools. The goal of Oregon's DE program is to develop a system that results in measurably safer new drivers with fewer injuries and deaths. The program seeks to develop safe and efficient drivers who understand that all young drivers should become competent, caring, productive and responsible traffic safety citizens, committed to continually improving their driving skills.

The Driver Education program manages statewide efforts to improve driver education by:

- Coordinating DE course curriculum and instructor training curriculum;
- Certifying public and private DE providers;
- Providing public information, education programs and resources;
- Overseeing the student driver training fund for public school reimbursement; and
- Coordinating train-the-trainer curriculum development.

Several legislative and other changes implemented in Oregon within the last few years have dramatically impacted the state's driver education program. In 1999, the state legislature moved the Driver Education program from the Oregon Department of Education (ODE) to the Transportation Safety Division of the Oregon Department of Transportation (ODOT). This change occurred for a number of reasons, important among them:

- Driver Education was not an ODE priority.
- ODE reduced staff from 1.5 Full-Time Employees (FTEs) to .25 FTEs.
- The driver education community asked for the program to be moved to ODOT-Transportation Safety Division (TSD).
- The Legislature felt that ODOT-TSD could provide quality service and better administrative support as well as manage the fiscal reimbursement process.
- Driver education was a better fit with the goals of the ODOT that advocate mobility and safety.

In 2000, ODOT established four task forces that conducted public forums throughout the state looking at curriculum, instructor standards, public outreach and operation. Specifically, ODOT looked at expectations for classroom curriculum, behind-the wheel curriculum, and instructor knowledge standards for teaching the skill of driving. As a

result, an action plan was formulated to address the task forces' major finding that the program needed established standards. Important aspects of this effort included:

- More than 100 individuals participated in the initial task force. Members included: commercial schools, contractors, DMV, Insurance, Team Oregon, community colleges, high schools, Oregon Transportation Safety Committee (OTSC), DE retirees, university and ODOT-TSD provided the staffing.
- OTSC members chaired the four task forces. They included: curriculum task force, instructor task force, media task force, and operation task force.
- Six town hall meetings were offered all across the state. Meetings were held with various organizations including Oregon School Board and Community College Association, Oregon Traffic Safety Education Association (OTSEA), Diocesan Social Action Offices (DSAOs).
- Draft Rules were shared, reviewed and changes were finally adopted to support all areas of the driver education program.

These new standards were implemented by 2004. Another significant legislative action occurred in 2001 when an ODOT bill adopted by the Legislature allowed for private companies to offer a full Driver Education program, adding to the public schools already allowed under law. The requirements for private companies were set very close to the public school standards.

On-going improvements to the program include:

- In 2005, House Bill (HB) 2112 raised the Driver Education student reimbursement from \$150 to \$210 for public providers.
- Implementing HB 2112 requires changing the Oregon Administrative Rules (OAR 737-015).
- Since efforts are being undertaken to update the OAR, it was determined that additional changes to the OAR are appropriate. These changes aim to:
 - Create consistent statewide standards and eliminate inconsistencies in language and programming in DE providers;
 - Establish standards with the onset of new DE programs being established throughout the state;
 - Respond to non-compliant issues concerning learning and teaching and student safety;
 - Align state program and providers to quality standards in light of education reform and NHTSA/ADTSEA national standards for traffic safety education;
 - Add language for inspection, record keeping and legal issues; and
 - Clarify language concerning instructor training requirements.

Successes and accomplishments of the program since being taken over by ODOT include:

- 1) Created the Oregon Parent Involvement Resource Guide: developed in partnership with the Oregon Traffic Safety Education Association, this guide provides material for teachers and guidance for parents.
- 2) Developed the Oregon Driver Education Risk Prevention Curriculum CD-ROM: this resource includes classroom and in-car lesson plans, homework assignments, entrance and exit exams and more. It brings together materials from Western Oregon University (WOU) and ODOT Trainer of Trainers Curriculum, National Driver Training Credentialing Program of the ADTSEA, and the NIDB Driver Risk Prevention Curriculum. (See next sub-section for details of the curriculum)
- 3) Established the Driver Education Advisory Committee: developed to give advice on driver education issues, the duties of the committee include reviewing and updated guidelines for the operation of the program and stimulating public awareness of driver education needs.
- 4) Created instructor training standards: more than 475 instructors have gone through training established by minimum standards of competency.
- 5) Increased safety in teen driving as demonstrated through a national study (See details of program evaluation efforts in subsection below.)
- 6) Increased funding for driver education: in 2005, the Legislature increased funding to \$210 per student completing an approved driver education program.

Oregon Driver Risk Prevention Curriculum

Curriculum Development and Content

The Oregon Traffic Safety Education Association (OTSEA) website (www.otsea.com) contains a link to the “Oregon-ized Curriculum” which was fully implemented within the 2004 to early 2006 timeframe. The curriculum and its associated documents and resources, all available on the website, were created through a partnership between ODOT and Western Oregon University (WOU). The curriculum is a representation of a localized traffic safety education curriculum and brings together resources and materials gleaned from the WOU-ODOT Trainer of Trainers Curriculum, National Driver Training Credentialing Program of the ADTSEA and NIDB Driver Risk Prevention Curriculum. It follows the NIDB Risk Prevention Curriculum and its behavioral delivery sequences. It is designed to meet the minimum standards of driver behavior risk prevention as set forth by the ADTSEA and NIDB.³³

³³ Disclaimer: The State of Oregon has express permission from Fredrik R. Mottola to utilize all materials and resources derived from the NIDB Risk Prevention Curriculum excluding movies contained on either of the two NIDB Risk Prevention CD-Roms. The State of Oregon and all other States, governmental agencies, national organizations, public or private business organizations are prohibited from changing or altering the name of the NIDB space management system entitled "The Zone Control Driving System" or from changing or altering resources and materials. Any organization that desires to use materials, concepts, principles that have been published in the NIDB Curriculum may only make such materials known to the public after receiving written permission from Frederik R. Mottola. The State of Oregon has express permission from Frederik R. Mottola to edit and incorporate the following video clips as a part of the

The desired outcome of the Oregon Risk Prevention curriculum is to help students develop the knowledge, skills, attitudes and habits that will enable them to achieve low risk driving behaviors that will serve them in terms of preventing crashes over the course of their lifetime. To achieve this end, this localized curriculum presents key behavioral patterns in a simple-to-complex manner.

Presentation of content in the classroom parallels the presentation of in-car content. Introductions to all concepts and most of the required in-car skills take place in the classroom, prior to in-car lessons.

A variety of instructional methods demonstrate student-centered activities for participative education to include low-risk driving values, knowledge for development of safe habits, and mental readiness for correct in-vehicle performance.

The full curriculum includes:

- 1) Read Me First Oregon File which details the development of the curriculum and the disclaimer provided above.
- 2) A Curriculum Resource File which includes a localized scope and sequence sample, curriculum flow chart, program improvement plan and several other documents to help individual driver education providers (school districts) to localize their own curriculum.
- 3) Curriculum Modules: 1 – 10. Each module contains:
 - a) An overview and activities document
 - b) Classroom and in-car lesson plans
 - c) Homework assignment sheets and keys
 - d) Classroom worksheets and keys
 - e) Movie Clips (in some modules)
 - f) In-car driving route, record, and activities documents
 - g) Parent student guided practice route
 - h) Entrance and exit exams and keys
 - i) Interactive student centered power point lessons and their overhead counterparts
- 4) Sample course schedule
- 5) Sample course syllabus
- 6) Driving Behaviors Outcomes document, which includes an assessment form for determining if established driving behavior outcomes are being met. It is based on NIDB's minimum standards of Driver Performance.
- 7) Extra Movies & Funnies
- 8) Extra In-car Resources

Module topics include:

Module 1: Uniting Driver and Vehicle

- 1) Introduction to Course
- 2) The Highway Transportation System
- 3) Habit Development Needs
- 4) Your Expectations after Getting a Driver's License
- 5) Getting Ready to Drive
- 6) Starting Engine
- 7) Orientation to Controls
- 8) Moving and Stopping Smoothly
- 9) On-Target, Off-Target
- 10) Vision and Driving
- 11) Use of Central and Fringe Vision

Module 2: Knowing Where You Are

- 1) Signs, Symbols and Pavement markings
- 2) Reference Point Discoveries - Part One
- 3) Reading Instruments And Gauges
- 4) Reference Points' Discoveries - Part Two
- 5) Entering & Crossing Traffic Flows
- 6) Precision Turns
- 7) Securing and Exiting the Vehicle

Module 3: You Are In Control

- 1) Motor Vehicle Laws and Regulations
- 2) Insurance Requirements
- 3) Risk Management
- 4) Control of Tracking & Targeting Path
- 5) Introduction to Line-of-Sight and/or Path-of-Travel (LOS-POT)
- 6) Introduction to Backing
- 7) Turn About Options for Low Risk

Module 4: Searching for LOS-POT

- 1) Perceptual Skill Development
- 2) Searching Target Area to Target Area
- 3) Judging Space in Seconds
- 4) Three Search Ranges
- 5) Introduction to the Zone Control System
- 6) Restraint Systems
- 7) Forward, Angle and Hill Parking

Module 5: You Control the Intersection

- 1) Communications Options
- 2) Identifying High Risk 4-Second Danger Zone
- 3) Approaching Intersections

- 4) Highway- Rail Grade Crossings
- 5) Rear Zone Control
- 6) Stopping in Traffic

Module Six: Space Management

- 1) Traffic Lights: Timing And/Or Turning
- 2) Using the ABCS of Zone Control
- 3) Lane Changes with Precision
- 4) Backing Between Cars, Perpendicular Parking

Module D: The Deadly D's & Organ Donation

- D.01 Drinking, Drugs & Driving (Included in Module 6 – Managing Space)
- D.02 Drowsy Driving
- D.03 Dangerous Emotions – Road Rage
- D.04 Distractions (Included in Module 6 – Managing Space)
- D.05 Drag Racing
- D.06 Organ Donation
- D.07 Disabilities

Module Seven: Interacting With Others

- 1) Signs, Signals and Pavement Markings Review
- 2) Approaching Curves and Hill Crests
- 3) Following Time and Space
- 4) Commentary Driving

Module Eight: Practicing Your Skills

- 1) Timing Side Zones
- 2) Parallel Parking
- 3) Winter Driving Techniques
- 4) Skid Avoidance and Vehicle Control

Module Nine: Managing Driver, Vehicle and Environmental Risks

- 1) Night Driving Conditions
- 2) D.02 Drowsy Driving
- 3) Passing and Being Passed
- 4) Handling Vehicle Malfunctions and Emergencies
- 5) Interacting with Other Users
- 6) D.03 Road Rage
- 7) Environmental Issues
- 8) Preventive Maintenance

Module Ten: Putting It All Together

- 1) Limited Access Highways: Getting On/Off
- 2) Practice and Review In-Vehicle Concepts
- 3) Licensing Requirements

An important aspect of the Oregon risk prevention curriculum (and of the NIDB risk prevention approach in general) is the linkage between the in-class curriculum and the in-car exercises. The Oregon Risk Prevention Curriculum matches the desired outcomes of the in-class modules with specific in-car driving practice exercises.³⁴ Presentation of content in the classroom parallels the presentation of in-car content. Introductions to concepts and the required in-car skills take place in the classroom prior to each in-car lesson. Therefore, the sequence of the two elements and the order in which they are completed is an integral part of the success of the overall curriculum. In the opinion of the Oregon representative with whom we spoke, it is this integration of the in-class and in-car portions of the curriculum that marks the major difference between an NIBD-based curriculum and an ADTSEA-based curriculum.

Another important aspect of Oregon's driver education program is its emphasis on parental involvement. The state representative who completed the survey and with whom the study team spoke noted parental involvement as one of what he considered the most effective components of Oregon's driver education program. Included with the driver education curriculum materials on the OTSEA website is an entire directory of documents dedicated to parental involvement including the materials necessary to invite parents to and to conduct a "parent's night" to orient parents with the curriculum. Also included is a student-parent handbook that outlines both the administrative rules and technical learning objectives of the curriculum. A variety of other materials are available for driver education instructors and schools to provide to parents including articles about teen driving behavior and copies of the curriculum syllabus and schedule, etc.

Curriculum Implementation

The curriculum materials are designed to be used by individual driver education providers to adapt to their local area. Each provider must "localize" the program in terms of selecting appropriate in-car lesson driving routes, etc. Starting in September 2007, all providers must submit a localized curriculum to ODOT-TSD in order to be an approved provider. OTSEA provides instruction to driver education schools and driver education instructors through their "Train the Trainer" program on how to implement the curriculum. Approval of any private driver education school is contingent upon implementation of the curriculum. The state representative to whom we spoke estimated that it takes approximately 100 hours for driver education administrators and instructors to properly read through, absorb and consequently effectively implement the curriculum.

Relevant Adverse Conditions-Related Portions of Curriculum

Modules 8 and 9 contain classroom concepts most related to adverse driving conditions as defined for this research effort. Specifically, Module 8 covers "winter driving techniques" and "skid avoidance and vehicle control," and Module 9 covers "night

³⁴ Oregon Office of Public Instruction. "Driver Education Risk Prevention Curriculum" available at: [HTTP://OPI.MT.GOV/PDF/DRIVERED/07OREGON_DRIVER_EDFACTS.PDF](http://opi.mt.gov/pdf/drivered/07oregon_driver_edfacts.pdf)

driving conditions”, “handling vehicle malfunctions and emergencies”, “environmental issues” and “preventive maintenance.”³⁵

Driver Education Program Evaluation Efforts

In 2004, Oregon analyzed the impact of the transfer of DE from ODE to ODOT and the impact of the new standards on teen drivers in Oregon. In 1998, the year before the license and driver education changes, there were 1,196 16-year old drivers behind the wheel in a crash when someone was killed or injured. In 2000, there were 898 16-year old drivers behind the wheel in a crash when someone was killed or injured - a 24.9 percent reduction. The number of 16-year old drivers behind the wheel in crashes involving fatalities or injuries continued to decline steadily between 2001 and 2004, reaching 687 in 2004 - a 42.6 percent reduction since 1998.

Beyond this analysis, a national study was completed on Oregon in January 2005 that reviewed teen driving records, including 16, 17, 18 and 19-year old drivers. It compared those that had 50 hours of driving practice and a formal driver education course, against those that chose 100 hours of driving practice with their parents and no driver education course. The findings of this research included:

- The crash rate for the teens taking formal driver education was 11-21% lower than those taking 100 hours of practice time with their parents.
- The traffic conviction rate for the teens taking formal driver education was 39-57% lower than those taking 100 hours of practice time with their parents.
- The driver license suspension rate for the teens taking formal driver education was 51-53% lower than those taking 100 hours of practice time with their parents.

5.2 Delaware Department of Education

**Contact: Dr. Dean Betts, the Education Associate for Driver Education & Safety,
302-857-3320**

Delaware Driver Education Program Overview

Under Delaware law all 10th grade students in public and private schools must complete a state-certified driver education program in order to receive a driver’s license. These programs are fully funded by the General Assembly

The Department of Education is tasked with the responsibility of developing curriculum standards and ensuring local school districts and schools comply with these standards in providing driver education courses. The Department is also responsible for providing training and overseeing certification of driver education instructors. Currently, individual

³⁵ Oregon Department of Transportation. “Oregon Driver Education Risk Prevention Curriculum.” available at:

[HTTP://OPI.MT.GOV/PDF/DRIVERED/07OREGON_DRIVER_EDFACTS.PDF](http://opi.mt.gov/pdf/DRIVERED/07OREGON_DRIVER_EDFACTS.PDF)

school districts and schools are charged with developing and implementing their own driver education curricula following the state mandated standards, which include the following core requirements:

- 30 hours of classroom instruction,
- 7 hours of actual in-car instruction, and
- 7 hours of in-car observation.

The driver education course, offered on a pass-fail basis, must include modules addressing the following five subjects:

- 1) **Rules of the road:** Students must be able to identify and define signs, pavement markings, and signals. Additionally, students must demonstrate an understanding of the driver licensing process and traffic laws and right of way regulations.
- 2) **Alcohol & Drug Impacts:** Students must understand the legal, physical and mental effects and responsibilities associated with alcohol and drugs.
- 3) **Defensive Driving:** Students must understand the concepts and techniques of defensive driving.
- 4) **Vehicle Operation:** Students must understand the laws of nature as they pertain to the operation of a motor vehicle. This includes understanding concepts including: gravity and energy of motion, friction and traction, stopping distances, controlling force of impact, and car maintenance fundamentals.
- 5) **Adverse Driving Conditions:** Students must understand how to implement different safe driving habits when encountering adverse conditions. Adverse conditions are defined as driving at night, in bad weather, and other special situations.

During the in-class instruction portion, instructors use a combination of videos, computer programs, driving simulators, and traditional textbooks designed to train students on basic driving skills and knowledge. Student proficiency is assessed through the use of unit tests, quizzes, class participation evaluations, and homework.

The Department of Education is, however, in the process of developing a standardized statewide driver education curriculum. It will likely be about one year before that curriculum is completed and fully implemented by all school districts. The new curriculum will likely follow the existing standards in terms of topics covered, but it is unknown at this time what topics specifically will be included in the new curriculum.

Academic Requirements for Drivers Licensing

In 1999, Delaware implemented a GDL program in order to combat the rising numbers of youth driver related car accidents and fatalities. The program was amended in 2001 by the passage of House Bill 138 entitled “Academic Grades and Driver Education.” This law created a direct linkage between a student’s academic performance and his/her eligibility to enter into the GDL program. According to the survey of all state driver education organizations completed for this study, Delaware appears to be the only state

with legislation that binds GDL program entrance with student academic performance. Dr. Betts is unaware of any other similar program. According to Dr. Betts, this concept was originally developed by the Delaware Driver Safety Education Association (DDSEA), an influential legislative liaison.

To learn more about this innovative approach, study staff interviewed Dr. Dean Betts, the Education Associate for Driver Education & Safety. According to Dr. Betts, the state code mandates all students must be passing at least 5 credits (two of which must be in core academic subjects) at the time of receiving entrance into the GDL program at the age of 16. The graphic below provides an example of how academic grades are linked to the GDL credit requirement scheme. At the completion of the driver education course instructors are required to consult with the school’s guidance office and certify that the prospective student is passing 5 high school course credits. Each elective course is only worth one-half of a credit.

Exhibit 5-1: Example of Academic Requirements for GDL Program Entrance

Course	Letter Grade	Credit Earned
English	A	1
Science	B	1
Social Studies	C	1
Health	A	½
Physical Education (Gym)	A	½
Drama (Elective Course)	B	½
Art (Elective Course)	C	½
	Total Credits	5

After certifying that the student has met the 5 credit requirement, the instructor may issue a “Blue Certificate” that allows the student to go to the DMV and enter the GDL at age 16. Students who fail to meet this requirement are given the opportunity to raise any or all failing subjects to a passing grade by the next marking period. If the students do not bring the failing grade (s) to a passing grade, they receive a failing grade (“Unsatisfactory/Academically Ineligible” notation on transcripts) in the driver education course and are ineligible for the GDL program until the course is passed. Students receiving a failing grade must retake the entire driver education course for a fee in an adult evening or summer driver education program.

The Delaware driver education program and GDL program are perceived to be highly effective by the Department of Education. According to Dr. Betts, the intent of the GDL program was to reduce car crashes among 16 and 17 year old novice drivers. Dr. Betts’ analysis of crash data after implementation of the GDL program shows a 41 percent reduction in accidents among this age group. The DDSEA and Department of Education have not completed any analysis of the impact of the new academic performance requirements on accident rates. However, supporters of the requirements do not argue that “smarter” students drive more safely. Rather, they believe the requirement will help combat the drop out rate.

5.3 Idaho State Department of Education

Contact: Ms. Kelly Glenn, Driver Education Coordinator, 208-332-6984

Idaho Driver Education Program Overview

The Idaho SDE is the agency in charge of both developing driver education curriculum and implementing the education program in the state. Oversight of curriculum development is specifically tasked to the Driver Education Coordinator. The SDE's driver education department organizes training sessions for both public school and professional driving school instructors and administers the driver education instructor certification program. Certified instructors then implement the State's standardized driver training curriculum in public and professional driving schools using a combination of in-class, in-car, video, simulator and other computer-based instruction.

In 2004, the SDE adopted a set of course content requirements for driver education called the "Idaho Standards for Public School Driver Education and Training"³⁶ and "Idaho Standards for Commercial Driving Schools."³⁷ Among the standards, which establish a range of requirements such as classroom size maximums, grading criteria, and insurance mandates, are the following core student training requirements:

- 30 hours of classroom instruction,
- 6 hours of student observation of a teacher or parent driving, and
- 6 hours of behind the wheel instruction.

Idaho's driver education curriculum, summarized in the table below, covers a range of subjects from basic car mechanics and road signs to car physics and driving skills. Also available are training modules that instruct students on other driver-related issues including insurance requirements, purchasing a vehicle, automotive safety technology, and trip planning.

³⁶ Idaho Standards for Public School Driver Education and Training, Idaho State Department of Education, November 2004. <http://www.sde.idaho.gov/drivered/docs/PublicSchoolsStandards.pdf> Last accessed 5/10/2007

³⁷ Idaho Standards For Commercial Driving Schools, Idaho State Department of Education, July 2007. <http://www.sde.idaho.gov/drivered/docs/CSSStandards.pdf> Last accessed 2/9/2008.

Exhibit 5-2: Idaho Department of Education Driver Education Curriculum Standards

Standard	Description
1	Course Overview and Parent Orientation
2	Identify Vehicle Gauges, Alert and Warning Symbols, Operating Vehicle Control Devices, Preparing to Drive, Protecting Occupants
3	Traffic Control Devices and Traffic Laws, Right of Way Rules
4	Vehicle Positioning, Performing Basic Control Tasks
5	Using Vision for Vehicle Control, Time and Space Management Systems and Strategies
6	Negotiating Intersections, Performing Lane Changes and Passing, Performing Parking Maneuvers
7	Effect of Gravity and Energy of Motion on Vehicle Balance, Maintaining Traction Control, Negotiating Hills and Curves
8	Driving in Rural Environments, Driving in Urban Environments, Driving on Limited Access Highways (Freeways), Driving at Night and in Other Reduced Visibility Conditions, Driving During Adverse Weather Conditions
9	Cooperating with Other Roadway Users, Responding to Emergencies, Responsibilities After a Crash, Driving Within the Highway Transportation System, Driver Licensing
10	Effects of Emotions, Effects of Disabilities, Alcohol and Drugs, Alcohol Involved Crashes and Idaho Laws, Drowsy Driving, Aggressive Driving, Driver Distractions
Enhanced Program Content	Insurance Requirements, Purchasing a Vehicle, Maintaining a Vehicle, Planning Your Travel, Conserving Resources, Emerging Vehicle and Highway Safety Technologies

Driver education students are assessed in the following three criteria: knowledge, skills, and attitude. Throughout the in-class instruction students are tested on their knowledge and understanding of each standard with quizzes and unit tests that require them to list, define, describe, identify, demonstrate, explain, compare, predict, estimate, or solve car and traffic related issues. An overall score of 80 percent is required to pass the course. Additionally, any student who fails in any one of the three grading criteria fails for the entire course.

According to the survey submitted by the Driver Education Coordinator, the SDE does not currently evaluate the program's effectiveness. However, the state's program is perceived to be effective. The representative noted that a key barrier in program evaluation is the fact that students spend a small portion of their total instruction time in driver education courses and they may or may not be attending the school where they originally took the course. This makes building in an evaluation process and following up on student progress and driving experiences a challenge. Ms. Glenn also stated that teachers are placing greater emphasis on using observations of student attitude and behavior during training as a reflection of the program's impact.

Adverse Driving Conditions Training

The curriculum component most germane to this study is Standard No. 8, which trains students for driving at night, in reduced visibility conditions and during adverse weather conditions. The following summarizes each training module.

Driving at Night and in Other Reduced Visibility Conditions

In this module, students are taught the causes and effects of driving at night and in reduced visibility conditions. Instructors describe, conduct discussions, and/or demonstrate the reduced-risk procedures for driving at night and in other reduced visibility driving conditions. Textbooks, simulators and videos are used to present this information. At the end of the unit, students are required to be able describe and/or demonstrate:

- 1) Sources of glare and procedures to protect from glare;
- 2) Driving strategies during low light or darkness conditions;
- 3) The laws and the proper use of headlights;
- 4) Limited visibility conditions (i.e., fog, smoke, snow, rain and rain and dust etc.) and procedures to reduce risk.

Driving During Adverse Weather Conditions

In this lesson, students train on the impact and safety strategies for driving in adverse weather conditions. The SDE defines adverse weather conditions as flooding, heat, cold, storms, blizzards or strong winds. Students receive training on vehicle and driver limitations caused by these conditions and how to apply strategies for reduced risk driving. At the end of the lesson, students are tested on their ability to define:

- 1) The different types of adverse weather driving conditions and
- 2) The risks associated with and strategies to compensate for driving during each condition.

Pre-Driver Education Course

In response to ongoing discussions within the driver education community concerning the ability of educators to shape the habits and attitudes of youths toward driving and vehicle safety, the Idaho SDE is developing an innovative program targeted at middle-school students called “Pre-Driver Education.” An experimental version of this course, called “Driving Attitudes”, was recently developed and implemented at a middle school. The following describes the program’s goals and content.

According to Ms. Glenn, the pre-driver education course was initially conceived by Mr. Brad Street, an instructor at Teton Middle School. Mr. Street worked with the school’s counselors and principal to develop curriculum and offer the class as an elective for a trial semester. The course was implemented in Spring of 2006, spanned 9 weeks and

included 45 minutes of in-classroom instruction each day. The goal was to provide young students training about drugs, alcohol, and other traffic safety issues that may affect their future driving habits and experiences. The class placed special emphasis on encouraging students to think about safety when traveling, wearing a seatbelts, and increasing awareness of their surroundings and road conditions.

Both Ms. Glenn and the instructor are reluctant to release any details of the course until a complete model curriculum is researched and established. According to Ms. Glenn, the Idaho SDE had no involvement in the course's initial curriculum development. The effort was entirely spearheaded by the instructor, who collected driver education curriculum materials and information from existing SDE and other published sources. The Idaho SDE is now working with the instructor to develop a complete curriculum package that may be transferable to other schools and organizations.

Despite the lack of details concerning the course's content, a recent article in *Centerline*, a newsletter published by the Idaho Traffic Safety Education Journal, provides some insight.³⁸

According to the article, the pre-driver education course focuses on group discussions and exercises that emphasize the seriousness of car accidents and the habits that cause them. Exercises included conducting a lottery where students drew cards from a pool of cards that reflect the traffic accident statistics. For example, if the statistic was that 1 in 10 drivers experience an injury or accident, then 1 in 10 students would draw a card marked with an "X" that signified that student was an injury victim. This exercise enabled student to visualize the wide-spread impact of traffic accidents. Other activities include tasking students to bring in and present news articles involving traffic accidents. After presenting the article, the instructor leads a discussion session on how the accident may have been avoided. Guest speakers were also invited to present on their personal experiences.

Currently, the pre-driver education course is not scheduled to be offered regularly in Idaho public schools. Ms. Glenn stated that this program is the first of its kind in the State. The curriculum is still in a conceptual phase and will need to be further refined and evaluated before implementation at the state level. Although no completion date or development schedule is set, Ms. Glenn stated that the course is likely to materialize in the future since it received tremendous support and feedback from the participating students and their parents.

³⁸ "Teton Middle School Pre Driver Education Course", *Centerline, Idaho Traffic Safety Education Journal*. January 2007. <http://www.sde.idaho.gov/DriverEd/docs/JanuaryCENTERLINE.pdf> Last accessed 5/08/2007.

5.4 Montana Office of Public Instruction

Contact: David Huff, Traffic Education Director, 406-444-4396

Montana Driver Education Program Overview

Montana's driver education program, both in terms of curriculum development and implementation, is managed by the Office of Public Instruction (OPI). Driver education in Montana is provided exclusively through the public school system. This is primarily because Montana has a total population of less than one million, with about 13,000 teens scattered across the expanse of the 4th largest state in the nation turning an age eligible to drive each year. Commercial driving schools obviously must rely on economies of scale to be able to provide driver's education services and could not serve many communities simply because there are not enough teens learning to drive in most communities to keep a driving school in business. If the state did not utilize the public school system to reach the emerging drivers, many communities would not have driver education available at all.

The state has developed and implemented a standard statewide driver education curriculum. Specifics regarding development, content and implementation of the curriculum are provided below.

Montana's Driver Education and Training Curriculum

Development and Content

Completed in the fall of 2006, the Montana Driver Education and Training curriculum is available for review at www.opi.mt.gov/drivered, although the online version does not include test questions and worksheet answers. This curriculum was developed by Elizabeth Shepard of Boise, Idaho and is based on modules geared towards addressing 45 identified essential knowledge and skills topics. Generally, these knowledge and skills topics are grouped into those that provide the foundation for driving knowledge and skills, those that relate to the application of knowledge and skills, those that speak to driver responsibility and attitude and those that are considered program enhancements such as trip planning, vehicle maintenance, insurance requirements, etc.³⁹ Generally speaking, Montana's curriculum embraces many of the risk-prevention, behavior-modification oriented concepts of Fred Mottola's NIDB Risk Prevention Curriculum. Because it was developed with public funds, other states are allowed to use and/or modify the curriculum to meet their own state needs (with proper credit given). Ms. Shepard has expressed a willingness to help other states with this task.

³⁹ Montana Office of Public Instruction "Curriculum Map Teen Driver Essential Knowledge and Skill Topics." Available at: <http://opi.mt.gov:8010/Driver's%20Education/Curriculum%20Modules/April%2005%20Curriculum%20Guide/Curriculum%20Map.pdf>

Module Topics Include:

- 1) Introduction and Parent Orientation
- 2) Preparing to Drive
- 3) Highways & Laws
- 4) Basic Control
- 5) Vision
- 6) Time & Space
- 7) Mixing with Traffic
- 8) Limited Spaces
- 9) Natural Laws
- 10) Hills & Curves
- 11) Rural
- 12) Urban
- 13) Freeways
- 14) Adverse Conditions
- 15) Share the Road
- 16) Emergencies
- 17) Operator Fitness - Aggressive, Drowsy, Distracted, Alcohol, Drugs
- 18) Cars & Trips
- 19) Manage Risk
- 20) License & Test

These 20 instructional modules provide resources to meet the Montana Driver Education and Training Curriculum Standards and Benchmarks that were developed by OPI. Each module contains lesson plans, one or more PowerPoint presentations, fact sheets, worksheets, quizzes and tests.

David Huff of Montana OPI is also the President-Elect of Driver Education and Training Administrators (DETA) -- formerly the Association of State Supervisors of Safety and Driver Education. As such, he is very involved in driver education curriculum development and had a few comments on driver education curriculum in general, beyond that which was adopted in Montana. In Mr. Huff's opinion, the risk-prevention, driver-behavior-modification type of curriculum as developed by Fred Mottola of NIDB is the best driver education curriculum available. In practical terms however, he recognizes that curriculum is not always the best option for a particular state. In the case of Montana, for example, he chose not to fully adopt the NIDB curriculum because most of the instructors in his state are older and nearing the end of their careers and he feared that if the curriculum were changed too dramatically he would lose instructors. Mr. Huff considers the curriculum developed by Ms. Shephard for Montana a good, middle-of-the-road curriculum that includes many of the behavior modification concepts included in Fred Mottola's curriculum, but which is organized closer to Montana's previous curriculum and closer to most other more traditional driver education curricula. Mr. Huff believes Montana's transition (and probably other states' as well) to new technologies and methodologies must be tempered with deliberate thought and planning to move the whole industry forward in a manner that can be understood and embraced and at a pace it can survive.

In general, Mr. Huff thinks traditional driver education probably covers too many subjects - subjects that are good, but do not necessarily contribute to the types of knowledge, skills, and habits needed to survive the first 6 months of driving. Without validation, however, it is difficult to know what areas to focus on, so traditional driver education tries to cover all topics. Rather than provide what is needed, driver education professionals try to cover it all, just in case.

As an example, he posed the question, how important is organ donation training toward meeting the objectives of teaching a teen to safely drive? Regardless of the answer, there are states requiring this subject in teen driver education simply because there is no other opportunity to influence the driver pool. Another example is, how important is insurance training or knowing the numbering scheme of the highways and freeways? Are they important or useful? Yes, but does the time spent on these topics help a teen drive more safely? Likely not.

Curriculum Implementation

Though the Office of Public Instruction developed a driver education curriculum and standards for implementation of the curriculum in terms of in-class, behind-the-wheel and other hours requirements, public school districts have latitude in implementing the curriculum in terms of the specific delivery methods they can utilize. Curriculum CD-ROMs are provided to instructors and include lesson plans, PowerPoint presentations, fact sheets, worksheets, quizzes and tests, plus the tests and worksheet answers. The CD-ROMs include documents developed as part of the curriculum to assist in the design and delivery of a driver education program including a scope and sequencing document to guide the implementation of the in-class and behind-the-wheel portions of the curriculum. The materials are provided to instructors as non-secure Microsoft Word documents to allow modifications or additions that better meet the needs of a particular community.

In Mr. Huff's opinion, the classroom component of Montana's curriculum is better than the BTW, whereas it should be the other way around. In his opinion, the BTW should be the strongest, and the classroom should be entirely geared to prepare students to drive, with the classroom being integrated with the BTW. In this scenario, the classroom is an extended lab of the BTW, with the classroom exploring and building behaviors expected in the car through student centered activities that simulate in-vehicle behaviors. That way, once a new driver gets in the car, they will have already learned the correct driving procedures and behaviors, and will be asked to demonstrate the correct behaviors while driving under the supervision and teaching of the BTW instructor.

Relevant Adverse Conditions-Related Portions of Curriculum

Module 14 of Montana's statewide curriculum is entitled, "Strategies for Adverse Conditions." For purposes of their module, adverse driving conditions are defined as: glare, low light, darkness, fog, smoke, dust, rain, winter weather, and reduced traction. The stated objective of the lesson is, "The student recognizes and understands the risk involved and the reduced risk driving behaviors needed during reduced visibility driving conditions and extreme weather driving conditions. The student understands driver and

vehicle limitations and how to apply time and space management strategies with vision control, motion control and steering control.”⁴⁰

The module’s content and essential knowledge and skills include:

- Understanding Reduced Visibility Driving Conditions
- Vehicle Lights for Visibility
- Sources of Glare
- Protection From Glare
- Improve Visibility from the Vehicle
- Driving at Night
- Driving in Fog
- Driving in Smoke and Dust
- Driving in Lightning
- Driving in Rain
- Low-Water Crossings
- Winter Driving
- Hot Weather Driving
- Assignment
- Assessment

As a result of participating in Module 14, the student is expected to:

- Describe sources for glare and procedures to protect from glare;
- Describe and demonstrate driving strategies during low light or darkness conditions;
- Describe and apply laws regarding headlights use;
- Analyze headlight projection and efficient and proper use of vehicle illumination;
- Describe fog related reduced visibility conditions and procedures to reduce risk;
- Describe limited visibility conditions caused by smoke and dust and procedures to reduce risk;
- Describe rain related reduced visibility driving conditions and procedures to reduce risk;
- Describe extreme weather driving conditions such as flooding, heat, cold, storms, blizzards and strong wind;
- Describe risks associated with driving during extreme weather driving conditions; and
- Explain reduced risk strategies to compensate for extreme weather driving conditions.

⁴⁰ Montana Office of Public Instruction “Montana driver education and training curriculum guide – module 14 lesson plan.” Available at: <http://opi.mt.gov:8010/Driver's%20Education/Curriculum%20Modules/Module%2014%20Final/M14%20Lesson%20Plan%20final.pdf>

Program Evaluation Efforts

Although not a scientific study, Montana continually evaluates the attitudes of the driver education community through papers written by the driver education teachers attending the annual traffic education conference. Mr. Huff reports that attitudes and enthusiasm of teachers is at an all time high because of the recent efforts Montana has made to improve the system.

Montana also does desk monitoring of programs. All public school driver education programs must apply for approval to offer traffic education each year and they must provide documentation that they meet minimum standards in order to receive state funds to partially offset the cost of providing driver education. Montana has a high level of program standards compliance.

Additionally, Montana volunteered to be a pilot state in the AAA Foundation-sponsored research evaluating driver education projects, which is being implemented this year. Montana was not selected as a state for this year, but hopes to be included next year. Montana is active in developing and testing new products and processes for driver education. Montana conducted a second phase advanced driver education instruction project in 2005 and researchers are tracing the intervention and control group for 4 years.

Montana is also presently developing materials based upon the new driver education and training curriculum described above, which will involve parents with driver education and test these materials for validity. Dr. Jessica Hartos of the University of North Carolina-Charlotte, one of the CheckPoints researchers, is working with Montana on this project. Mr. Huff commented that very few, if any, driver education materials in the nation have been tested for validity. It is only recently that the nation and the traffic safety community in particular has taken an interest in and provided funding for such activities.

Montana is planning on further evaluating the driver education program, and is currently developing parent linkages to driver education. The state has already surveyed Montana parents of teen drivers and learned that a very strong majority of parents want to be involved in their teens' driver education. Through the survey, parents have told Montana driver education administrators their opinions on how they want to be involved. The lessons of Oregon and Texas (NHTSA study due to be released in late spring 2007 on parent-taught driver education versus formalized driver education courses) have taught the driver education community that parent-taught driver education alone does not produce safe teen drivers. In Mr. Huff's opinion, knowledgeable parent monitoring and supervision of their teen's practice driving must be linked with professional teaching. Montana plans to develop tools to do this. More information on the parent survey in Montana is available on the website, www.opi.mt.gov/drivered.

5.5 Michigan Department of State

Contact: Greg Lantzy, Manager 517-373-3677

Michigan Driver Education Program Overview

Michigan's GDL program came about in 1997 with the passage of a new state law. As a part of that GDL program, Michigan developed a driver education program that included a standardized curriculum consisting of two segments – Segment 1 consisting of 24 hours of classroom, and 6 hours of BTW instruction, and Segment 2 consisting of an additional 6 hours of classroom instruction and occurring at least 90 days after the student has held a level 1 license and has completed 30 hours of adult-supervised driving practice. Under the Driver Education Provider and Instructor Act of October 2006 (DEPIA), a new driver education curriculum is currently being developed. The new curriculum will maintain the two segment approach.

Public laws 70 and 71 of 2004 transferred oversight of Michigan's driver education program from the Department of Education to the Department of State. Key staff (Mr. Lantzy) followed the program from the Department of Education (DOE) to Department of State. An advisory committee was formulated at that time which provided input to the development of Driver Education Provider and Instructor Act of 2006. The advisory group included public schools and driver training schools, Universities teaching instructor preparation courses, third party testing organizations, law enforcement, the Michigan Driver Traffic Safety Education Association and other traffic safety entities. The goals of DEPIA were:

- To eliminate overlap in statutory requirements,
- Create a level playing field for Michigan's driver education program (e.g. between public school and professional driving school programs),
- Achieve consistency in program objectives (e.g. between public school and professional driving school programs) ,
- Strengthen and improve curriculum, and
- Establish appropriate requirements and qualifications for driver education providers and instructors.

Key elements to the program under DEPIA include:

- Driver education providers and instructors are no longer "licensed" or "approved;" instead, they will be "certified." Governmental agencies offering driver education are also required to be certified.
- Providers will be certified according to the following classifications: a. Teen and/or Adult (automobile) driver training, and b. Truck driver training
- All driver education providers will be certified biennially (every two years) by the Secretary of State. Certifications expire exactly two years from the date of issuance.

- Providers will no longer be required to license or approve instructors, but will be required to verify each instructor's certification. Providers are required to inform the Secretary of State of employment changes.
- All driver education instructors will be certified biennially (every two years) DIRECTLY by the Secretary of State. Providers will no longer make application for the licensure and/or approval of their instructors.
- All instructors will need to submit criminal history checks every 4 years and medical reports (not older than 90 days) every two years.
- An instructor will need only one certification, which will be valid for employment at any provider. *Previously, instructors were required to be licensed for each employer, and teen providers were required to obtain approval letters for each instructor.*
- DEPIA no longer requires a public, private, or parochial school instructor to possess a valid Michigan teaching certificate.
- Conditional certification will be granted to an individual enrolled in a university instructor preparation program practicum course.

Michigan's Driver Education Curriculum

Development and Content

As mentioned above, the Driver Education Provider and Instructor Act of 2006 is what led to Michigan's current development of a new driver education curriculum. DEPIA includes a number of standards for that curriculum including:

- A model Segment 1 and Segment 2 curriculum will be prescribed by the Secretary of State.
- By September 1, 2007, providers must either adopt the curriculum, or receive approval from the Secretary of State to use an alternative curriculum that meets or exceeds the standards of the prescribed curriculum.
- Each student must successfully pass a written knowledge test prescribed by the Secretary of State for each segment.
- For students under the age of 18, a written agreement must stipulate that on-the-road instruction will be provided with not less than 2 students present, unless waived by the student's parent or legal guardian.

Segment 1

- Classroom instruction of 4 or more hours must be completed before the student begins behind-the-wheel instruction.
- Behind-the-wheel instruction of 3 or more hours must be completed before classroom instruction concludes.
- A student must complete any remaining required behind-the-wheel instruction no later than 3 weeks after the last classroom instruction has been completed.
- Behind-the-wheel instruction on a multiple vehicle driving facility (range) may be substituted for not more than 2 hours of on-the-road instruction. *Previously, 3 hours of substitution was allowed.* The Secretary of State will give providers

written approval to utilize a range, based on verification that the range meets the written standards prepared by the Secretary of State.

- A student must receive 4 or more hours of behind-the-wheel observation time during Segment 1.

Segment 2

- A student must possess a Level 1 graduated driver license for not less than 3 continuous months to be eligible for segment 2. *Previously, 3 months must have elapsed since the completion of Segment 1.*

In terms of the actual content of the curriculum, Michigan plans to utilize the ADTSEA curriculum as a base. Modules will be modified as necessary to conform with DEPIA and any other relevant Michigan laws, statutes, or circumstances, but essentially that model curriculum will be used.

Michigan's current Segment 1 curriculum includes the following topics:

- Vehicle Familiarization,
- Basic Control Tasks,
- Driver Fitness Tasks,
- Intermediate and Advanced Control Tasks,
- Legal Awareness Tasks, and
- The Vehicle

Topics under Segment 2 include:

- Mental and Perceptual Awareness,
- Driver Fitness Tasks and
- Advanced Collision Tasks

Segment 2 curriculum is designed to be very open-ended, interactive and discussion oriented.

Implementation

Currently and with the new curriculum being developed under DEPIA, Michigan's driver education curriculum is recommended and provided to all driver education providers, but it is not required. Certified providers can submit a comparable curriculum for approval by Department of State. Instructional materials and activities are included in the standardized curriculum, but delivery methods, utilized within the standards developed by the Department of the State in terms of hours requirements and sequencing mentioned above, are left up to the discretion of the certified providers and certified instructors.

Relevant Adverse Conditions-Related Portions of Curriculum

The existing Michigan curriculum does not specifically include a module geared towards safety under adverse driving conditions, although the follow topics are covered at various

points within the modules listed above: weather conditions (bright sunlight, fog, ice rain, snow, wind); night-driving (including distortion of speed and distance and headlight glare); roadway conditions (including wet, icy, gravel), and construction zones.

The new curriculum will be based on the ADTSEA curriculum which does include a module entitled “Environmental Conditions That Affect Safe Vehicle Operation.” This module includes the following topics:

- Changing Weather and Conditions of Visibility
 - Driving at night
 - Sources of glare
 - Countermeasures
 - Visibility limited by fog, smoke, rain or snow
- Vehicle Control and Traction Loss
- Occupant Protection
- Changing traction conditions
 - Condition of the vehicle
 - Actions of the driver
 - Hydroplaning
 - Front wheel skid
 - Rear wheel skid
 - Off road recovery

Program Evaluation Efforts

Michigan has not undertaken any efforts specifically geared towards evaluating the effectiveness of their program. Mr. Lantzy’s perception as indicated through his response to the AzDOT Driver Education survey is that Michigan’s program is “somewhat effective.” Mr. Lantzy stated that, as a part of the overall GDL program, he believes driver education to be effective, but acknowledges that it is too difficult to isolate the impact of driver education alone on a reduction in crashes.

5.6 Arizona Department of Transportation

Contacts: Robert Turney, Motor Vehicle Department, 602-712-7975, Jean Ajamie, Director of School Safety and Prevention, Department of Education, 602-542-8734

Arizona Driver Education Program Overview

Driver education in Arizona is provided through both professional driver training schools, which are licensed and regulated by the AzDOT-MVD, and public high schools, whose programs are regulated by the Arizona Department of Education (ADE). No one statewide agency is responsible for either curriculum development or driver education implementation. Driver education is not a requirement in Arizona. Under Arizona's driver license law, minors are eligible to receive a class G license if they successfully complete an approved driver education program or have a parent or guardian certify that they received 25 hours of supervised driving practice, 5 of those at night, and have had a learner's permit for five months.

Arizona Driver Education Curriculum

Development and Content

Completing an ADE-approved program satisfies the driver education requirement of the graduated driver's license law.

A public or private high school may participate in the Arizona Department of Education's Driver Education Program provided the following requirements are met:

- 1) Students receive 30 hours of classroom instruction;
- 2) Students receive 6 hours (or the equivalent) of BTW instruction;
- 3) The class and BTW instruction are taught by a certified teacher with a driver education endorsement (a University-level course);
- 4) The principal or superintendent verifies the school information.

The Arizona Department of Transportation, MVD, allows driver education teachers in participating schools to issue Certificates of Completion to their students who successfully complete a course. MVD waives the behind-the-wheel portion of the driver's license test for students with Certificates of Completion, although they reserve the right to administer tests to any applicant if the field station representatives believe doing so would be in the interest of public safety.

Professional driver training school courses must include the following topics:

- Introduction to driving and the law,
- Basic control and rules of the road,
- Space cushioning and safe driving practices,
- Routine driving methods and procedures,
- Highway driving methods and procedures,
- Issues regarding impairment,
- Special problems and crash avoidance.

In order to be licensed by MVD as a driver education provider, professional driving schools must follow these standards in terms of the subjects covered. There are no standard hours requirements for the in-class curriculum, and, as stated above, BTW training can be waived if the student completes the in-class portion of the professional driving school curriculum.

Ms. Ajamie representative indicated that a driver education task force consisting of both ADE and MVD representatives has formulated an action plan to develop uniform standards for both the curriculum and training for driver education instructors to apply to both the public school driver education program and the professional driver training schools. Her initial hope was for those standards to be developed by December of 2007, but it does not appear as though that is going to happen.

Implementation

As mentioned above, the public school driver education course must be taught by a certified teacher with a driver education endorsement. Endorsements are attachments to teaching certificates and indicate areas of specialization. Courses and programs must be taken from an accredited institution. The driver's education instructor endorsement requires taking one class in each of the following: safety education, driver and highway safety education, driver education laboratory experience.

Professional driving school instructors must complete an employment application through a licensed driver training school, be of a minimum age as required by MVD, pass a criminal record check and complete 100 hours of training.

Relevant Adverse Conditions-Related Portions of Curriculum

The Special Problems and Crash Avoidance module of the professional driving school curriculum standards includes the following relevant topics:

- Reduced traction,
- Reduced visibility (different weather conditions) and
- Night driving

Program Evaluation Efforts

No specific efforts have been undertaken in Arizona to determine the effectiveness of the driver education program. Mr. Turney representative indicated, however, through completion of the AzDOT Driver Education Survey that he believes the program to be "effective."

5.7 Texas Education Agency, Driver Training Division

Contacts: Victor Alegria & Nina Saint, Driver Education Program Specialists, (512) 936-6778

Texas Education Agency Driver Education Program Overview

The following presents the results of an in-depth analysis of the Texas's driver education program and curriculum. This state was selected for further study to highlight two unique program characteristics: 1) Texas offers driver education training as concurrent, block, and completely parent-taught options, and 2) the state approves of several different driver education course curricula in addition to the State's own curriculum package. To learn more about these training options and different curricula, study staff interviewed Mr. Victor Alegria and Ms. Nina Saint, Driver Education Program Specialists with the Texas Education Agency.

In Texas, the Texas Education Agency (TEA) is responsible for developing, approving and implementing driver education curriculum and training. The TEA's Driver Training Division serves as the point of contact for all driver training programs including public and commercial programs for training novice drivers and driving safety courses (e.g. defensive driving or traffic school). The Division is also tasked with providing technical assistance to public schools and oversees licensing of commercial instruction programs.

Texas law requires persons less than 18 years of age to successfully complete one of three different state-approved driver education course options before they are eligible to receive driver licenses. These options include:

- 1) Block In-Class Training
- 2) Concurrent In-Class Training
- 3) Parent Taught

The summaries for each of these different training programs are provided below. Although formatted differently, each of these programs are designed to meet the State's minimum novice driver training requirements. These requirements include:

- 32 hours of curriculum instruction,
- 7 hours of behind-the-wheel training, and
- 7 hours of behind-the-wheel observation.

Implementation

Block & Concurrent In-Class Training

According to Mr. Alegria, the TEA approves of the use of either a block or concurrent driver education program. While both programs adhere to the 32 hour in-class, 7 hours behind-the-wheel instruction and 7 hours in-car practice requirements, the delivery of lessons are on two different timelines and enable students to obtain a driving permit at different stages of training. In the Block Program, a student completes all 32 hours of TEA approved classroom instruction and becomes eligible to test for an instructional permit. After receiving the permit, the student may then proceed to complete the 7 hours of in-car training and 7 hours of in-car observation. In contrast, a student in a Concurrent Program is only required to complete at least 6 hours of classroom instruction before testing for the permit. The remaining 26 hours of classroom instruction are then completed simultaneously with the behind-the-wheel training and in-car observation.

Parent Taught Driver Education

In 1997, the Texas legislature approved the implementation of a Parent Taught Driver Education (PTDE) program. This program, administered by the Texas Department of Public Safety, enables a parent or legal guardian to provide all the necessary training for youths between the age of 14 and 17. To be eligible, parents must have a valid Texas

driver's license, a clean driving record for the last three years, and be free of any legal conviction. Parents are required to instruct students in mastering the following elements:

- Applicable Texas traffic laws, rules and procedures for operating and owning an automobile;
- Benefits of occupant protections, use of space management systems; factors and behaviors that effect driver performance including alcohol and other drugs; and
- Protection of Texas natural resources, including litter prevention.

Parents who receive approval from the Department of Public Safety are directed to a web site to download the program or may purchase a CD-ROM containing a curriculum package entitled "Model Course 101", which is described in the next subsection. Parents can also chose to use any of the curriculum options described in the next section. After certifying their student has completed an approved driver education curriculum, met all in-car training and observation requirements (logbooks provided), and completing the in-car driving exam, students receive a license.

Curriculum

For all three training program options, instructors are allowed to implement TEA-approved driver education curricula (Model Course 101 through 109). Model Course 101, summarized below, is the comprehensive curriculum developed by TEA. The remaining options, Model Courses 102 through 108, consist of curriculum developed by other public and private organizations. For these other curricula, instructors must receive approval from TEA prior to their implementation. The following provides a summary of these alternatives:

- **Program Course – 102:** This course is developed and distributed by National Driver Training Institute (NDTI). The lessons are provided on an interactive CD-ROM and are accompanied by the NDTI textbook "Help for the Teenager Who Wants to Drive."
- **Program Course – 103:** This program is developed by a firm called "Driver Ed in a Box." The course consists of an interactive CD-ROM and textbook called "Driver Ed in a Box, The Textbook."
- **Program Course – 104:** This program, offered by "Curb Buster," consists of an interactive CD-ROM and a textbook called "Drive Right."
- **Program Course – 105:** This curriculum, distributed by "Driver Ed at Home," includes lesson plans and textbook entitled "Responsible Driving."
- **Program Course – 106:** This curriculum is offered by Texas Driver and Traffic Safety Education Association and includes a textbook entitled "Texas Traffic Safety Education Student Manual."
- **Program Course – 107:** This program is offered by Virtual Drive of Texas. It consists of a computer based training program provided on a CD-ROM.
- **Program Course – 108:** Offered by DriversEd.com, this driver education course provides training via a website.
- **Program Course – 109:** This course, offered by a private firm called "I DRIVE SAFELY," consists of online computer-based training.

For each of these curricula, instructors utilize textbooks, computer-assisted learning programs, training videos and simulators to train students. The TEA does not require the use of a specific textbook, but offers several recommendations. However, Texas law limits the use of films, slides, videos, tape recordings, guest speakers, and other instructional media to a total of 640 minutes (10.6 hours) of the 32 hours of required instruction.

Similar to standards of other states, Texas established equivalency ratios for in-car training hours logged in a simulator or during range driving. According to state law, “A minimum of four periods of at least 55 minutes per hour of instruction in a simulator may be substituted for one hour of in-car instruction. A minimum of two periods of at least 55 minutes per hour of multicar driving range instruction may be substituted for one hour of in-car instruction relating to elementary or city driving lessons. However, a minimum of four hours must be devoted to behind-the-wheel instruction. Seven hours of in-car observation is required regardless of combinations used.”⁴¹

Model Program 101

According to the TEA representatives, Model Program Course 101, entitled “The Texas Driver and Traffic Safety Education Master Curriculum Guide,” was developed by the agency for use by public and licensed private driving schools. It includes 10 modules with over 1,600 pages of sample classroom and behind the wheel lesson plans, support materials, worksheets, exams, instructor-lead activities, fact sheets, student worksheets, transparency masters, in-car lesson plans, supplementary resources, evaluation tools (exams, quizzes, etc.), and parent involvement support handouts.⁴² The 10 training modules are as follows:

- 1) Texas Driver Responsibilities--Knowing Texas Traffic Laws
- 2) Preparing to Operate the Vehicle
- 3) Basic Maneuvering Tasks--Low Risk Environment
- 4) Basic Maneuvering Tasks--Moderate Risk Environment
- 5) Information Processing--Moderate Risk Environment
- 6) Information Processing--Multiple Lane Expressways
- 7) Driver Performance--Personal Factors
- 8) Driver Responsibilities--Adverse Conditions
- 9) Texas Driver Responsibilities--Vehicle Functions
- 10) Texas Driver Responsibilities--The Wise Consumer & Driver Assessment--
Making Informed Choices

⁴¹ Texas Administrative Code (TAC) Part II: Texas Education Agency, Chapter 176. Driver Training Schools Subchapter AA. “Commissioner's Rules on Minimum Standards for Operation of Licensed Texas Driver Education Schools”

⁴² Driver and Traffic Safety Education Master Curriculum Guide, Texas Education Agency
<http://www.tea.state.tx.us/safedriver/masterguide.html>

TEA provides all the necessary material for teaching each of these modules. Instructors are responsible for tailoring these materials, if necessary, to develop their own unique lesson plans and work within their time allotments. These TEA course materials are available at no cost online for use by schools, teachers, and parent instructors. According to Ms. Saint, all of these materials are available for free use by the public, including AzDOT, and can be downloaded from the TEA website.⁴³

Relevant Adverse Conditions-Related Portions of Curriculum

The training module most germane for this study is Module 8, Driver Responsibilities-Adverse Conditions. This module is summarized below.⁴⁴

In this module students are instructed on the impacts and strategies to cope with inclement and extreme weather conditions. The goal is to train students to predict vehicle behavior and driver limitations before developing and executing a driving maneuver. It also places emphasis on map reading and trip planning skills to avoid adverse driving conditions entirely. The module includes the following topics:

- **Topic 1 – Visibility in Adverse Conditions:** Students are trained to recognize driver responsibilities and limitations for reduced-visibility driving conditions including glare, darkness, fog, precipitation, winter weather, or smoke. They learn to formulate predictions on vehicular and driver limitations before developing and executing appropriate responses.
- **Topic 2 – Extreme Weather Conditions:** Students are taught to describe extreme weather conditions relative to driving such as flooding, heat, cold, or strong winds and formulate predictions on related vehicular and driver limitations before developing and executing appropriate responses.
- **Topic 3 – Protecting Occupants.** Students receive training on the proper use of vehicle occupant protection devices.
- **Topic 4 – Roadway and Vehicle Technology:** Students learn about enhanced occupant protection features incorporated into highway and vehicular design technology and occupant protection.
- **Topic 5 – Traction Loss Concerns:** Students receive training on vehicular imbalance and how to take appropriate countermeasures to prevent loss of vehicle control.

As previously stated, the TEA representatives indicated that this module, along with all other TEA-developed driver education curriculum, is free for use by the public. This module comes complete with lesson plans, PowerPoint presentation slides/transparencies,

⁴³ The Texas Education Agency's complete driver education curriculum is available for download at: <http://www.tea.state.tx.us/safedriver/masterguide.html>

⁴⁴ Texas Education Agency, "Module 8" Available at <HTTP://WWW.TEA.STATE.TX.US/SAFEDRIVER/CURRICULUM/TXDRIVERMASTERCURRICULUM/MOD8TRANS.PPT>

quizzes, handouts, and exams. A more detailed analysis of this module is provided in the recommendations chapter.

Program Evaluation Efforts

Texas law requires each school that teaches driver education courses to collect student data to enable TEA to evaluate the overall effectiveness of the driver education course in reducing the number of violations and accidents of persons who successfully complete the course. TEA obtains the data from the schools when they transmit a copy of the student's driver education completion certificate to the agency.

According to the Ms. Saint, the agency has not completed any program analyses or studies. However, the data was recently analyzed by the Texas Transportation Institute (TTI) in a study entitled, "Parent-Taught Driver Education in Texas: A Comparative Evaluation."⁴⁵ The study, published in April 2007, evaluated the Texas PTDE program using three different methods:

- 1) Focus groups with driver education instructors, teen drivers, and their parents;
- 2) A statewide mail survey of young drivers; and
- 3) An analysis of Texas driver records.

The study came to three main conclusions. First, the advent of the PTDE did not impact the number of youths applying for permits. Parent-taught students were more likely to receive a permit earlier than students trained in a class environment because the number of classroom opportunities is linked to the school year calendar. It was believed a spike in learning permits might translate to an increased population of young drivers, who are at risk of traffic accidents. Second, students and parents agree that parent-taught programs offer advantages over traditional public and private courses in terms of cost and one-on-one training. Private instructors contend that the lack of driver safety knowledge and proper teacher training of parent instructors outweighs these benefits. Finally, an analysis of self-reported data indicated that virtually no difference existed between parent-taught and school-taught novice drivers in terms of driver errors, traffic convictions and crash rates.

⁴⁵ "Parent-Taught Driver Education in Texas: A Comparative Evaluation" Texas Transportation Institute for the National Highway Traffic Safety Administration, April 2007. (DOT HS 810 760)
<http://www.nhtsa.com/portal/site/nhtsa/menuitem.cd18639c9dadbabbbf30811060008a0c/>

CHAPTER 6: CASE STUDY OF OTHER ORGANIZATIONS

Task 5 of this research was to interview between 5 and 7 private or semi-government agencies to ascertain what driver education programs currently exist and to gather their opinions and willingness to sponsor an improved driver education program that includes an added element for driving in adverse conditions.

The task called for Jack Faucett Associates (JFA) to submit to AzDOT for approval a list of potential interviewees and the general topics for discussion for these interviews. The first sub-section of this chapter presents the list of 5 entities interviewed including a general explanation for their inclusion in the research. Also included in this sub-section is the list of topics that were discussed during the interviews.

The second sub-section of this chapter presents the results of each agency interview. Each agency discussion includes contact information and is organized loosely according to the topics presented in subsection 6.1.

6.1 List of Agencies Interviewed and Topics Covered

The list of entities interviewed includes:

- 1) Governor's Highway Safety Association (GHSA)
- 2) National Highway Traffic Safety Administration (NHTSA)
- 3) American Driver and Traffic Safety Education Association (ADTSEA)
- 4) National Institute for Driver Behavior (NIDB)
- 5) AAA Foundation for Traffic Safety

These entities were selected for inclusion in the research based on information gained through the literature review conducted for this project and other subsequent research into the primary entities engaged in either the research or development of driver education curricula.

In interviewing these entities, the follow topics were discussed and documented:

- 1) Please describe your organization in terms of membership, history, and activities (research, advocacy, etc) in the area of driver education curriculum.
- 2) What types of efforts, if any, has your organization undertaken in the area of driver education curriculum development?
- 3) Have any of your driver education curriculum development efforts focused on driving under adverse conditions? If so, how did you define adverse conditions?
- 4) Has your organization specifically developed a driver education curriculum module geared towards driving under adverse driving conditions?
 - a) If so, would you be willing to allow AzDOT to utilize this module in full or to utilize portions of the module as applicable?

- b) Have you been able to quantify a reduction in crashes (adverse condition-related or otherwise) as a result of your efforts?
- c) If not, would your organization be interested in being involved in the development of such a module through the contribution of expertise, funding, or other data you believe would be helpful?
- 5) Regardless of whether or not your organization has previously engaged in efforts related to driver education curriculum development in general or driver education curriculum for adverse driving conditions in particular, do you have thoughts or recommendations on what topics and/or methods of instruction should be included in such a driver education curriculum module?
- 6) Do you have knowledge of other organizations or individuals you think we should speak with on this topic?

6.2 Results of Agency Interviews

The following subsections present the results of discussions with each of the entities identified in section 6.1 above. This information is the result of telephone and email conversations between study team staff and staff from each organization conducted in April 2007.

Governors Highway Safety Association (GHSA)

Contact: Ms. Barbara Harsha, Executive Director

About the Organization

GHSA is the states' voice on highway safety. The 501(c)(3) nonprofit association represents state and territorial highway safety offices. Its members implement programs that address the behavior of motor vehicle drivers and road users. Areas of focus include:

- occupant protection,
- impaired driving,
- speed and aggressive driving,
- motorcycle safety,
- pedestrian and bicycle safety,
- highway safety issues relating to mature and younger drivers,
- drowsy driving, and
- distracted driving.

In addition to the behavioral aspects of driving, GHSA also deals with other aspects of highway safety such as traffic records and training.

GHSA's mission is to provide leadership and representation for the states to improve traffic safety, influence national policy and enhance program management. The Association provides a collective voice for the states in working with Congress and the federal agencies to address highway safety challenges.

The Highway Safety Act of 1966 established the State and Community Highway Safety Grant Program (U.S.C. Title 23, Section 402), commonly known as the "402" program. State Highway Safety Offices were created as a result of the legislation and were funded mainly with 402 funds. In 1967, several state Highway Safety Representatives decided to organize into a formal group (at the time called The National Conference of Governors' Highway Representatives) and meet annually in order to share information and collectively work for national safety goals. The organization was officially incorporated in 1974 and received nonprofit status in 1976. In 2002, the organization's name was changed to the Governors Highway Safety Association.

Highway safety program managers, appointed by the governors of the fifty states, the government of the District of Columbia, the Commonwealths of Puerto Rico and Northern Mariana Islands, and the territories of the Virgin Islands, Guam, American Samoa and Native Americans make up the membership of GHSA. These members are responsible for developing and implementing highway safety programs, maintaining fiscal oversight of the programs, and evaluating the programs' impact on highway safety problems. Members pay annual dues based, in part, on a flat fee and, in part, on a proportional formula which considers state population. Associate membership is available to organizations, associations and businesses whose goals and interests are compatible with GHSA. A special classification as "Member Emeritus" is available to former Governors' Representatives and Coordinators who are no longer employed by a state or territorial highway safety office but who still have an active interest in the Association and in highway safety issues.

GHSA's governing body is its Executive Board that consists of a Chair, Vice Chair, Secretary and Treasurer, as well as representatives and alternates from 10 regions. All officers are elected by the membership and serve a term of one year. The immediate past chair is a member of the Board and there are also up to five at-large members.

Much of the work of the Association is conducted through its standing committees. Current GHSA committees include the following:

- The **Member Services** committee is charged with organizing the annual Executive Seminar on Program Management which provides a "crash course" for new members on managing a highway safety office.
- The **Finance and Operations** committee reviews and revises Association business policies and procedures to ensure its effectiveness.
- The **Strategic Communications** committee works to achieve maximum visibility for GHSA positions and activities and works closely with state public information officers.

On occasion, the GHSA Chair appoints task forces to address specific highway safety issues or concerns

The Association maintains an office in Washington, D.C., near Capitol Hill. Staff participate in the planning and review of highway safety policy by the Congress and the

Executive Branch of the government. The staff works to ensure that the states' perspective is represented to key officials, members of the media and others in the transportation safety communities.

Driver Education Curriculum Development:

GHSA and the Ford Motor Company Fund have developed *Driving Skills for Life* (DSFL). DSFL is an awareness program, not a driver education program *per se*. It is a national safety initiative aimed at teenagers who have earned or are about to earn a driver's license and its intent is to fill in the gaps not addressed by traditional driver education, e.g. risky behavior.

The DSFL program is free. It incorporates the four driving skills that research conducted by GHSA revealed to have the most promise of preventing crashes:

- Hazard Recognition,
- Vehicle Handling,
- Speed Management, and
- Space Management.

In developing DSFL, GHSA created a task force to work with safety experts to identify these key driving skills. Worthland Worldwide, an opinion research firm, was hired to conduct a survey of safety experts. Their responses formed the basis on which DSFL was created and identified the four driving skills that make up the program.

The program is designed to help students learn the skills necessary for safe driving beyond what they have learned in standard driver's education classes. Specifically, DSFL helps young drivers improve their skills in the four key areas mentioned above, which GHSA's research showed are critical factors in more than 60 percent of vehicle crashes. The subjects covered under each area include:

- 1) Hazard Recognition
 - Approaching and turning left at intersections
 - The point of no return
 - How to scan for trouble
 - Minimizing distractions
 - Safety zones
 - Minimum vision lead time

- 2) Vehicle Handling
 - How acceleration, deceleration, braking and turns affect vehicle balance
 - Shifting loads gradually
 - Adjusting to a vehicle's size and weight
 - Conventional braking systems versus anti-lock braking systems
 - Emergency braking techniques
 - Contact road patches

3) Speed Management

- How to stay in contact with the road
- Driving at a speed that doesn't endanger or impede others
- How to recover from skids in front-and rear-wheel drive vehicles
- Using proper signals and covering the brake

4) Space Management

- Maintaining space around, ahead and behind your vehicle
- Learning how to adjust speed
- Maintaining a safe distance between vehicles
- How to avoid being rear-ended
- Avoiding a head-on crash

DSFL provides learning materials for use by students, parents, educators, and instructors and is appropriate for use at home, in schools and in community settings. The program's learning tools include:

- A web site, www.drivingskillsforlife.com, which includes four study modules and a quiz, several interactive games and enhanced curriculum noting the importance of eco-driving to personal safety and the environment.
- An educator packet that can be used by students and parents at home, as well as educators in the classroom and community settings. This packet includes an in-depth CD-ROM concentrating on each of the four driving skills, a letter for parents, a letter for educators, a leader's guide, brochures, and cards. Materials are available in English and Spanish.
- A 30-minute documentary.
- Ride & Drives where teens get behind the wheel and go through exercises on the four DSFL skills. These are opportunities for teens to gain experience, with a professional instructor at their side, in the four primary skills - hazard recognition, vehicle handling, speed management, and space management.
- A 2007 Driving Camp scheduled to take place in Pittsburg, Pennsylvania during the summer months. Teens are invited to participate in this daylong driver training combining significant classroom and behind-the-wheel instruction.

Driver Education Curriculum Addressing Adverse Conditions

The Driving Skills for Life program is the closest thing to a driver education curriculum and/or a driver education curriculum for safety in adverse driving conditions that GHSA has been involved with. Though "adverse conditions" are not expressly covered in DSFL, nor were they focused on when it was created, elements within the Vehicle Handling and Speed Management skill areas are relevant to the AzDOT research (as "adverse conditions" was defined for the project to include vehicle stability and traction control).

Driving Skills for Life is a copyrighted program owned by the Ford Foundation, but it is free and the Ford Foundation is very open to sharing the program with interested parties.

Mr. Jonathan Adkins, Communications Director and Driving Skills for Life Program Manager with GHSA, is the appropriate person to contact should AzDOT wish to incorporate aspects of DSFL into their module.

Driver Education Program Evaluation Efforts

No effort has been taken to evaluate the effectiveness of DSFL or to quantify a reduction in crashes as a result of completion of the program. GHSA reported that the Ford Foundation has discussed conducting research of this type, but has yet to do so or to publish anything related to this type of effort.

Inputs/Recommendations on the Topic of Driver Education for Safety in Adverse Driving Conditions

The Executive Director of GHSA, Ms. Harsha is active in many other organizations and efforts related to traffic safety, some related to driver education. In her experience, though there has been much discussion in recent years about the role of driver education in traffic safety, the content of driver education, the need for reform of driver education, etc., training for driving in adverse conditions in particular have not been a focus in the driver education arena.

Her only specific involvement related to driving under adverse conditions is that she is part of an AAMVA (American Association of Motor Vehicle Administrators) stakeholder group that is currently working to develop a model Driver Manual to complement driver education. This manual does include a chapter on adverse conditions.

Other Organizations/Individuals to be Contacted on the Subject

- John Harvey of Oregon is on the “cutting edge” of driver education and should definitely be contacted
- NHTSA’s work along with ADTSEA is the closest thing to the development of an actual model driver education curriculum
- Transportation Research Board (TRB) has a committee related to driver education
- The National Transportation Safety Board held a symposium on driver education in 2003.

National Highway Traffic Safety Administration (NHTSA)

**Contacts: Mr. Jim Wright, Office of Enforcement and Justice Services Division
Dr. Patricia Ellison-Potter, Office of Research and Technology**

About the Organization

Part of the U.S. Department of Transportation, NHTSA’s mission is to save lives, prevent injuries and reduce vehicle-related crashes. NHTSA provides leadership to the motor vehicle and highway safety community through the development of innovative

approaches to reducing motor vehicle crashes and injuries. NHTSA activities are focused in the following areas:

- Spearheading innovative research and data analysis critical to motor vehicle and highway safety.
- Leading the nation by setting the motor vehicle and highway safety agenda.
- Serving as the catalyst for addressing critical safety issues that affect the motor vehicle and highway safety communities.

Driver Education Curriculum Development

NHTSA worked closely with and funded the development of the ADTSEA driver education curriculum discussed above. Initially, the effort involved developing standards that could be applied nationally for a driver education curriculum. Later, that was expanded to the actual development of the curriculum. NHTSA and ADTSEA continue to work together on the topic of driver education including current efforts to investigate the driver education practices of each state. The National Transportation Safety Board was involved in getting both NHTSA and the Department of Education to investigate state driver education programs.

Though it is not part of their current mission, NHTSA is occasionally approached by Congress on the subject of standardizing driver education nationally. Being a governmental agency, however, NHTSA's efforts ebb and flow with the political tide. There is currently no plan for NHTSA to be involved in establishing, educating states on and/or enforcing any type of standardized driver education curriculum. NHTSA believes, however, that the agency must work cooperatively and proactively with the NTSB and the Department of Education because it is likely that eventually the agency will be tasked by Congress with developing and/or implementing some sort of nationwide driver education policy or curriculum.

NHTSA has also over the years conducted a number of research projects related to driver education. Though driver education has historically been studied by NHTSA, it has not been a high priority area in terms of funding. One current research effort is to examine teen-oriented curriculum development practices in general in order to apply those principles identified as successful to driver education curriculum development.

Other related efforts include ADTSEA's current efforts to develop guidelines or standards for the education of driver education instructors.

Driver Education Curriculum Addressing Adverse Conditions

NHTSA has been involved in the development of curriculum to address driver education for adverse conditions only to the extent ADTSEA curriculum addresses adverse conditions.

Driver Education Program Evaluation Efforts

NHTSA recognizes that crashes are largely the result of driver behavior, not necessarily driver skills. NHTSA is currently working to determine the best way to evaluate driver education, e.g. are crash rates a reasonable measure? Can a driver education program be expected to have a behavioral effect?

NHTSA also has a current research project to evaluate the effectiveness of advanced driver training courses, e.g. skid control courses, etc.

Inputs/Recommendations on the Topic of Driver Education for Safety in Adverse Driving Conditions

Though Mr. Wright was not familiar with any studies that specifically show the relationship between driver education and crash reduction, he definitely does not feel driver education should be abandoned. This was also the general sentiment of the traffic safety professionals who attended the Graduated Drivers Licensing Symposium in Arizona this year. NHTSA believes the 30 hour classroom/6 hour behind-the-wheel model of driver education needs a “booster shot” and that shot is a behavioral component. NHTSA suggests keeping the 30/6 model to teach necessary driving skills, but also include another round of education focused on necessary driver behaviors. Generally, NHTSA sees the visibility on driver education increasing.

Other Organizations/Individuals to be Contacted on the Subject

None beyond those already identified, although AAMVA does work in the area of driver’s licensing manuals, which is somewhat related.

American Driver and Traffic Safety Education Association (ADTSEA)

Contact: Dr. Alan Robinson, Chief Executive Officer

About the Organization

ADTSEA, is headquartered at the University of Pennsylvania Highway Safety Center, is a professional association composed of over 1,000 traffic safety professionals including: state supervisors of safety education, university professors, elementary and secondary school teachers, commercial driving school instructors, and law enforcement traffic safety representatives. ADTSEA’s mission is to advocate for traffic safety education by conducting research and distributing policy recommendations, implementation guidelines, and educational materials to its members. The association regularly provides consulting services and peer review of research and training materials to its members. It also serves as a legislative advocate to support driver and safety education policy development.

Driver Education Curriculum Development

To learn more about ADTSEA's driver education curriculum, study staff interviewed ADTSEA Chief Executive Officer, Dr. Allen Robinson. According to Dr. Robinson, ADTSEA developed and markets a comprehensive "Driver Education and In-Car Curriculum" to provide current information and techniques on teaching new drivers the basics of motor vehicle operation. ADTSEA's curriculum encompasses the following 10 units of study and amounts to roughly 45 hours of classroom instruction:⁴⁶

- Unit 1 - Introduction to Novice Driver Responsibilities and the Licensing System
- Unit 2 - Introducing Operator and Vehicle Control Tasks in a Controlled Environment
- Unit 3 - Space Management System
- Unit 4 - Basic Maneuvering Tasks
- Unit 5 - Risk Reducing Strategies for High-Speed Multi-lane Expressways
- Unit 6 - Personal Factors Influencing Operator Performance
- Unit 7 - Environmental Conditions that Affect Safe Vehicle Operation
- Unit 8 - Vehicle Functions and Malfunctions, and Collision Reporting
- Unit 9 - Sharing the Road with Commercial Motor Vehicles
- Unit 10 - Reducing the Influence of Distractions on the Driving Task

These units are designed to be used in conjunction with any of the following textbooks.

- 1) *Drive Right*, 10th edition, published by Prentice Hall
- 2) *Handbook Plus*, 1999 edition, published by Propulsion International, Inc.
- 3) *How to Drive*, 9th edition, published by the American Automobile Association
- 4) *Responsible Driving*, 2006 edition, published by Glencoe/McGraw-Hill

The curriculum includes written materials for each unit and four DVDs. Each DVD includes video segments that complement particular lessons. The first disc, *ADTSEA's DVD Curriculum*, consists of over 1 hour of video instruction and spans all 10 different areas of study. This DVD also includes written lesson plans or course content for each unit, a *Skills Log* for students to track progress, sets of questions to guide class discussion, and final exams forms. ADTSEA also provides a written *In-Car Guide* that lays a course of study for eight hours of in-car instruction for use by parents and instructors and a *Parent Mentor Home Practice Guide* that includes information to help parents teach their teens key driving techniques. All of these written materials are printable via PC.

Three other DVDs complement this core curriculum. The first, entitled "AAA Foundation for Traffic Safety Videos," provides one hour of general instruction on safety-oriented topics such as, "Sharing the Road," "Managing Space and Time," and

⁴⁶ ADTSEA "Driver Education and In-Car Curriculum." Available at [HTTP://WWW.ADTSEA.IUP.EDU/ADTSEA/CURRICULUM/V2/DEFAULT.ASPX](http://www.adtsea.iup.edu/adtsea/curriculum/v2/default.aspx)

“Freeway Driving.” The second DVD, “Teaching Your Teen to Drive,” is produced by the AAA and provides parents with guidance for instructing new teen drivers. The third DVD “Signs, Signals and Marking, Understanding the Language of the Road,” is produced by the AAA Foundation for Traffic Safety and educates students on road signage and road layout and design.

Adverse Driving Conditions Driver Education Curriculum

According to Dr. Robinson, the training module most germane to this study is “Unit 7 - Environmental Conditions that Affect Safe Vehicle Operation.” In this curriculum adverse driving conditions are defined as those conditions of inclement weather, limited visibility and limited traction. These include primarily fog, rain, snow, smoke, hot and cold temperatures and strong cross winds.

In this unit, which consists of 5 hours of in-class training, students are introduced to and shown videos of the common problems and accidents associated with driving under adverse conditions. For each condition, students are trained on the vehicular factors (traction and visibility) affected and the strategies that can limit accident risk. For example, the curriculum introduces the dangers and causes of accidents that occur while driving at night or in conditions of reduced visibility. Students are taught that “Not only can a driver not see ahead as clearly, he/she cannot see to the sides as well. Drivers have difficulty seeing objects approaching from their left or right into their path of travel.⁴⁷” Students are then tasked to study corresponding material from their textbook and view segments from the AAA Foundation for Traffic Safety Videos that show actual footage of driving in these conditions and the results of taking a particular action while driving.

Students also learn about potential strategies to improve safety. For each condition, students are taught a series of countermeasures for each adverse condition. For example, students are advised to use high-beam headlights when safe and legal, use low-beam headlights in bad weather or when following or meeting another car at night and take precautionary measures. Precautionary measures to reduce glare and improve visibility include such as cleaning the windshield prior to driving, placing paper on the dashboard, adjusting speed, using safety oriented trip planning, wearing sunglasses, and properly adjusting mirrors. Additionally, the course stresses the need for increased time/space needs with respect to following, being followed, changing lanes and turning, traveling with traffic in adjacent lanes, passing and adjusting to the actions of pedestrians and other road users.

A key part of each unit is a structured discussion session where students talk about the course content and strategies. Students learn and discuss the basic physics of traction, its affect on the movement and control of an automobile resulting from loss of traction, and how to return safety to a road after steering or drifting onto the shoulder. The ADTSEA curriculum also allocates a discussion session to train students on the latest technological

⁴⁷ “ Unit 7-5 - Changing Weather and Conditions of Visibility”, Driver Education Classroom and In-Car Instruction, American Driver and Traffic Safety Association.
<http://www.adtsea.iup.edu/adtsea/curriculum/v2/PDF/Unit%207.pdf>

advances in car safety that protect vehicle occupants or enhance a driver's ability to respond and control the vehicle during traction loss or other emergencies. "Fact Sheets" are provided for instructors that highlight new safety technologies and crash physics. For example, fact sheets are available for instructing students on the mechanics and advantages of anti-lock brakes and electronic stability control.

Overall, the ADTSEA curriculum provides a wealth of detailed information on adverse driving condition impacts and strategies that can help avoid common accidents. It is an ideal source for an AzDOT training module. Dr. Robinson noted that ADTSEA would be willing to share these materials with AzDOT pending a discussion of its distribution and consultation with ADTSEA concerning usage rights and attribution. He also stated that ADTSEA would be more than willing to explore the development of a specialized training module focused on adverse driving. However, he was quick to note that any comprehensive driver education program would address these areas. Dr. Robinson added that an adverse driving conditions module would need to be just one part of a more complete driver education curriculum.

National Institute for Driver Behavior (NIDB)

Contact: Mr. Fred Mottola, Executive Director

About the Organization

The National Institute for Driver Behavior is a nonprofit 501(c) organization dedicated to the premise that education is an essential component in the formula for crash reduction. To compensate for the driver's ever present risk NIDB has defined standards for driver behavior so that one can, over a period of time, acquire and internalize them into low-risk driving habits. With the empowerment of such habits, proactive decisions can be made to minimize one's risk exposure and to reduce driver stress.

NIDB's work focuses on five primary goals:

- 1) To provide lifetime learning opportunities for developing lifelong habits for risk prevention. An objective of the Institute is to provide children with a decision making structure that will have transferable values which can be applied to driving attitudes and driving behavioral patterns. Making good driving decisions requires a structure that can be formulated into unconscious behavioral values and patterns that provide automatic low-risk performance.
- 2) To help drivers acquire preventive behavior habits to manage risk - to reduce, avoid, or eliminate risk. Drivers make most of their decisions on an unconscious level based upon an inner set of values as to what actions are acceptable or unacceptable. It is the intent of the Institute to provide multiple opportunities during one's lifetime to discover and acquire a set of values that can generate automatic preventive behavior.
- 3) To identify and develop standards for low-risk driver performance habits. The Institute has formulated very precise behavioral patterns that drivers should

- perform. Such behavioral patterns would include specific actions such as: searching intersections to the left, front, and right zones; keeping four seconds following time; turning the head before turning the steering wheel; target area searching, and evaluating the targeting path for changes resulting in line-of-sight restrictions and/or path-of-travel closures.
- 4) To formulate and disseminate risk management educational modules for use throughout the school system and in the work place. The Institute will provide educational modules that allow individuals to develop risk management behaviors into habits and to reinforce the benefits gained by having such habits.
 - 5) To partner with existing organizations to achieve a common goal of driver risk reduction. There are many organizations – private, public, civic, government agencies – that apply a great amount of energy and resources to the goal of reducing motor vehicle crashes and occupant injuries. The Institute will serve to coordinate and channel these efforts into an effective direction to maximize the efforts of each group.

As President and CEO of Interactive Driving Systems, Inc., NIDB’s Executive Director, Fred Mottola, works both through NIDB and independently on various traffic safety initiatives and products.

Driver Education Curriculum Development

The NIDB and its Executive Director, Fred Mottola, have formulated 159 key behavioral patterns that are structured into a taxonomy for habit development. Their approach to driver risk-reduction, whether for a novice or for a corporate fleet operator, is to help drivers develop good habits. To effectively change habits takes a well-devised plan, which the NIDB believes they have developed. NIDB has published on their website, their “Minimum Standards: Driving Behaviors of Risk Prevention” and “Standards for a Driver Risk-Management Program.”⁴⁸

According to NIDB, the most important skill a driver needs to learn is how to effectively use vision. The NIDB curriculum goes into helping the driver develop the concept of “targeting,” into habits that will give them an internal system of being able to have control of space at least 12 to 15 seconds ahead of the vehicle’s path of travel.

Driver Education Curriculum Addressing Adverse Conditions

The NIDB approach is based on the belief that you cannot “teach” driving under adverse conditions; but rather, you need to teach behavioral patterns that will allow a driver to become aware of when there is an adverse condition. Adverse conditions are defined as a change in the ability of the vehicle’s tires to grip the road and/or when there is a reduction in the visibility from that which is normally available. For example, an adverse condition that creates major crashes is driving in a “fog” environment. The average

⁴⁸ The National Institute for Driver Behavior “Minimum Standards: Driving Behaviors for Risk Prevention” and “Standards for a Driver Risk-Management Program.” Are available at http://nidb.us/index.php?option=com_content&task=view&id=14&Itemid=32

driver has a 3 to 5 second normal awareness of the space they will be occupying. If the driver has a habit of using a following distance of 1.5 seconds, then when fog rolls in and reduces visibility to 5 seconds, it does not appear to be threatening. However, NIDB's curriculum teaches drivers to have 12-15 seconds of "control" over the space they will occupy. Therefore, when visibility is reduced, it is seen as an unacceptable condition for which adjustments in speed are to be made.

According to the NIDB method, with the proper repetition of behavioral patterns, a driver is able to develop respect for the limitations that one has to control the vehicle. The theory is that it does little good to lecture to drivers about being careful when they are driving in "reduced traction" situations if they are not aware of what the correct behavior is during normal conditions. Most drivers will make many errors in how the balance of the vehicle is maintained, for example, but they are well within the envelope of "acceptable" traction under normal conditions. According to NIDB, for effective training of drivers, especially the teenager, emphasis must be placed upon the proper techniques that are being learned, one behavior at a time, not the completion of tasks. For example, a driver could go into a curve using the wrong techniques, (the wrong behavioral patterns) and there is no consequence. Take the same behavior and reduce the traction envelope because it is raining, and the driver now has a car out of balance going too fast into the curve, which results in a single vehicle crash.

As explained above, neither NIDB or Fred Mottola have specifically developed a driver education module addressing adverse conditions, as it is their belief that responding properly to adverse conditions is a part of the overall behaviors for risk prevention that drivers need to learn. That said, Fred Mottola, through his company Interactive Driving Systems, Inc., has developed two tools that address the elements he has defined as adverse conditions (e.g. a change in the ability of the vehicle's tires to grip the road and/or when there is a reduction in the visibility from that which is normally available.) One tool is called the Skid Monster, which allows drivers to experience the consequences of wrong behavior during any condition, and is absolutely unforgiving during "adverse conditions." The Skid Monster is a set of caster wheels, capable of rotating 360 degrees, which is attached to the rear wheels of a car (no permanent modification to the car is needed.) Driven with the caster device in a locked position, the Skid Monster handles like the average car. However, whenever the instructor flips a switch to unlock the casters the back of the car swings, and simulates the effects of suddenly losing traction to the rear wheels. Another tool produced and sold by Interactive Driving Systems, Inc. is the "Traction for Action" kit that has some 30 student-centered hands-on activities that demonstrate cause and effect of reduced traction.

Fred Mottola would be willing to consult on a project to develop a driver education module geared towards adverse conditions, but would not like to have his materials utilized without a complete understanding of the complexity of the driver behaviors for risk prevention theory. More specifically, he would be very much interested in helping to develop an effective program. In his opinion, he would not call the module "Adverse Driving." Most drivers think of "adverse conditions" as being an ice and snow covered road surface. However, when it is icy out, drivers get visual clues that things are not

normal and will, without any training about “adverse conditions” reduce speed and drive “carefully,” or not at all. In Mr. Mottola’s opinion, the major cause of adverse driving conditions is rain. When it is raining, drivers do not get the same warning clues that reduced traction is present. Therefore, there is little change in behavior. Mr. Mottola suggested calling the module, “How to Survive Driving in Fog and Rain to Keep your Family Alive” in order to address the real problem.

Driver Education Program Evaluation Efforts

Fred Mottola’s company has over the years had organizations show reduction in crashes by going through his programs, but there have been no results from a formalized study. There is an ongoing five-year study with the State of Montana that is evaluating the results of newly licensed teen drivers’ records after going through a one day Skid Monster training session.

Inputs/Recommendations on the Topic of Driver Education for Safety in Adverse Driving Conditions

There are a few websites where samples of the materials can be obtained:

http://web.mac.com/d_college/iWeb/SkidSA/One.html
http://web.mac.com/d_college/iWeb/AFB/Curves.html

Other Organizations/Individuals to be Contacted on the Subject

Fred Mottola suggested speaking to Dave Huff from the OPI in Montana.

AAA Foundation for Traffic Safety

Contact: Mr. Brian Tefft, Foundation Research Analyst

About the Organization

The American Automobile Association Foundation for Traffic Safety is a nonprofit education organization established in 1947 to sponsor and conduct driver and traffic safety research. Its mission is to research, evaluate and document traffic safety issues and solutions. While an affiliate of the AAA, it does not have the same membership base or funding structure. The Foundation is funded by grants and contributions from individuals and motor club associations in the United States and Canada. The Foundation, which has completed or sponsored 143 studies to date, uses its research to produce educational tools for drivers, pedestrians, bicyclists and other mode users.

These outreach materials are utilized by a variety of different groups. For example, government agencies and legislators use the Foundation’s research to frame safety-oriented policies and regulations. Automobile clubs, driving schools, and other organizations use the educational materials to train adults and teens to drive more safely. School districts across the country use these materials to teach students about vehicle,

bicycle, and pedestrian safety. The Foundation's teen-oriented materials are often deployed in high school driver education programs.

Driver Education Curriculum Development

To learn more about the AAA Foundation for Traffic Safety's driver education programs, study staff contacted Brian Tefft, a Foundation Research Analyst who specializes in driver education. According to Mr. Tefft, the Foundation continually funds research to develop new and improve existing driver education curricula. The Foundation works to transform its research into easily disseminated and integrated modules designed to teach drivers new skills, refresh existing knowledge, and help drivers identify behavioral patterns that cause accidents. Some of these materials are available for a fee while others are free for distribution.

In 1995, the Foundation produced a "Novice Driver Education Model Curriculum Outline," which is designed to "reinvigorate" and "reinvent" the objectives and methods of driver education.⁴⁹ The outline is a product of a state of practice interview with over 40 individuals from education, law enforcement, and the insurance sectors. It is designed to guide educators in developing and revising an educational program. Key areas of program components examined include driver education's missions, stakeholder needs, underlying strategic assumptions, and curriculum development goals and performance measures.

According to the representative, the AAA Foundation does not have a module that is focused specifically on adverse driving conditions. However, the following highlights several education materials that include components that focus on educating drivers on how to cope with various adverse conditions. These materials define adverse driving conditions as driving in poor weather, lighting and road surface environments.

Driver Education Volume I and II DVDs

The Foundation markets two training video series designed to educate new and experienced drivers on key techniques and safety strategies. Each volume contains six video training segments that each range between 7 to 15 minutes in length and encompass a variety of subjects such as conventional driving skills (lane changes, freeway entry, maintaining safe following distances, etc.), car maintenance, and strategies that address specific road conditions.

Three of these training units deal directly with adverse driving conditions. First, the Foundation offers a video entitled, "Driving in Bad Weather." This video, produced in 1994, focuses on demonstrating the impact on a driver's vision caused by driving in fog, dust, smoke, rain, snow, and ice. It also discusses the importance of choosing safe speeds for adverse weather conditions and vehicle maintenance tips that can help drivers prepare for bad weather. A second video, entitled "Night Driving," emphasizes how darkness

⁴⁹ AAA Foundation for Traffic Safety, "Novice Driver Education Model Curriculum Outline" (1995) <http://www.aaafoundation.org/resources/index.cfm?button=lonaro#1> (Last accessed 04/02/07)

limits drivers' vision and presents behavior and maintenance strategies to improve vision and safety during night driving. Finally, to address on road obstacles and conditions caused by road construction personnel, vehicles, and materials, the Foundation produced "Getting Safely Past the Orange Barrels." This video educates drivers on the meaning of construction signs and related road markings. This video, based on Foundation-sponsored research on the causes of roadway construction areas accidents, also outlines driving adjustments that can increase safety while traveling through areas with obstacles and construction debris.

DriverZED – Risk Awareness Driver Training

The AAA Foundation also produced and distributes an educational tool called DriverZED. ("ZED" is an acronym for Zero Error Driving.) DriverZED is a DVD-based risk awareness training program, which contains 100 interactive and live-action driving scenes. Users are prompted to indicate what course of action they would take in a particular scenario. The goal is to train drivers to use visual cues and critical thinking skills to accurately weigh the risks of certain actions while driving. Although, it is not a complete driver education curriculum, DriverZED includes the American Driver and Traffic Safety Education Association's Perceptual Driving Module and is designed to be integrated into other driver education programs. Strategies emphasized include increased following distances and the use of visual cues for lane changes and turning.

Driver Education Program Evaluation Efforts

In October 2006, the Foundation published a three-volume series of resources for "Evaluating Driver Education Programs."⁵⁰ The series, often referred to as "guidebooks", provide a detailed roadmap for planning and conducting a program evaluation of driver education. Guidance is also provided on how to integrate performance measures into the program development process. Each of the guidebooks is designed for use by a specific audience in the driver education field from program developers to the driving school instructors. They provide a set of easy to implement tools to evaluate and improve beginner driver education programs.

The first guidebook entitled, "Evaluating Driver Education Programs: Comprehensive Guidelines," offers a step-by-step roadmap for planning and conducting effective evaluation of driver education. It also offers strategies for integrating an evaluation mechanism into program development and policy. These guidelines form a simple to complex evaluation strategies. This guidebook is targeted for use by program evaluators, researchers, and technical audiences. It also includes the surveys, focus group guides, and log books needed to conduct the evaluation.

The second guidebook entitled, "Evaluating Driver Education Programs: Management Overview," offers an introduction to evaluation and research methods for driver

⁵⁰ AAA Foundation for Traffic Safety, "Evaluating Driver Education Programs" (2006) <http://www.aaafoundation.org/pdf/EvaluatingDriverEducationProgramsGuidelines.pdf> (Last accessed 04/03/07)

education evaluation. This management guide serves as a primer on assessment methods and is targeted at the driving schools, driver educators, program managers, administrators, and others with less technical research backgrounds.

The third companion guidebook, “Evaluating Driver Education Programs: How-To Guide,” details the types of evaluation that can be used by education managers to improve the quality of the program and its outcomes. This guide emphasizes “formative evaluations” which places the focus on improving the content and product delivery of a program. It offers a step-by-step guide for completing a basic evaluation of beginner driver education programs and was developed for driving school operators and owners, program developers, and managers.

According to the Mr. Tefft, these evaluation tools will be used in an upcoming research and outreach project. The Foundation’s Research and Development Advisory Committee recently approved a project that will use the evaluation methodology developed for the guidebook to evaluate driver education programs in three jurisdictions. While contracts have not been finalized it is anticipated that participants will include Oregon, Michigan, and Manitoba (Canada). This evaluation project will include both process evaluations (e.g., curriculum content and delivery) and impact evaluations (e.g., skills, knowledge, violations, and crashes).

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

This chapter provides recommendations on the implementation of a realistic driver education curriculum and/or module to address the state's desire to focus on improving safety under adverse driving conditions. Also addressed in this chapter are other actions that could be taken by Arizona in terms of implementing certain laws or regulations related to driving in the state. The recommendations provided in this chapter represent a range of options the state could pursue depending on the degree to which the state plans on revising its existing driver education program. These recommendations are based on the research efforts undertaken to-date including a literature review, survey of all states, targeted case studies of various state officials and other organizations involved in driver education, and a statistical analysis of the types and causes of accidents in the state.

7.1 A Review of What the Team Has Learned

The literature review revealed that there is a commonly held belief based on existing, albeit limited, research that driver education is not terribly effective in reducing crashes in novice drivers. However, it is also a point in the literature that evaluating the effectiveness of driver education is a very tricky exercise in that driver education has traditionally not been tasked with actually teaching or specifically influencing traffic safety, but has rather taken on the role of teaching driving skills. Consequently, crash rates are not a reasonable measure of the traditional driver education program's performance or effectiveness. Moreover, the literature reveals the important point that there appear to be many educational tools, driver safety behaviors and other identifiable factors that could be incorporated into driver education in order to make it more responsive to the outcome of reducing crashes should we, as a society, decide reducing crashes should be the intended purpose of driver education.

In looking at Arizona vehicle crash statistics between 2001 and 2005, it was found that adverse conditions are present in just fewer than 40 percent of crashes and approximately 60 percent of fatalities. Moreover, when cross tabulated with driver education indicators (see Chapter 3 for details on what these indicators include), this strong correlation is maintained. The results indicate that both adverse conditions and driver education indicators are present in about a third of accidents and half of fatalities.

The survey and case study exercises revealed there is a great disparity amongst states in terms of how driver education is addressed and the specific topics that are covered under a driver education program. In addition, there is a groundswell of individuals particularly active in the area of driver education that is working hard to change that fact. Not only do many proponents of driver education reform seek some uniformity amongst driver education programs, or at least the standards on which they are based, but many also seek to promote the basic premise that driver education needs to address certain key driver behaviors that should be taught and reinforced through proper training and education in order to minimize the risky behaviors that lead to crashes.

There are two primary national level sources of driver education curriculum and/or standards including the Driver Education and In-Car Curriculum developed by the ADTSEA and the Driving Behaviors for Risk Prevention developed by Fred Mottola of the NIDB.

The NIDB provides curriculum and program resources in terms of establishing the standards for a complete driver education program. The NIDB curriculum is generally referred to as the Driving Behaviors for Risk Prevention Curriculum and the driver education program as a Driver Risk Management Program. Though the NIDB does not provide a turnkey curriculum *per se*, Fred Mottola has worked directly with a number of states to adapt the standards provided by the NIDB into a full scale curriculum and these curriculum resources are available from individual states. The ADTSEA curriculum, on the other hand, is available from ADTSEA in full, including all teaching materials for a relatively small fee.

A number of states have recently developed driver education curricula, some of which specifically address the topic of safety under adverse driving conditions. Some of these curricula align themselves directly with the NIDB risk prevention model, others have adopted some aspects of this model, while still others have been developed independently or following the ADTSEA model.

How Do These National Level Models Relate to Safety Under Adverse Conditions?

The basis of the NIDB risk prevention model is 159 key behavioral patterns that are structured into a taxonomy for habit development. Those curricula that follow strictly the driver behavior risk prevention model, will not, by definition, include modules geared specifically towards driving under adverse conditions. Under this model, the most important skill a driver needs to learn is how to effectively use his/her vision. The risk prevention model is designed to help the driver develop the concept of “targeting,” into habits that will give them the ability to have control of space at least 12 to 15 seconds ahead of the vehicle’s path of travel. Consequently, a risk prevention based curriculum teaches behavioral patterns that allow a driver to become aware of when there is an adverse condition - a change in the ability of the vehicle’s tires to grip the road, and/or when there is a reduction in the visibility from that which is normal. The concept being that it does little good to teach drivers about being careful when driving in reduced traction or reduced visibility situations if they are not aware of what correct behavior is during normal conditions. So in a way, the risk-prevention curriculum can be viewed as an entire curriculum geared towards driving under adverse conditions in that the behaviors necessary to perform safely under “normal” conditions are the same as those required to perform safely under adverse conditions. The adverse conditions merely exacerbate the need for these behaviors.

The NIDB model stresses coordination and integration between the in-class and in-car portions of a driver education curriculum in that the presentation of content in the classroom parallels the presentation of in-car content. Introduction to concepts and the required in-car skills takes places in the classroom just prior to each in-car lesson.

The ADTSEA model is similar to the NIDB model in that it is based on a set of very similar standards geared towards changing certain basic driver behaviors, but its modules are not geared specifically towards those behaviors. Instead, the ADTSEA curriculum includes ten units geared towards topical areas more traditionally covered in driver education curriculum, including a unit addressing the problems associated with driving under conditions of inclement weather, limited visibility and limited traction. Both curricula include both in-car and classroom instruction and stress the coordination between these two instructional elements, although the NIDB model provides for more direct integration between the two instructional elements.

7.2 Curriculum/Module Recommendations

As many driver education, traffic safety, behavioral specialists and curriculum development professionals have spent a great deal of time addressing the need for driver education and in some cases specifically driver education for safety under adverse conditions, there is no need for the Arizona Department of Transportation to reinvent the wheel, so to speak. There are driver education modules available and driver education curriculum standards available that can be reasonably adapted to Arizona's circumstance in order to meet the state's need for a driver education module for safety under adverse driving conditions.

Through the literature review, survey and case study activities undertaken for this research effort, three of the best examples of these modules and curricula were identified and are presented here. The recommendation on which to use is dependent on several factors that only AzDOT can determine including:

- the level of effort the state wishes to expend on the issue of improving driver education,
- the legal or regulatory actions the state is interested in pursuing, and
- the nature of the reform the state is interested in addressing, e.g. comprehensive program changes, limited program changes including adoption of full driver education curricula or limited program change including adoption of one module of a driver education curriculum addressing adverse conditions.

Consequently, this chapter presents each of these options and explains the circumstances under which it is recommended that option be pursued. This chapter also notes certain aspects of other curricula that AzDOT could or should adopt regardless of the specific module or curriculum that is followed.

Oregon Driver Risk Prevention Curriculum

Overview

The Oregon Traffic Safety Education Association (OTSEA) website contains a link to the "Oregon-ized Curriculum," which was fully implemented within the 2004 to early 2006

timeframe. The curriculum and its associated documents and resources, all available on the website,⁵¹ were created through a partnership between ODOT and WOU. The curriculum is a representation of a localized traffic safety education curriculum and brings together resources and materials gleaned from the WOU-ODOT Trainer of Trainers Curriculum, National Driver Training Credentialing Program of the ADTSEA and the NIDB Driver Risk Prevention Curriculum. It follows the NIDB Risk Prevention Curriculum and its behavioral delivery sequences. It is designed to meet the minimum standards of driver behavior risk prevention as set forth by ADTSEA and NIDB.

The desired outcome of the Oregon Risk Prevention curriculum is to help students develop the knowledge, skills, attitudes and habits that will enable them to achieve low risk driving behaviors that will serve them in terms of preventing crashes over the course of their lifetime. To achieve this end, the localized curriculum presents key behavioral patterns in a simple-to-complex manner, as an essential element of the NIDB model.

Presentation of content in the classroom parallels the presentation of in-car content. Introductions to all concepts and most of the required in-car skills take place in the classroom, prior to in-car lessons.

A variety of instructional methods demonstrate student-centered activities for participative education to include low-risk driving values, knowledge for development of safe habits, and mental readiness for correct in-vehicle performance.

The full curriculum includes:

- 1) Read Me First Oregon File which details the development of the curriculum and the disclaimer provided above.
- 2) A Curriculum Resource File which includes a localized scope and sequence sample, curriculum flow chart, program improvement plan and several other documents to help individual driver education providers (school districts) to localize their own curriculum.
- 3) Curriculum Modules: 1 – 10. Each module contains:
 - a. An overview and activities document
 - b. Classroom and in-car lesson plans
 - c. Homework assignment sheets and keys
 - d. Classroom worksheets and keys
 - e. Movie clips (in some modules)
 - f. In-car driving route, record, and activities documents
 - g. Parent student guided practice route
 - h. Entrance and exit exams and keys

⁵¹ The OTSEA website has a secure area to which researchers for this project were granted access in order to see and download curriculum materials not available to the general public. Researchers can share this information with Arizona if they want it. Mr. John Harvey of Oregon Department of Transportation, Traffic Safety Division has also offered to send the full curriculum on a CD if desired.

- i. Interactive student centered power point lessons and their overhead counterparts
 - j. Sample course schedule
 - k. Sample course syllabus
- 4) Driving Behaviors Outcomes document which includes an assessment form for determining if established driving behavior outcomes are being met. It is based on NIDB's minimum standards of Driver Performance.
- 5) Extra Movies & Funnies
- 6) Extra In-car Resources

Module topics include:

Module 1: Uniting Driver and Vehicle

- 1) Introduction to Course
- 2) The Highway Transportation System
- 3) Habit Development Needs
- 4) Your Expectations after Getting a Driver's License
- 5) Getting Ready to Drive
- 6) Starting Engine
- 7) Orientation to Controls
- 8) Moving and Stopping Smoothly
- 9) On-Target, Off-Target
- 10) Vision and Driving
- 11) Use of Central and Fringe Vision

Module 2: Knowing Where You Are

- 1) Signs, Symbols and Pavement Markings
- 2) Reference Point Discoveries -- Part One
- 3) Reading Instruments and Gauges
- 4) Reference Points' Discoveries -- Part Two
- 5) Entering & Crossing Traffic Flows
- 6) Precision Turns
- 7) Securing and Exiting the Vehicle

Module 3: You Are In Control

- 1) Motor Vehicle Laws and Regulations
- 2) Insurance Requirements
- 3) Risk Management
- 4) Control of Tracking & Targeting Path
- 5) Introduction to Line-of-Sight and/or Path-of-Travel (LOS-POT)
- 6) Introduction to Backing
- 7) Turn About Options for Low Risk

Module 4: Searching for LOS-POT

- 1) Perceptual Skill Development
- 2) Searching Target Area to Target Area

- 3) Judging Space in Seconds
- 4) Three Search Ranges
- 5) Introduction to the Zone Control System
- 6) Restraint Systems
- 7) Forward, Angle and Hill Parking

Module 5: You Control the Intersection

- 1) Communications Options
- 2) Identifying High Risk 4-Second Danger Zone
- 3) Approaching Intersections
- 4) Highway- Rail Grade Crossings
- 5) Rear Zone Control
- 6) Stopping in Traffic

Module 6: Space Management

- 1) Traffic Lights: Timing and/or Turning
- 2) Using the ABCs of Zone Control
- 3) Lane Changes with Precision
- 4) Backing Between Cars, Perpendicular Parking

Module D: The Deadly D's & Organ Donation

- D.1 Drinking, Drugs & Driving (Included in Module 6 – Managing Space)
- D.2 Drowsy Driving (Included in Module 9 – Managing Risks)
- D.3 Dangerous Emotions – Road Rage (Included in Module 9 – Managing Risks)
- D.4 Distractions (Included in Module 6 – Managing Space)
- D.5 Drag Racing
- D.6 Organ Donation
- D.7 Disabilities

Module 7: Interacting With Others

- 1) Signs, Signals and Pavement Markings Review
- 2) Approaching Curves and Hill Crests
- 3) Following Time and Space
- 4) Commentary Driving

Module 8: Practicing Your Skills

- 1) Timing Side Zones
- 2) Parallel Parking
- 3) Winter Driving Techniques
- 4) Skid Avoidance and Vehicle Control

Module 9: Managing Driver, Vehicle and Environmental Risks

- 1) Night Driving Conditions
 - D.2 Drowsy Driving
- 2) Passing and Being Passed
- 3) Handling Vehicle Malfunctions and Emergencies

- 4) Interacting with Other Users
 D.3 Road Rage
- 5) Environmental Issues
- 6) Preventive Maintenance

Module 10: Putting It All Together

- 1) Limited Access Highways: Getting On/Off
- 2) Practice and Review In-Vehicle Concepts
- 3) Licensing Requirements

An important aspect of the Oregon risk prevention curriculum (and of the NIDB risk prevention approach in general) is the linkage between the in-class curriculum and the in-car exercises. The Oregon Risk Prevention Curriculum matches the desired outcomes of the in-class modules with specific in-car driving practice exercises. Presentation of content in the classroom parallels the presentation of in-car content. Introductions to concepts and the required in-car skills take place in the classroom prior to each in-car lesson. Therefore, the sequence of the two elements and the order in which they are completed is an integral part of the success of the overall curriculum. The curriculum materials are designed to be used by individual driver education providers to adapt to their local area.

Recommendation and Ease of Implementation

As explained above, a curriculum following the NIDB driver risk-prevention model such as Oregon's curriculum does not have a module specifically geared towards driving under adverse conditions. All modules are part of a broader effort to teach certain key driver behaviors geared towards risk prevention under all driving circumstances including adverse conditions. Therefore, it is the recommendation of this report, that the program in its entirety be adopted should Arizona be looking to implement a driver education program in its entirety and not necessarily be focused on a driver education module for safety under adverse driving conditions.

As detailed in a footnote earlier in this section, secure access to OTSEA's website, which allows the user to download all curriculum materials including classroom activities, slides, etc. has been granted to researchers for this report. The full curriculum CD is also available to AzDOT at no charge. Should Arizona choose to develop an NIDB-based curriculum geared specifically to Arizona, Mr. Fred Mottola has expressed to researchers for this project an interest in working with Arizona to do that and to allow Arizona to use his materials. This would, however, be a fee-based consulting situation. Details of the cost estimate are provided in the Summary sub-section of this chapter.

Required Contact(s) to Move Forward

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Website for materials: http://www.otsea.org/curriculum/		

Montana Driver Education and Training Curriculum Guide

Overview

Completed in the fall of 2006, the Montana Driver Education and Training curriculum is available for review and download at www.opi.mt.gov/drivered, although the online version does not include test questions and worksheet answers. This curriculum was developed by Elizabeth Shepard of Boise, Idaho and is based on modules geared towards addressing 45 identified essential knowledge and skills topics.⁵² Generally, these knowledge and skills topics are grouped into those that:

- Provide the foundation for driving knowledge and skills,
- Relate to the application of knowledge and skills,
- Speak to driver responsibility and attitude and
- Are considered program enhancements such as trip planning, vehicle maintenance, insurance requirements, etc.

Generally speaking, Montana's curriculum embraces many of the risk prevention, behavior modification oriented concepts of Fred Mottola's NIDB Risk Prevention Curriculum. Because it was developed with public funds, other states are allowed to use and/or modify the curriculum to meet their own state needs (with proper credit given). Ms. Shepard has also expressed a willingness to help other states with this task.

⁵² Montana Office of Public Instruction "Curriculum Map Teen Driver Essential Knowledge and Skill Topics." Available at: <http://opi.mt.gov:8010/Driver's%20Education/Curriculum%20Modules/April%2005%20Curriculum%20Guide/Curriculum%20Map.pdf>

Module Topics Include:

- 1) Introduction and Parent Orientation
- 2) Preparing to Drive
- 3) Highways & Laws
- 4) Basic Control
- 5) Vision
- 6) Time & Space
- 7) Mixing with Traffic
- 8) Limited Spaces
- 9) Natural Laws
- 10) Hills & Curves
- 11) Rural
- 12) Urban
- 13) Freeways
- 14) Adverse Conditions
- 15) Share the Road
- 16) Emergencies
- 17) Operator Fitness - Aggressive, Drowsy, Distracted, Alcohol, Drugs
- 18) Cars & Trips
- 19) Manage Risk
- 20) License & Test

These 20 instructional modules provide resources to meet the Montana Driver Education and Training Curriculum Standards and Benchmarks that were developed by OPI. Each module contains lesson plans, one or more PowerPoint presentations, fact sheets, worksheets, quizzes and tests.

David Huff of Montana OPI is also the President-Elect of DETA (formerly the Association of State Supervisors of Safety and Driver Education). In Mr. Huff's opinion, the risk prevention, driver behavior modification type of curriculum as developed by Fred Mottola of NIDB is the best driver education curriculum available. In practical terms however, he recognizes a full NIDB curriculum is not always the best option for a particular state. In the case of Montana, for example, he chose not to fully adopt the NIDB curriculum because most of the instructors in his state are older and nearing the end of their career and he feared that if the curriculum were changed too dramatically he would lose instructors. Mr. Huff considers the curriculum developed by Ms. Shephard for Montana a good, middle-of-the-road curriculum that includes many of the behavior modification concepts included in Fred Mottola's curriculum, but which is organized closer to Montana's previous curriculum and closer to most other more traditional driver education curricula.

Montana's curriculum is designed so each entity (in Montana's case they are all public school districts) has latitude in implementing the curriculum in terms of the specific delivery methods they can utilize. Curriculum CD-ROMs are available for instructors and include lesson plans, PowerPoint presentations, fact sheets, worksheets, quizzes and tests, plus the tests and worksheet answers. The CD-ROMs include documents

developed as part of the curriculum to assist in the design and delivery of a driver education program including a scope and sequencing document to guide the implementation of the in-class and behind-the-wheel portions of the curriculum. The materials are provided to instructors as non-secure Microsoft Word documents to allow modifications or additions that better meet the needs of a particular community.

Recommendation and Ease of Implementation

Though the Montana curriculum includes a module geared specifically towards adverse conditions, the recommendation to AzDOT is to implement this curriculum in its entirety so as to pick up on the delivery of other proven driver risk-prevention behaviors. This would be an excellent curriculum for the state to adopt if the state’s goal is to implement a complete driver education curriculum that incorporates a specific module geared towards adverse conditions. The curriculum incorporates concepts of the driver risk-prevention model, which appears to be the future of driver education and which is embraced by almost all driver education and traffic specialists interviewed for this project, yet it is organized in a manner that is recognizable to professionals working previously with more traditional driver education curricula.

If implementing the full curriculum is not a viable option or not desired, Module 14 of Montana’s curriculum would be relatively easy to implement alone in that the module as written does not refer back to other modules of the curriculum and contains its own slides and student activities, etc. As discussed in Section 6.3, should Arizona choose to implement this module or the entire curriculum, the standards on which Montana’s curriculum and driver education program as a whole are based are available to Arizona for use as a guideline for the regulations under which this module or curriculum could be implemented. Moreover, the module covers those topics of adverse conditions as the term was defined for this project. In addition, the curriculum materials are available free of charge⁵³ and the developer has expressed a willingness to consult with AzDOT on implementation and any specific changes that might be appropriate for Arizona.

Required Contact(s) to Move Forward

Contact	Phone	Email
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Website for materials - http://www.opi.mt.gov/DriverEd/index.html http://www.nidb.org/standards.html		

⁵³ Transportation Highway Traffic Safety Office for educational use and distribution. Commercial resale of materials is strictly prohibited. However charges may be made for cost of reproduction of materials, and other governmental agencies may, with written permission from the Montana Office of Public Instruction, adapt the Traffic Education materials and should acknowledge the State of Montana as developers and owners.

Texas Driver Education Classroom and In-car Instruction Model Curriculum/Virginia Curriculum Scope and Sequence Modules for Driver Education

Overview

The states of Virginia and Texas utilized the same model for the development of their driver education curriculum and have modules that are essentially the same including Module Eight entitled Driver Responsibilities: Adverse Conditions. The curriculum was developed under the guidance of Dr. Terry Kline and Hilde Kline of Safe T Associates. The curriculum is designed to provide students with a detailed understanding of the fundamentals of driving and to foster responsible attitudes and driving behaviors. The curriculum emphasizes linking visual search skills, space management, and balanced vehicle movement to risk-reducing driving strategies. Significant attention is given to risk awareness, driver alertness, and responsible actions relative to occupant protection devices, positive interactions with other roadway users, and the physical and psychological conditions that affect driver performance.

The Texas and Virginia curriculum includes 10 modules with over 1,600 pages of sample classroom and behind the wheel lesson plans, support materials, worksheets, exams, instructor-lead activities, fact sheets, student worksheets, transparency masters, in-car lesson plans, supplementary resources, evaluation tools (exams, quizzes, etc), and parent involvement support handouts.⁵⁴ The 10 training modules are as follows:

- 1) Licensing Responsibilities-Knowing Texas/Virginia Traffic Laws
- 2) Preparing to Operate the Vehicle
- 3) Basic Maneuvering Tasks - Low Risk Environment
- 4) Basic Maneuvering Tasks - Moderate Risk Environment
- 5) Information Processing - Moderate Risk Environment
- 6) Information Processing - Multiple Lane Expressways
- 7) Driver Performance - Personal Factors
- 8) Driver Responsibilities - Adverse Conditions
- 9) Driver Responsibilities - Vehicle Functions
- 10) Driver Responsibilities - The Wise Consumer & Driver Assessment: Making Informed Choices

The eleventh module is the laboratory instruction covering behind-the-wheel and in-car observation curriculum. Instructors of these materials are responsible for tailoring the materials, if necessary, to develop their own unique lesson plans and work within their time allotments.

⁵⁴ Driver and Traffic Safety Education Master Curriculum Guide, Texas Education Agency
<http://www.tea.state.tx.us/safedriver/masterguide.html>

Recommendation and Ease of Implementation

Module Eight, Adverse Conditions, would be an appropriate module for use by Arizona. Similar to the Montana Model, the materials are prepared such that it could be implemented separate from the curriculum as a whole, although the Texas/Virginia curriculum also stresses the need to address other identified driving behaviors in order to implement a comprehensive driver education curriculum for risk prevention. The Virginia/Texas module does not cover as many topics of adverse conditions as does the Montana module which makes the Montana module slightly more relevant to Arizona's stated goals.

These course materials are available online at no cost for use by schools, teachers, and parent taught instructors. According to the Texas Education Agency all of these materials are available for free use by the public, including Arizona DOT, and can be downloaded from the TEA website.⁵⁵

Required Contact(s) for Moving Forward

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Website(s) for materials: http://www.pen.k12.va.us/VDOE/Instruction/PE/ http://www.tea.state.tx.us/drive/DriverEducation.html		

ADTSEA's Driver Education and In-Car Curriculum

Overview

According to Dr. Allen Robinson, ADTSEA Chief Executive Officer, ADTSEA developed and markets a comprehensive "Driver Education and In-Car Curriculum" to provide current information and techniques on teaching new drivers the basics of motor vehicle operation. ADTSEA's curriculum encompasses the following 10 units of study and amounts to roughly 45 hours of classroom instruction:

- Unit 1 - Introduction to Novice Driver Responsibilities and the Licensing System
- Unit 2 - Introducing Operator and Vehicle Control Tasks in a Controlled Environment
- Unit 3 - Space Management System
- Unit 4 - Basic Maneuvering Tasks
- Unit 5 - Risk Reducing Strategies for High-Speed Multi-lane Expressways

⁵⁵ The Texas Education Agency's complete driver education curriculum is available for download at: <http://www.tea.state.tx.us/safedriver/masterguide.html>

- Unit 6 - Personal Factors Influencing Operator Performance
- Unit 7 - Environmental Conditions that Affect Safe Vehicle Operation
- Unit 8 - Vehicle Functions and Malfunctions, and Collision Reporting
- Unit 9 - Sharing the Road with Commercial Motor Vehicles
- Unit 10 - Reducing the Influence of Distractions on the Driving Task

These units are designed to be used in conjunction with any of the following textbooks.

- 1) *Drive Right*, 10th edition, published by Prentice Hall
- 2) *Handbook Plus*, 1999 edition, published by Propulsion International, Inc.
- 3) *How to Drive*, 9th edition, published by the American Automobile Association
- 4) *Responsible Driving*, 2006 edition, published by Glencoe/McGraw-Hill

The curriculum includes written materials for each unit and four DVDs. Each DVD includes video segments that complement particular lessons. The first disc, *ADTSEA's DVD Curriculum*, consists of over 1 hour of video instruction and spans all 10 different areas of study. This DVD also includes written lesson plans or course content for each unit, a *Skills Log* for students to track progress, sets of questions to guide class discussion, and final exam forms. ADTSEA also provides a written *In-Car Guide* that lays a course of study for eight hours of in-car instruction for use by parents and instructors and a *Parent Mentor Home Practice Guide* that includes information to help parents teach their teens key driving techniques. All of these written materials are printable via PC.

Three other DVDs complement this core curriculum. The first, entitled "AAA Foundation for Traffic Safety Videos," provides one hour of general instruction on safety-oriented topics such as, "Sharing the Road," "Managing Space and Time," and "Freeway Driving." The second DVD, "Teaching Your Teen to Drive," is produced by the AAA and provides parents with guidance for instructing new teen drivers. The third DVD "Signs, Signals and Marking, Understanding the Language of the Road," is produced by the AAA Foundation for Traffic Safety and educates students on road signage and road layout and design.

"Unit 7 - Environmental Conditions that Affect Safe Vehicle Operation" is the module relating most specifically to driving under adverse conditions, although, like the NIDB risk prevention curriculum, the ADTSEA curriculum is built on the concept of teaching novice drivers certain key behaviors that are applicable and necessary for safe driving under all conditions. In this curriculum adverse driving conditions are defined as inclement weather, limited visibility and limited traction. These are primarily fog, rain, snow, smoke, hot and cold temperatures and strong cross winds.

In this unit, which consists of 5 hours of in-class training, students are introduced to and shown videos of the common problems and accidents associated with driving under adverse conditions. For each condition, students are trained on the vehicular factors (traction and visibility) affected and the strategies that can limit accident risk. For example, the curriculum introduces the dangers and causes of accidents that occur while

driving at night or in conditions of reduced visibility. Students are taught that “Not only can a driver not see ahead as clearly, he/she cannot see to the sides as well. Drivers have difficulty seeing objects approaching from their left or right into their path of travel.”⁵⁶ Students are then tasked to study corresponding material from their textbook and view segments from the AAA Foundation for Traffic Safety Videos that show actual footage of driving in these conditions and the results of taking a particular action while driving.

Students also learn about potential strategies to improve safety. For each condition, students are taught a series of countermeasures for each adverse condition. For example, students are advised to use high-beam headlights when safe and legal, use low-beam headlights in bad weather or when following or meeting another car at night and take precautionary measures. Precautionary measures to reduce glare and improve visibility include cleaning the windshield prior to driving, adjusting speed, using safety oriented trip planning, wearing sunglasses, and properly adjusting mirrors. Additionally, the course stresses the need for increased time/space needs with respect to following, being followed, changing lanes and turning, traveling with traffic in adjacent lanes, passing and adjusting to the actions of pedestrians and other road users.

A key part of each unit is a structured discussion session where students talk about the course content and strategies. Students learn and discuss the basic physics of traction, its affect on the movement and control of an automobile resulting from loss of traction, and how to return safely to a road after steering or drifting unto the shoulder. The ADTSEA curriculum also allocates a discussion session to train students on the latest technological advances in car safety that protect vehicle occupants or enhance a driver’s ability to respond and control the vehicle during traction loss or other emergencies. “Fact Sheets” are provided for instructors that highlight new safety technologies and crash physics. For example, fact sheets are available for instructing students on the mechanics and advantages of anti-lock brakes and electronic stability control.

Recommendation and Ease of Implementation

Overall, the ADTSEA curriculum provides a wealth of detailed information on adverse driving condition impacts and strategies that can help avoid common accidents. It is an ideal source for a complete AzDOT driver education curriculum should the state decide to implement a standardized curriculum. Dr. Robinson noted that ADTSEA would be willing to share these materials with AzDOT pending a discussion of its distribution and consultation with ADTSEA concerning usage rights and attribution. He also stated that ADTSEA would be more than willing to explore the development of a specialized training module focused on adverse driving. However, he was quick to note that any comprehensive driver education program would address these areas. Dr. Robinson added that an adverse driving conditions module would need to be just one part of a more complete driver education curriculum.

⁵⁶ “ Unit 7-5 - Changing Weather and Conditions of Visibility”, Driver Education Classroom and In-Car Instruction, American Driver and Traffic Safety Association.
<http://www.adtsea.iup.edu/adtsea/curriculum/v2/PDF/Unit%207.pdf>

Required Contact(s) for Moving Forward

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7.3 Other Legal or Regulatory Actions Related to Driving in Arizona

Driver education in Arizona is currently provided through both professional driver training schools, which are licensed and regulated by MVD and public high schools, whose programs are regulated by the ADE. No one statewide agency is responsible for either curriculum development or driver education implementation. Driver education is not a requirement in Arizona. Under Arizona's driver license law, minors are eligible to receive a class G license if they successfully complete an approved driver education program or have a parent or guardian certify that they received 25 hours of supervised driving practice, 5 of those at night, and have had a learner's permit for five months.

Completing an ADE-approved program satisfies the driver education requirement of the graduated driver license law. Arizona's Driver License Manual, which is designed to help novice drivers obtain a driver license or an instruction permit, covers the following topics:

- Section 1: Before You Drive
- Section 2: Safe Driving Practices
- Section 3: Rules of the Road
- Section 4: Sharing the Road with Other Vehicles
- Section 5: Actively Avoiding collisions
- Section 6: Handling Emergencies, and
- Test review questions.

As identified in the AAA Foundation for Traffic Safety's *Evaluating Driver Education Programs, Management Overview*, the key components of a driver education program include:

- Theory – theoretical and logical bases of the program
- Context – political, economic and social environments that influence a program
- Standards – principles and regulations that govern a program
- Products – content of instructional materials
- Processes – education delivery methods and management operation
- Outcomes – direct educational effects of the program on students, such as increased knowledge and skills,
- Impacts – the social consequences of the program, such as crash reductions or increases

As this list suggests, the curriculum content and curriculum delivery methods, which are included in the recommendations provided in Section 7.2 of this chapter, are just two of many items that should be considered in terms of evaluating a driver education program. As this Section is suggesting, the standards guiding that curriculum and the management operations of the program are also critical to overall success.

Since Arizona does not currently have a statewide driver education curriculum a logical step ahead of adopting a driver education module related to adverse conditions is to develop and adopt statewide standards for a driver education program as a whole, which would include standards for the content of their curriculum.

As with driver education curricula, several states and other driver education-related entities have developed standards to guide an overall driver education program. The standards guiding each of the curriculum and/or module recommendations provided in Section 7.2 are referenced in the Curriculum and Administrative Guide for Driver Education in Virginia (available at http://www.pen.k12.va.us/VDOE/Instruction/PE/ca_guide.html) unless noted differently below and include:

- Oregon’s “Division 15 Traffic Safety Education” administrative rule;
- Oregon’s “Driver and Traffic Safety Education Program Vision 2006;”
- Oregon’s “Driver and Traffic Safety Education and the Nine Characteristics of High Performing Schools;”
- Montana’s “Traffic Education Teen Driver Education and Training Curriculum Guide – Content Standards, Benchmarks, Performance Standards, Essential Knowledge and Skills;”
- Montana’s “Traffic Education Standards/Requirements/Procedures for High School Driver Education Programs;”
- Virginia’s Curriculum and Administrative Guide for Driver Education in Virginia;”
- Texas’ Driver Training Statute
- NIDB’s “Standards for a Driver Risk-Management Program;”⁵⁷
- NIDB’s Minimum Standards: Driving Behaviors for Risk Prevention;”⁵⁸
- ADTSEA’s “Traffic Safety Education Life Long Learning Process Driver Education Standards.”

Should the state choose to implement one of the recommended curriculum or modules, it should first consider adopting the administrative rules and/or standards that correspond to that curriculum or module.

⁵⁷ National Institute for Driver Behavior, “Minimum Standards: Driving Behaviors for Risk Prevention.” Available at http://nidb.us/index.php?option=com_content&task=view&id=14&Itemid=32

⁵⁸ National Institute for Driver Behavior, “Minimum Standards: Driving Behaviors for Risk Prevention.” Available at http://nidb.us/index.php?option=com_content&task=view&id=14&Itemid=32

7.4 Summary of Recommendations and Required Resources

The table below summarizes the module/curriculum recommendations detailed in Section 7.2, including greater detail on the resources required to implement each option.

Exhibit 7-1: Summary of Recommendations

Curriculum/Module Recommendations	Circumstances Under Which to Implement	Required Resources
1) Oregon Driver Risk Prevention Curriculum	Desire to implement a full and complete national level driver education curriculum based on NIDB driver risk prevention model that is readily available, but which will require some consultation with developer.	<p>Full CD-ROM containing all curriculum materials, student activities, quizzes, etc. provided with this report and available on line. Oregon DOT estimates 100 hours necessary to train instructors who will use curriculum.</p> <p>Developer of curriculum, however, must grant permission for use of materials. Conversations indicate that permission would be granted only with some fee-based consultation (minimum hourly fee is \$125) on his part regarding use, understanding and implement of the materials.</p>
2) ADTSEA Curriculum	Desire to implement a full and complete driver education curriculum based on national standard which is readily available at a fixed price and limited consultation with developer.	<p>CD-ROM can be ordered online including all curriculum discs, recommended videos, printed materials, and parent mentor guide for \$225 (ADTSEA members \$175) plus \$25 shipping and handling.</p> <p>Limited consultation (no fee) would be required in order to obtain usage rights and to discuss distribution and attribution.</p>

Curriculum/Module Recommendations	Circumstances Under Which to Implement	Required Resources
<p>3) Montana Driver Education and Training Curriculum Guide</p> <p>-----</p> <p>3a) Montana Module 14, Strategies for Adverse Conditions</p>	<p>Desire to implement full and complete driver education curriculum incorporating some NIDB driver risk prevention concepts, but organized in more traditional fashion and including a module on adverse conditions.</p> <p>-----</p> <p>Desire to adopt a stand-alone module on adverse conditions that incorporates many driver risk prevention concepts and covers adverse conditions topics including: glare, low light, darkness, fog, smoke, dust, rain, winter weather and reduced traction.</p>	<p>All materials available for download free of charge.</p> <p>Developer willing to provide fee based consultation for training, curriculum modification or other purposes.</p>
<p>4) Texas/Virginia, Module 8, Driver Responsibilities: Adverse Conditions</p>	<p>Desire to adopt stand-alone module on adverse conditions that includes the adverse conditions topics of: visibility, extreme weather, vehicle restraints, roadway and vehicle technologies, traction loss and that incorporates some driver risk prevention concepts and is part of a curriculum that largely follows the ADTSEA curriculum model.</p>	<p>All materials available for download online free of charge.</p>

Next Steps

It is the recommendation of this report that Arizona continue its on-going efforts, as reported by Jean Ajamie, Director of School Safety and Prevention, Arizona Department of Education, to convene a young driver committee consisting of both ADE and MVD representatives with the goal of developing uniform standards for both the curriculum and training for driver education instructors to apply to both the public school driver education program and the professional driver training schools. As detailed in Section

7.3, a number of resources are provided here to assist in the development of driver education programs and driver education curriculum standards.

It is also the recommendation of this report that, because Arizona does not have an existing state-level driver education curriculum, the state should adopt a complete driver education curriculum as opposed to only a module geared towards adverse driving conditions. That said, should that effort not be possible, it is the recommendation of this report that one of the two adverse conditions related modules (Montana or Texas/Virginia) presented in Sections 7.2 and summarized in Section 7.4 be implemented. Both modules are very good and both would serve Arizona well. They are similar in their coverage of adverse driving conditions and the choice between the two would come down to Arizona's preference between the NIDB and ADTSEA models of driver education. The Montana curriculum is more aligned with the NIDB concepts and materials, whereas the Texas/Virginia Module is more aligned with the ADTSEA curriculum and its materials.

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9 - DIAGRAM <div style="border: 1px solid black; height: 200px; width: 100%;"></div>	10 - INDICATE NORTH <input type="checkbox"/>	11 - SKIDDING OCCURRED <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;"></td> <td style="width:10%; text-align: center;">VEHICLE</td> <td style="width:10%; text-align: center;">1</td> <td style="width:10%; text-align: center;">2</td> <td style="width:10%; text-align: center;">3</td> </tr> <tr> <td>YES</td> <td></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>NO</td> <td></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		VEHICLE	1	2	3	YES		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NO		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																	
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01-2704R11/99 BACK

ARIZONA TRAFFIC ACCIDENT REPORT
TRUCK/BUS SUPPLEMENT
 FORWARD COPY TO
 ADOT TRAFFIC RECORDS SECTION 064R
 206 S. 17th AVE., PHOENIX, AZ 85007-3213

01-2710 R6/00

ADOT USE ONLY

REPORT ID					Agency Report Number	
YEAR	MONTH	DAY	HOUR	NCIC NO.	OFFICERS ID NO.	

TRAFFIC UNIT NO. (MUST CORRESPOND WITH MAIN REPORT)	CARRIER INFORMATION		VEHICLE CONFIGURATION																																	
	NAME: _____		<input type="checkbox"/> Passenger Car <input type="checkbox"/> Light Truck <input type="checkbox"/> Bus (9-15 seats) <input type="checkbox"/> Bus (> 15) <input type="checkbox"/> 1-Unit Truck (2 axle/6 or more tires) <input type="checkbox"/> 1-Unit Truck (3 or more axles) <input type="checkbox"/> Truck with Trailer <input type="checkbox"/> Truck Tractor only <input type="checkbox"/> Truck Tractor with Semi-trailer <input type="checkbox"/> Tractor with Double Trailers <input type="checkbox"/> Tractor with Triple Trailers <input type="checkbox"/> Other - Unable to Classify																																	
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SIGNATURE OF OFFICER _____	DATE _____
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Appendix B: State Administrators of Driver Education

State	Name	Title	Agency	Address	Address 3	Phone	Fax	Email
Alabama	Michael Bassett	Driver Education	Alabama State Department of Education, Driver Education			334-242-8220		mbassett@alsde.edu
Alaska	Shelly Mellott					907-269-5129		shelly_mellott@admin.state.ak.us
Arizona	Robert Turney		Motor Vehicle Department					RTurney@azdot.gov
Arizona	Jean Ajaimie		Department of Education, Division of School Safety and Prevention	1535 W Jefferson, Bin #29	Phoenix, AZ 85007	602-542-8734	602-364-1938	jaaimie@ade.az.gov
Arkansas	Susan Sims	Manager, Driver Control	Arkansas Office of Driver Services			501-682-7211		susan.sims@rev.state.ar.us
California	Robert Lee					916-323-5799		rllee@cde.ca.gov
Colorado	Peter Fritz		Colorado Department of Education			303-866-6175		Fritz_P@cde.sate.co.us
Connecticut	Barbara Westwater	Chief, Curriculum and Instruction	Connecticut Department of Education					Barbara.Westwater@ct.gov
Delaware	Dean Betts	Education Associate	Delaware Department of Education			302-857-3320		dbetts@doe.k12.de.us
Florida	Lillian Finn	Director of Curriculum and Instruction	Florida Department of Education			850-245-0423		lillian.finn@fldoe.org
Georgia	Daniel Fleming	Director Curriculum & Instruction	Ga Department of Education			404-657-5310		DFleming@doe.k12.ga.us
Hawaii	Katherine Sakuda		HI Department of Education	475 22nd Ave. , Rm. 124	Honolulu, HI 96816	(808) 735-8370		
Idaho	Kelly Glenn	Driver Education Coordinator	Department of Education, School District Support Services, Driver Education	PO Box 83720	Boise, ID 83720-0027	208-332-6984	208-334-3484	kdglenn@sde.idaho.gov
Illinois	Mark Gruca	IHSCDEA						
Indiana	John Bodeker		Indiana Department of Education, Division of School Traffic Safety	151 W. Ohio Street	Indianapolis, IN 46204	317-232-0893	317-233-0858	jbodeker@doe.state.in.us
Iowa	Steven Tudor	Driver and Safety Education	Iowa Department of Education			515-237-3180		steven.tudor@iowa.gov
Kansas	Joan Peterson	Education Program Consultant	Kansas Driver Safety Education Association	120 SE 10th Avenue	Topeka, KS 66612-1182	(785) 296-3261		jpeterson@ksde.org
Kentucky	Michael Miller		KY Department of Education, Curriculum Documents Department			502-564-2106		michael.miller@education.ky.gov
Louisiana	Cheryl Brown		Louisiana Department of Education, Motorcycle Division			225-342-4141		cheryl.brown@la.gov
Maine	Eric Bellavance	Driver Education Program Manager	Bureau of Motor Vehicles	Station 29, State House	Augusta, ME 04333	(207) 624-9156	207-624-9158	eric.bellavance@maine.gov
Maryland	Andy Krajewski	Program Director	MARYLAND DEPARTMENT OF TRANSPORTATION, Motor Vehicle Administration, Driver & Vehicle Policies & Programs	Room 103 MVA Building	Glen Burnie, MD 21062	410-424-3731		akrajewski@mdot.state.md.us
Massachusetts	Michael Devaney	Assistant Director	Massachusetts Registry of Motor Vehicles, Vehicle Safety and Compliance Services			(617) 351-9328		michael.devaney@state.ma.us
Michigan	Greg Lantzy		MI Department of State, POD-Driver Education Section	430 W. Allegan, 3rd Floor	Lansing MI 48918	517-373-3677	517-373-0964	lantzyg@michigan.gov
Minnesota	Don Heochst	Driver Education Coordinator	Minnesota Department of Public Safety, Driver and Vehcile Service, Office of Driver Education	445 Minnesota St., Suite 176	St Paul, MN 55101-5176	651-201-7625	651-296-5316	Don.Hoechst@state.mn.us
Mississippi	James Brooks	Supervisor, Driver Education	Mississippi Department of Education, Office of Healthy Schools			601 359 1028	601 359 3184	jbrooks@mde.k12.ms.us
Missouri	Helen Drinkard		Missouri State Department of Elementary and Secondary Education, Division of School Improvement, Curriculum Services Section			573-751-4234		helen.drinkard@desse.mo.gov
Montana	David Huff		MT Office of Public Instruction	PO Box 202501	Helena, MT 59620	406-444-4396		dhuff@mt.gov
Nebraska	Fred Zwonecheck	Administrator	Nebraska Office of Highway Safety			402-471-2515		fredz@dmv.ne.gov
Nevada	Keith Rheault	Superintendent of Public Instruction	Nevada Department of Education, Superintendent's Office			775-687-9217		krheault@doe.nv.gov
New Hampshire	Philip Fujawa					603-271-3869		PFujawa@ed.state.nh.us
New Jersey	Sandy Grossman	Public Relations	New Jersey Registry of Motor Vehicles			609-292-5203		sandy.grossman@dot.state.nj.us
New Mexico	Kirt Heider	Program Specialist	U of NM School of Law, Insitute of Phblic Law, Transportation Safety Law Center			505-277-0872		kheider@unm.edu
New York	Anne Schiano	Assistant Director	New York State Education Department; Elementary, Middle, Secondary and Continuing Education; Office of Curriculum and Instructional Support			518-474-5922		aschiano@mail.nysed.gov
North Carolina	Joanne Chase	Curriculum and School Reform	North Carolina Public Schools, State Board of Education, Department of Public Instruction	301 N. Wilmington Street	Raleigh, NC 27601-2825	919-807-3857		jchase@dpi.state.nc.us
North Dakota	Paula McKay		Driver and Traffic Safety Education, School Approval and Accreditation Unit, Department of Public Instruction	600 E. Boulevard Ave., Dept. 201	Bismark, ND 58505-0440	701-328-4563	702-328-4770	pmckay@state.nd.us
North Dakota	Lory Harsche	Program Manager	Driver License & Traffic Safety, Department of Transportation	605 E. Boulevard Ave.	Bismark, ND 58505	701-328-2402	701-328-2435	lharsche@state.nd.us
Ohio	Karen Kadar		OH Department of Education	1970 West Broad St.	Columbus OH 43218	614-466-3250	614-728-8330	kkadar@dps.state.oh.us
Oklahoma	Karen Johnson		Oklahoma State Department of Education	2500 North Lincoln Boulevard	Oklahoma City, OK	405-521-3301		karen_johnson@sde.state.ok.us
Oregon	John Harvey		OR Department of Transportation, Transportation Safety Division	235 Union Street NE	Salem OR 97301-1054	503-986-4413	503-986-4341	John.L.Harvey@odot.state.or.us
Pennsylvania	Robert Roush	School Safety Education Advisor	Pennsylvania Department of Education, Curriculum and Instruction, Driver and Safety Education	333 Market Street, 8th Floor	Harrisburg, PA 17126	717-783-6595	717-783-3946	rroush@state.pa.us
Rhode Island	Monica Russell	Driver Education Program	Rhode Island Department of Education - Students, Families and Community, Implemented by Community College of Rhode Island, Division for Lifelong Learning	400 East Avenue	Warwick, RI 02886	401.825.2182		mrussell@ccri.edu
South Carolina	Ruth Earls		South Carolina Department of Education	1429 Senate Street, Suite 802C	Columbia, SC 29201	803-734-8099		rearls@ed.sc.gov
South Dakota	Jane Schrank					605-773/6390		jane.schrank@state.sd.us
Tennessee	Tim Hackney		Tennessee Rehabilitation Center, Human Services	460 Ninth Ave	Smyrna, TN 37167	615-459-6811	615-355-1373	Tim.Hackney@state.tn.us
Texas	Victor Alegria	Director	Texas Education Agency, Driver Training and Education, Driver Training Division			512-936-6778		victor.alegria@tea.state.tx.us
Utah	Gail Johnson	Driver Education Specialist	Utah State Office of Education			801-538-7779		Gail.Johnson@schools.utah.gov
Vermont	Judy Safford		Vermont Department of Education, Driver and Traffic Safety Education			802-828-3126		judy.safford@state.vt.us
Virginia	Janet Ragland	Driver Education	Virginia Department of Education; Division of Instruction; Office of Middle and High School Instruction; Health, Physical Education and Driver Education	101 N. 14th Street	Richmond, VA 23219	804-786-2799		Janet.Ragland@doe.virginia.gov
Washington	Dan Payne	Program Supervisor	Office of Superintendent of Public Instruction, Traffic Safety Education			360-725-6120.		dan.payne@k12.wa.us
West Virginia	Don Chapman	Assistant Director	West Virginia Board of Education, Division of Student Support Services, Office of Healthy Schools	1990 Kanawha Blvd. Building 6, Room 309	Charleston, WV 25305	304-558-8830	304-558-3787	dchapman@access.k12.wv.us
Wisconsin	Randall Thiel	Driver Education Consultant	Wisconsin Department of Public Instruction			608-266-9677		randall.thiel@dpi.state.wi.us
Wyoming	D. Leeds Pickering		Wyoming Department of Education, Health and Safety Unit	2300 Capitol Ave, Hathaway Building 200	Cheyenne, WY 82002	307-777-6265		lpicke@educ.state.wy.us

Appendix C: Driver Education Survey



ARIZONA DEPARTMENT OF TRANSPORTATION

Driver Education for Safety in Adverse Driving Conditions

INTRODUCTION

This survey explores the existing driver education programs employed by other states and their estimated effectiveness. In particular, the survey seeks to learn about practices in educating drivers for safety in certain adverse driving conditions.

For purposes of this survey, adverse driving conditions are defined as, "Environmental and other factors affecting visibility and traction including: 1) darkness; 2) weather conditions (e.g. fog, rain, snow, flood, smoke, severe wind, extreme temperatures, etc.); 3) road conditions and construction; and 4) vehicle stability and traction control (e.g. tire pressure and wear, steering and brake issues.)"

Click [here](#) for more information about the AzDOT Arizona Transportation Research Center project "[SPR 609 - Driver Education for Safety in Adverse Driving Conditions.](#)"

Your participation is *greatly* appreciated.

Agency:

Your Title:

1. What agency/department within your state is responsible for developing your driver education program?

2. What agency/department within your state is responsible for implementing the driver education program?

3. What elements comprise your driver education program?

(check all that apply)

In class curriculum

- Driving simulation
- In car curriculum
- Other, please explain

4. What delivery methods does your state employ in implementing your driver education program?

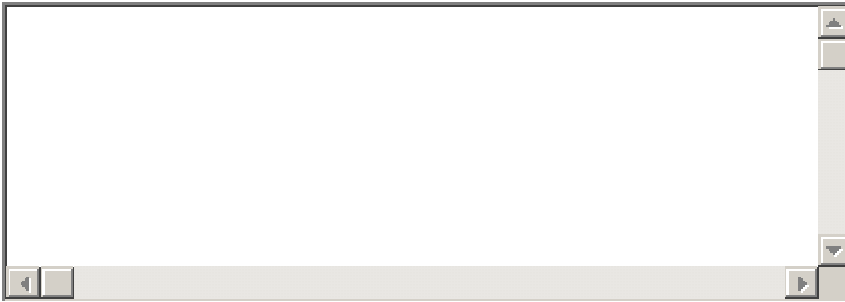
(check all that apply)

- Pre-prepared, written material, *e.g.* textbook or other, presented by instructor in classroom
- Pre-prepared, written materials, *e.g.* text books, worksheets, etc., provided to students to be completed outside of class
- Videos or other electronic presentations shown in class
- Videos or other electronic presentations provided for students to view outside of class
- Interactive electronic activities including driving simulators and/or quizzes with immediate response and response explanation
- Other, please explain

5. Are all of the elements of your driver education program implemented concurrently or in immediate succession, *i.e.* no delays or graduations in implementation related to levels of achievement, age, driving experience and/or other factors?

- Yes No

If no, what is the schedule of graduated implementation, *e.g.* are some modules of education provided only after receipt of learner's permit or after some other measure of driver experience?

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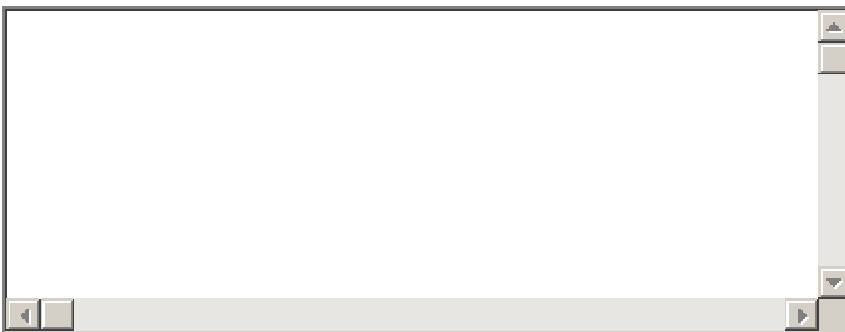
6. What primary subjects are covered in your driver education program, *e.g.* module titles or chapter headings, etc.?

(Please list)

An empty rectangular text box with a light gray border and a vertical scrollbar on the right side. The box is intended for the respondent to list the primary subjects covered in the driver education program.

7. If your driver education curriculum addresses driving under adverse conditions (*i.e.* covers *any or all* of the items listed in the definition of adverse conditions provided in the Introduction to this survey regardless of whether or not you use that exact terminology), what topics are covered?

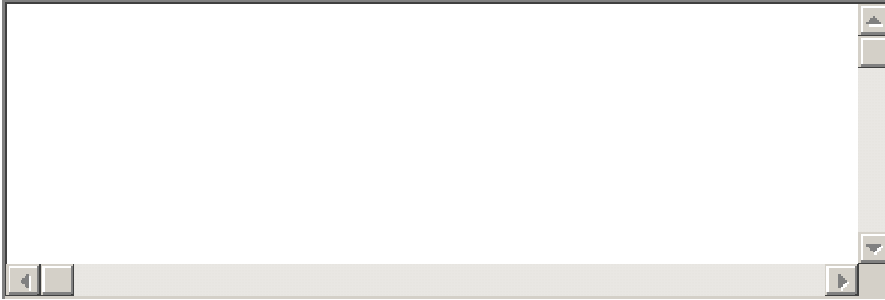
(Please list)

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8. Has your state attempted to measure the effectiveness of your driver education program or any components of your driver education program in any way?

Yes No

If yes, please briefly explain the methodology and measures of effectiveness.



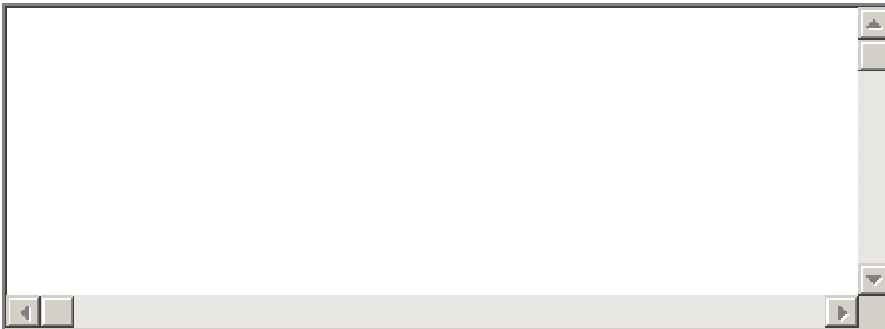
9. Whether or not your state has actually attempted to measure the effectiveness of your driver education program, what is your perception of its effectiveness?

- Entirely Ineffective
- Somewhat Ineffective
- Somewhat Effective
- Effective
- Highly Effective

10. Are there components of your state's driver education program that you perceive as more effective than others or than the program as a whole?

- Yes No

If yes, please list and explain.



11. In your opinion, does your state's driver education program cover all the subjects it should?

- Yes No

If no, please list other possible subjects

12. In your opinion, does your state's driver education program utilize the delivery methods it should?

Yes No

If no, please list other possible delivery methods

13. Are there any planned changes/improvements to your state's driver education program that have not yet been implemented?

Yes No

If yes, please describe

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