VIRGINIA SCHOOL BUS DRIVER TRAINING: DOES TRAINING PROGRAM ADEQUACY AFFECT SCHOOL BUS ACCIDENT RATES?

by

James O. Crews

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APPROVED:

_____
Richard G. Salmon, Chairman

_____ _____
Patrick W. Carlton Jimmie C. Fortune

_____ _____
Barbara V. Goodman Samuel D. Morgan

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Committee Chairman - Dr. Richard G. Salmon
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(ABSTRACT)

Analysis of data provided by the Virginia Departments of Motor Vehicles, Transportation, and Education all show school buses as having a significantly higher number of accidents per hundred million miles of travel than other forms of transportation. Such statistics are alarming and formal study of school bus accident factors has been limited. The purposes of this study were to (a) establish the adequacy of the school bus driver training programs of Local Education Agencies(LEAs) of the Commonwealth of Virginia, and (b) assess the results of various training programs on the reduction of school bus accidents.

Descriptive data were gathered using two surveys. The driver survey included items regarding driver training and accident history. In addition, the survey included driver history, driver demographics, and inquiries into the adequacy of training preparation for the Commercial Drivers License(CDL). The transportation directors' survey included items regarding training topics, training methods, program description, and employer expectations. Other topics included were the impact of the CDL, and government mandated training programs. Data analysis was conducted by developing cross-tabulation matrices, chi square tests of significance, correlation coefficients, paired t-tests, and multifactor analysis of variance (ANOVA).

Conclusions formulated from this study include: (a) training programs in many LEAs do not meet national standards for adequacy; (b) there is no direct relationship between the number of school bus accidents and the adequacy of the training program; (c) there are few LEAs that analyze accident statistics to make modifications to training programs; and (d) most LEAs use the Virginia School Bus Driver Curriculum Guide as their major training resource. Findings such as these provided beneficial data to the Virginia Department of Education, LEA officials, and directors of transportation on training modification and effectiveness, as well as accident reduction.

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DEDICATION

This study is dedicated to my parents, Felton and Laura Crews, who instilled in me the value of education and the need to always do my best; and my wife, Wanda, and my children, Jamie and Jennifer. My wife and children sacrificed more than I can ever know. Their love, compassion and prayers carried me through the most difficult of days.

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CHAPTER I - INTRODUCTION

On October 25, 1995, school bus driver, Patricia Catencamp, decided to partially cross a railroad track while waiting for a traffic light. Mrs. Catencamp's decision initiated a series of events resulting in injuries to twenty-four students and the death of seven others (School Transportation News (STN), February, 1996, p.32, The American School Board Journal (ASBJ), January, 1996, p.17). Since it was later determined that mechanical difficulties did not exist with the traffic signal switching device; why would a trained, experienced driver decide to place her bus in such a precarious position? As a part of their training, are the drivers of the Fox River Grove school district assessed on properly handling railroad crossings? Patricia Catencamp's additional responsibilities as Fox River Grove's deputy transportation safety supervisor would have one believe her training was as good or better than those of the other school bus drivers in her district(ASBJ, January, 1996, p.17).

A Minneapolis, Minnesota, teenager died after exiting through the emergency door of her bus on April 8, 1996. Amanda Perkins, a thirteen-year-old student at Northeast Middle School, Minneapolis, Minnesota, ran to the back of the bus and jumped out. The driver, Roger Morelock, did not brake and continued on his route. The investigating officer indicated, "When he didn't stop, that was careless driving"(School Transportation Director (STD), April 24, 1996, p.4). Did Roger Morelock receive instruction on how to handle emergency situations?

On October 24, 1991, a school bus overturned and came to rest in a creek at the base of an embankment, injuring twenty-three students of the Pine Top, Kentucky, school district. The accident report indicated the driver lost control of the bus as the vehicle entered a curved section of road. Was this driver using proper vehicle control as prescribed in both classroom and behind-the-wheel training?

In Halifax County, Virginia, on June 12, 1996, a six-year-old student was run over by her bus. Upon completion of her daily route, the school bus driver used the same road for the return trip home. Reacting to several students waving from their yard, the driver brought the bus

to a halt. The students crossed the roadway to speak to the driver, but as the children returned to their home, the driver pulled off before the younger child cleared the front of the bus(News and Record, June 13, 1996, p.1). Preliminary investigation indicated the driver did not use proper, pupil highway crossing procedures. It was unclear whether the mechanical arm requiring pupils to walk farther from the bus and in better view of the driver had been deployed.

Chesterfield County, Virginia, paid the family of a girl who had been run over by her school bus, a one million dollar settlement in an out-of-court action. The January 1992, litigation came in response to the driver testifying she was not concentrating on the young girl crossing in front of the bus(Slavinsky,p.2, and STD, January 22, 1992, p.7). Improper use of mirrors and the failure to check the area in front of the bus led to this unfortunate accident.

Incidents of this severity are "relatively rare"; yet, their occurrence or the occurrence of less severe accidents cannot be minimized(Slavinsky, p.2). School bus drivers do commit errors, but accidents can occur as a result of errors other drivers make. Accidents occur where the bus driver, training officer, director of transportation, or school division have no control, but in any accident, the school bus driver must react in an appropriate manner.

In Northampton County, Virginia, on November 6, 1995, a school bus stopped to unload a student was rear ended by a tractor trailer (STD, 1995, November 15, p. 4). Luckily, the driver, Doris Walton, realized what was about to happen and put the bus into motion after the disembarkment of the student, lessening the force of the blow. Although the school bus driver and students on board received only minor injuries, the bus driver's seat was ripped from the floor, throwing the driver against the dashboard. An investigation found the school bus driver had followed proper procedures and all warning lights were found to have been in working condition. The Virginia State Police charged the driver of the truck with reckless driving.

For the driver to be adequately prepared, training programs must provide instruction and practice in the various skills needed to transport students. These skills include the following: handling the vehicle, loading and unloading, behavior management, medical emergencies, properly crossing railroad tracks, detecting hazards, door controls, skid recovery, parking, and braking systems.

Virginia's Department of Education-Pupil Transportation Services (VDOE-PTS), under the leadership of Barbara Goodman, has taken a proactive stand on this issue by providing local school divisions an extensive training program guide. The guide appeared to be well-designed and represents the state standard for training programs in each Local Education Agency(LEA).

Virginia Motor Vehicle Law, Section 46.2-339, establishes the standard for the qualifications and examination of school bus drivers. Specifically after January 1, 1990, anyone who operates a school bus in the Commonwealth of Virginia must have had "a reasonable amount of experience in driving motor vehicles and have passed a special examination pertaining to his ability to drive a school bus with safety to its passengers and to other persons using the highways." Also, school bus drivers are required to qualify for a Commercial Driver's License (CDL) with a specific school bus endorsement to drive school buses transporting 16 or more students.

Virginia School Law, Section 22.1-178, specifies the following: (a) the driver must have a physical examination as prescribed by the Board of Education, (b) the driver has not been convicted of driving under the influence (alcohol or drugs) within the last five years, (c) the driver has not had two or more moving traffic violations within the previous twelve month period, and (d) the driver must produce two statements by reputable clients that the candidate is of good moral character and has taken the examination prescribed in Section 46.2-339. Local school boards may require first aid training, and shall require drug testing, a yearly physical, and a police report on traffic violations. Section 22.1-181 of Virginia School Law indicates "the State Board of Education shall develop a training program for persons applying for employment and employed, to operate school buses and shall promote its implementation."

The Virginia General Assembly has assigned the responsibility for developing curriculum components for bus driver training to the State Department of Education while the LEAs are required to conduct program promotion. The LEA has the ultimate responsibility of providing a method of implementation. Experts in the field of pupil transportation agree that adequately trained drivers result in increased safety for children(Personal Communication- Barbara Goodman, Jim Ellis, and Ron Kinney, 1996, July).

Organization of the Study

This study was presented in a five chapter format. Included in Chapter I, the reader was given examples of the necessity for specific training curriculum, a statement of the problem, the purpose of the study, the significance of the study, specific definitions, and limitations for the study. Literature pertinent to the training of school bus drivers is presented in Chapter II. Specifically, items reviewed in Chapter II included the following: school bus safety records, national and state standards for training, training program components, legal aspects of training, liability costs, training program adequacy, and efficacy of the drivers and driver trainers.

Research methodology is presented in Chapter III and includes the following topics: survey(s) development, piloting of the surveys, survey revision, adequacy models, population descriptions, statistical analysis, instrumentation, data gathering procedures, and strategies to increase response rates.

The findings of the study are presented in Chapter IV. Data presentation allowed the researcher to construct answers to the research questions. Chapter V provides a summary, conclusions, and suggestions for further study.

Statement of the Problem

Statistics gathered by the Virginia Department of Education (VDOE) during the three year period, 1992-1995, indicated Virginia's school buses were involved in three accidents resulting in student fatalities, 75 accidents resulting in student injury, and 2,695 accidents involving property/injury. The number of fatalities and injuries is minute in comparison to other forms of transportation, but no less tragic. Accident rates for school buses per hundred million miles of travel do not, however, correspond as positively with other forms of vehicular transportation. School bus accidents continue to occur in the Commonwealth at a virtually unchanged rate; yet, accident rates for other forms of land transportation continue to decrease. The importance of these data is expanded as an additional review reveals school bus miles of travel are remaining constant while miles of travel for other forms of transportation are increasing dramatically (National Safety Council - Accident Facts 1995 Annual Edition).

In an effort to improve student transportation safety, Virginia has become one of only 17 states which requires school bus drivers to obtain a school bus specific Commercial Driver's License (CDL); however, preparation to drive any commercial vehicle goes beyond the acquisition of a license. The license represents only a small portion of the complete set of skills needed to safely operate a school bus. To assist in the endeavor to adequately train all bus drivers, the VDOE-PTS developed the Virginia School Bus Driver Training Guide based on the NHTSA model training program, and criteria specific to the Commonwealth. The guide does not represent the model all LEAs use, and variations in training programs among Virginia LEAs can lead to variations in training adequacy.

The problem addressed in this study was the excessive number of accidents Virginia's school buses have per million miles of travel as compared to other forms of land transportation. Accidents are viewed differently from crashes in that other vehicles or stationary objects do not have to be involved. School bus accidents may involve only the bus, the bus and the passengers, the bus and pedestrians, or the bus, individuals, and other objects . In an effort to

determine which factors may affect the school bus accident rate, this study sought to analyze the effects of Virginia's LEA's training programs on accident reduction. To accomplish this task, surveys of LEA directors of transportation and school bus drivers provided data used in identifying the adequacy of their training programs. Secondly, Pearson's Correlation Coefficient, Paired T-Test, Chi Square Test of Significance, and Multivariate Analysis were used to determine what relationships exist between training program adequacy and accident rate reduction. A third analysis was conducted using accident rate data and training program comparison solicited from other states. Without adequate training, school bus accident rates may not be reduced and the costs, both in human and monetary terms, cannot be lowered.

Purpose of the Study

The purpose of this study is to analyze Virginia's Local Education Authorities'(LEAs') school bus driver training programs for the following qualities:

1. The statistical significance in the reduction of school bus accidents.
2. Training program adequacy in comparison to a national standard for school bus driver training.

The accomplishment of these tasks will involve the addressing of additional purposes:

1. The modification of training programs in response to annually reported accident data.
2. The costs of providing school bus driver training in Virginia's LEAs.
3. Local implementation and supplementation of the Virginia School Bus Driver Training Curriculum Guide.
4. Determination of reasons for the bus accident rate per hundred million miles being significantly greater than statistics for all accidents in a given area.
5. The financial burden of accident losses.

Significance of the Study

A national study, Assessing the Adequacy of Commercial Motor Vehicle Driver Training: Final Report (AACMVDT: FR), 1995, p. 22, stated that an extensive literature search to find studies demonstrating a relationship between training and accidents had been conducted, finding only two studies which showed significant accident reduction. This study will seek to determine what relationships exist, in Virginia, between bus driver training programs and accident reduction, and the adequacy of Virginia's LEA's driver training programs. In completing such a study, accident data analysis can direct both LEAs and VDOE-PTS to areas of emphasis for improved driver training and accident rate reduction. Study results will provide a methodology for school divisions to analyze training and accident data to improve driver skills and reduce accidents. Insurance carriers also may find this information significant in determining rates for school divisions providing exemplary training programs and annually filing fewer claims per hundred million miles of travel.

Definitions

Adequate Training Programs - Based on the FHWA model curriculum and a school bus model curriculum developed by the National Highway Traffic Safety Administration(NHTSA) specifying minimum values for the following curriculum characteristics: (a) classroom/laboratory hours, (b) range hours, (c) on street hours, (d) total course hours, (e) class/lab/student ratio, (f) range/student/teacher ratio, (g) on-street student/teacher ratio, (h) behind-the-wheel hours or miles, (i) topic/content match(Appendix B, p. B-1,VSBDTG, Technical Overview, p. 4).

Virginia School Bus Driver Training Guide - Components of the guide include the following: Driver's Role and Responsibility, Passenger Conduct, Driving Fundamentals, Loading and Unloading, Passengers, Bus Maintenance, Crashes and Emergencies, Controlling the

Position of the Bus, Detecting Hazards, Driving In Emergencies, Driving Under Special Conditions, Transporting Students With Special Needs, Fuel Efficient Driving, and Radio Communications.

School Bus

Type A-Vehicle designed for 4-20 passengers (van conversion or a vehicle with a body built on a van-type compact truck frame with a gross weight of 10,000 pounds or less).

Type B-Vehicle designed for 16 to 71 passengers (van conversion or a vehicle with a body built on a front-section vehicle chassis with a gross weight rating of more than 10,000 pounds, part of the engine is beneath or behind the windshield and beside the driver's seat).

Type C-Vehicle designed for 34-64 passengers (the school bus body is built on a flat back cowl chassis with a gross vehicle weight rating of more than 10,000 pounds, engine in front of the windshield, entrance door ahead of the front wheels).

Type D-Vehicle designed for 34-84 passengers (the body is on a chassis with the engine in front, midship, or rear, entrance door is ahead of the front wheels).

Commercial Motor Vehicle(CMV) - Large trucks, Motorcoaches, School Buses

Accident Rate - Number of accidents per hundred million miles of travel

Entry Level Training - All training received during the first three years of the driver's experience. Entry-level training included each of the following:

1. Pre-service training - Training received prior to starting work as a Commercial Motor Vehicle driver (CMV). To include behind-the-wheel and classroom instruction.

2. On-the-job training - Training provided when the new driver first begins actually carrying passengers.

3. In-service training - Training activities provided by the fleet operator specifically intended to improve the safety-related skills and knowledge of bus drivers.

Behind-the-Wheel Training - An extension of classroom instruction providing the driver though supervised training while actually operating the motor vehicle.

Vehicle Miles of Travel (VMT) - Total number of miles traveled on highways during a given year.

Crash Rate - Number of crashes per hundred million miles of travel unless otherwise stated.

Total Accidents - The sum of all fatal, injury, and property damage accidents unless otherwise stated.

Driver-Error Accidents - An accident in which a report filed by a law enforcement officer states the driver has been determined to be in error and has violated a vehicle law.

School Bus Rider - Pupils who attend public schools in the Commonwealth of Virginia and encompass grade levels PreK-12.

Training Program - A program which has a structured process characterized by either all or most of the following components: A set curriculum, specific objectives and teaching, learning activities, a designated instructor, classroom instruction, range or street practice, a reasonably set direction, and criteria determining pass/fail.

Accident Factors

1. Human factor - behavior or actions of drivers.
2. Vehicle factor - aspects of the vehicle such as size, maneuverability and condition.
3. Environment - roadways, vehicles, weather, passengers and pedestrians.

Personal Efficacy - the conviction that one can successfully excite the behavior required to produce the desired outcome(Bandura, 1977).

Limitations

This study is limited by the following threats to internal and external validity.

1. The study was limited by the method employed to distribute questionnaires to LEA school bus drivers. Questionnaire distribution was dependent on the discretion of the director of transportation in each LEA. Directors of transportation who chose not to participate in the project were not likely to provide school bus drivers with questionnaires, thus affecting survey return rates.

2. The director of transportation could negate the randomization process used to select school bus drivers by distributing questionnaires to drivers of his/her choosing.

3. Survey distribution did expose external limitations, but the selection of the distribution method did delimit the study in terms of costs to the researcher and the efficiency of delivery to 134 school divisions and 536 participants.

4. The study was limited in efforts to make comparisons among different training programs in different states. This limitation is primarily due to variant definitions used for terms such as crashes, training models, and training model adequacy.

5. Drivers having had many years of previous experience, little formal training, and were "Grandfathered - allowed to retain their employment without having to retrain," under increased training requirements may affect the external validity of the study.

6. Driver selection is a threat to the internal validity of the study due to the varied experiential background of the school bus driver.

7. Driver selection processes did not allow the researcher to determine if the driver selected was a regular or substitute driver, although both regular and substitute drivers should have received identical training.

8. While some school divisions are much larger than others, the selection of three drivers from each division provided for the same response level on training procedures per school division. Training procedures should be identical for all bus drivers in a school division therefore delimiting the study.

9. Extracurricular use of school buses was not included in the study.

CHAPTER II - LITERATURE REVIEW

Introduction

School bus transportation is lauded for an extremely low fatality rate, which statistics from the National Safety Council-Accident Facts 1995 Annual Edition (NSC-AF 1995) support. Other reports arraying the same data have been produced by the National Highway Traffic Safety Administration (1995), and the U.S. Department of Transportation in Assessing the Adequacy of Commercial Motor Vehicle Driver Training: Final Report (AACMVDT:FR, 1995), and the Transportation Research Board in Special Report 222, (1989). Whereas the 1989 research indicates bus fatalities occurred at the rate of 0.5 occupant fatalities per hundred million miles of travel, 1994's rate indicated a reduction to 0.23 occupant fatalities per hundred million miles of travel (National Safety Council-Accident Facts 1995 Annual Edition). School Transportation News (STN), (April 1996, p.13) reported another facet of this overall good record and provided statistics which indicated school bus transportation has the lowest fatality rate of commercial drivers in either the heavy truck, school bus, or motorcoach field. While this is wonderful news to educational administrators, parents, and the general public, it was misleading in comparison to the total number of fatality, injury, and property-only accidents public school buses are involved in annually.

In 1993-94 only ten persons were killed "on the bus," but 115 persons were killed nationwide as a result of accidents involving school buses (NSC-AF 1995, p.94). Of the 105 persons killed outside of the bus, the majority of pupil deaths came as a result of children run over by their own buses (NSC-AF 1995, p.94). Characteristics of pupils fatally injured by their school bus included the following: (a) the fatality occurred in a loading and unloading zone, (b) was located in a rural setting, (c) happened under clear weather conditions, (d) likely happened on Monday or Wednesday, and (e) probably occurred in the fall of the year (STN, February 1992).

Nationally, data analysis of school bus accidents and driver training has been limited due to non-standard definitions and variant methods of reporting. However, this problem is not a formidable factor in the comparison of accidents and training if restricted to a single state. Such comparisons within Virginia is relatively simple due to standardization of terminology used by the VDMV, and the VDOT. The variance between these two agencies and the VDOE lies primarily in assessed damage costs of the accident. The VDMV and VDOT formulate statistics only for accidents of $750.00 or more of property damage while the VDOE does collect data on all accidents, no matter the damage costs(Personal Communication, Barbara Goodman, July 1996). VDOE-PTS yearly reports are however based on the standard of $750.00 or more in damage assessment and limited to the time pupils are on board.

Nationally, during the 1993-94 school year, 400,000 buses transported approximately 22,000,000 pupils daily, amassing a total of 4.4 billion miles of pupil transportation. School buses were involved in 30,000 accidents resulting in injuries to 14,000 persons, the majority (11,000) being pupils (NSC-AF 1995, p.95). A comparison to 1990-1991 data revealed the nation had approximately 350,000 buses, traveled 4.3 billion miles, had 26,000 accidents, and injured 7,700 pupils (STD, Oct.14, 1992, p.7). In 1995, the NSC reported 11,200,000 total accidents, 43,000 vehicle related deaths, and a 1.83 mileage death rate. It was obvious that school bus transportation again fared extremely favorable with its occupancy death rate of 0.23.

Virginia's 10,628 school buses traveled a total of 95,909,009 miles during the 1993-94 school term while providing daily transportation for 806,500 pupils (1993-94 Pupil Transportation DOE-PTS, p.7). Virginia LEAs reported a total of 892 accidents during the 1993-94 school year. The 1993-94 accident total represents seven fewer accidents than the 899 of the 1994-95 school year and twelve less than the 904 accidents of the 1992-93 school term.

Additional data from the VDOE-PTS showed a total of 10,698 buses were used during the 1994-95 school term, establishing a difference of 70 more buses from 1993-94 statistics. Statistically, the difference in accident number (892 in 1993-94 and 899 in 1994-95) is not

significant ($p \leq 0.05$ level) when compared to the increase statewide in miles of travel, number of registered vehicles, and increased transportation mileage.

Although transporting students has been viewed as extremely safe, Slavinsky, p.10, stated, "Whenever an accident occurs the chance of tragic events is possible." Also, the possibility of tragedy is greater for school buses because of the number of occupants. National statistics have indicated school buses travel 2.2% of all miles driven, and represented 2.8% of all vehicles registered; yet, school buses have accounted for 3.2% of all accidents (NSC-AF 1995). While some of these accidents were unavoidable or came at the hands of other drivers, the results were just as costly. Examples given in Chapter I of this study described the results of several such accidents.

School bus accidents have gained the attention of transportation officials, safety organizations, the National Highway Traffic Safety Administration (NHTSA), senators, state departments of education, law enforcement officials, and LEAs. Each of these groups has taken the position that training is essential in improving the safety record of school bus transportation. The Association of School Business Officials, 1987, reaffirmed that in-service training for drivers is a typical method utilized by successful school officials to improve pupil transportation safety. Little documentation exists, however, which links training to accident reduction. Also, little documentation exists in which training programs have been analyzed for their adequacy in comparison to standards such as those set forth in AACMVDT:FR, 1995.

Transportation officials agree that an adequately trained driver pool should result in a reduction in school bus accidents. Historical review identifies an array of efforts, standards, and legislative measures aimed at the development of adequate driver training programs. Contained later in this chapter is a review of Virginia's school bus driver training model. Other discussion items included are training program adequacy, legal issues in training, training costs, training program development, and training program implementation.

National History

Vehicle use for student transportation was first referenced in a letter from the County Superintendent of Duval County, Florida, to the State Superintendent of Public Instruction(1898-1900). A portion of the letter read, "The concentration of these schools is accomplished by means of wagonettes, especially constructed for this purpose by the Board of Public Instruction. They are of such capacity as to carry twelve, fourteen, sixteen, eighteen, or twenty pupils each" (Farmer, May 1990, p.23). Stanley A. Abercrombie (Farmer, p.194) noted before the School Transportation Section, National Safety Congress, Chicago, Illinois, October 20, 1980, that publicly supported transportation actually began in Massachusetts in 1840. Several other references to early transportation reported by Farmer (p.14) include wagon transportation in 1906-07, and the debut of motorized vehicles equipped with manufactured bodies for student transportation in 1914.

With the implementation of vehicles to transport students came the possibility of accidents. Putman County, Florida, was the sight of a 1933 accident where a train struck a school bus killing eleven students and injuring others (Farmer, p.25). In 1936, three students from Randolph County, Alabama were burned to death when their bus overturned. The students were trapped when the emergency door jammed shut (Farmer, p.26). Whereas accidents were few in number, state and national pupil transportation authorities began to give serious consideration to transportation safety.

This concern became a reality with the establishment of the first National Conference on School Transportation. The first conference was held in April of 1939, at Columbia University, with Frank W. Cyr of Columbia University, Teachers College, serving as chairman (Farmer, p.26). The Second and Third National Conferences on School Transportation were held at Jackson's Mill, West Virginia, November 1945, and October 1948. The highlight of the third conference, setting the stage for the beginning of driver training, was the adoption of the Standards and Training Programs for School Bus Drivers, (Washington, DC: The Commission,

1949, 24 pages). The training program adoption of 1949 primarily was due to the efforts of Frank W. Cyr and Norman Key, Supervisor of Transportation and Maintenance, Jefferson County, Alabama, 1940.

Key, as early as 1943, headed the development of one of the first bus driver training programs, and his training materials were incorporated into the comprehensive bulletin, Training School Bus Drivers, published by the U.S. Office of Education in 1945 (Abercrombie, 1980, October 20). Farmer credited Raymond L. Wimbish for his work in improving school transportation in Virginia by pioneering the use of the flashing red lights for loading and unloading students.

State and national involvement in student transportation gained momentum with the establishment of Standard No. 17, Pupil Transportation Safety (U.S. Dept. of Transportation, National Highway Traffic Safety Administration, Highway Safety Program Standard No. 17, Pupil Transportation Safety, Washington, DC: The Dept., 1972, amended 1973). It was not until 1973 that recommendations were made to begin compiling school bus accident data. By linking these data to National Safety Council statistics, the reporting of school bus accidents gave credibility to Standard No. 17. In 1974 a set of publications was developed which presented detailed material for training programs. Funding for this initiative was provided under Section 406 of the Highway Safety Act (Applied Science Associates, School Bus Driver Instructional Program, Instructor, and Course Guides, Washington, DC: U.S. Dept. of Transportation, 1974, 5 volumes).

A concern made evident at the 10th National Conference on School Transportation (1985) was the "long awaited" completion and adoption of a uniform school bus accident reporting form. According to Bernard, the adoption of this standard permitted the National Safety Council to report data of improved statistical significance. Bernard wrote, "When fully utilized, this form will be a milestone in standardizing school bus accident reporting throughout the industry, and will provide more accurate and badly needed statistics (Farmer, p.55)." In the same writing, Bernard stated, "The reduction in school bus-related fatalities and accidents can

be directly attributed to the adoption and enforcement of many of the standards initiated by conference participants (Farmer,p.57)." Participants in the National Conferences on School Transportation and their search for uniformity led to other efforts based on Standard No. 17.

National Legislation Effecting Transportation/Driver Training

Farmer's (1990, p.45) notes for the tenth national conference on school transportation reflected that the training of bus drivers did not begin to take center stage until 1949. It was the third conference (1949) that laid the groundwork for the "Standards and Training Programs for School Bus Drivers" established in 1949. Since that time, national involvement in school transportation safety has been demonstrated through the development of acts and regulations which include issues of bus safety.

The Transportation Research Board (1989, p. 10) reported the legislative history of school bus safety took a leap forward with the establishment of the Highway Safety Act of 1966. This act, also recorded as PL 89-564, 402(a), (September 9, 1966), included the following statement: "Each state shall have a highway safety program approved by the secretary designated to reduce traffic accidents and deaths; injuries, and property damage resulting therefrom. Such programs shall be in accordance with uniform standards proclaimed by the secretary."

It was from this legislation that eighteen highway safety standards were developed, including Standard No. 17 - Pupil Transportation Safety (NHTSA, 1974). While, Standard No. 17 is no longer mandatory, it still operates as a national guideline (PL 100-17, 206(a), (April 2, 1987)). To insure the safety of the bus itself, the Secretary of Transportation also issued a set of standards by which vehicles were to be maintained (PL 93-192, 202, [October 27, 1974]). Legislative actions which targeted school bus drivers include the following:

1. Emergency Planning and Right-To-Know Act of 1986
2. Education for all Handicapped Children Act of 1975 (PL 94-142)

3. Federal Motor Carrier Safety Regulations, 49 (Federal code of Regulations-CFR) 383, 390-397 and 399

4. Guideline rules 17 issued by the NHTSA in 23, CFR 204, Formerly Standard No. 17

5. Omnibus Transportation Employee's Testing Act of 1991 (Drug Testing)

6. Section 402 and 406 of 23 CFR (Highway Safety Funding)

7. Federal Motor Vehicle Safety Standards (FMVSS) 131, 49 CFR

8. Highway Safety Program Guide No. 105 Traffic Records and No. 19-Accident Investigation and Reporting, FMVSS No. 11, 49 CFR 571, 111

9. The Americans with Disabilities Act (PL 101-386, 42 USC 12101, et seq.)

10. International Surface Transportation Efficiency Act of 1991 (ISTEA), (PL 102-240).

Although there are many laws, acts, and regulations which contain provisions for pupil transportation, the elements previously listed represented major national efforts aimed at improved student transportation safety.

Standard No. 17

The Secretary of Transportation, May of 1972, "promulgated Standard No. 17, Pupil Transportation Safety" which presented requirements to be met in the designed implementation of each state's Pupil Transportation Safety Program. Standard No. 17 was divided into five subdivisions: **Scope**, **Purpose**, **Definitions**, **Requirements**, and **Evaluations**.

Included under the category of **scope** are minimum requirements for state highway programs on pupil safety were promulgated. Included in these programs were, "identification, operation, and maintenance of school buses; training of personnel; and administration" (Standard No. 17,Item 1).

Contained within the category of **purpose** was the following statement, "to the greatest extent possible, a reduction of the danger of death or injury to school children while they are being transported to and from school" (Standard No. 17, Item II).

A set of **definitions** was established by which school transportation officials would be able to identify school bus types. Initially, Standard No. 17 identified buses in two categories; Type I (16 passengers or more) and Type II buses (16 passengers or less).

Category four identified specific **requirements** for the states to develop comprehensive safety programs in order to assure the safe operation of school transportation vehicles. To complete this task, the following processes were developed; an administrative system; an identification and equipment process; a process for operating the vehicles selected; and, a method for vehicle maintenance. Finally, category five provided a **method** for program evaluation by each state, which was presented at an annual summary for to the National Highway Traffic Safety Administration.

A complete version of Standard No. 17 can be reviewed for more detailed specifics of individual categories and subcategories in Appendix A. The essence of Standard No. 17 was the national establishment of an accountability system for individual states.

Virginia Pupil Transportation History

Accomack County is believed to be the first county to provide student transportation in the form of horse drawn covered wagons in 1902 (Pupil Transportation in Virginia School Systems, p.1). Highland and Norfolk counties were also identified as providing the same type of transportation, Highland is credited for being the first school division in a mountainous area to provide transportation. Schools operated on a "district basis" until 1922, but the County Unity Act brought about the removal of the district system and subsequent establishment of the division system. The County Unity Act added emphasis to the provision of transportation and by 1930 more than half of the state's counties were providing some means of student transportation (Pupil Transportation in Virginia School Systems (PTVSS), p.1). The County

Unity Act elevated interest in transportation and minutes from the State Board of Education (September 21, 1926) contain "some requirements for school bus drivers for the first time" (PTVSS, p. 1).

Virginia established standards for school buses in 1939 after a committee of five school division superintendents was appointed to formulate a plan patterned after national standards set that same year. The superintendents submitted the proposal to the Virginia State Board of Education for adoption on June 22, 1939 (PTVSS, p.2). The State Board of Education voted to accept the proposal.

The Virginia Department of Education established a department of Pupil Transportation Services on July 1, 1946. Prior to the development of this department, drivers received training from instructors employed by the U. S. Office of Defense Transportation (PTVSS, p.4). The Virginia Department of Education's role in the evolution of pupil transportation has included the recognition and amending of original laws no longer pertinent or sufficient (PTVSS, p.9). Administratively, in November of 1972, Governor Holton designated the "Board of Education" as the single state agency responsible for pupil transportation. The rationale for the establishment of this agency rested in the fulfilling of the same five standards outlined in the national guidelines, Standard No. 17: administration, identification and equipment of school vehicles, operation, vehicle maintenance, and program evaluation.

Virginia took a leadership role in school bus identification and equipped buses with warning lights as early as 1946. It was noted (PTVSS, p.20) that Virginia was indeed the first state to equip its school buses with warning lights in an effort to identify buses other than with paint and words.

School bus drivers were required, as of June 1, 1974, to complete a driver training program including pre-service and/or in-service work (PTVSS, p.24). In addition to training, drivers were, and still are, required to obtain a special school bus license issued by the Virginia Department of Motor Vehicles. Training began in a more aggressive fashion with plans developed for a complete driver training program. Virginia pursued Safety Act Funds (402) to

defray the costs of conducting in-service education in "fourteen counties on a regional basis" to orient LEA school bus driver training instructors in the use of materials and aids to carry out a uniform training program (PTVSS, p.44).

Other subjects covered in the operation of school buses included pupil instruction and vehicle operation. Public school students were required to participate in one evacuation drill per year. Also, elementary students were to view a film on bus safety, and educators were directed to make an effort to provide pupil safety instruction (PTVSS, p.25). Vehicle operation included topics such as: maximum use of buses, avoidance of standees, loading zones, warning lights, stop arms, seating, and the use of seat belts by drivers. Vehicle maintenance was included in three sub-topics: regular state motor vehicle inspections, inspection by an agent representing the Department of Pupil Transportation, and daily pre-trip inspections by the driver.

The final guideline was program evaluation. A minimum of one evaluation of the pupil transportation safety program was to be completed by the Department of Pupil Transportation annually. This report is filed with the National Highway Traffic Safety Administration.

Virginia Legislation

Legislative material has taken many forms in the history of Virginia student transportation. Virginia's State Board of Education was first given legal authority for the control and supervision of public school buses by Virginia School Law, Section 22-276. This section of the law reads,

> The State Board may make all needful rules and regulations not inconsistent with laws relating to the construction, design, operation, equipment, and color of school buses, and shall have the authority to issue an order prohibiting the operation on public streets and highways of any school bus which does not comply with such regulations, and any such order shall be enforced by the Department of State Police(PTVSS,1974, p.4-5).

This particular section of the law was first enacted in 1919 and was amended two additional times, 1940 and 1958. The passage of the Compulsory Attendance Law initiated the expanded use of transportation to reduce exemptions, necessary if transportation was not provided (PTVSS, 1974). Vehicles used for transportation came under the scrutiny of the Virginia Motor Vehicles Inspection Program of 1932.

School transportation agencies have to be compliant to two basic forms of law: Virginia School Law and Motor Vehicle Law. An overview of these regulations are contained in Appendix B. The laws outlined in Appendix B represent revisions over those in all previous enactments, with the latest revision made, April 4, 1996. Motor Vehicle Laws that relate specifically to school bus drivers are found in sections: 22.1-178, 180, 181, 184, 221, 300, 15.1-291 through 15.1-291,111 and 15.1-292, 46.2-339, 340, 810, 812, 871, 886, 893,and 1090. Virginia School Laws which address student transportation personnel include sections: 22.1-178, 46.2-497, 18.2-271.1, 22.1-184, 221, 256, 300, and others already described as part of Motor Vehicle Law. The section of both school or motor vehicle law most prevalent to this study is section 22.1-181:

> Training Program for School Bus Operators - The Board of Education shall develop a training program for persons applying for employment, and employed, to operate school buses and shall promote its implementation, p. 7.

Pursuant to this section of the law, the Virginia Department of Education developed the Virginia School Bus Driver Training Curriculum Guide.

School Bus Driver Training in Virginia

Virginia's experience with a growing pupil transportation system launched the Commonwealth into a safety program which included training for all potential school bus drivers. The first organized effort by the Commonwealth to provide training came in the form of a minimum of twelve hours of pre-service classroom instruction (Slavinsky, p.12). This and other

forms of transportation improvement were not the result of haphazard, misdirected efforts, but organized, legislatively guided materials which formed a legislative background for Virginia's driver safety programs.

Virginia's School Bus Driver Training Program

Introduction

Local Education Agencies (LEAs) have the authority to develop, mandate, and implement training programs which exceed state requirements outlined in the Virginia School Bus Driver Curriculum Guide (VSBDCG) for pre-service, in-service, and behind-the-wheel instruction. The VSBDCG offers elements which provide "applicants for positions as school bus drivers" the skills to operate a school bus safely and efficiently (VSBDCG, iii). The contents of this program are the result of a compilation of materials from the USDT-School Bus Instructional Program; The National Highway Traffic Safety Administration, the National Minimum Guidelines for School Bus Operations and Driver, and materials from Virginia, Maryland, Michigan, North Carolina, West Virginia, and other states (VSBDCG, iii). VSBDCG developers indicate that materials were designed for flexibility and success, but it is imperative that materials be adapted to meet local needs.

Pre-service

The pre-service curriculum consists of six units. Time recommendations for each of these units is as follows: Driver's Role and Responsibilities (2-3 hours), Passenger Control (2-3 hours), Loading and Unloading (1-2 hours), Bus Maintenance (2-3 hours, pre-trip), Crashes and Emergencies (2-3 hours), and Driving Fundamentals (2-3 hours—not to include behind the

wheel instruction). It is projected these topics would be administered in a two-to three-day period, dependent on such factors as the number of trainees, the number of hours used each day, and the experiences of the participants.

Pre-service instruction is to be provided by an instructor who has taken the Virginia Department of Education "Instructor Orientation Course" (VSBDCG, vi 1996), holds a valid Virginia CDL (with school bus endorsements), has had no moving violations within the previous 12 months, has experience as a school bus driver and/or supervisor, has a safe driving record, and has participated in the adaptation and selection of curriculum materials. Students participating in pre-service activities must have met the following criteria: hold a valid Virginia CDL (with school bus endorsements),have no moving violations within the preceding 12 month period, be physically qualified, be free of convictions for drunk driving within the last 5 years, provide two character references, exhibit a license showing a successful examination prescribed by 75.2-339 of the Code of Virginia, and be at least 18 years old. Completing an American Red Cross First Aid Course is recommended but remains optional at this juncture (VSBDCG, A-3). It is also recommended that the driver has accumulated reasonable amount of experience in driving motor vehicles. Under the revisions, drivers currently are required to complete twenty hours of classroom instruction, pre-service activities, and twenty hours of behind-the-wheel training opposed to earlier standards of twelve hours each for instruction and behind-the-wheel training.

A complete review of the VSBDCG provides a detailed explanation of each of the six areas listed in pre-service training. The VSBDCG is available from the Virginia Department of Education-Pupil Transportation Services or LEA directors of transportation. The training guide is supplemented with video tapes, transparencies, and film strips.

Behind-The-Wheel Instruction

The purpose of behind-the-wheel instruction is to provide opportunities to develop operational skills needed by school bus driver candidates. It is important that the instructor devotes his time to observation, re-emphasis of principles and procedures, actual driving, and student evaluation. This is not a time for teaching items that should have been taught in the classroom phase (VSBDCG, Section III, i).

Behind-the-wheel instruction is accomplished in six units. These units include the following: orientation of the trainee, driving practice in a controlled environment (possibly a driving range), driving practice on the road, advanced driving in a controlled environment, preparation for obtaining a school-bus driver's license, and transporting students under an instructor's supervision. After completing these six units, the driver is certified through final examination, recommendation, and training certification.

In-Service Instruction

Drivers are to participate in continual instruction and training. In-service training is required by the Commonwealth of Virginia at a rate of four hours per year. The division of the four hours is usually in the form of two hours during the first semester of the school year and an additional two hours, usually in the second semester of the school year. Based on the predetermined needs, individual units of study for in-service training vary among LEAs. Major topic areas outlined in the VSBDCG include the following: controlling the position of the bus, detecting hazards, driving in emergencies, driving under special conditions, transporting students with special needs, driving in a fuel efficient manner, and communicating by radio.

Legal Aspects of Training

Court Cases

School attorneys agreed that the "failure to train" was the key legal trend in 1995 (STN, 1996, April). STN (1996, April) and STD (1996, March 27) both reported on court cases where the failure of a school district or transportation contractor to provide appropriate training was brought into question.

Sargi V. Kent City Board of Education (94-3647, Ohio, December 1, 1995) addressed the issue of school bus drivers having received first aid training. A student of the Kent City Board of Education was transported by a school bus where the driver had not been trained in the use of CPR. The Sargi child went into heart failure, subsequently resulting in the child's death. The Sargi family sued the school division on the basis of the school division failing to train drivers in First Aid and CPR techniques (STN, 1996, April).

Durham Transit V. Valero (STN, 1996, April) addressed the issue of a driver maintaining a regular schedule. The school bus driver began the daily route fifteen minutes earlier than normal. This definite change in schedule caused at least one student, the Valero child, to become apprehensive about missing the bus. Sensing that the bus was about to leave him, the student darted across the street to catch the bus and was tragically struck and killed by an oncoming vehicle. The suit alleged that the school bus driver did not exercise the degree of care "that a very cautious or highly prudent person would have experienced under the circumstances" (STN, 1996, April). Alexander and Alexander (1992) refer to this as the concept of "The Reasonable Person."

Roanoke County, Virginia, was the site of an $8 million lawsuit where the parents of a child killed in a school bus crash alleged that her death was the result of system-wide safety violations. The lawsuit charged that the driver allowed students to open and close the bus doors at each stop, and did not check the rear view mirror to make sure that off-loaded children were

not in danger before moving forward (STD, 1996, March 27). In this particular incident, the driver failed to heed the warning of students on the bus who said the pupil was caught in the school bus door (STD, 1996, March 27). The plaintiffs indicated that a well-trained driver should not have allowed activities such as "students opening the bus door" to take place on the school bus (STD, 1996, March 27, p. 6). The status of this case was unknown when this document went to press.

These three incidents represent only a few of the many school bus accidents that occur, but the broader representation is one of drivers who are not properly trained. Whereas sovereign immunity in certain states may lend protection to school divisions and their employees from liability, it does not, as in Molitor v. Kaneland Community Unit District(18 Ill.2d 11, 163 N.E.2d 89, 1959), restrict individuals from bringing suit against school divisions not so protected (Alexander & Alexander, p.532). Individuals may sue school divisions who have obtained insurance coverage and may seek damages in the amount of the coverage. Since Molitor v. Kaneland, immunity for transportation injuries has been eliminated in some cases while remaining in place for the regular school program.

Driver Liability

Drivers can face criminal liability, civil liability, or both criminal and civil liability. If a driver "failed to stop at a stop sign or exceeded the speed limit," a criminal liability exists, and the driver may be subject to a fine, jail term, or license suspension. Drivers are also subject to civil liability, resulting in monetary judgments. Generally, for a civil liability to be awarded, four elements must be in place. The driver must experience the following: a legal duty to conform, a failure to conform to standard, a direct loss or damage has been caused, and did the driver's actions cause an accident (SBF, 1995, December).

National Underwriter echoed this information in an article entitled *Bus Drivers Walk Liability Line* (p. 25,47). The sentiment of legal arbitrators is to hold school bus drivers to a higher accountability than most other employees in the district. "A seemingly simple act such as slightly deviating from the bus route or asking an unruly child to leave a bus a few blocks from home can expose the driver to large liabilities" (National Underwriters, 1990, July 9, p. 25,47). To conclude, School Bus Fleet (SBF, 1992, June/July, p. 24) emphasized training should include the basics of the legal responsibilities routinely confronted by bus drivers and school bus driver trainers.

Behavioral Aspects of Safety Training

Introduction

Scott Geller (p.53) noted vehicular accidents "are the nation's leading cause of lost productivity, greater than AIDS, cancer, and heart disease." Is the act of driving being taken for granted? "The risk of a fatality from driving a vehicle or working in a factory is much higher than from environmental contamination of radiation, asbestos, or chemicals. Yet look at the protests over asbestos in schools..." (Geller, p.53). How many protests have been lodged for inadequately preparing school bus drivers? A driver knows when his brakes, signal lights, or gear shift lever does not work, but where does he get "natural feedback regarding safe versus at-risk use of such control devices"? (Geller, p.95) Individuals have to realize that their at-risk behaviors can endanger others and "it can happen to me" to set the stage for behavior modification through training. Behavior modification attempts to reach people where the problems occur (e.g. in the home, school, and workplace) in order to teach co-workers the behavioral change techniques most likely to work under the given circumstances (Geller, p.21).

Program Establishment

Alan Waring (p.16) indicated the establishment of safety management systems can only become credible through team-building training and objective staff selection. Dawn A. Baldwin's 1992 book Safety and Environmental Training (p. 16-23) outlined the elements of successful training in the following manner:

1. Consistency - consider behavior requirements
2. Content - make sure there is no contradiction
3. Procedures - lecture and on-the-job
4. Support - do what you say you are going to do
5. Enforcement - do the same training for everyone all the time
6. Communication - demand reciprocity
7. Goals - set them and remember incentives are not bribes
8. Discipline - discipline transforms commitment into achievement; "isn't discipline better than the loss of life or permanent injury?"
9. Life - the program must grow and change, stagnant programs are dead programs
10. Leadership - including passion, opportunities and patience.

William Haddon (p. 3) indicated behavior modification programs for motor vehicle accidents consist of three phases and three factors. The phases must include the pre-event, event, and post-event. Factors must include the human (host), the agent, and the environment. Cara Graham (SBF, 1995, April/May, p. 6) stated, "training programs should model coping skills." Lee W. Frederiksen (p. 527) iterated behavioral aspects of a problem must be addressed if accident prevention programs are to be successful.

Program Success

Critical to the success of an accident prevention program is the mastery of appropriate safe practices. Mastery learning requires each component of a concept or skill to be demonstrated by the trainer to have reached a criteria level of 90% or better (Frederiksen, p. 527). Some school systems have subjected drivers to both extreme pre-service and in-service training programs as dedicated staff members educate drivers in the fundamentals of transportation service. Such staff members have also realized that drivers who are haphazardly dedicated will contribute little to the success of a safe transportation program (Farmer, p.4).

Reducing Risks

At-risk behavior is recognized as the "root cause" of most accidents, injuries, and near misses. Behavior modification feed-back has been recognized as a common "ingredient" of successful intervention (Geller, p.76). The behavioral approach described above is depicted in Figure 1 (Geller, p. 77). This pyramid is known as Heinrick's Law of Safety. Targeting specific behaviors and letting participants know they are undesirable will help reduce undesirable behaviors. A complete risk-reduction policy will involve identifying both what is right and what is wrong (Geller, p. 78). In a presentation to the National Safety Congress in 1979, G. T. Shriner (Frederiksen, p. 152 and Shriner, G.T., paper presented to 67TH Congress, Chicago, 1979) explained the following six steps he used to reduce accidental injury by 23%:

1) determine your positive goal
2) select the performance you desire
3) divide the performance into steps or levels
4) select reinforcements
5) reinforce desired performance
6) keep to the task.

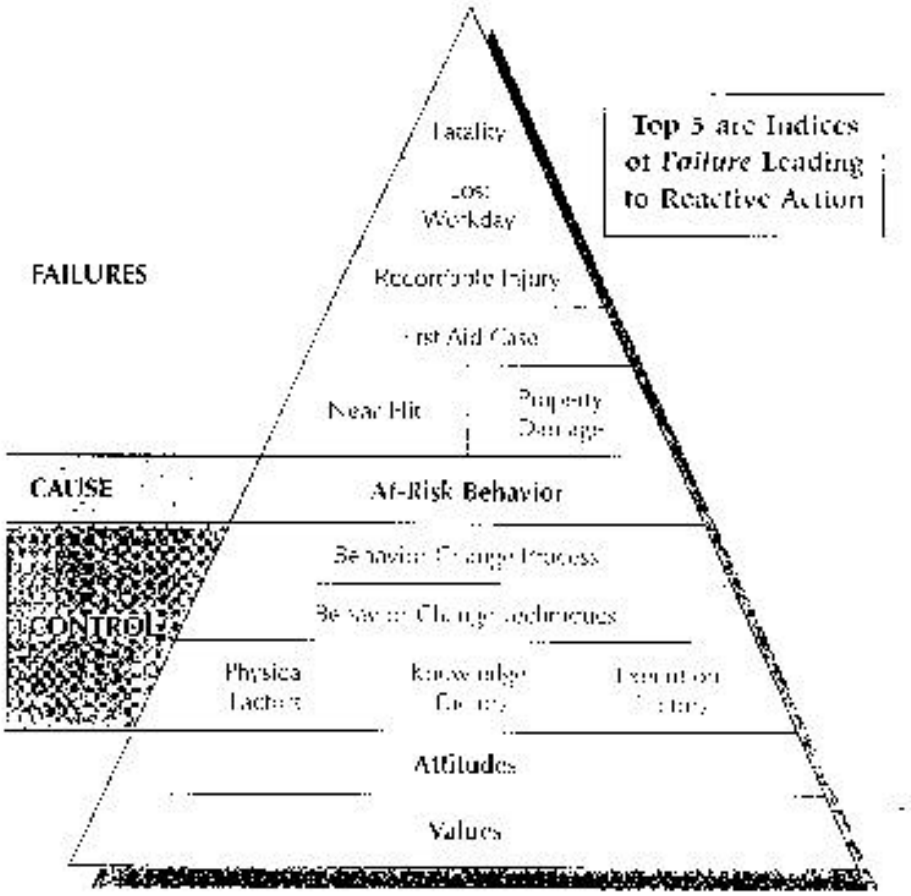

Figure 1

BEHAVIOR-BASED APPROACH TO REDUCING AT-RISK BEHAVIORS

Geller, p. 77.

Summary

The success of behavior modification in the reduction of accidents in any industry is continual work (Farmer, p.115). It takes time and reinforcement to change embedded behavior (Waring, p. 76).

Industry Accident Reduction

Safety officers for several industries provided information indicating the positive effects of safety training programs. The positive effects were measured using the national industry standard (Incident Rate = # Accidents X 200,000 over actual hours [per 100 employees]). For industries with less than 100 employees, the 200,000 factor is reduced by the percentage of reduction in the work force (e.g. a company of 50 workers would use a constant 100,000).

Industry representatives indicated OSHA guidelines established the requirement to provide training. The focus of training sessions was to be centered on activities that keep accidents from happening, and activities which accelerated accident occurrence. One safety officer indicated, “short cuts may not be short cuts. Consideration must be given to what are the hazards, and are these gambles actually chancing minutes against hours, days and weeks” (Mike Jones, personal communication). In an additional comment in the same personal communication, Jones indicated, “It seems we have time to do training over, but we sometimes forget to take the time to do it right the first time, which in the end takes less time.”

Jones has taken the same attitude into his work as safety officer for a division of the Georgia Pacific Corporation. To implement a successful training program, he instituted a four-step approach including the following elements: varying methods, meeting OSHA training requirements, tracking accident incidents, and determining yearly training needs. Data collected from 1990 to 1996 show a reduction in the number of incidents and a reduction in the number

of incidents that required first aid to be administered (Appendix C). The goal of any safety officer is zero accidents. To achieve that goal, the mission must be the creation and maintenance of a safe, accident free environment for the purpose of manufacturing.

In similar form, a producer of textiles implemented a safety training program for fork-truck drivers. The manufacturer would not allow company specific data to be made public, but a general analysis of these data provided by the manufacturer did indicate a significant reduction in fork-truck accidents after the implementation of a training program. The training program was job specific and was implemented in a three-step methodology. The three steps included each of these phases: (a) description of each job step, (b) recognition of possible hazards, and (c) establishment of safety procedures.

Another textile producer, JPS Converter, provided data which indicated substantial savings as the result of a revised safety training provided to its tractor-trailer drivers. Personnel director, George Whitted, noted the company had saved $50,000 per 1,000,000 vehicle miles as a result of its implementation of the revised program.

Accident Reduction of Truck Drivers

Televerket, a Swedish based company of approximately 900 worker/drivers, analyzed four methods for reducing accident involvement through changing driver behavior. The methods used were driver training, group discussions, campaigning, and bonuses for accident free driving (Accident/Analyzing Prevention, 1996 –Volume 28, p. 297-306). The driver population was divided into four groups and one control group. The effect on accidents in relation to mileage was compared for a period of two years after application of the four measures. Study results indicated driver training did improve the accident risk factor (accidents were reduced), while the control group did not experience accident reduction.

Studies Verifying the Validity and Cost Effectiveness of School Bus Driver Training

Efforts have been made to identify studies which validate the accident reducing potential of school bus driver training programs. Most experts agree that few studies have been conducted, and of those, only two provide documentation that indicates a significant reduction in accidents.

The California Association of School Transportation Officials (CASTO), 1983, conducted a study to determine the effectiveness of driver training for validity and cost reduction (CASTO Report, 1983, March 31). The report was conducted in response to a request from the Commission of the California Highway Patrol (CHP) to report to the California State Legislative on the requirements of Senate Bill 926, Chapter 1509, September 8, 1982 (CASTO Report, p.3). The study defined three variables for research: training, accidents, and costs.

Noted in the scope of the study was the need for school bus drivers to receive training more precise than vehicle drivers not involved in passenger transit. As an example, heavy truck operators do not receive training in passenger behavior, operation of wheel chair lifts, and passenger loading and unloading procedures.

Researchers noted limitations of the study included the following items: variable exclusion which may affect validity and cost, control of all factors, and selection of factors(CASTO Report, p.6). Data sources for the variables chosen included the following: CHP, school bus fleets, and driver training school surveys. The results of the study are represented as follows: bus fleets that had longer training programs experienced lower accident rates, these same fleets experienced lower vehicle maintenance costs; however, relationships between time, accidents, and costs were not clearly defined (CASTO Report, p.9).

The above study did not demonstrate increases in training by a specific amount of time resulted in specific increases in proficiency. Nevertheless, research has been conducted on public education and occupational training that concludes “time on task” to be an important

element to success in training (CASTO Report, p.14). Enforcement of a twenty-hour minimum for behind-the-wheel training of a school bus driver resulted in a 41% lower injury or fatality accident rate. This comparison was made within a period of time where no minimum time standard existed. The program change represented 149 fewer accidents (CASTO Report, p.14).

The CASTO Study advocated training programs are required to reverse incorrect habits and provide examples of correct behavior. Competition between training and previously established habits was noted as a major source of interference in training programs (Berelson & Stenier,1994).

Figures 2, 3, and 4 (CASTO Report, p.25, 27 and 28) provide statistical data compiled as a result of the CASTO Study. A review of these data revealed a definite reduction in the accident rate was accomplished after the training requirement was increased to the 40 hour minimum.

A second study of a school bus driver training program conducted in Nashville, Tennessee, also reported favorable results. A summary of study data indicated additions to training programs resulted in a 23% decrease in school bus accidents (SBF, 1983, April/May). The 1995 study, Assessing the Adequacy of Commercial Motor Vehicle Driver Training: A Final Report, 1995 (AACMVDT:FR, 1995) also referenced these two studies as the only two to actually provide documentation on accident rate reduction.

Training Costs

The decision to train and the degree of training provided obviously demand additional costs. Such costs often include the following: driver training schools, supervisory personnel, insurance, driver stipends, repair costs, injury costs, and reduced productivity.

SCHOOL BUS ACCIDENTS PER MILLION VEHICLE MILES

CALIFORNIA DATA (VS) NATIONAL AVERAGES

YEAR	NATIONAL AVERAGE	CALIFORNIA ACTUAL	CORRELATION
1965-66	6.7	11.2	
1966-67	7.1	11.3	
1967-68	7.5	12.0	
1968-69	10.4	12.3	
1969-70	8.0	12.6	
1970-71	8.5	12.4	
1971-72	9.0	11.7	
1972-73	9.9	12.7	
			r = .567
1973-74	9.7	8.0	
1974-75	9.4	7.5	
1975-76	8.9	7.8	
1976-77	10.5	8.1	
1977-78	10.6	7.9	
1978-79	10.0	8.7	
1979-80	8.6	8.4	
			r = .076
1980-81	NA	7.7	
1981-82	NA	7.4	

Figure 2

SCHOOL BUS ACCIDENTS PER MILLION VEHICLE MILES:

CALIFORNIA DATA (VS.) NATIONAL AVERAGES

CASTO, 1983, p. 25.

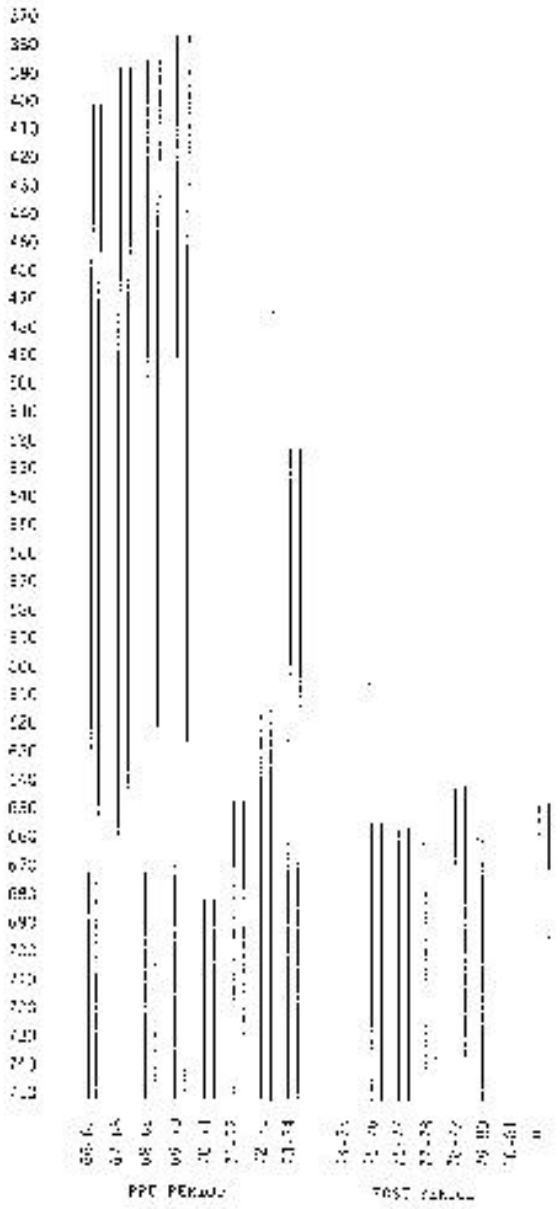

Figure 3

SCHOOL BUS ACCIDENT RATES: PRE AND POST 1974 PERIODS

CASTO, 1983, p. 27.

School Bus Accidents
Trends of Two Periods
1966-74 and 1974-82

Forty nine-step minimum standards for training drivers.

	MILES PER INJURY OR FATALITY ACCIDENT	YEAR	PERCENTAGE OF ACCIDENTS IN WHICH SCHOOL BUS DRIVER IS AT FAULT	MEAN
1981-82	848,740		39.0	
1980-81	710,476		42.0	
1979-80	602,302		43.2	
1978-79	540,283		45.7	
1977-78	602,260		46.9	
1976-77	636,474		46.1	
1975-76	567,7[illegible]		45.3	
1974-75	674,98[illegible]	602,292	44.[illegible]	44.6

No minimum bus standards for training. Proficiency test only.

1973-74	499,780		47.4	
1972-73	477,083		45.0	
1971-72	640,164		50	
1970-71	583,039		48.0	
1969-70	575,230		48.9	
1968-69	591,650		45	
1967-68	542,651		44.2	
1966-67	408,[illegible]74	473,425	49.2	46.6

Figure 4
SCHOOL BUS ACCIDENTS: TRENDS OF TWO PERIODS

CASTO, 1993, p. 28.

Training Schools

Driver training schools vary in composition, curriculums, and costs. One of the nation's best known transportation consultants, Dick Fisher, leads a driver training consultation firm based in Cordova, Tennessee. Fisher noted he has trained over 2,500 drivers at an approximate cost of $250 per student (SBF, 1992, August/September, p. 34). Individual school divisions indicated that the cost for training programs vary from $100 to $1,000 per student, primarily determined by the method of training. Private driving schools used by some districts create substantial economic effects. Training providers of this type include Ryder Student Transportation Services and, probably the largest and best known, Laidlaw Transit, Inc. of Burlington, Ontario (SBF, 1995, September, p. 38-43). A review of the research indicates that most school divisions pay for school bus driver training and often find themselves losing their trainees to more lucrative jobs requiring a CDL.

School divisions that maintain transportation departments find themselves providing personnel to supervise and train drivers. Based on the size of the school division, an individual may need to be hired specifically to train drivers, adding to the overall costs of the transportation program.

Insurance

Transportation experts, Karen Finkel and Jim Ellis (personal communication, September 9, 1996), have indicated insurance costs are lower for school systems which provide training programs and specifically for those which provide exemplary training programs. Communication with the office of the Insurance Commissioner of the Commonwealth of Virginia confirmed that rates do vary among Virginia's school divisions. The variance in insurance rates school divisions receive depends on accident history, geographical location, and the type of training drivers

receive (Personal Communication with the office of the Insurance Commission, February 21, 1997). The Commissioner would not provide rate schedules for insurance carriers due to the number of providers and the exposure of specific private company rates schedules.

Representatives from the Selective Insurance Agency and Hartford Insurance, both providers of school bus fleet insurance, also agreed that they provide different rates based on accident history, geographical location, and training history (Personal Communications, February 23, 1997). William Tucker, a representative for Erie Insurance, Erie, Pennsylvania, indicated his firm gives special rate deductions to school districts that provide extended training and require monthly in-service meetings for their drivers. Kathleen George (ASBJ, 1995, November, p.33) noted transportation insurance premiums and fleet operating costs tend to increase if "inexperienced, less trained drivers fail to operate buses properly."

Payments

School divisions that require drivers to participate in in-service activities usually credit drivers with time invested or pay them for that time. Accidents bring with them costs for repairs. First run vehicles are taken off line due to accident repairs and are replaced with substitute buses, maintained for only occasional use. Substitute drivers who are less familiar with routes and procedures have to be put into action for drivers who have been involved in an accident. SBF (1992, June/July, p. 24) reminds school systems that benefits from training range from reduced accidents and lowered vehicle abuse, to reduced transportation costs.

National Training Trends

Introduction

The safety of school buses improved with the revision of national standards for student transportation. Manufacturers of school buses added devices such as: back-up beepers, crossing arms, strobe lights, top and side exits, side stop arms, and motion detectors; but, all the "bells and whistles" in the world cannot eliminate human error. Carl Poretka (SBF, 1995, June/ July, p. 26) commented, "We can't rely on sensors to curtail accidents alone, we need training as well." In an editorial comment for SBF (1995, December, p. 4), Poretka stated, "There is no excuse for inadequately prepared drivers to perform a task that even under optimal conditions is extremely challenging." Representatives from various organizations associated with student transportation all agree with the need to adequately train school bus drivers. The following section represents a review of different aspects of bus driver training. Specifically programs from various states, reasons for training, and funding dilemmas are presented.

State Programs

Analyses of state training programs have revealed variations in curriculum and duration. Alaska approved a bus driver training course that includes 10 hours of training in the following subjects: pre-trip inspection, seat and mirror adjustment, defensive driving, driving skills, loading and unloading procedures, student behavior, and safety and energy procedures (Reference Internet, Alaska government home page). Also, bus driver instructors are required to hold a special school bus driver permit, have had at least two years experience, and have completed a school bus driver instructor certification program. Missouri has recognized that only 20% of the state's school districts provide more than 5 hours of training. Missouri's state representatives agree that a lack of state regulations requiring training and low supervision time are major reasons that more driver training is not accomplished. Minnesota indicates that its training

program consists of approximately 15 to 20 hours of yearly in-service. Illinois requires new drivers to take 8 hours of driver training and 2 hours of yearly in-service (ASBJ, 1996, January, p. 18). Vermont has an annual training course for drivers which includes a minimum of 40 hours of training. Wyoming has no formal training program for school bus drivers. Indiana indicates that its training program consists of initial training not to exceed 40 hours with yearly classroom training of 8 hours and 2 hours of in-service. LaToya Independent School District, LaToya, Texas, Superintendent Jerry Doyle indicates Texas drivers must have 20 hours of initial training and then 6 hours every subsequent year. Doyle commented, "Here, you show up with your CDL and we turn you loose" (ASBJ, 1996, January, p. 18). In the report, AASBDD:FR, 1995, researchers did not identify by name, but researchers did report that 5 of 28 states studied did not provide training programs of any type. A review of state programs suggests that there is an absence of uniform training standards for school bus drivers.

Reasons School Divisions Train

An increased number of transportation officials are calling for tougher standards and regulations for school bus driver training. Some officials are fearing accidents will begin to increase if the level of driver training does not improve (ASBJ, 1996, November). School bus driver, David McFarland is quoted as saying, "They taught me how to drive a bus. They didn't tell me about the cargo" (ASBJ, 1996, November, p.50). McFarland continued by saying, "The driver needs to know as much about behavior management as a classroom teacher."

Jim Ellis, New York Department of Student Transportation, commented that drivers need training of a different nature than they did a few years ago. Increasing reports of weapons have prompted transportation officials to train drivers in conflict resolution, crisis situations, and survival tactics (SBF, 1994, September, p. 8). Ellis agrees that veteran drivers also need special attention and require additional training programs. Veteran drivers are not immune to the real threats which all drivers face (SBF, 1992, August/September, p. 34).

Dick Fisher commented in an article entitled *Management Magic* (SBF, 1995, December, p. 43-48), "We can no longer accept average drivers, we need well-rounded, properly trained drivers." In response to Fisher's comment (SBF, 1995, December, p. 68) some school officials recognized safety and driver training should be placed at the top of the in-service training priority list, and constant updates and revisions to classroom and behind-the-wheel training needed to be met. Dennis Essary wrote, "A good training program will incorporate all aspects of a school bus driver's daily responsibilities" (SBF, 1992, June/July, p. 24).

In a 1996 article *Driving Safety* (ASBJ, 1996, November, p. 50) Kathleen Vail indicated the NSTA and NAPT have both testified before the U.S. Senate Transportation Committee to call for a separate CDL test which could be tailored specifically for school bus drivers. Where some states do require a different CDL test, the push is for nationally set standards. To conclude, Vail wrote, "If training doesn't improve, we are destined for tragedy" (p. 50). She also wrote that U.S. Congressman James Traficent, D-Ohio, was in agreement and has been trying since June of 1995 to introduce the School Bus Safety Act, an effort to set national bus driver training standards.

Funding Dilemmas

In an era when more transportation experts are calling for intensified training, some states are reducing the amount of funds going into training. Minnesota's legislature cut driver training regulations which has created a funding "relief" to small rural school districts, but the result has been a reduction in the number of drivers trained in CPR and First-Aid (STN, 1995, August, p. 18). Illinois has reduced training funds by providing money for training not to exceed 40 hours. SBF (1992, February/March, p. 19) reported that many states are cutting staff, support for training programs, and travel to transportation conferences. In STN (1996, May, p. 23) Jim Ellis wrote, "We are sort of a victim of our own success in New York state. The state went from

$400,000 in subsidies for school bus driver training to zero in 1996. However, we are not lowering our standards and we are digging deeper into our pockets because driver training is saving lives and we believe in driver training" (STN, 1996, May, p. 23). When other transportation industries are providing more in-depth training to 100% of their new operators it seems ironic that many school bus drivers likely will receive less training (Henderson, Harold, et al, p. 108-126).

Summary

The literature review indicates school bus driver training is needed sorely and will result in a reduction in accident rates. A variety of industries provided data which indicates the success of properly-designed driver training programs. Behavioral scientists also agree on the need to train such personnel and the successful history of such training programs. Legal authorities have addressed the need of properly trained employees and understand the liabilities faced when such training has not taken place.

If training is viewed in such a positive manner, why do certain states continue to offer substandard training for school bus drivers? The literature indicated bus driver training ranges from no requirements to forty plus hours.

CHAPTER III - METHODS

Introduction

In 1991, Congress enacted the Intermodal Surface Transportation Efficiency Act (ISATEA), [Public Law 102-240]. This law mandated the Federal Highway Administration (FHWA) to report to Congress on the effectiveness of private sector efforts to ensure adequate training of entry-level drivers of commercial motor vehicles (CMVs), i.e. heavy trucks, motor coaches, and school buses (AACMVDT: FR, 1995, p.1). Whereas the FHWA was mandated to report on "adequate training programs," it remained the decision of each state as to the type or amount of training that would be offered to school bus drivers.

The literature review revealed that states varied greatly in the type and amount of training programs offered school-bus drivers (Transportation Report, 1989). A review of survey data from twenty-eight states revealed only twenty-three states had training requirements(AACMVDT:FR, 1995). Virginia was not one of the states included in the survey, but this information allowed for questions about the implementation and adequacy of school bus driver training in the Commonwealth.

Virginia's Department of Education (VDOE) indeed made efforts to provide LEAs with the support and materials necessary to provide adequate training. From the first efforts in training in the 40's, to the guidelines of the 80's and the newest standards' revisions of 1994, Virginia has laid the groundwork for "adequate training." However, the question remains, "Do the LEAs of the Commonwealth offer drivers an adequate training program?"

The primary purpose of this chapter was to describe the methodology utilized in the study, state the purposes, define populations and samples, discuss instrumentation, provide data collection procedures, outline instrument development, describe data analysis procedures,

describe non-respondents, and discuss limitations. Completion of these tasks provided the researcher with data necessary for determining the adequacy of school bus driver training programs and the type of relationship that exists between training and accident-rate reduction.

Methodology

Descriptive research forms the basis for the data collected and analyzed in this study. Best (1970) indicated, "descriptive statistics 'describe what is', often involve some kind of comparison or contrast, and may attempt to discover cause-effect relationships that exist." Data collected from the population of LEA directors of transportation and the school bus driver sample provided answers to questions centered around the training and accident related variables identified for the study. Mouly (1970, p. 224) stated, "No category of educational research is more widely used than the type variously known as descriptive, survey, or narrative research. This is a broad classification comprising a variety of specific techniques and procedures, all similar from the standpoint of purpose … mainly to establish the status of the phenomenon under investigation."

Dillman (1978, p.3) expressed that both mail and telephone surveys have undergone changes which have brought them to the,

> point of being competitive with face-to-face interviews in many kinds of studies. It has become apparent that many individuals will no longer grant face-to-face interviews or they are difficult to locate.

Another researcher, Babbie (1973, p.101), identified three general objections to survey research. These objections take three distinct forms: (a) Description - The ability to make descriptive assertions about the distribution of chance among a carefully selected sample or population of respondents and to infer a comparable description to the larger population. (b) Explanation - The ability to make explanatory assertions about the population. (c) Exploration - The ability to search for additional possibilities.

Process

To accomplish this study, the population of LEA directors of transportation (N=134) was surveyed using a marked questionnaire (Appendix D). Attached to the questionnaire mailed to each director of transportation was a second survey (Appendix E) which the director distributed to selected (N=402) school bus drivers. The study was well received by the Department of Education Pupil Transportation Services (VDOE-PTS), who provided valuable information, names, addresses, and accident data. Study results were provided the VDOE-PTS, LEAs, and superintendents throughout the Commonwealth of Virginia, if requested. Mouly (1970, p.242) expressed,

> Among the major advantages of a questionnaire is that it permits wide coverage at a minimum expense both in money and effort. It not only affords wider geographic coverage but it also reaches persons who are difficult to contact. This greater coverage makes for greater validity in the results through promoting the selection of a larger and more representative sample or population.

Dillman (1978, p. 282) stated,

> The Total Design Method (TDM) demonstrates that mail and telegram surveys can consistently produce good results, relegating to the past the view that neither could be anything more than a poor substitute for face-to-face interviews.

Data Collection

The two questionnaires sought information on training programs describing the adequacy of and accident reducing potential of LEA designed programs. Data gathered were compared with existing data from a national study of twenty-eight states to determine whether the training programs in the LEAs of Virginia met or exceeded the national average for adequate training programs. Also, an analysis of variant LEA training methodologies was conducted in order to

determine their successes in reducing accident rates. Other study characteristics included the following: district size, geographic location, gender of the driver, years of driver experience, and educational background of the training officer.

Design of the Study

The study is "ex-post-facto" research of a casual-comparative design. Ron Kinney (CASTO Report, 1983, p. 6) comments, "It is not possible to select, control, and manipulate all the factors necessary to study cause and effect relationships directly." Multifactorial analysis of variance will be used to formulate more complete analysis of the different types of data collected.

Three components formed the basis for this study. First, it was necessary to collect information which detail current training practices of LEAs in the Commonwealth of Virginia. Data were collected from each LEA director of transportation or the LEA individual responsible for the training of school-bus drivers. A second data set was collected from school-bus drivers to provide information from a variant viewpoint, provide additional data, and add reliability to LEA surveys. Survey questions were specifically related to the training methods used by LEAs to prepare school bus drivers, modifications made in training programs to attempt to reduce accidents, and driver perceptions of the training provided by LEAs.

The second portion of this study involved a comparison of currently employed training methods used by LEAs of Virginia with practices, described in a national study conducted by the FHWA, as "adequate training programs" (Appendix F). To accomplish this task, comparisons of results from the surveys of training officers and drivers from the one hundred thirty-four school divisions, comprising the Commonwealth of Virginia, were made with those provided in the literature. A direct comparison was made between the reported practice in Virginia and the "adequate training program" recognized nationally (Barlett, 1991, p. 36).

The third portion of this study examined variance in training programs and modifications used to reduce school bus accident rates among the LEAs. Variables to receive additional attention in this portion of the study included population densities, highway types, pupil transportation miles, and topography. Comparisons were made among LEAs who showed common variables or presented the same basic set of demographics. Comparisons were also made among LEAs which varied in demographics.

The purpose of this study was to identify the training provided by the LEAs of the Commonwealth of Virginia, access the adequacy of this program, determine whether training programs that exceeded the program recommended by the Commonwealth have resulted in reduced accident rates, and determine why Virginia's school buses have three times as many accidents as all forms of registered Virginia, land-vehicle accidents combined (e.g. in 1995 vehicular accidents occurred at a rate of 138 accidents per hundred million miles of travel and school buses had 477 per hundred million miles of travel, 1995 DMV statistics).

Defining the purpose of the study in this manner allowed for a clear determination of the dependent variables (Lamanna, 1993). School bus driver trainers (Transportation Directors) reported on the adequacy of training programs and survey results were measured as sub-scores of the Training Adequacy Scoring Inventory. LEA driver trainers reported on the reasons for accidents as measured by the criteria set for accidents by the Virginia Department of Motor Vehicles, the Virginia State Police, and the Virginia Department of Transportation. School-bus drivers reported on training programs and provided results which were measured as sub-scores on the Training Adequacy Scoring Inventory.

Population & Sample

Trainers

At the onset of this study, the population of LEA directors of transportation (driver trainers) consisted of a representative for each of the 134 school divisions listed by the VDOE-PTS (Barbara Goodman, List; Appendix G). This list provided the names, telephone numbers, and work addresses for each of the supervisors or directors of transportation who represent the ninety-five counties, thirty-five cities, four towns, and a school for the deaf and blind in the Commonwealth of Virginia. The researcher used this list to mail surveys to the person(s) responsible for the training of school-bus drivers.

Drivers

The population of school bus drivers for the Commonwealth of Virginia is approximately fifteen thousand drivers. From the population, a representative sample was chosen to respond to the driver survey on training procedures and accident analysis. The number of drivers selected was based on the statistical formula 100 divided by square root of N, (Where N = number of people in the sample) to attain an error tolerance of plus or minus 5%. To acquire this tolerance (plus or minus 5%), it was necessary to survey approximately 400 drivers.

A limitation in surveying the drivers was the reliance on the directors of transportation to disseminate information. However, since home mailing addresses were unavailable for individual drivers, it was not possible to deliver the questionnaire efficiently without the assistance of a third party. Additionally, it was thought that the distribution of the questionnaire by the directors of transportation would result in a higher rate of return than a questionnaire received from an unknown party.

Instrumentation

Two survey instruments were employed by the researcher in implementing the study (see Appendices D and E). The instruments used were modifications of surveys used by National Technical Information Service in a study conducted for the U.S. Department of Transportation in 1995. The original survey format was designed for telephone use, thereby forcing extensive revisions before they could be used as mail surveys (Applied Science Associates, Inc.). Revisions to the original surveys followed the suggestions and procedures recommended by the research methodology of Dillman (1978). Questionnaires were modified based on a comprehensive review of the literature, previously-conducted research, and field-tested with directors of transportation and school bus drivers. Additional questions were added to provide information more specific to requirements set forth by the Commonwealth of Virginia.

The original telephone survey was analyzed by twenty-one individuals representing 14 different transportation organizations. Their analysis of the telephone survey instrument resulted in the determination that the instrument was an accurate measure of the content domain. Survey adaptations, which allowed the instrument to be used as a mailed questionnaire, were reviewed by members of the researcher's doctoral committee. Adaptations were determined not to have reduced the content validity of the newly formed instrument. Special emphasis on questionnaire function was given by committee member Barbara Goodman, because of her expertise in the area of pupil transportation issues.

Initial Telephone Field Test

Prior to the implementation of the paper questionnaire, a sample of directors of transportation was telephoned in order to determine information availability. Eight school divisions were chosen using a stratified random sampling methodology. Stratification was based on the VDOE division of the Commonwealth into eight regions. One school division randomly selected from each region, was contacted by the researcher and asked to participate.

Each telephone conversation was opened with an identification of the researcher and a request to speak with the director of transportation. The transportation director was asked a series of questions regarding information availability, training program existence, and accident reporting. Questions used included the following:

1. Does your school division have a school-bus driver training program?
2. Is your LEA willing to provide information on the training program you use?
3. Does your LEA keep records on school-bus accidents?
4. Is the director of transportation willing to complete a survey to aid in this researcher's project?
5. Would you bewilling to distribute an attached questionnaire to a selected sample of school-bus drivers who were employed by your LEA?

In all cases, the researcher was able to determine that the required data were available and the transportation directors questioned were willing to provide the requested information.

Survey Field Test

Following the telephone field test, two paper questionnaires were field tested in December 1996 and January 1997, the first questionnaire was field tested with directors of transportation and the second field test with individual school bus drivers. Eight directors of transportation and eight bus drivers were used to field test the questionnaires. These individuals were selected using a stratified random selection process, one school division from each of the eight educational regions of the state (Appendix H). Bus drivers who participated in the field test were selected from the same division from which the director of transportation was chosen. This methodology was implemented to increase the likelihood of 100% return rate, and aid in the validation of the scales.

Questionnaire reliability was analyzed through a cross validation of scales. This process was accomplished by a telephone survey of each of the participants who participated in the field test of the paper questionnaire and asking them to answer the identical survey questions. The calculation of a correlation coefficient indicated a very strong correlation (r=0.93) between the paper questionnaire and the telephone survey that used the identical survey instrument. Based on a review of the field tests and suggestions by committee members, final revisions of the surveys were completed.

Survey respondents were asked to evaluate the surveys to determine clarity and ease of administration. To complete this task, respondents were to complete an evaluation form (Appendix I) to be returned with the completed survey. An analysis of the evaluation results did indicate survey data could be collected without ambiguity. Paper questionnaires were then mailed to the one hundred thirty-four directors of transportation for self-completion and dissemination to school bus drivers(N=402).

Description of the Instruments

Director of Transportation or Training Supervisor

The director of transportation or training supervisor survey contained thirty questions as well as a chart describing specific training activities. The paper questionnaire was adapted from a telephone survey used by the Highway Transportation Industries to survey commercial licensed drivers in the area of heavy trucks, motor coaches and school buses. Eight of the paper questionnaire items were open-ended and requested explanation regarding the selection of training criteria. These criteria include the following: components of the training program, entrance requirements, guidelines from various agencies, student completion rates, placement of students, team player request of specific skills, in house studies, and additional studies. Other items addressed included each of the following: training costs, requirements, training time,

distribution, training methodology, class sizes, range experience, sheet response, instructor ratio-behind the wheel, equipment used, audio visuals, standards, student fulfillment of objectives, graduations, future involvement, and accident reduction.

School-Bus Driver Questionnaire

The school-bus driver questionnaire consisted of twenty-eight questions and a training activities checklist. Like the trainer survey, the driver survey was adapted from a telephone survey used by the Highway Transportation Industries to survey commercial licensed drivers. Questions were short answers or limited to specific data choices provided by the researcher. The driver survey did not contain items dealing with the selection of training criteria. Individual questions addressed the following: experience, prior training history, commercial driver license attainment, time spent in training, accident history, and driver characteristics.

Format and Appearance

Cover letters (Appendices J and K) provided respondents with insight into the study and encouraged the completion and return of the questionnaire. The letter explained the importance of the line of research, encouraged cooperation, provided the assurance of confidentiality, and emphasized the interest of the VDOE-PTS in project results. Letters were printed on VDOE letterhead, and transportation director Barbara V. Goodman's name was included because of her involvement and support in the research project.

Paper questionnaires were printed on yellow paper to be attractive, symbolic of school buses, eye-catching, and to avoid the possibility of losing the survey in other correspondence. Print size was reduced to allow the survey to be printed two pages to each side of a sheet, then combined in a booklet format. A code number was printed on each booklet only for the purpose of identifying those who had not responded by the suggested date. The number was affixed to the front page of the questionnaire in the upper right hand corner.

On February 17, 1997, each director of transportation was mailed a large, brown envelope containing four smaller envelopes and a cover letter. The cover letter (Appendix L) explained the contents of the smaller envelopes and the process for distribution. Each smaller envelope contained a separate cover letter (Appendices J and K), a paper questionnaire, and a stamped, pre-addressed return envelope. February 28, 1997, was given as a suggested return date.

As recommended by Dillman (1978, pp. 180-90),any respondent that failed to return his/her questionnaire within fourteen days was sent a follow-up post card as a reminder (Appendix M). Post cards could not be sent directly to individual drivers, but were sent to directors of transportation who could pass the reminder on to the individuals named. On March 17, 1997, a third correspondence was sent to directors of transportation with additional survey copies and stamped, return envelopes for those individuals who had not responded. The third correspondence also contained a thank you note for all additional effort put forth by the respondents (see Appendix P).

Selection

One hundred thirty-four directors of transportation were surveyed in an effort to reach the population of Virginia LEA directors of transportation. Three drivers were selected from each school division using a stratified, random-number selection process. The result was a sample of 402 drivers.

Non-Respondent School Divisions

Non-respondent school divisions, those divisions who had neither a trainer or driver survey response, were randomly selected to participate in a telephone interview. The interview was constructed in a manner that would provide the researcher with information about the reason for non-response. Data gathered from the interview revealed there were few differences between school divisions which participated and those that failed to respond.

Limitations

Using the list of school bus drivers provided by the Department of Motor Vehicles (DMV) enabled the researcher to develop a true, random sample. However, the list provided by the DMV could not account for those drivers who were no longer employed by the school divisions. The VDOE-PTS indicated that DMV data were as accurate as their own due to work-force turnover and limited data up-dating procedures.

A second limitation dealt with the method of questionnaire distribution. Questionnaire distribution was dependent upon the willingness of the directors of transportation (trainer) to participate in the study. Also, the larger the school division the more difficult it was for the director of transportation to distribute the paper questionnaire.

Data Analysis

Completed questionnaires were reviewed and results entered into the Number Cruncher Statistical System 6.0 (Heinz, 1995). Open-ended question responses were grouped into common concerns allowing for more specific review upon receipt of all returned surveys. Questions unanswered were coded as non-responses. Cases that required clarification resulted in telephone calls to respondents.

Data acquired through questionnaire implementation were analyzed by the use of descriptive statistics. To determine the type of training programs provided by LEAs, driver participation in training programs, accident reduction factors, and frequency counts were established. Frequency counts were used to develop Adequacy Sub-Scores. Adequacy Sub-Scores established baselines for data comparison. Negative scores represented perceptions that the training was less than adequate, a score of zero represented the perception of adequate training, and a positive score suggested perceptions that the training programs were exemplary. Sub-Scores were established in each of eight areas: class hours, laboratory hours, off-street practice hours, on-street practice hours, student-teacher ratio, student-teacher behind-the-wheel-ratio, behind-the-wheel time, and course content topics.

Determination of an adequate training program resulted from the use of cross-tabulations to establish differences in training methodologies of Virginia's LEAs and the national standard for adequacy. Multivariate analysis (ANOVAs, $p \leq .05$), was used to determine which array of independent variables (class training, behind-the-wheel training, accident rates, geographic environment, trainer demographics, and driver characteristics) affected the establishment of an adequate training program, driver skill assessment, and program modification to reduce accident rates. ANOVA was also used to analyze single interactive effects between individual independent variables on the establishment of adequate training programs and accident reduction rates.

Null hypotheses were developed to guide the research analysis.

H0,1: There is no difference in the training program offered school bus drivers in Virginia and the standard set by researchers for a national standard on training adequacy, AACMVDT:FR, 1995.

H0,2: There is no reduction in accident rates for districts that have adequate to above adequate training programs.

Additional hypotheses were developed to view the efforts of individual factors on the compilation of an adequate training program and reduced accident rates.

H1,1: Interactive effects do not exist between LEAs and adequate training programs.

H1,2: Interactive effects do not exist between geographic location and adequate training programs.

H1,3: Interactive effects do not exist between LEA size and training program adequacy.

H1,4: Strong correlations do not exist between VDOE-PTS training model topics and baseline training model topics.

H2,1: Interactive effects do not exist between driver demographics and reduced accident rates.

H2,2: Interactive effects do not exist between geographic demographics and reduced accident rates.

Tables

Tables were used to align data to report percentages and frequencies of survey question responses. Specific table designs were established to coincide with the purposes of the study determination of training program adequacy and accident reduction factors. Individual tables included the following: cross tabulation tables for national and state adequacy factors, survey participant composition, prevalence of entry level training, pre-determined training activities, adequacy scores for training programs, planned training activities, present training support activities, characteristics of driver demographics (e.g. experienced, new, overall), relevance of training by type and experience level, summary of prior experience and training, comparison of driver's training adequacy scores by experience level, employer training requirements, employer training incentives, employee activities to encourage safe driving, driver accident frequency, and CDL effectiveness by type of training. Table values, determined from the Directors' and Drivers' Surveys, were compared through use of cross tabulation to the values from the national criteria scores to determine training program adequacy (AACMVDT:FR, 1995 ,p. B.2).

AACMVDT:FR, 1995, p. B.2 defined sub-scores as the "percent deviation of the target program's total time spent in the activity with the established criteria value." The computations to obtain these scores used the following formula: (as an example)

Class/Laboratory Hours Program - Class/Laboratory Hours Criteria divided by Class/ Laboratory Hours Criteria X 100 = Class/Laboratory Hours Sub-Scores.

The summation of the sub-scores, as stated earlier, permitted the determination of less than adequate, adequate, exemplary training programs.

Summary

Data needed for acceptance or rejection of the null hypothesis regarding training program adequacy and accident rate reduction were acquired through the Driver and School Bus Transportation Director Surveys. An analysis of the findings of these surveys are presented in Chapter 4. Subsequently, recommendations and conclusions are presented in Chapter 5.

CHAPTER IV - RESULTS

Introduction

Behavioral scientists, safety trainers, transportation experts, and school transportation administrators and have expressed the positive aspects of training on accident reduction. Concern over the large accident rate for school buses has focused the attention of transportation officials on the adequacy of and crash reducing potential of various training programs.

Surveys of LEA transportation directors and school bus drivers were used to collect data relative to training models used in the LEAs of Virginia. Survey data from directors of transportation provided information on the training models LEAs provide perspective drivers and the in-service activities provided current drivers. In a second survey, school bus drivers provided data on the training program drivers receive from their school divisions.

Data were examined from three aspects: program characteristics, adequacy, and accident reduction. Program characteristics were examined from the viewpoint of directors of transportation and drivers. Adequacy information was derived from data found in survey responses compared to the AACMVDT:FR, 1995 research baseline, the NHTSA baseline, and VDOE requirements. Accident reduction was calculated for years between 1992 and 1996 when more stringent training guidelines were put into effect, requiring a CDL before driving Type B, C or D buses.

Survey Respondent Characteristics

Surveys were administered to the directors of transportation in each of Virginia's school divisions, N=134. Three school bus drivers were randomly selected from each school division to comprise the driver sample, N=402. The return rate for directors of transportation was n=113 (82%) of the school divisions polled. Of the 402 drivers surveyed, 242 responses were

received representing 60% of the sample (See Table 1). Directors of transportation and drivers had a combined return rate of 65.5% or 355 of the 536 surveys distributed (See Table 1). Approximately 81% (80.7) of all trainers identified themselves as directors of transportation, leaving 19.3% of the trainers not holding the title of director of transportation.

TABLE 1

SCHOOL BUS DRIVER (N=402) AND DIRECTOR OF TRANSPORTATION (N=134)

SURVEY RETURN RATES

PRIMARY JOB	RETURN BY JOB TITLE	RETURN RATE
TRAINER	# 21	19.3%
DIRECTOR OF TRANSPORTATION	# 92	80.7%
SCHOOL EMPLOYEE TRAINER	# 0	0%
PRIVATE SECTOR TRAINER	# 0	0%
TOTAL	113	84.3%
SCHOOL BUS DRIVERS	# 242	60.2%
TOTAL	242	60.2%
TOTAL (OVERALL)	355	65.5%

School Division Respondents

At least one survey was returned from 128 of Virginia's 134 school divisions (95.5%), (See Table 2). At least one driver and the director of transportation returned surveys in 100 (74.5%) of Virginia's 134 school divisions. Of the 128 school divisions responding (See Table 2 for other details), 45 (33.6%) divisions returned four surveys, one from the director of transportation and three from school bus drivers.

Trainer Characteristics

Directors of transportation (113) identified 139 males and 259 females are presently employed as a school bus driver trainer (See Table 3). Trainers ranged in education levels from those with high school diplomas to individuals holding graduate degrees. Of the 113 school divisions responding, 107 (97%)indicated that their trainers have participated in a Virginia School Bus Driver Training School. However, only 75 school divisions indicated that their trainers had maintained certification from the VDOE-PTS. Only one school bus driver trainer was identified as maintaining certification as a classroom teacher by the VDOE.

TABLE 2

SURVEY RETURN RATES BY SCHOOL DIVISION

RESPONDENT	# OF SCHOOL DIVISIONS (N = 134)	RETURN RATES (%)
DIRECTORS OF TRANSPORTATION	113	84.3%
SCHOOL BUS DRIVERS	113	84.3%
BOTH DIRECTOR OF TRANSPORTATION AND SCHOOL BUS DRIVERS	100	74.5%
ALL 4 SURVEYS RETURNED	45	33.6%
DISTRICT WITH AT LEAST 1 RESPONSE	128	95.5%

TABLE 3

DIRECTOR OF TRANSPORTATION DEMOGRAPHICS

DEMOGRAPHIC CATEGORY	**NUMBER (N=398)**	**%**
TRAINER GENDER: MALE FEMALE	139 259	35% 65%
TRAINER EDUCATION LEVEL:	N =109	100%
NO RESPONSE	2	2%
HIGH SCHOOL GRADUATES OR GED	65	61%
SOME COLLEGE COURSE WORK	21	20%
COLLEGE DEGREE	9	8%
GRADUATE DEGREE	12	11%
TRAINER HAS PARTICIPATED IN THE VIRGINIA SCHOOL BUS DRIVER TRAINING SCHOOL	107	98%
TRAINER MAINTAINS CERTIFICATION FROM THE VDOE-PTS	75	69%
TRAINER HAS CERTIFICATION AS A CLASSROOM TEACHER BY VDOE	1	1%
TRAINER HAS EXPERIENCE AS A CLASSROOM TEACHER	1	1%

School Bus Driver Characteristics

The two hundred forty-two drivers who responded ranged in age from 18 to 77 (See Table 4). The largest group consisted of respondents in the 53 to 59 year-old range. This group accounted for 22% (56) of all drivers returning surveys. Drivers in the 18-24 year-old range (5 or 2%) and the 25-31 year-old category (15 or 6%) were the smallest groups represented (See Table 4). Driver experience ranged from 1 to 38 years, with the largest portion of the sample having 10 years of experience (7.14% of all drivers).

Characteristics of School bus Driver Training Students

Data from the 113 school division-directors of transportation indicated 2,464 individuals entered training during the 1995-96 school year (See Table 5). Of the 2,464 students, 1,873 graduated or successfully completed their training (76%). Table 5 shows 83% or 1,555 of the 1,873 graduates were placed in school bus driver positions. Based on present numbers, the predicted graduation rate for the 1996-97 school term is 1,785.

Trainers were questioned as to the traits they believed were the most important when choosing school bus drivers. Twenty-nine percent or 39 directors of transportation indicated driving ability as their number one choice. Surprisingly, good references were ranked higher in importance than experience, meeting state regulations, or their ability to control student behavior (See Table 5).

TABLE 4

SCHOOL BUS DRIVER DEMOGRAPHICS

	DRIVERS (N = 242)
EDUCATION:	
DID NOT GRADUATE	58 (24%)
DIPLOMA OR GED	114 (46%)
COLLEGE COURSES	47 (21%)
COLLEGE DEGREE	16 (7%)
NO RESPONSE	7 (2%)
AGE:	
18 - 24	5 (2%)
25 - 31	15 (6%)
32 - 38	39 (15%)
39 - 45	41 (18%)
46 - 52	43 (19%)
53 - 59	56 (22%)
60 +	43 (19%)

TABLE 5

CHARACTERISTICS OF VIRGINIA SCHOOL BUS DRIVER TRAINING STUDENTS

CHARACTERISTICS	**N**	**%**
# OF STUDENTS IN TRAINING 1995-96	2464	100%
# OF STUDENTS GRADUATING OR SUCCESSFULLY COMPLETING TRAINING 1995-96	1873	76%
STUDENTS PLACED IN SCHOOL BUS DRIVING JOBS	1555	83%
PROJECTED GRADUATION RATE FOR 1996-97	1785	100%
MOST REQUIRED TRAITS: EXPERIENCE DRIVING ABILITY GOOD REFERENCES MEETS STATE REGULATIONS CONTROL STUDENT BEHAVIOR	N = 134 2 39 16 8 3	100% 1.5% 29% 11% 6% 3%

Training Program Entrance Requirements

Table 6 reflects data from directors of transportation on LEA requirements for driver training program entry. Most prevalent, 108 of 109 directors responding indicated the importance of a good driving record. Secondly, trainers saw the importance of performing drug screening on prospective drivers. Eighty-nine percent (89%) of directors indicated their school divisions do require drug screening as a prerequisite to program entry. Other requirements include the acquisition of a CDL learner's permit, passing a physical, and having earned a high school diploma (See Table 6). Finally, directors from 103 school divisions (96%) indicated their guidelines resulted from a compilation of state and local requirements(See Table 6).

Drivers Record of Employment Requirements

Drivers and directors of transportation noted the importance of a good driving record. Two hundred nineteen (91%) of the drivers responding indicated their school divisions do complete driving record checks (See Table 7). Medical exams ranked second with 217 (90%) drivers recognizing this as a requirement to employment. School bus drivers referenced previous experience and training as a truck driver or transit bus driver as a requirement for employment by some LEAs. Truck driving was listed as an experience required for employment by 52 drivers (21%) and transit bus experience was noted as required experience in 15 cases (6%), (See Table 7).

Equipment and Facilities Used In Driver Training Programs

Directors use a variety of equipment and facilities to provide training. Table 8 lists the most prevalent items used in preparing drivers for the task of driving a school bus. Of 109 school districts, 52 directors (48%) indicated practice activities were conducted in off-street, range or practice areas. Behind-the-wheel practice with buses of different lengths and different transmissions was offered by twenty-four (24) of 109 school divisions (See Table 8).

TABLE 6

VIRGINIA SCHOOL BUS DRIVER

TRAINING PROGRAM DESIGN AND ENTRANCE REQUIREMENTS

PROGRAM DESCRIPTION	**NUMBER N=109**	**%**
SCHOOL DIVISION TRAINING PROGRAM (IN HOUSE)	108	99%
PRIVATE TRAINING SCHOOL	0	0%
TRAINING PROVIDED BY: DIRECTOR OF TRANSPORTATION TRAINER NOT A DIRECTOR OF TRANSPORTATION	 21 87	 19% 81%
TUITION: YES NO	 2 87	 2% 98%
REQUIREMENTS:		
HIGH SCHOOL DIPLOMA	30	21%
GOOD DRIVING RECORD	108	99%
PASS PHYSICAL	71	65%
DRUG SCREENING	97	89%
CDL LEARNER'S PERMIT	82	75%
AGE: YES NO	 100 9	 92% 8%
BASED ON: STATE GUIDELINES LOCAL GUIDELINES BOTH	 99 4 103	 94% 4% 96%

TABLE 7

DRIVER REQUIREMENTS

PRIOR TO AND DURING EMPLOYMENT

REQUIREMENTS:	**NUMBER (N=242)**	**%**
CDL REQUIRED	118	40%
CERTIFICATE OF ROAD TEST	139	57%
ROAD TEST	211	87%
MEDICAL	217	90%
DRIVER RECORD CHECK	219	91%
DRUG TEST	92	38%
PRIOR EXPERIENCE AS A SCHOOL BUS DRIVER	23	10%
TRAINING PROGRAM PARTICIPATION	176	74%
OTHER RELATED WORK EXPERIENCES:		
PREVIOUSLY A TRUCK DRIVER	52	21%
TRUCK DRIVER WITH TRAINING	12	5%
PREVIOUSLY A TRANSIT BUS DRIVER	15	6%
TRANSIT BUS DRIVER WITH TRAINING	11	5%

TABLE 8

EQUIPMENT AND FACILITIES USED IN DRIVER TRAINING PROGRAMS

ITEM	NUMBER OF DIVISIONS REPORTING N=109	PERCENT OF DIVISIONS REPORTING
CLASSROOMS	65	60%
RANGE/OFF-STREET PRACTICE AREA	52	48%
OFF-STREET OBSTACLES (e.q., CONES, BARRELS)	52	48%
SIMULATORS	6	6%
BUSES WITH DIFFERENT TRANSMISSIONS	24	22%
BUSES OF DIFFERENT LENGTHS	24	22%
AUDIO-VISUAL EQUIPMENT:		
OVERHEAD	70	64%
35mm SLIDE PROJECTOR	21	19%
VIDEO PLAYER	104	95%
FILM PROJECTOR	36	33%
AUDIOTAPE	16	15%

Classroom instruction was conducted in a variety of ways. The most prevalent method was the use of video players (104 or 95%). Other items used were overhead projectors, audio tapes, slide projectors and simulators.

Elements of Driver Training Programs-Driver Perspective

One hundred sixty-nine drivers responded that training was now required by their school divisions, thirty-one responded it was not, and thirty-seven responded, I do not know (See Table 9). Forty-six percent (46%) of drivers responding noted that their training met the state requirements. While only one driver said his training did not meet the state requirements, 14 drivers (6%) indicated training went beyond the minimum (See Table 9). Eighty-eight (36%) of the drivers in the sample did not respond to the question on state requirements. Drivers indicated lecture was the most prominent means of driver training (60%) with demonstration ranking second (123 responses or 51%), (See Table 9). Video tapes, textbooks, behind-the-wheel practice, simulators, and observations were other teaching methods listed by drivers.

Driver Preparation and Retraining-Driver Perspective

Although drivers responded (46%) that trainers were meeting state requirements, 19 drivers responded that the training they were given was insufficient to prepare potential drivers for the CDL written test (See Table 10). Forty-two percent (42%) of drivers indicated that the preparation was sufficient for the written test, and 39% agreed that training was sufficient for the behind-the-wheel test (see Table 10). Sixty-four of the 242 drivers (26%) indicated their school divisions reimbursed them for the time spent in training. Reimbursement for training is given tenuous consideration by many school divisions because of the large number of drivers who take training from LEA's, but use their CDL to go elsewhere.

TABLE 9

ELEMENTS OF SCHOOL BUS DRIVER TRAINING PROGRAMS

FROM THE DRIVER'S PERSPECTIVE

ELEMENTS	NUMBER (N=242)	%
WAS TRAINING REQUIRED:		100%
YES	169	70%
NO	31	13%
I DON'T KNOW	37	15%
NO RESPONSE	5	2%
DID THE TRAINER PROVIDE:		100%
THE STATE REQUIREMENTS	112	46%
LESS THAN THE STATE MINIMUM	1	0.4%
EXTRA TRAINING BEYOND STATE MINIMUM	14	6%
DON'T KNOW	27	11%
NO RESPONSE	88	36%
METHODS USED IN TRAINING:		
TEACHER LECTURES	145	60%
DEMONSTRATIONS	123	51%
VIDEO TAPES	130	54%
TEXTBOOKS	104	43%
SIMULATORS	13	5%
OBSERVATIONS	175	72%
BEHIND THE WHEEL PRACTICE	122	50%
UNSUPERVISED PRACTICE	41	17%

TABLE 10

DRIVER PREPARATION AND RETRAINING

OFFERED BY VIRGINIA'S SCHOOL DIVISIONS

ELEMENTS	NUMBER	%
ACQUISITION OF CDL:	N=203	100%
BEFORE TRAINING	33	16%
DURING TRAINING	40	24%
AFTER TRAINING	121	60%
PREPARATION FOR WRITTEN TEST:	N=199	100%
DID NOT PREPARE ENOUGH	19	10%
JUST ENOUGH	84	42%
SOMEWHAT MORE THAN NEEDED	63	32%
MUCH MORE THAN NEEDED	33	17%
PREPARATION FOR BEHIND THE WHEEL:	N=180	100%
NOT ENOUGH	14	8%
JUST ENOUGH	71	39%
SOMEWHAT MORE THAN NEEDED	58	32%
MUCH MORE THAN NEEDED	37	21%
REIMBURSEMENT PROVIDED	N=242 64	26%
RETRAINING AFTER ACCIDENT	66	27%
RETRAINING AFTER A CITATION	53	22%
SAFE DRIVING AWARDS	111	46%
PERIODIC RETRAINING	80	33%
SUPERVISED CHECK RIDES	82	34%
SAFETY MEETINGS	183	76%

Of particular interest, there were just 66 (27%) drivers who indicated their school divisions offer retraining after an crash, and only 53 or (22%) indicated retraining is offered after a traffic citation (See Table 10). Drivers did indicate that safety meetings (183 drivers or 76%) were held, and both supervised check rides (82 drivers or 34%) and periodic retraining is offered (80 drivers/33%). Also encouraging is the data which indicate safe driving awards are being presented (111 drivers or 46%) to deserving drivers.

Summary

Data arrayed in Tables 1-10 indicate that directors of transportation view training programs as more positive and complete than do drivers. Drivers' responses point to many LEA requirements and practices not being in agreement with state guidelines. However, the opinions expressed by drivers and directors of transportation does verify that training is being used although it may need improvement in some LEA's.

Adequacy

Introduction

Data gathered through the Director of Transportation and School Bus Driver Surveys provided statistics representing various dependent variables of the study. Analyses of these data were completed and hypotheses presented in Chapter III were tested. The results of these analyses follow.

Topics Covered In Adequate Training

A panel of school transportation experts, fleet insurance carriers, heavy truck fleet operators, and highway safety officials developed a baseline of recommended topics deemed necessary for adequate school bus driver training (AACMVDT:FR, 1995). These topics were

grouped into three main areas: non-vehicle activities, safe operating practices, and basic operations. The three areas contain twenty-eight individual skills or areas of knowledge (See Table 11). Table 11 provides a comparison of what directors of transportation indicate is covered in an adequate training program. School bus drivers' perspectives are also reviewed in Table 11. A review of this material showed drivers and directors basically agreed on the topics discussed in training. Whereas various topics are included in training programs, to what degree are these topics being taught? Table 12 provides an insight into the criteria for adequate training, and how the VDOE-PTS, Virginia directors of transportation, and Virginia school bus drivers view the presentation of the criteria.

Criteria For Adequate School Bus Driver Training

Table 12 provides an array of data on adequacy levels as determined by an NHTSA model, research baseline data as provided in AACMVDT:FR, 1995, the VDOE, Virginia LEA directors of transportation, and Virginia school bus drivers. Data revealed Virginia exceeding criteria recommendations in several areas, but attention is quickly drawn to the amount of hours spent on class/laboratory activities by Virginia's school bus driver trainers. The NHTSA model maintains a requirement of 38 hours of class/lab activities, and the AACMVDT:FR, 1995 baseline is based on 57 hours of class/lab activities; however, Virginia requires 20 hours of class/lab instruction. Table 12 indicates Virginia's trainers are extremely close (19.88 hours) to the Virginia requirement, but drivers indicated that the training actually provided is actually much less (11.94 hours). Data analysis revealed Virginia exceeds the NHTSA model for hours of street practice. Virginia requires 20 hours, whereas the NHTSA model reports 16 hours and the AACMVDT:FR, 1995 baseline suggests 9.3 hours. However, there is a significant difference in what drivers and directors indicate is offered as opposed to what the VDOE-PTS said should be offered.

TABLE 11

RECOMMENDED CURRICULUM TOPICS FOR "ADEQUATE" BUS TRAINING

CURRICULUM TOPIC	NATIONAL (AACMVDT:FR) RESEARCH BASELINE CURRICULUM	VA DIRECTORS OF TRANSPORTATION	VA SCHOOL BUS DRIVERS
NON-VEHICLE ACTIVITIES			
HANDLING BAGGAGE & PACKAGE EXPRESS	X	X	X
RECOGNIZING HAZARDOUS MATERIALS & PROPER REFUSAL TO TRANSPORT THESE MATERIALS	X	X	
HOURS OF SERVICE REQUIREMENTS	X		
KEEPING A LOG	X		
GENERAL ACCIDENT PROCEDURES	X	X	X
FIRST AID PROCEDURES	X	X	X
FIRE FIGHTING TECHNIQUES	X	X	X
TRIP AND ROUTE PLANNING	X	X	
BASIC GEOGRAPHY AND MAP READING	X	X	
HOW TO HANDLE CARGO (SAFE LOADING, WEIGHT DISTRIBUTION, SECURING THE LOAD)			
HAZARDOUS MATERIALS PAPERWORK REQUIREMENTS, AND HOW TO USE PLACARDS			
SPECIAL TYPES OF NON-HAZARDOUS CARGO (e.g., UNSTABLE CARGO) AND HOW TO HANDLE IT			
SAFE OPERATING PRACTICES			
VISUAL SEARCH	X	X	X
COMMUNICATION WITH OTHER ROAD USERS (e.g., SIGNALING, FLASHERS, HEADLIGHTS, BACKUP LIGHTS)	X	X	X
ADJUSTING SPEED TO TRAFFIC, TRACTION, VISIBILITY, ROAD CONDITIONS	X	X	X
MONITORING SPACE AROUND THE VEHICLE	X	X	X
UNDERSTANDING & USING THE DEFENSIVE DRIVING 4-SECOND FOLLOWING DISTANCE TECHNIQUE	X	X	X

(CONTINUED)

BASIC OPERATION	NATIONAL	VA DIRECTOR OF TRANSPORTATION	VA SCHOOL BUS DRIVERS
FUNCTION, LOCATION & PROPER USE OF ALL PRIMARY VEHICLES CONTROL SYSTEMS (e.G., BRAKES, STEERING WHEEL, ACCELERATOR, SHIFTERS, CLUTCH, AND INTERNAL TRANSMISSION RETARDERS)	X	X	X
FUNCTION, LOCATION AND PROPER USE OF ALL SECONDARY VEHICLE CONTROL SYSTEMS AND INSTRUMENTS (e.g., LIGHT SWITCHES, WINDSHIELD WIPERS, IGNITION CONTROLS, DRIVER SEAT BELT, GAUGES, AND WARNING LIGHTS/BUZZERS)	X	X	X
DOOR CONTROLS	X	X	X
HOW AIR BRAKES OPERATE	X	X	X
HOW HYDRAULIC BRAKES OPERATE	X	X	X
PROPER USE AND ADJUSTMENT OF MIRRORS FOR MAXIMUM VISIBILITY	X	X	X
EQUIPMENT-SPECIFIC ENGINE STOP AND/OR START CONTROLS, FOR EXAMPLE: •EMERGENCY SWITCH •ENGINE COMPARTMENT SWITCH •MASTER SWITCH		X	X
ELECTRIC HORNS	X	X	X
BASIC CONTROL & MANEUVERING (e.g., STARTING, ACCELERATION, BRAKING, STEERING, SHIFTING, BACKING)	X	X	X
TURNING-UNDERSTANDING LOCATION OF BUS PIVOT POINT	X	X	X
PARKING	X	X	X
OVERHEAD CLEARANCE	X	X	X
RAILROAD CROSSING PROCEDURES	X	X	X
FUELING PROCEDURES	X	X	X

TABLE 12

CRITERIA FOR "ADEQUATE" SCHOOL BUS DRIVER TRAINING

SCHOOL BUSES

TRAINING ADEQUACY CRITERIA	NHTSA MODEL	RESEARCH BASELINE	VA REQUIREMENTS	VA SCHOOL BUS DRIVERS MEAN SCORE	VA SCHOOL BUS DRIVER TRAINER MEAN SCORE
HOURS:					
CLASS/LAB	38 (AVE)	57	20	11.94	19.88
RANGE	NONE	NONE	NA	4.65	4.12
STREET	16 (AVE)	28	20	10.00	10.55
TOTAL	54 (AVE)	85	40	26.59	34.55
PER STUDENT HOURS:					
STREET ONLY		9.3	20	10.00	10.55
RANGE AND STREET		9.3	20	14.65	14.67
S/T RATIOS:					
CLASS/LAB	6	12	15 max	14.48	5.35
RANGE	NONE	6	NA	3.40	2.52
STREET	6	3		4.51	2.10
BEHIND WHEEL:					
HOURS	NONE	9	20	14.65	14.67
MILES	NONE	225	NA	NA	NA
CONTENT (TOPICS):	23 UNITS/45 OBJECTIVES	53[1]	51	41.39	46.30

[1] See the comprehensive topics listing in table 11

VDOE, drivers, and directors reported averages better than the model or baseline in areas of student/teacher ratios for class/laboratory and range/street practice (see Table 12). Also in Table 12, the NHTSA model recommended 45 units of study, the AACMVDT:FR, 1995 baseline recommended 53, and the VDOE program covered 51 topics. The mean score for drivers was 41.39 topics covered, but trainers indicated 46.30 (mean score) topics were covered. In summary, Virginia exceeds some NHTSA model criterion such as range/street practice and class/laboratory ratios), yet falls short of the model average for class/laboratory hours (model-38hr, Virginia-20hr).

Adequacy Sub-Score Analysis

The baseline established by researchers in AACMVDT:FR, 1995 integrated the use of sub-scores for individual criteria categories. Sub-score totals were used as the basis for determining program adequacy. Sub-scores of zero(0) were regarded as adequate, positive scores were considered more than adequate, and negative sub-scores were considered less than adequate. The results of individual sub-scoring can be examined in Table 13. Individual scores for student hours of street/range practice were more than adequate, whereas class/ laboratory hour sub-scoring displayed a less than adequate rating. Positive sub-scores were established in class/laboratory and student/teacher ratio categories.

Analysis of driver and director of transportation responses shows driver's scores were lower than director of transportation scores (See Table 13). Overall adequacy sub-scoring for drivers was -40.4, directors of transportation scored -16.9, and the VDOE-PTS model scored -20.9. Negative scores are indicative of programs which do not meet the adequacy standard set in AACMVDT:FR, 1995.

TABLE 13

CALCULATIONS OF TRAINING MODEL SUB-SCORING AND OVERALL ADEQUACY SCORING

ADEQUACY SUB-SCORES

ADEQUACY SUB-SCORE CATEGORIES[1]	DRIVER RESPONSES	TRAINER RESPONSES	VA REQUIREMENTS	DRIVERS SUB-SCORES	TRAINERS SUB-SCORES	VA MODEL SUB-SCORES
CLASS/LAB HOURS (57 HOURS)	11.94	19.88	20	-79	-65	-28
PER STUDENT HOURS - STREET ONLY[2] (9.3 HOURS)	10.00	10.55	20	+ 8	+ 9	4.8
PER STUDENT HOURS - RANGE & STREET (9.3 HOURS)	14.65	14.67	20	+57	+57	4.8
CLASS/LAB STUDENT/TEACHER RATION (12 STUDENTS)	14.48	5.35	15	-21	+55	- 6
RANGE STUDENT/TEACHER RATIO (6 STUDENTS)	3.40	2.52	NA[5]	+43	+58	+ 3[3]
STREET STUDENT/TEACHER RATION (3 STUDENTS)	4.51	2.10	NA[5]	-50	+30	0[3]
BEHIND-THE-WHEEL HOURS (9.0 HOURS)	14.65	14.67	20	+62	+62	4.5
CONTENT (TOPICS) MATCH (53 TOPICS)	41.39	46.30	51	-21	-13	- 4

[1] Negative scores indicate less than criteria; positive scores indicate exceeds criteria. See appendix for a detailed description of how program adequacy was scored. Numbers in parentheses indicate the criterion values for the various sub-scores.

[2] The total street hours divided by the number of students per instructor.

[3] Score assigned, not specifically stated in training model.

Null Hypothesis HO,1

Null hypothesis HO,1 was tested using descriptive statistics and paired t-test. The results of these analyses follow.

Analysis of the mean differences of the model recommended by AACMVDT:FR, 1995 researchers and the model provided by the VDOE-PTS was performed and the mean difference was noted as 43.39,(See Table 14). The standard error was 1.29 and the t-ratio was calculated as 33.48. Each group contained 107 members yielding 106 total degrees of freedom. The table of t-values indicates any t-value greater than 1.65 is significant for $p \leq 0.05$ and df=106. Data analysis indicates the null hypothesis is to be rejected, and there is a significant difference in the VDOE-PTS model and the model recommended by AACMVDT:FR, 1995 researchers.

Research Hypothesis H1,1 : Interactive effects do not exist between LEAs and adequate training programs.

Virginia director of transportation training models and the programs drivers actually received were analyzed through the use of a paired t-test. The mean difference was 11.72 and the standard error was 2.03. The t-ratio was calculated as 5.77. Using the $p \leq 0.05$ level of significance, data results indicate hypothesis H1,1 should be rejected (See Table 15).

Research Hypothesis H1,2: Interactive effects do not exist between geographic location and training program adequacy.

Data on training programs used in rural and urban locations were analyzed through a paired t-test. The mean difference was 3.5, with a standard error of 3.18. The t-ratio was calculated as 1.10. Using the $p \leq 0.05$ level of significance and a t-value of 2.947, data results indicate hypothesis H1,2 (See Table 16) should be retained. Analyses of training programs above and below state criteria levels did produce large mean differences; however, analysis of all programs did provide the data arrayed in Table 17.

TABLE 14

PAIRED T-TEST OF LEA TRAINING PROGRAMS

AND THE AACMVDT:FR BASELINE

VARIABLE	NUMBER (#)	$\bar{X}$	SD	STANDARD ERROR
LEA MODEL	107	41.60	13.4078	1.296
AACMVDT:FR BASELINE	107	85	0	0
DIFFERENCE	107	43.39	13.407	1.296

T-RATIO = 33.48

df = 106

CHART T-VALUE OF 1.65 FOR A SIGNIFICANCE LEVEL OF .05 AND 106 DEGREES OF FREEDOM.

TABLE 15

PAIRED T-TEST OF LEA TRAINING PROGRAMS

AND DRIVER PERCEPTION OF TRAINING PROGRAMS

VARIABLE	NUMBER (#)	$\bar{X}$	SD	STANDARD ERROR
LEA MODEL	85	42.51	13.28	1.44
DRIVER PERCEPTION	85	30.78	17.39	1.89
DIFFERENCE	85	11.72	18.72	2.02

SKEWNESS NORMALITY = 0.015 - REJECT NORMALITY

KURTOSIS NORMALITY = 0.001 - REJECT NORMALITY

OMNIBUS NORMALITY = 0.0003 - REJECT NORMALITY

CORRELATION COEFFICIENT $r^2 = 0.278$

T-RATION = 5.77

df = 84

CHART T-VALUE OF 1.658 FOR A SIGNIFICANCE LEVEL OF .05 AND 84 DEGREES OF FREEDOM.

TABLE 16 A & B

PAIRED T-TEST OF LEA GEOGRAPHIC LOCATION

AND TRAINING PROGRAM ADEQUACY

A. PROGRAMS ABOVE THE STATE CRITERIA LEVEL

VARIABLE	NUMBER (#)	$\bar{X}$	SD	STANDARD ERROR
LEA GEOGRAPHIC LOCATION	13	57.846	13.861	3.844
LEA TRAINING MODEL	13	40.000	0	0
DIFFERENCE	13	17.846	13.861	3.844

B. PROGRAMS BELOW THE STATE CRITERIA LEVEL

VARIABLE	NUMBER (#)	$\bar{X}$	SD	STANDARD ERROR
LEA GEOGRAPHIC LOCATION	11	15.727	8.877	2.677
LEA TRAINING MODEL	11	40.000	0	0
DIFFERENCE	11	-24.272	8.877	2.677

TABLE 17

VIRGINIA LEA SCHOOL BUS DRIVER TRAINING ADEQUACY

(BASED ON SURVEY DATA)

PROGRAM DESCRIPTION BY PARTICIPANT (BY DIVISION)	PROGRAMS ABOVE STATE CRITERIA	PROGRAMS AT STATE CRITERIA	PROGRAMS BELOW STATE CRITERIA
SCHOOL BUS DRIVERS	22 (22%)	23 (23%)	53 (54%)
DIRECTOR OF TRANSPORTATION (DRIVER TRAINER)	19 (18%)	79 (74%)	9 (8%)

Pearson's Correlation Coefficient of training programs offered in rural and urban areas provided the statistic r^2=0.515. This result expressed a moderate correlation.

Analysis of program identification from Virginia's eight educational regions (Appendix H) indicates more school divisions in Region V provide training programs not meeting state requirements. Also, more school divisions in Region IV provide training programs exceeding state criteria requirements.

Research Hypothesis H1,3: Interactive effects do not exist between LEA size and training program adequacy.

School divisions were ranked in size by the number of miles students are transported. School divisions transporting students 500,000 miles or more per year were classified as large school districts, and divisions transporting students less than 500,000 miles per year were determined to be small school districts. Pearson's Correlation Coefficients were calculated with the following results: the correlation coefficient for large districts was r^2=0.747,(See Table 18A) and the coefficient for small districts was r^2=0.148,(See Table 18B). These correlations indicate research hypothesis H1,3 should not be retained. Correlations in Table 18A indicate there is a strong correlation between large school divisions and training model adequacy. However, Table 18B suggests there is very little correlation between small school divisions and training model adequacy.

Research Hypothesis H1,4: Strong correlations do not exist between VDOE-PTS training model topics and baseline training model topics.

Correlation coefficients were developed on responses from LEA directors of transportation and information taken from AACMVDT:FR, 1995. Correlation results (r^2=0.981) indicate there are strong correlations between training models and the topics covered in each. Hypothesis H1,4 is therefore rejected. Data for this correlation are arrayed in Table 19. It should be noted that strong correlations in included topics do not address the degree to which each topic is taught in training.

TABLE 18 A & B

A. PEARSON'S CORRELATION MATRIX OF VARIABLES FOR LARGE LEAS AND TRAINING PROGRAM ADEQUACY

VARIABLES	$\bar{X}$	SD	A	B
A	1,157,185	1,059,266	1.000000	0.747248
B	44.9375	15.661	0.747248	1.000000

A - LARGE LEAs (TRANSPORT STUDENTS MORE THAN 500,000 MILES)

B - TRAINING PROGRAM ADEQUACY (HOURS)

STANDARDIZED CRONBACH'S ALPHA = 0.855343

B. PEARSON'S CORRELATION MATRIX OF VARIABLES FOR SMALL LEAS AND TRAINING PROGRAMS ADEQUACY

VARIABLES	$\bar{X}$	SD	A	B
A	248,133.3	138,595.0	1.000000	0.148787
B	38.8245	10.81521	0.148787	1.000000

A - SMALL LEAs (TRANSPORT STUDENTS 5000,000 MILES OR LESS)

B - TRAINING PROGRAM ADEQUACY (HOURS)

STANDARDIZED CRONBACH'S ALPHA = 0.259833

TABLE 19

PEARSON'S CORRELATION MATRIX OF VARIABLES FOR:

VDOE-PTS TRAINING MODEL AND BASELINE MODEL TOPICS

VARIABLES	$\bar{X}$	SD	A	B
A	41.61	13.40	1.000000	0.986217
B	85.0	*	0.986217	1.000000

A - VDOE-PTS TRAINING MODEL TOPICS (#)

B - BASELINE TRAINING MODEL TOPICS (#)

STANDARDIZED CRONBACH'S ALPHA = 0.993

Accident Reduction Characteristics

Introduction

Data gathered from directors of transportation and school bus drivers, and information received from VDOE-PTS and VDMV were used to determine the accident reducing capabilities of driver training models. Analyses of these data were completed and hypotheses stated in Chapter III were tested using Pearson's Correlation Coefficients, Chi squares, paired t-tests, and multivariate analysis.

Accident Trends for Virginia's School Bus Drivers

School bus accident rates have remained several times above the state average for all land vehicle accidents. A review of these data is presented in Table 20. Table 20 indicates the number of accidents remained virtually the same in the years between 1992 and 1995; however, in 1996, the number of accidents increased by 76 over 1995 statistics. The increase in accidents accounted for a 2.1% increase in accident rates; whereas, the accident rate for all vehicles used for land transportation in Virginia accounted for a 1.6% increase in the accident rate. A Chi square test of significance shows no significant difference in these two figures. Table 20 provides evidence that the accident rate increased in the years following training program increases or when licensing requirements became more stringent.

Table 21 provides data on the geographic location of accidents. Implications from these data include the following: the school bus accident rate for urban areas is approximately six times that of rural areas, rural school divisions outnumber urban divisions 103 to 31, buses in rural areas travel 95,162,000 miles annually compared to 20,838,000 miles for urban school divisions, and urban areas had a total of 536 accidents as compared to 439 for rural divisions

TABLE 20

VIRGINIA SCHOOL BUS ACCIDENT TRENDS

(BASED ON IMPLEMENTATION OF NEW STATE STANDARDS IN 1992)

YEAR	# OF ACCIDENTS	# OF MILES	ACCIDENT RATE	% INCREASE /DECREASE
1995-96	975	118,234,753	826	+2%*
1994-95	899	111,197,468	809	-6%
1993-94	892	104,131,000	857	-9%
1992-93	904	95,909,009	951	+2%
1991-92	841	90,000,000 approx.	934	-----

*COMPARED TO CHANGE IN STATE RATES OF +1.6%

TABLE 21

VIRGINIA'S SCHOOL DIVISION VEHICLE ACCIDENT RATES:

BASED ON GEOGRAPHIC LOCATION (URBAN OR RURAL)

GEOGRAPHIC LOCATION	# OF SCHOOL DIVISIONS PER LOCATION	# OF ACCIDENTS (ALL TYPES)	MILES OF TRAVEL	ACCIDENT RATE
URBAN	31	536	20,838,000	2576.923
RURAL	103	436	95,162,000	417.928

NOTE: RATES ARE BASED ON ACCIDENTS PER HUNDRED MILLION MILES OF TRAVEL.

(1995-96 school year). Paired t-tests were performed on accident data (See Table 21) and the results ($p \leq 0.05$) were found significant in the number of accidents occurring in a specific geographic location. These data were used to reject research hypothesis H1,2.

Analysis of accident data for school buses and Virginia's other forms of land vehicle transportation was performed and results are arrayed in Table 22. The accident rate for school buses ranged from 934 in 1991-92 to 826 in 1995-96. Rates increased and decreased throughout the five year period with the lowest rate, 809, coming during the 1994-95 school year. Accident rates for other forms of travel followed the same basic pattern; yet, the accident rate for all land vehicles used for transportation ranged from 184 to 194 during the four year period from 1991-95. Group comparison shows the accident rate for all land vehicles was significantly lower than the rate for school buses, only twenty-five percent of the rate attributed to school buses.

Driver respondents provided demographic information relative to their personal school bus accident histories. The results of those data are presented in Table 23. Eighty-three percent of new drivers (less than three years of experience) indicated they had been involved in a school bus accident, while only twenty-six percent of experienced drivers (three or more years of experience) indicated they had been involved in a school bus accident. Fifty-four drivers classified as new drivers accounted for forty-five accidents. Experienced drivers, 185 in number, accounted for forty-eight accidents. New drivers accounted for more fatalities, more nonfatal-injury accidents, and more accidents determined to be the bus driver's fault.

Accidents and Training Program Adequacy

Virginia's school bus driver curriculum is based on twenty hours of classroom instruction and twenty hours of behind-the-wheel training. Based on these criteria for adequacy, an analysis of school bus accidents was conducted and the resulting data are displayed in Table 24. The analysis in Table 24 used all accidents involving school buses rather than just the 975

TABLE 22

LAND VEHICLE ACCIDENT RATES IN VIRGINIA

PER HUNDRED MILLION MILES OF TRAVEL

VEHICLE TYPE	YEAR	# OF ACCIDENTS	MILES OF TRAVEL	ACCIDENT RATES
ALL LAND VEHICLES USED FOR TRANSPORTATION	1994 1993 1992	126,637 120,265 122,887	67,609,000,000 65,419,000,000 63,274,000,000	187 184 194
SCHOOL BUSES (ALL ACCIDENTS - EMPTY OR WITH PASSENGERS)	1994-95 1993-94 1992-93 1991-92	899 892 904 841	111,197,468 104,131,000 95,909,009 90,000,000	809 857 951 934
SCHOOL BUSES ACCIDENT - RESULTING IN $750 (OR MORE) IN DAMAGES	1996	975	118,234,753	826

TABLE 23

CHARACTERISTICS OF SCHOOL BUS DRIVER SAMPLE

ACCIDENT HISTORY

	NEW DRIVERS (N = 54)	EXPERIENCED DRIVERS (N = 185)	TOTAL (N = 239)
HAVE YOU HAD A SCHOOL BUS ACCIDENT?			
YES	45 (83%)	48 (26%)	93 (39%)
NO	9 (16%)	137 (74%)	146 (61%)
NUMBER OF ACCIDENTS	45 (48%)	48 (52%)	93 (100)
SCHOOL BUS ACCIDENTS RESULTING IN A FATALITY: ALL ACCIDENTS ONLY FATALITY ACCIDENTS	 2 (4%) 40%	 3 (6%) 60%	 5 (5%) 100%
SCHOOL BUS ACCIDENTS RESULTING IN A NON-FATAL INJURY: ALL ACCIDENTS ONLY INJURY ACCIDENTS	 8 (15%) 42%	 11 (6%) 58%	 19 (20%) 100%
DRIVERS DETERMINED TO BE AT FAULT IN A SCHOOL BUS ACCIDENT: ALL ACCIDENTS ONLY AT FAULT ACCIDENTS	 15 (33%) 70%	 8 (17%) 30%	 23 (25%) 100%

TABLE 24

TOTAL SCHOOL BUS ACCIDENTS 1995-96 SCHOOL YEAR

BASED ON TRAINING PROGRAM ADEQUACY

TRAINING PROGRAM ADEQUACY LEVEL	# OF ACCIDENTS	% OF TOTAL ACCIDENTS
ABOVE ADEQUATE LEVEL	913	46%
AT THE ADEQUATE LEVEL	897	44%
BELOW ADEQUATE LEVEL	141	10%

accidents which resulted in damages of $750.00 or more. School division breakdowns on the more costly accidents were not available at the time this document went to press. Results indicated training programs regarded as above the adequacy level (19 of 134) accounted for 913 or 46% of all accidents. Important to the research is the fact that these nineteen school divisions do not transport students a disproportionate number of miles. Frequency distributions point to there not being a high correlation between accident rate reduction and training program adequacy.

Correlations of Training to Accident Reduction

Null Hypothesis H0,2: There is no reduction in accident rates for districts having adequate to above adequate training programs.

To test hypothesis H0,2 a correlation coefficient for training program adequacy and accident reduction was determined. An inverse relationship would be needed to show increases in training adequacy results in reduced accident rates. Three correlations were performed with the data arrayed in Tables 25, 26, and 27. Correlation of all levels of training with accident occurrences was r^2=0.619 (See Table 25). Training programs meeting more than the state requirements of forty hours of training showed a correlation of r^2=0.14 (See Table 26). The best correlation was determined between accident occurrence and specific topics covered in training models. The resulting correlation of r^2=-0.04 (See Table 27) being the only inverse relationship established. Correlations showed virtually no linking of accident reduction to training program adequacy, indicating the null hypothesis should be retained.

Research Hypothesis H2,1: Interactive effects do not exist between driver demographics and reduced accident rates.

Drivers were divided into two groups: new drivers (less than three years of experience) and experienced drivers (three or more years of experience). Chi square tables were developed and the significance of group membership and accident rate reduction were tested.

TABLE 25

PEARSON'S CORRELATION MATRIX OF VARIABLES FOR

OVERALL TRAINING ADEQUACY AND ACCIDENT RATES

VARIABLES	$\bar{X}$	SD	A	B
A	41.61	13.40	1.000000	0.618975
B	838.289	1146.30	0.618975	1.000000

A - OVERALL TRAINING PROGRAM ADEQUACY (HOURS)

B - ACCIDENT RATES (PER HUNDRED MILLION MILES)

STANDARDIZED CRONBACH'S ALPHA = 0.765

TABLE 26

PEARSON'S CORRELATION MATRIX OF VARIABLES FOR
LEA TRAINING PROGRAMS BELOW VDOE-PTS CRITERIA LEVEL
AND ACCIDENT RATES

VARIABLES	$\bar{X}$	SD	A	B
A	19.1111	8.492	1.000000	0.747248
B	353.497	480.1902	0.747248	1.000000

A - LEA TRAINING PROGRAMS BELOW VDOE-PTS CRITERIA (HOURS)

B - ACCIDENT RATES (PER HUNDRED MILLION MILES)

STANDARDIZED CRONBACH'S ALPHA = 0.855343

TABLE 27

PEARSON'S CORRELATION MATRIX OF VARIABLES FOR
LEA TRAINING PROGRAMS ABOVE VDOE-PTS CRITERIA LEVEL
AND ACCIDENT RATES

VARIABLES	$\bar{X}$	SD	A	B
A	60.06	21.1826	1.000000	-0.035598
B	1181.723	1488.871	-0.035598	1.000000

A - LEA TRAINING PROGRAMS ABOVE VDOE-PTS CRITERIA LEVEL (HOURS)

B - ACCIDENT RATES (PER HUNDRED MILLION MILES)

The results of these efforts, seen in Table 28, show new drivers have a significantly larger number of accidents than do experienced drivers. Therefore, hypothesis H2,1 is to be rejected [X^2=57.84, df=1, p≤0.001(10.822)].

Research Hypothesis H2,2: Interactive effects do not exist between geographic demographics and reduced accident rates.

Geographic factors were reviewed from two perspectives: urban vs. rural, and educational regions. First, training program accident reduction capabilities were examined for rural and urban school divisions. To test this relationship, Chi square tables were developed for location and accident occurrences. Results of the Chi square test were x^2=47.79, df=1, p≤0.001(10.822), (See Table 29). The observed results from the Chi square test of significance indicate hypothesis H2,2 should be rejected at the p≤0.05, 0.01, and 0.001 levels. There is evidence to suggest geographic location does have a significant effect on accident rates.

Secondly, an analysis of Virginia educational regions shows Region V having the largest number of divisions not meeting the VDOE-PTS criteria for school bus driver training. Of twenty-two divisions in Region V, three directors of transportation (15%) indicate the state criteria was not being met. However, Region V does not have an overall accident rate larger than the other seven regions.

Finally, multiple regression was used to determine which factors could be used to predict an influence on the two dependent variables: training program adequacy and accident reduction. The independent variables include the following: miles traveled, training program scores from directors of transportation, driver demographics, school division size, accident rates, and training program scores from drivers. The descriptive statistics for this regression are displayed in Table 30. Data analysis revealed a strong correlation between miles traveled and accident numbers. Mild correlations were noted in three other comparisons with additional comparisons representing very weak levels of significance (See Table 30).

TABLE 28

CHI SQUARE TEST OF SIGNIFICANCES FOR GROUP MEMBERSHIP AND ACCIDENT FREQUENCY

CROSSTABS

	ACCIDENTS	NO ACCIDENTS	TOTALS
NEW DRIVERS	45	9	54
EXPERIENCED DRIVERS	48	137	185
TOTALS	93	146	239

FREQUENCIES

OBSERVED (0)	EXPECTED (E)	(0-E)	$(0-E)^2$	$\frac{(0-E)^2}{E}$
45	21.01	+23.99	575.52	27.39
9	32.99	-23.99	575.52	17.45
48	71.90	-23.90	571.21	7.95
137	13.01	+23.90	571.21	5.05
TOTAL				* 57.84

df = (2-1)(2-1) P = .05, TABLE VALUE df=1, 3.841
= (1)(1) P = .01, TABLE VALUE df=1, 6.635
= 1 * P = .001, TABLE VALUE df=1, 10,827

*SIGNIFICANT AT P2 .001 LEVEL OF SIGNIFICANCE

TABLE 29

CHI SQUARE TEST OF SIGNIFICANCE FOR ACCIDENT FREQUENCY AND GEOGRAPHIC LOCATION

CROSSTABS

	NUMBER OF SCHOOL DIVISIONS	NUMBER OF ACCIDENTS	AVERAGE NUMBER OF ACCIDENTS PER SCHOOL DIVISION
URBAN SCHOOL DIVISIONS	31	536	17.29
RURAL SCHOOL DIVISIONS	103	439	4.26
TOTALS	134	975	7.28

FREQUENCIES

OBSERVED (0)	EXPECTED (E)	(O-E)	$(0-E)^2$	$\frac{(O-E)^2}{E}$
31	68.51	-37.51	1407	20.53
103	65.49	37.51	1407	21.48
536	498.49	37.51	1407	2.83
439	476.51	-37.51	1407	2.95
TOTAL				*47.79

df = (2-1)(2-1)
= (1)(1)
= 1

P = .05, TABLE VALUE df=1, 3.841
P = .01, TABLE VALUE df=1, 6.635
* P = .001, TABLE VALUE df=1, 10.827

*SIGNIFICANT AT P = .001 LEVEL OF SIGNIFICANCE

TABLE 30

INTERCORRELATION MATRIX OF VARIABLES

VARIABLE	$\bar{X}$	SD	A	B	C	D	E	F
A	7.539	15.7603	1	.65	.15	.88	.09	.48
B	41.60	13.41	.65	1	.28	.62	.17	.29
C	30.10	17.53	.15	.28	1	.08	.10	.27
D	628,666.7	823,645.1	.88	.62	.08	1	.05	.25
E	16.783	159.697	.09	.17	.10	.05	1	.18
F	838.29	1146.3	.48	.29	.27	.25	.18	1

A - NUMBER OF ACCIDENTS
B - TRAINING MODEL FROM DIRECTORS OF TRANSPORTATION
C - TRAINING MODELS RECEIVED BY SCHOOL BUS DRIVERS
D - MILES OF TRAVEL
E - VIRGINIA DEPARTMENT OF MOTOR VEHICLES LAND VEHICLE ACCIDENT RATES
F - SCHOOL BUS ACCIDENT RATES

CHAPTER V - CONCLUSIONS, RECOMMENDATIONS, AND SUMMARY

The purposes of this study were to assess the adequacy of school bus driver training in the Commonwealth of Virginia and to determine the accident reducing effects of the VDOE-PTS school bus driver training program. The commitment to provide adequate training is growing and literature reflects this sentiment; however, few studies have been conducted to assess the adequacy of school bus driver training models. AACMVDT:FR, 1995, represents one of only three major studies conducted on school bus driver training. The other most prevalent study was conducted in 1983 by The California Department of Education(CASTO Report, 1983). The third, a Tennessee study, investigated this timely topic and provided data which noted improved training program adequacy resulted in a 23% reduction in school bus accidents.

The study utilized surveys of directors of transportation and school bus drivers from the 134 school divisions of the Commonwealth of Virginia. The 134 directors of transportation represented a population; whereas, the 402 drivers selected through a randomized sampling process represented a sample of the 15,000 school bus drivers in the Commonwealth of Virginia.

Directors of transportation identified only one school bus driver trainer as maintaining certification as a classroom teacher. Seventy-five of one hundred thirteen directors of transportation responding indicated that their trainers were maintaining certification from the VDOE-PTS. Directors indicated the most important characteristic for a school bus driver in training to possess was driving ability. Characteristics such as experience, meeting state regulations, and control of students were considered of lesser importance than good references. Analysis of responses from 108 of 109 directors of transportation indicated a good driving record was the most important characteristic to consider when accepting applicants into driver training programs. Whereas the safety of children should be the primary concern of the director of transportation, only 89% of directors indicated that drug screening was a prerequisite to

training program entry. One conclusion the researcher has drawn from the data and literature review is that a good driving record in a personal vehicle does not indicate the driver will be able to properly handle a commercial motor vehicle carrying passengers.

Drivers (91%) indicated good driving records were important and driving record checks were performed prior to program entry. Medical exams were required of 217(90%) of drivers responding. Of 242 driver responses, one hundred sixty-nine drivers indicated training was a requirement for employment in their school division. Thirty-one(31) drivers responded training was not required, and 37 drivers responded, "I do not know if training is required" (See Table 9). Experienced drivers may not have been required to participate in new training programs, but it does seem unusual that drivers did not know if training was required. A conclusion drawn from this information is that directors of transportation have not explained the training and licensing processes to all employees.

Drivers expressed most training was accomplished through lecture(60%), with demonstration ranking second. Surprisingly, behind-the-wheel experience, trainer check rides, and observations ranked very low.

Findings indicate school divisions need to offer more opportunities for drivers to retrain. This conclusion is based on only 27% of drivers indicating their school divisions offer retraining after school bus accidents. Also, 22% of drivers indicated their school divisions do offer retraining after traffic citations.

A review of survey data on director of transportation and driver demographics revealed not all directors(trainers) are meeting state requirements for school bus driver training programs. Drivers agreed with those data, but indicated requirements are not met at the level acknowledged by directors. Therefore, the criteria set by the VDOE-PTS are not being met by all school divisions.

Comparisons of Virginia's training model to the baseline established by AACMVDT:FR, 1995 researchers revealed an adequacy score on topics covered to be 51 of 53. Directors indicated they covered(mean score) X_T=46.3 topics while drivers scored program topics at

X_D=41.4. These data indicate a significant difference in programs offered by LEA directors of transportation and the model specified by the VDOE-PTS. Data collected from drivers also indicate the program they are receiving is significantly different from the model required by the VDOE-PTS. Finally, there was no significant difference in the topics covered in the VDOE-PTS model as compared to the topics covered in the AACMVDT:FR, 1995 model.

Analysis of time spent in training revealed no significant difference in the VDOE-PTS model for classroom activities and the time used by school division trainers (VDOE/20hr, Directors/19.88hr). The mean score for drivers revealed a significant difference in time spent in classroom activities(VDOE/20hr, drivers X_d=11.94hrs). Comparing the VDOE-PTS model to the NHTSA model and AACMVDT:FR, 1995 baseline revealed a significant difference in hours spent in training for class/laboratory activities: NHTSA model/38hr, AACMVDT:FR, 1995 baseline/57hr, and the VDOE-PTS program/20hr.

Sub-Scores for the models involved in the analysis revealed significant differences. The adequacy sub-score was set at zero(0) in the AACMVDT:FR, 1995 model as positive scores represented above adequate scores and negative scores revealed programs considered less than adequate. Overall adequacy sub-scores revealed the VDOE-PTS mean score at X_V=-20.9, the director of transportation mean score X_D=-16.9 and the driver mean score was X_d=-40.4. Conclusion, the VDOE-PTS model does not meet the AACMVDT:FR, 1995 sub-score criteria for adequacy. Also, Virginia's directors of transportation and drivers both indicated they were not meeting the criteria set by the VDOE-PTS model. This does not indicate the VDOE-PTS model is inadequate, but it merely suggest that the VDOE-PTS model does not meet the standard established by AACMVDT:FR, 1995 researchers. Correlation with the NHTSA model showed less variance, but the conclusion is the VDOE-PTS model does not meet the adequacy level of the NHTSA program.

No significant difference was found in training program adequacy and accident reduction. Accident rates did decrease after training requirements increased to 40 hours in 1994. However, correlation coefficients calculated from acquired data did not reveal an inverse

relationship between training adequacy and accident reduction.

Driver respondents were divided into two groups: new drivers(less than three years of experience), and experienced drivers(three or more years of experience). New drivers recorded a significantly larger number of accidents than did experienced drivers. The indications from these data are drivers who are experienced have fewer accidents than new drivers subject to less experience but exposed to new training requirements. Increased behind-the-wheel experience may help new drivers have fewer accidents.

Analysis of data using geographics as a demographic variable was predictive of accident rates for school bus drivers. The resulting conclusion is geographics is significant and urban areas have significantly higher accident rates regardless of training adequacy.

In conclusion, this study indicated the VDOE-PTS model for school bus driver training does not attain the adequacy level set by researchers in AACMVDT:FR, 1995. Additional conclusions include the following: Virginia's LEA directors of transportation are not meeting all of the standards set in the VDOE-PTS model for school bus driver training, and not all school bus drivers are meeting the standards set in the VDOE-PTS model. Finally, training and adequacy levels cannot significantly be linked to a reduction in accident rates for school buses.

Due to the limitations of this study, the following recommendations are made for further study.

1. It is suggested that training programs from other states be reviewed under the same criteria(AACMVDT:FR, 1995) to determine Virginia's relationship in training adequacy to other states.

2. It is also suggested that training programs from other states be compared to Virginia's program to determine their adequacy level compared to that of the VDOE-PTS model.

3. It is suggested that Virginia school divisions that analyze accident types and vary training accordingly be reviewed more closely to determine the accident reduction capabilities of increased or varied training.

4. An analysis of training programs offered by professional driving schools for commercial motor vehicles should be reviewed to determine their accident reducing characteristics.

5. Investigate drivers who have participated in various training models for CMV licensing to determine if a significant difference exists between those who have had training and those who have not, as compared to accident reduction.

6. Investigate training methodology to determine if there are programs providing a specific type of training(e.g. behind-the-wheel) effective in reducing accidents.

7. Complete a more in-depth analysis of the cause of accidents and the relationship to time spent in training.

Summary

There are many variables which cannot be separated from the study to determine specific element effectiveness in training or accident rate reduction. Drivers learn from behind-the-wheel experience as well as through the training activities of their school division; but, how will researchers separate that which was learned in training from that which was learned behind-the-wheel?

Training is sometimes viewed as the miracle drug, the answer to solving the school bus accident problem, but it may just as well be a placebo. School Bus Fleet (1996, April/May, p. 5) wrote, "While some in-house studies by carriers indicated that training reduced the number of accidents, other studies pointed to a tendency of trained drivers to have a slightly higher accident rate." They asserted that inferior training might produce drivers who have a false sense of confidence in their abilities. To say training will reduce accidents, may indeed be false. Another point to be considered is the maximization of training.

The implementation of new standards in 1990, 1992, and 1994 did result in increased training of drivers entering the field of pupil transportation. However, continuing to increase training will probably result in the development of a ceiling on accident reduction. There will be a certain number of accidents which will occur no matter the degree to which training is taken. Illinois may be considering this plateau in establishing a maximum of 40 hours for initial training activities.

Does the selection of the trainer play as much a role in the reduction of accidents as the selection of the driver? The trainer has the ability to train only to the degree that he/she understands, practices, and can relay correct driving procedures.

Factors which may play as important a role as training are numerous. The length of one driver's route may be twice that of another driver, and this study did show that there is indeed a moderate to strong correlation between mileage and the number of accidents. One driver's route may be on divided highways while another has narrow, winding, two-lane roads to travel. Some drivers will cover most of their routes on paved highways while others may have to drive primarily on unpaved surfaces. Driver X may serve an urban area while Driver Y serves a rural school division. The driver of one bus may have on-board cameras to aid with student discipline problems while another must concentrate on the road and the discipline.

Other elements to consider include the process of driver selection. The study found drivers who indicated previous experience as a driver of a vehicle which required a CDL was a prerequisite for their employment. Few school divisions may have this luxury, but this selection process would produce a more experienced work force, which has been linked to fewer accidents.

Driver compensation may be indicative of the quality of driver a school division is able to hire. If compensation is not competitive, drivers who have developed skills in driving and interpersonal communication will be employed by other transportation industries. Individuals who use driving the bus as supplemental income may take a different approach to training than drivers whose only work interest is that of the school bus.

Other areas this study did not address included factors specific to geographic locations. Accident rates could vary based on the crime rate of that area. Areas experiencing higher rates of alcoholism may produce higher accident rates. Unemployment and accident rates may form strong correlations. Whereas the list has not been exhaustive, it is to be gathered that training is not a completely separate factor.

Will the determination of the VDOE-PTS training model not attaining the adequacy level of the AACMVDT:FR, 1995 baseline result in a review of Virginia's program? Will additional training requirements be considered? Would increased training reduce the number of drivers participating in training? Can we isolate a variable primarily responsible for the largest number of accidents and impact a change on that variable?

It was interesting to note that there were Virginia LEA directors of transportation (or trainers) who did admit they do not meet the state requirements. This fact alone may indicate a need for a more specific way of knowing what training is provided by individual school divisions. Four hours of in-service should not mean one hour of picking up buses in August, one hour of break time, and a two hour general session complete with welcomes. While the data revealed the amount or adequacy level of training has not reduced the accident rate of school buses, it does suggest the focus of further study should be trainer and driver accountability.

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APPENDICES

APPENDIX A

Standard No. 17

APPENDIX A

HIGHWAY SAFETY PROGRAM STANDARD NO. 17

Pupil Transportation Safety

I. *Scope.* This standard establishes minimum requirements for a State highway safety program for pupil transportation safety; including the identification, operation, and maintenance of schoolbuses; training of personnel; and administration.

II. *Purpose.* The purpose of this standard is to reduce, to the greatest extent possible, the danger of death or injury to schoolchildren while they are being transported to and from school.

III. *Definitions.* "Type I school vehicle" means any motor vehicle with motive power, except a trailer, used to carry more than 16 pupils to and from school. This definition includes vehicles that are at any time used to carry schoolchildren and school personnel exclusively, and does not include vehicles that only carry schoolchildren along with other passengers as part of the operations of a common carrier.

"Type II school vehicle" means any motor vehicle used to carry 16 or less pupils to or from school. This does not include private motor vehicles used to carry members of the owner's household.

IV. *Requirements.* Each State, in cooperation with its school districts and its political subdivisions, shall have a comprehensive pupil transportation safety program to assure that school vehicles are operated and maintained so as to achieve the highest possible level of safety.

A. *Administration.* 1. There shall be a single State agency having primary administrative responsibility for pupil transportation, and employing at least one full-time professional to carry out its responsibilities for pupil transportation.

2. The responsible State agency shall develop an operating system for collecting and reporting information needed to improve the safety of school vehicle operations, in accordance with Safety Program Standard No. 10, "Traffic Records," § 204.4.

B. *Identification and equipment of school vehicles.* Each State shall establish and maintain compliance with the following requirements for identification and equipment of school vehicles. The use of stop arms is at the option of the State.

1. Type I school vehicles shall:

a. Be identified with the words, "School Bus," printed in letters not less than 8 inches high, located between the warning signal lamps as high as possible without impairing visibility of the lettering from both front and rear, and have no other lettering on the front or rear of the vehicle;

b. Be painted National School Bus Glossy Yellow, in accordance with the colorimetric specification of Federal Standard No. 595a, Color 13432, except that the hood shall be either that color or lusterless black, matching Federal Standard No. 595a, Color 37038;

c. Have bumpers of glossy black, matching Federal Standard No. 595a, Color 17038; unless, for increased night visibility, they are covered with a retroflective material.

d. Be equipped with a system of signal lamps that conforms to the schoolbus requirements of Federal Motor Vehicle Safety Standard 108, 49 CFR 571.21; and

e. Have a system of mirrors that will give the seated driver a view of the roadway to each side of the bus, and of the area immediately in front of the front bumper, in accordance with the following procedure:

When a rod, 30 inches long, is placed upright on the ground at any point along a traverse line 1 foot forward of the forwardmost point of a schoolbus, and extending the width of the bus, at least 7½ inches of the length of the rod shall be visible to the driver, either by direct view or by means of an indirect visibility system.

2. Type I school vehicles that are operated by a privately or publicly owned local transit system, and used for regular common carrier transit route service as well as special school route service, shall meet all of the requirements of this standard, except as follows:

a. Such vehicles need not be painted yellow and black as required by paragraphs 1(b) and 1(c) of this section.

b. In lieu of the requirements of paragraph 1(a) of this section, such vehicles shall, while transporting children to and from school, be equipped with temporary signs, located conspicuously on the front and back of the vehicle. The sign on the front shall have the words "School Bus" printed in black letters not less than 6 inches high, on a background of national school bus glossy yellow, as specified in paragraph 1(b) of this section. The sign on the rear shall be at least 10 square feet in size and shall be painted national

school bus glossy yellow, as specified in paragraph 1(b) of this section, and have the words "School Bus" printed in black letters not less than 8 inches high. Both the 6-inch and 8-inch letters shall be Series "D" as specified in the Standard Alphabets—Federal Highway Administration, 1966.

c. Where such vehicles are used only in places where use of warning signal lamps is prohibited, they need not be equipped with the signal lamps required by paragraph 1(d) of this section.

3. Any school vehicle meeting the identification requirements of 1.a-d above that is permanently converted for use wholly for purposes other than transporting pupils to or from school shall be painted a color other than National School Bus Glossy Yellow, and shall have the stop arms, and equipment required by section IV.B.1.d, removed.

4. Type I school vehicles being operated on a public highway and transporting primarily passengers other than school pupils shall have the words, "School Bus," covered, removed, or otherwise concealed, and the stop arms and equipment required by section IV.B.1.d shall not be operable through the usual controls.

5. a. Type II school vehicles shall either:

(1) Comply with all the requirements for Type I school vehicles; or

(2) Be of a color other than National School Bus Glossy Yellow, have none of the equipment specified in IV.B.1.d, and not have the words, "School Bus," in any location on the exterior of the vehicle, or in any interior location visible to a motorist.

b. The State shall establish conditions under which one or the other of the above two specifications for Type II vehicles shall apply.

C. *Operation.* Each State shall establish and maintain compliance with the following requirements for operating school vehicles:

1. *Personnel.* a. Each State shall develop a plan for selecting, training, and supervising persons whose primary duties involve transporting school pupils, in order to assure that such persons will attain a high degree of competence in, and knowledge of, their duties.

b. Every person who drives a Type I or Type II school vehicle occupied by school pupils shall, as a minimum:

(1) Have a valid State driver's license to operate such a vehicle(s);

(2) Meet all special physical, mental, and moral requirements established by the State agency having primary responsibility for pupil transportation; and

(3) Be qualified as a driver under the Motor Carrier Safety Regulations of the Federal Highway Administration 49 CFR 391, if he or his employer is subject to those regulations.

2. *Pupil instruction.* At least twice during each school year, each pupil who is transported in a school vehicle shall be instructed in safe riding practices, and participate in emergency evacuation drills

3. *Vehicle operation.* a. Each State shall develop plans for minimizing highway use hazards to school vehicle occupants, other highway users, pedestrians, and property, including but not limited to:

(1) Careful planning and annual review of routes for safety hazards;

(2) Planning routes to assure maximum use of buses, and avoid standees;

(3) Providing loading and unloading zones off the main traveled part of highways, wherever it is practicable to do so;

(4) Establishing restricted loading and unloading areas for schoolbuses at, or near schools;

(5) Requiring the driver of a vehicle meeting or overtaking a schoolbus that is stopped on a highway to take on or discharge pupils, and on which the red warning signals specified in IV.B.1.d are in operation, to stop his vehicle before it reaches the schoolbus and not proceed until the warning signals are deactivated; and

(6) Prohibiting, by legislation or regulation, operation of any vehicle displaying the words, "School Bus," unless it meets the equipment and identification requirements of this standard.

b. Use of flashing warning signal lamps while loading or unloading pupils shall be at the option of the State. Use of red warning signal lamps for any other purpose, and at any time other than when the school vehicle is stopped to load or discharge passengers shall be prohibited.

c. When vehicles are equipped with stop arms, such devices shall be operated only in conjunction with red signal lamps.

d. *Seating.* (1) Seating shall be provided that will permit each occupant to sit in a seat in a plan view lateral location, intended by the manufacturers to provide seating accommodation for a person at least as large as a 5th percentile adult female, as defined in 49 CFR 571.3.

(2) Bus routing and seating plans shall be coordinated so as to eliminate standees when a school vehicle is in motion.

(3) There shall be no auxiliary seating accommodations such as temporary or folding jump seats in school vehicles.

(4) Drivers of school vehicles equipped with lap belts shall be required to wear them whenever the vehicle is in motion.

(5) Passengers in Type II school vehicles equipped with lap belts shall be required to wear them whenever the vehicle is in motion.

D. *Vehicle maintenance.* Each State shall establish and maintain compliance with the follow-

ing requirements for vehicle maintenance:

1. School vehicles shall be maintained in safe operating conditions through a systematic preventive maintenance program.

2. All school vehicles shall be inspected at least semiannually, in accordance with Highway Safety Program Manual Vol. 1, published by the Department of Transportation January 1969. School vehicles subject to the Motor Carrier Safety Regulations of the Federal Highway Administration shall be inspected and maintained in accordance with those regulations (49 CFR Parts 393 and 396).

3. School vehicle drivers shall be required to perform daily pretrip inspections of their vehicles, and to report promptly and in writing any defects or deficiencies discovered that may affect the safety of the vehicle's operation or result in its mechanical breakdown. Pretrip inspection and condition reports for school vehicles subject to the Motor Carrier Safety Regulations of the Federal Highway Administration shall be performed in accordance with those regulations (49 CFR 392.7, 392.8, and 396.7).

V. *Program evaluation.* The pupil transportation safety program shall be evaluated at least annually by the State agency having primary administrative responsibility for pupil transportation. The National Highway Traffic Safety Administration shall be furnished a summary of each evaluation.

APPENDIX B

Virginia School and Motor Vehicle Law

MOTOR VEHICLE LAWS

46.2-100	Definition of School Bus
46.2-111	Flares and other signals related to disabled vehicles
46.2-339	Qualifications of school bus driver; examination
46.2-340	Information concerning school bus driver
46.2-810	Age limits
46.2-811	Coasting Prohibited
46.2-844	Passing Stopped school Bus; penalty
46.2-859	Passing a stopped school bus
46.2-871	Maximum speed limit for school bus
46.2-873	Maximum speed limit at school crossing
46.2-886	When drivers of certain vehicles to stop, look and listen at railroad crossing tacks without shifting gears
46.2-893	Stopping on highways to discharge cargo or passengers; school buses
46.2-917	Operation of yellow motor vehicle of certain seating capacity on state highway prohibited; exceptions; penalty
46.2-917.1	School buses hired to transport children
46.2-917.2	School buses operating under state corporation commission certificate
46.2-918	School buses to be routed so as to avoid necessity of pupils crossing divided highway
46.2-919	Age limit for drivers of school bus
46.2-1040	Hazard lights
46.2-1089	Paint and lettering on school bus
46.2-1090	Warning devices on school buses; use thereof; penalties
46.2-1090.1	Warning lights on school bus
46.2-1091	Safety belts to be worn by certain bus drivers

46.2-1095	Child restraint devices required
46.2-1099	Further exemption
46.2-1100	Use of standard seat belts permitted
46.2-1105	Width of vehicles generally; exception
46.2-112	Length of vehicle generally

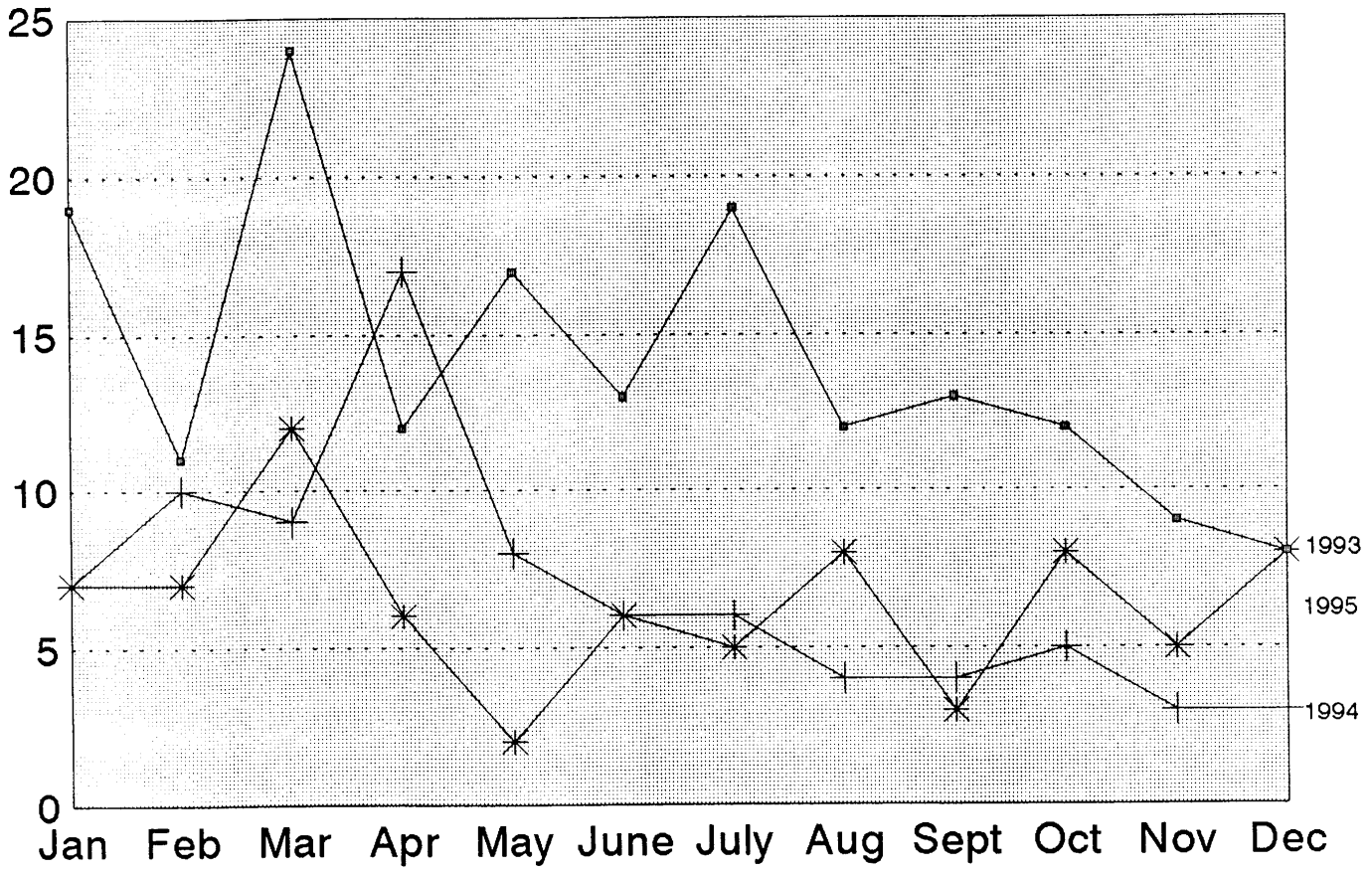
VIRGINIA SCHOOL LAWS

22.1-78	"Opinions of Attorney General" Authority of principals and teachers over pupils going to and return from school
22.1-98	Reduction of state aid when length of school term below 180 days or 990 hours
22.1-176	Transportation authorized; when fee may be charged
22.1-178	Requirements for persons employed to drive school bus
22.1-180	Requirements for persons employed to transport pupils attending parochial or private schools
22.1-181	Training program for school bus operation
22.1-182	Use of school bus for public purposes
22.1-183	When warning lights and identification to be covered
22.1-184	School Bus Emergency Drills
22.1-186	Payments for Transportation of Pupils
22.1-188 through 22.1-198 and 38.2-2206	School bus insurance
22.1-221	Transportation of handicapped children
22.1-256	Children exempted from article (compulsory attendance)
22.1-300	Tuberculosis certificate
15.1-291-15.1-291.11	Virginia Indoor Clean Air Act
15.1-291.2	Smoking shall be prohibited
33.1-252	Free use of toll, bridges, etc.

APPENDIX C

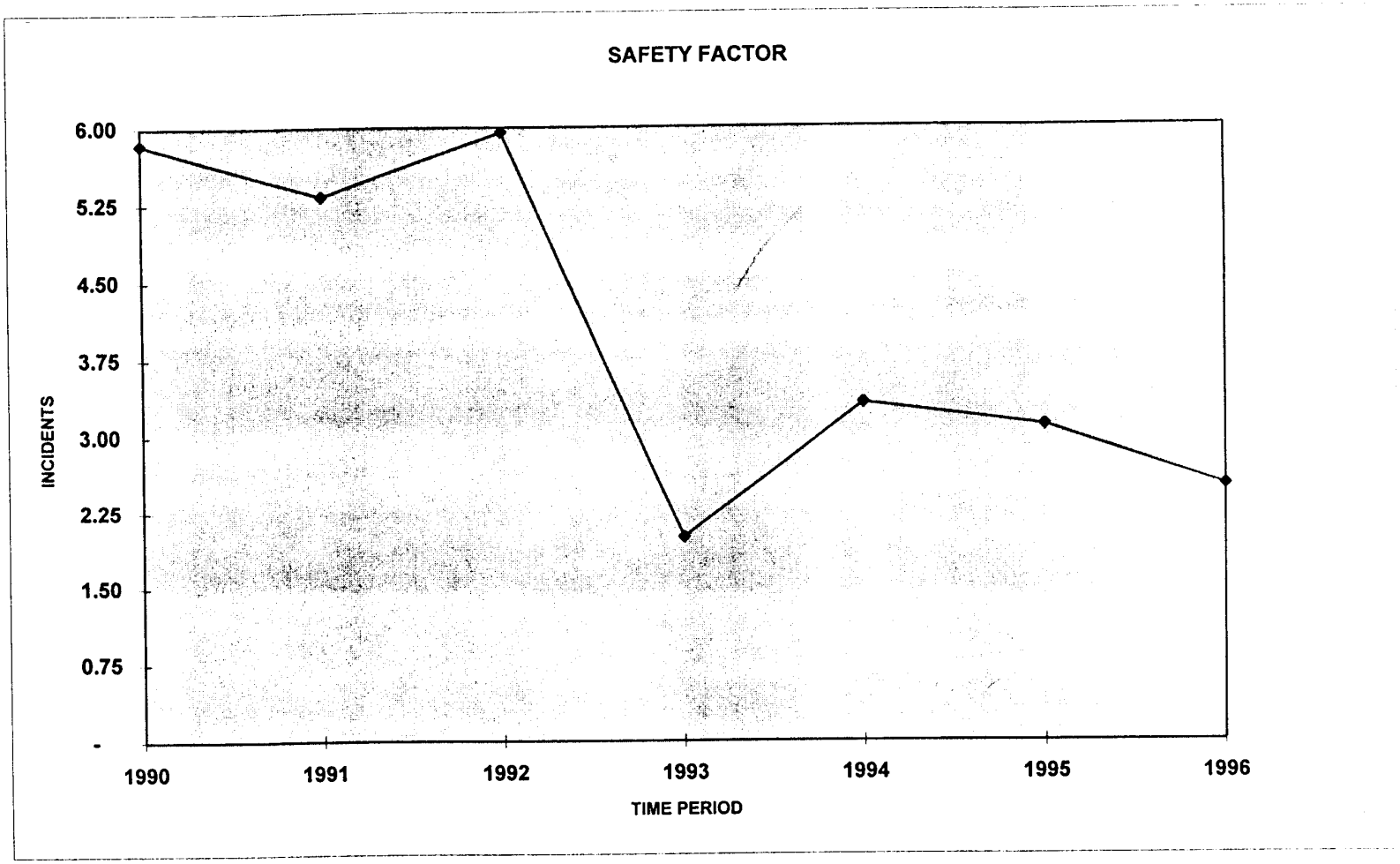
Accident Reduction Statistics for a Division of the Georgia Pacific Corporation

First Aid Totals 1993-95



Total: 328

SOUTH BOSTON PARTICLEBOARD PLANT
SAFETY
FOR THE PERIOD 1990 - YTD 1996



APPENDIX D

Virginia Director of Transportation Survey

VIRGINIA SCHOOL BUS DRIVER TRAINING:
TRANSPORTATION DIRECTORS (TRAINERS) SURVEY

The focus of this survey is to determine the adequacy of school bus driver training programs,and learn more about the impact of training on accident reduction.

Directions: Please circle the number of your answer or use the blanks provided.

Type of Training Program

1. Which one of the following phrases best describes your entry -level school bus driver training activity?

    1. School Division Training Program
    2. Private Training School

[If 1, answer Question 2.]

[If 2, skip to question 3.]

2. Is all of your entry-level school bus driver training done in-house by school division personnel or is some of the training done by a school bus driving school?

    1. All in-house
    2. Some training done by a school
    3. All training done by a school

[If 1, go to Question 3.]

[If 2 or 3,skip to Question 4.]

3. Is your school bus driver training conducted by:

    1. The director of transportation
    2. A driver trainer (not the director of transportation)

Tuition/Entrance Requirements

4. How much is the tuition for your program?

   1. $_____

   2. No Charge

5. What prerequisites or entrance requirements are there for enrollment in your program? Please feel free to list any additional entrance requirements.

[Circle all that apply.]

1. High School Diploma or GED
2. Good Driving Record
3. Pass VDOT Physical
4. Pass Drug Screening Test
5. CDL Learners Permit
6. Age - Must be 18 or older

Additional Entrance Requirements:_____

_____

_____

_____

6. Are these entrance requirements based upon local, state, or federal requirements and/ or guidelines?

1. YES
2. NO

If yes, what are they?

_____

_____

_____

_____

Training topics

The following is a list of topics that might be included as part of a training program for school bus drivers. When you read each topic, please place a check in the box(es) by that item to indicate the method(s) used in your training program.

Training Topic	Not Included	Training Method(s) Used			
		Lecture/ Self Study	Demon-stration	Range Practice	Street Practice
1. The first 13 topics involve **Basic Operation** of the school bus					
1.1 Function, Location, and Proper Use of All Primary Vehicle Control Systems (e.g., brakes, steering wheel, accelerator, shifters, clutch, and internal transmission retarders)					
1.2 Door Controls					
1.3 Function, Location, and Proper Use of All Secondary Vehicle Control Systems and Instruments (e.g., light switches, windshield wipers, ignition controls, driver seat belt, gauges, and warning lights/buzzers)					
1.4 Proper Use and Adjustment of Mirrors for Maximum Visibility					
1.5 Equipment-specific Engine Stop and/or Start Controls, for example: ▲ Emergency Switch ▲ Engine Compartment Switch ▲ Master Switch					
1.6 Air/Electric Horns					
1.7 Basic Control and Maneuvering (e.g., starting, acceleration, braking, steering, shifting, backing)					
1.8 Turning—Understanding Location of Bus Pivot Point					
1.9 Parking					
1.10 Overhead Clearance					

Training Topic	Not Included	Training Method(s) Used			
		Lecture/ Self Study	Demon-stration	Range Practice	Street Practice
1.11 Railroad Crossing Procedures					
1.12 Fueling Procedures [School Bus Drivers Only]					
1.13 Use of Retarders and Speed Controls					
2. Special Handling of Articulated Vehicles OMIT					
3. Safe Operating Practices					
3.1 Visual Search					
3.2 Communication with Other Road Users (e.g., signaling, flashers, headlights, backup lights)					
3.3 Adjusting Speed to Traffic, Traction, Visibility, Road Conditions					
3.4 Monitoring Space Around the Vehicle					
3.5 Understanding and Using the Defensive Driving 4-Second Following Distance Technique					
4. The next topics involve Special Conditions					
4.1 Nighttime Operation					
4.2 Operating in Extreme Temperatures (hot and cold)					
4.3 Mountainous Terrain					
4.4 Transporting Handicapped/ Exceptional Passengers					

Training Topic	Not Included	Training Method(s) Used			
		Lecture/ Self Study	Demon-stration	Range Practice	Street Practice
5. We have four topics grouped as **Advanced Driving Skills**					
5.1 Hazard Recognition (e.g., road conditions, driving situations, driver/pedestrian characteristics)					
5.2 Collision Avoidance (e.g., quick stops, evasive maneuvers, making judgments)					
5.3 Skid Prevention and Recovery					
5.4 Equipment-Related Emergencies (e.g., blow-outs and brake failure)					
6. The next topics are Vehicle-Related, Non-Driving Activities					
6.1 Safety Inspections, i.e., using systematic procedures for pre-trip, enroute, or post-trip inspections					
6.2 Securing Vehicle and Contents					
6.3 Basic Familiarization with the Location, Function, Operation and Common Failures of Vehicle Systems					
6.4 Recognizing Vehicle Malfunctions					
6.5 Diagnosing Vehicle Malfunctions					
6.6. Coordinate With Maintenance to Affect Repairs of Vehicle Components					
6.7 Safe Work Methods (e.g., lifting, ingress and egress)					
7. The following topics relate to Non-Vehicle Activities					
7.1 Handling Baggage and Package Express					

Training Topic	Not Included	Training Method(s) Used			
		Lecture/ Self Study	Demon-stration	Range Practice	Street Practice
7.2 Recognizing Hazardous Materials, and Proper Refusal to Transport These Materials					
7.3 Hours of Service Requirements and Log Keeping					
7.4 General Accident Procedures					
7.5 First Aid Procedures					
7.6 Fire Fighting Techniques					
7.7 Trip and Route Planning					
7.8 Basic Geography and Map Reading					
8. The next topics relate to Loading and Transportation of Passengers					
8.1 Safe Boarding and Alighting of Passengers					
8.2 Approaching and Leaving the Stop					
8.3 Proper Use of Lights/Signals for Loading and Unloading Pupils (School Bus only)					
8.4 Rules of the Road Governing Vehicles That Transport Passengers					
8.5 Emergency Evacuation Procedures					
8.6 Stowing Baggage/Equipment Inside the Bus So That Aisles and Emergency Exits are Accessible					

Training Topic	Not Included	Training Method(s) Used			
		Lecture/ Self Study	Demon-stration	Range Practice	Street Practice
9. Pupil Management					
9.1 Understanding of the General Rules of Pupil Conduct and Discipline Procedures					
9.2 Reporting Pupil Control Problems					
10. Passenger Management [Long-Haul Regular Route and Charter Drivers only]					
10.1 Understanding Government Regulations and Company Procedures Regarding Alcohol, tobacco, and drug use by passengers.					
10.2 Communication Techniques for Handling Difficult Passengers					
11. Maintaining Fitness					
11.1 Alcohol and Drugs					
11.2 Personal Health and Fitness					

Training Program Description

7. How many instruction hours are required to complete your school bus driver training program?

School	On-the-Job	Total
___hrs	___hrs	___hrs

8. What is the distribution of instruction hours by `training method?`

	School	On-the-Job	Total
Lecture/Demonstration or Self Study	___hrs	___hrs	____hrs
Range	____hrs	___hrs	____hrs
On-Street	____hrs	___hrs	____hrs

9. What is the student to instructor ratio in your program?

	School	On-the-Job
Classroom	____:1	____:1
Range	____:1	____:1
Street	____:1	____:1

10. What is the student to vehicle ratio in your program?

School	On-the-Job
____:1	____:1

11. What types of equipment/facilities are used to instruct your program? Please feel free to add additional equipment or facilities that you use.

[Check all that apply]

	School	On-the-Job
Classrooms	_____	_____
Range/Off-Street Practice Area	_____	_____
Off-Street Obstacles (e.g., cones, barrels) for maneuvering	_____	_____
Simulators	_____	_____
Buses with different transmissions	_____	_____
Different lengths and types of buses	_____	_____
Other Equipment	_____	_____

12. What kinds of audio/visual equipment are used to instruct your curriculum?]

[Check all that apply]

Overhead _____

35mm Slide Projector _____

Video Player _____

Film Projector _____

Audio Tape Player _____

Other AV Equipment _____

What additional audio/visual equipment do you use?_____

_____

13. What standards or guidelines were consulted to develop your curriculum? These standards and guidelines may be mandatory or voluntary. They may be prescribed by the government or professional associations or school accreditation groups.

School	On-the-Job
_____	_____
_____	_____
_____	_____

14. How do you determine that students have fulfilled your course objectives? That is, how do you determine that a student is qualified to graduate from your program?

School	On-the-Job
_____	_____
_____	_____
_____	_____

15. What standards/guidelines do you use to choose your instructors?

School	On-the-Job
_____	_____
_____	_____

Student Graduation

16. What percent of the students who begin your program graduate or complete the program?_____

17. How many students graduated/completed your program in 1995/96?_____

18. How many students do you expect to graduate/complete in 1996/97?_____

19. Over the next five years, do you expect your enrollment to:

    1. Increase
    2. Decrease
    3. Remain the Same

Placement/Employer Expectations

20. How many school bus drivers are employed in your school division?

[Circle your response]

    1. 0-49
    2. 50-99
    3. 100-149
    4. 150-199
    5. 200 or more

21. What percent of the students who complete your program are placed in a school bus driving job? _____%

22. What skills or training do you, the employer, most often request?

_____

_____

23. Have you conducted any in-house studies or data collection to determine whether training has reduced your accident rate?

1. YES
2. NO

[If YES, answer Question 24]

[If NO, go to Question 25]

24. Please describe these findings.

_____

_____

_____

_____

_____

25. Can you reference any studies that demonstrate whether or not the training of school bus drivers results in accident reduction?

1. YES
2. NO

[If YES, answer Question 29]

[If NO, go to Question 27]

26. Please give the title, the author's name and/or where a copy of the study can be obtained.

_____

_____

_____

Potential Impact of Other Government Programs

27. Other than the Commercial Drivers License(CDL), do you know of any future Federal government programs, regulations, policies, or activities that affect, or may affect, whether entry-level school bus drivers are adequately trained?

1. YES
2. NO

[If YES, answer Question 28]

[If NO, go to Question 29]

28. Please tell about them. For each one, indicate the government agencies responsible and what you expect its effect will be.

_____

_____

_____

_____

Demographics of Driver Trainers

29. What is the gender of the school division's driver trainer?

1. MALE 2. FEMALE 3. If more than one

____#male ___#female

30. What is the educational background of the driver trainer?

1. High School/GED
2. College Classes
3. Bachelor's Degree
4. Graduate Degree

31. Has the driver trainer participated in the Virginia School Bus Driver Trainer School?

1. YES
2. NO

32. Does the driver trainer have?

[circle all that apply]

1. Certification by the Virginia Department of Education-Pupil Transportation Service
2. Certification by the Virginia Department of Education as a classroom teacher
3. Experience as a classroom teacher
4. Other_____

APPENDIX E

Virginia School Bus Driver Survey

Virginia School Bus Driver Training:
School Bus Drivers Survey

The focus of this survey is to determine the adequacy of school bus driver training programs, and learn more about the impact of training on accident reduction.

Directions: Please circle the number of your answer or use the blanks provided.

Driving History

1. When did you first start driving school buses?

   Month:_____ Year:_____

2. How many years have you driven a school bus? _____

3. Did your school division require any of the following prior to hiring you?

[please circle all that apply]

Commercial Drivers License(CDL)	YES	NO
Certificate of Road Test	YES	NO
Road Test	YES	NO
Medical Exam	YES	NO
Review of Your Driving Record	YES	NO
Drug Test	YES	NO
Prior Bus Driving Experience	YES	NO

If YES, how many years?_____

Other:_____

4. Did your school division require you to complete a training program as a condition of employment?

1. YES

2. NO

If YES, who conducted this program?

_____

Training History

5. Before driving buses, did you drive heavy trucks?

1. YES

2. NO

[If YES, go to Question 6.]

[If NO, skip to Question 11.]

6. When did you first start driving heavy trucks?

Month:_____ Year:_____

7. Did you have any formal training when you began driving heavy trucks?

1. YES

2. NO

If YES, what kind of formal training did you have?

Other:_____

8. Before driving school buses, did you drive other types of buses?

1. YES

2. NO

[If YES, go to Question 9.]

[If NO, skip to Question 11.]

9. What type of bus did you drive

[circle all that apply]?

1. Motorcoach

2. School Bus

3. Transit Type Bus

4. Minibus(e.g., van, hotel bus)

10. Did you have any formal training before you began driving buses?

1. YES

2. NO

If YES, what kind of formal training did you have?

Other:_____

11. When you were learning how to drive a school bus, did your school division have minimum training requirements for school bus drivers?

1. YES

2. NO

3. DON'T KNOW

If YES, did your training provide:

1. The state requirement.

2. Less than the state minimum

3. Extra training beyond the state minimum.

4. Don't know.

12. When you were learning how to drive a school bus, what training approaches were used during classroom activities?

[circle all that apply]

1. Lecture

2. Demonstration

3. Video tapes

4. Textbooks that you studied by yourself(in class or homework)

5. Simulators

6. Observation in a bus

Behind the wheel? **[circle one]**

7.1 Range/Off-street

7.2 On the road

7.3 Both

Unsupervised practice?**[circle one]**

8.1 Range/Off-street

8.2 On the road

8.3 Both

13. When did you get your commercial driver's license? **[circle one.]**

1. Before you started your training

2. While you were in training (as part of the training).

3. After you finished the training.

[If your choice was 1, skip to Question 16.]

[If your choice was 2 or 3, go to Question 14.]

14. Which one of the following statements best describes how well your training prepared you to pass the Commercial Drivers License(CDL)knowledge(written) exam?

[Circle one.]

1. Did not prepare me enough.

2. Prepared me just enough.

3. Prepared me somewhat more than needed.

4. Prepared me much more than needed.

15. Which one of the following statements best describes how well your training prepared you to pass the CDL skills(behind-the-wheel) test?

[Circle one.]

1. Didn't give me enough practice.

2. Gave me just enough practice.

3. Gave me somewhat more practice than I needed.

4. Gave me much more practice than I needed.

16. Does your employer offer reimbursement to beginning drivers who participate in your driver training program?

1. YES

2. NO

17. Does your employer offer on-going training or other activities intended to promote safe driving, such as the following:

[Circle all that apply.]

1. Retraining of drivers involved in an accident.

   YES NO

2. Retraining of drivers receiving a traffic citation.

   YES NO

3. Bonuses/awards for safe driving.

   YES NO

4. Periodic retraining of all drivers

   YES NO

   If YES, how often? Every ____years.

5. Supervised check rides.

   YES NO

   If YES, how often? Every ____years.

6. Safety meetings.

   YES NO

   If YES, how often? ____times per year.

Other_____

18. How many hours were spent on each of these types of training?

1. Lecture/Demonstration/Self-study _____Hours

2. On a Driving Range _____Hours

3. On the Street _____Hours

Total # of hours spent in training _____Hours

19. How large were your classes?

_____number of students in classrooms for lecture or demonstrations.

_____number of students on range, per vehicle.

_____number of students in vehicle for on-street practice.

20. Approximately how many hours did you actually spend driving the bus during your training? _____Hours

Accident History

21. Have you ever had a school bus accident?

1. YES
2. NO

[**If YES, continue with question 21.]**

[If NO, go to question 27.]

22. How many accidents have you been involved in during your career as a school bus driver? _____

23. Of this number how many happened during your first three years of driving a school bus? _____

[If you have driven a school bus less than three years, please respond based on your years of experience.]

24. Did any of these accidents involve a fatality?

    1. YES

    2. NO

If YES, in what year of your school bus driving experience did it occur?_____

25. Did any of these accidents involve a non-fatal injury?

    1. YES

    2. NO

If YES, in what year of your school bus driving experience did it occur?_____

26. Was the accident determined to be your fault?

    1. YES

    2. NO

Demographics

27. What is your age?

    1. 18-24

    2. 25-31

    3. 32-38

    4. 39-45

    5. 46-52

    6. 53-59

    7. 60+

28. What is your educational background?

    1. Did not graduate?

    2. Diploma or GED

    3. College course work

    4. College degree

Training topics

The following is a list of topics that might be included as part of a training program for school bus drivers. When you read each topic, please place: (1) a check in the **YES** box if the topic was covered in your training, (2) a check in the **NO** box if the topic was not covered in your training, or (3) a check in the box marked **OTHER** if you received this training elsewhere.

TRAINING TOPIC	YES {1}	NO {2}	Other Training {3}
1. The first six topics involve **Basic Operation** of the school bus.			
1.1 Function, Location, and Proper Use of All Primary Vehicle Control Systems (e.g., brakes, steering wheel, accelerator, shifters, clutch, and internal transmission retarders)			
1.2 Door Controls			
1.3 Function, Location, and Proper Use of All Secondary Vehicle Control Systems and Instruments (e.g., light switches, windshield wipers, ignition controls, driver seat belt, gauges, and warning lights/buzzers)			
1.4 Proper Use and Adjustment of Mirrors for Maximum Visibility			

TRAINING TOPIC	YES (1)	NO (2)	Other Training (3)
1.5 Equipment-specific Engine Stop and/or Start Controls, for example: ▲ Emergency Switch ▲ Engine Compartment Switch ▲ Master Switch			
1.6 Air/Electric Horns			
1.7 Basic Control and Maneuvering (e.g., starting, acceleration, braking, steering, shifting, backing)			
1.8 Turning—Understanding Location of Bus Pivot Point			
1.9 Parking			
1.10 Overhead Clearance			
1.11 Railroad Crossing Procedures			
1.12 Fueling Procedures [School Bus Drivers Only]			
1.13 Use of Retarders and Speed Controls			
2. Special Handling of Articulated Vehicles OMIT			
3. The following topics relate to Safe Operating Practices			
3.1 Visual Search			
3.2 Communication with Other Road Users (e.g., signaling, flashers, headlights, backup lights)			
3.3 Adjusting Speed to Traffic, Traction, Visibility, Road Conditions			
3.4 Monitoring Space Around the Vehicle			
3.5 Understanding and Using the Defensive Driving 4-Second Following Distance Technique			

TRAINING TOPIC	YES {1}	NO {2}	Other Training {3}
4.0 The next topics involve **Special Conditions**			
4.1 Nighttime Operation			
4.2 Extreme Temperatures (e.g., hot and cold)			
4.3 Mountainous Terrain			
4.4 Transporting Handicapped/Exceptional Passengers			
5.0 We have four topics grouped as **Advanced Driving Skills**			
5.1 Hazard Recognition (e.g., road conditions, driving situations, driver/pedestrian characteristics)			
5.2 Collision Avoidance (e.g., quick stops, evasive maneuvers, making judgments)			
5.3 Skid Prevention and Recovery			
5.4 Equipment-Related Emergencies (e.g., blow-outs and brake failure)			
6.0 The next topics are **Vehicle-Related, Non-Driving Activities**			
6.1 Safety Inspections, i.e., using systematic procedures for pre-trip, enroute, or post-trip inspections			
6.2 Securing Vehicle and Contents			
6.3 Basic Familiarization with the Location, Function, Operation and Common Failures of Vehicle Systems			
6.4 Recognizing Vehicle Malfunctions			
6.5 Diagnosing Vehicle Malfunctions			
6.6 Coordinate With Maintenance to Affect Repairs of Vehicle Components			
6.7 Safe Work Methods (e.g., lifting, ingress and egress)			

TRAINING TOPIC	YES {1}	NO {2}	Other Training {3}
7. The next topics are classified as **Non-Vehicle Activities**			
7.1 Handling Baggage and Package Express			
7.2 Recognizing Hazardous Materials, and Proper Refusal to Transport These Materials			
7.3 Hours of Service Requirements and Log Keeping			
7.4 General Accident Procedures			
7.5 First Aid Procedures			
7.6 Fire Fighting Techniques			
7.7 Trip and Route Planning			
7.8 Basic Geography and Map Reading			
8. The following topics deal with **Loading and Transportation of Passengers**			
8.1 Safe Boarding and Alighting of Passengers			
8.2 Approaching and Leaving the Stop			
8.3 Proper Use of Lights/Signals for Loading and Unloading Pupils (School Bus only)			
8.4 Rules of the Road Governing Vehicles That Transport Passengers			
8.5 Emergency Evacuation Procedures			
8.6 Stowing Baggage/Equipment Inside the Bus So That Aisles and Emergency Exits are Accessible			

TRAINING TOPIC	YES {1}	NO {2}	Other Training {3}
9. The next two topics relate to **Pupil Management** [School Bus Only]			
9.1 Understanding of the General Rules of Pupil Conduct and Discipline Procedures			
9.2 Reporting Pupil Control Problems			
10. The next two topics relate to **Passenger Management** [School Bus]			
10.1 Understanding Government Regulations and Company Procedures Regarding Alcohol, tobacco, and drug use by passengers.			
10.2 Communication Techniques for Handling Difficult Passengers			
11. The final grouping to topics has to do with **Maintaining Fitness**			
11.1 Alcohol and Drugs			
11.2 Personal Health and Fitness			

APPENDIX F

Criteria for School Bus Driver Training Adequacy

APPENDIX B

TRAINING ADEQUACY SCORING

This appendix describes the process by which the training program descriptions (obtained in the Schools Surveys) and the descriptions of the training received, obtained from the Drivers Surveys, were scored for adequacy.

Research Baseline Curricula and Criterion Values

As described in Section 1, a "Research Baseline Curriculum" was developed in each domain - heavy trucks, motorcoaches, and school buses - to specify the minimum requirements for entry-level pre-service training as related to each of these CMV types. For heavy trucks, the research baseline curriculum was derived by consensus opinion of a group of trucking industry experts, beginning from the FHWA Model Curriculum for Tractor-trailer Drivers. A second group of motorcoach and school bus experts developed the research baseline curricula for those CMV types using both the FHWA model curriculum and a school bus model curriculum developed by the National Highway Traffic Safety Administration (NHTSA).

Each research baseline curriculum specified minimum values for the following curriculum characteristics:

- Classroom/laboratory hours.
- Range hours (For school bus training, range practice was considered desirable but not mandatory. So, a minimum value was not specified.)
- On-street hours.
- Total course hours.
- Class/lab student/teacher ratio.
- Range student/teacher ratio.
- On-street student/teacher ratio.

- Behind-the-wheel hours or miles.
- Topic (Content) match.

The minimum value for a curriculum characteristic is referred to as its "criterion score." Table B.1 lists the criterion scores for the three research baseline curricula. For comparison purposes, the table also shows the recommended values of the curriculum characteristics for the FHWA model tractor-trailer and the NHTSA model school bus curricula.

Adequacy Scoring

The process for determining the adequacy of an entry-level CMV driver training program involved determining a value for the program on each of eight areas referred to as adequacy sub-scores. Then, the adequacy sub-score values are combined to obtain an Overall Adequacy Score for the program.

Adequacy Sub-scores

The most straightforward way of scoring training program adequacy would be to compare the program's values on the curriculum characteristics listed above (as determined from the Schools or Driver Survey) with the criterion scores (as shown in Table B.1). The various adequacy sub-scores do provide this comparison but, for various reasons, sub-scores do not map one-for-one to the curriculum characteristics. In the paragraphs that follow, we will describe each sub-score, explaining its relationship to its curriculum characteristic and the rational for defining it as we did.

Class/Lab Hours. The Class/Lab Hours Sub-score is defined as the percent deviation of the target program's total time spent in the classroom and/or demonstrations, with the Classroom/Laboratory Hours criterion value. It is obtained from this computation:

$$\frac{\textit{Class/Lab Hrs Program} - \textit{Class/Lab Hrs Criterion}}{\textit{Class/Lab Hrs Criterion}} \times 100 = \textit{Class/Lab Hours Sub-score}$$

APPENDIX G

Virginia School Division Directors of Transportation Mailing List

COUNTY	SUPERVISOR/DIRECTOR	ADDRESS
Accomack	Andrew Henderson	P.O. Box 330, Accomac 23301
Albemarle	Willie Smith	401 McIntire Road, Charlottesville 22901
Alegahany	Dr. Paul Linkehoker	110 Rosedale Ave., Suite A, Covington 24426
Amelia	Joyce Medley	P.O. Box 167, Amelia 23002
Amherst	Gene Onestinghel	P.O. Box 1257, Amherst 24521
Appomattox	Matt Lair	P.O. Box 548, Appomattox 24522
Arlington	Thomas A. Newman, Jr.	2770 Sosuth Taylor St., Arlington 22206
Augusta	Ernie R. Landes	Route 1, Box 252, Fishersville 22939
Bath	Michael Sams	Route 2, Box 84, Hot Springs 24445
Bedford	Tom Paramore	310 South Bridge Street, Bedford 24523
Bland	Ron Pauley	P.O. Box 339, Bland 24315
Botetourt	Larry R. Hall	P.O. Box 309, Fincastle 24090
Brunswick	Doyle Clary	P.O. Box 309, Lawrenceville 23868
Buchanan	Herman E. Broyles	P.O. Box 833, Grundy 24614
Buckingham	Everette T. Palmore	P.O. Box 24, Buckingham 23921
Campbell	Barbara C. Scott	P.O. Box 99, Rustburg 24588
Caroline	Kenneth A. Davis	13487 Devil's Three Jump, Milford 22514
Carroll	Shelby Smythers	405-9 North Main Street, Hillsville 24343
Charles City	Melvin D. Robertson	10910 Courthouse Road, Charles City 23030
Charlotte	Cecile A. Roach	P.O. Box 790, Charlotte Courthouse 23923
Chesterfield	Dennis K. Lewis	P.O. Box 10, Chesterfield 23832
Clarke	Larry W. Hardesty	309 West Main Street, Berryville 22611
Craig	M. Dallas Helems	P.O. Box 245, New Castle 24127
Culpeper	Fred M. Rankin	1051 N. Main Street, Extended Culpeper 22701
Cumberland	Ralph Beverly	P.O. Box 170, Cumberland 23040
Dickenson	Chester Robinette	P.O. Box 1127, Clintwood 24228
Dinwiddie	Barbara Wilson	P.O. Box 7, Dinwiddie 23841
Essex	Raymond Whittaker	P.O. box 756, Tappahannock 22560
Fairfax	C. Frank Dixon, Jr.	8101 Lorton Road, Lorton 22079
Fauquier	Charles W. Stanton	225 West Shirley Ave., Warrenton 22186
Floyd	Michael L. Carr	220 Newtown Road, Floyd 24091

COUNTY	SUPERVISOR/DIRECTOR	ADDRESS
Fluvanna	Willa Powell	P.O. Box 419, Palmyra 22963
Franklin	Donald K. Ranson	Route 6, Box 19, Rocky Mount 24151
Frederick	Charles A. Puglisi	178 Indian Hollow Road, Winchester 22603
Giles	James E. Wheeler, Jr.	Route 1, Box 52, Pearisburg 24134
Gloucester	Roger D. Kelly	Route 5, Box 243, Main St., Gloucester 23061
Goochland	Lewis H. Blakely	P.O. Box 169, Goochland 23063
Grayson	Charles Dickson	P.O. Box 219, Independence 24348
Greene	Mary Eppard	P.O. Box 98, Stanardsville 22973
Greensville/Emporia	G. H. Cain	P.O. Box 1156, Emporia 23847
Halifax	James W. Wagner	P.O. Box 1849, Halifax 24558
Hanover	Fred S. Valentine	200 Berkley Street, Ashland 23005
Henrico	Harold F. Grimes, Jr.	3820 Nine Mile Road, Richmond 23223
Henry	Velera C. Gammons	P.O. Box 2958, Collinsville 24078
Highland	Kathryn Ralston	P.O. Box 250, Monterey 24465
Isle of Wright	Eugene Blair	P.O. Box 78, Isle of Wright 23397
King George	Robert Minter	P.O. Box 21, King George 22485
King and Queen	Ken Amrhein	P.O. Box 97, King and Queen Courthouse 23085
King William	John R. Reeder, Jr.	P.O. Box 185, King William 23086
Lancaster	David L. Reedy	P.O. Box 2000, Kilmarnock 22482
Lee	J. D. King	5 Park Street, Jonesville 24263
Loudoun	J. Michael Lunsford	42000 Loudoun Ctr. Place, Leesburg 22075
Louisa	Lewis Stephens	P.O. Box 7, Mineral 23117
Luenburg	Thomas J. Henry	P.O. Box X, Victoria 23974
Madison	C. Wayne Huckaby	P.O. Box 674, Madison 22727
Matthews	Don K. Haynes	P.O. Box 369, Matthews 23109
Mecklenburg	Dwight Elam	P.O. Box 190, Boydton 23917
Middlesex	David O. Thomas	P.O. Box 205, Saluda 23149
Montgomery	Denise Lacey	510 Church Street, Christiansburg 24073
Nelson	Bobbie F. Napier, Sr.	P.O. Box 276, Lovingston 22949
New Kent	Ralph E. Ishler	P.O. Box 110, New Kent 23124
Northampton	Donald P. Kellam	P.O. Box 360, Machipongo 23405

COUNTY	SUPERVISOR/DIRECTOR	ADDRESS
Northcumberland	Clint Staples	P.O. Box 10, Heathsville 22473
Nottoway	Michael V. O'York	P.O. Box 47, Nottoway 23955
Orange	Fred J. Beam	P.O. Box 349, Orange 22960
Page	Mason Lackridge	735 West Main Street, Luray 22835
Patrick	Jeanette P. Mitchell	P.O. Box 346, Stuart 24171
Pittsylvania	Bobby L. Lovelace	P.O. Box 232, Chatham 24531
Powhatan	Brenda Powers	2320 Skaggs Road, Powhatan 23139
Prince Edward	Alexander Fowlkes	Route 5, Box 680, Farmville 23901
Prince George	Thomas Hooker	P.O. Box 80, Prince George 23875
Prince William	James H. Bettis	12153 Hooe Road, Brotow 22013
Pulaski	Ron Nichols	44 Third Street, N.W., Pulaski 24301
Rappahannock	Helen Williams	6 Schoolhouse Road, Washington 22747
Richmond	Reuben B. Bryant	P.O. Box 735, Warsaw 22572
Roanoke	Richard Flora	701 South Market Street, Salem 24153
Rockbridge	Scott Hannah	417 Morningside Drive, Lexington 24450
Rockingham	A. J. Botkin	1210 N. Liberty Street, Harrisonburg 22801
Russell	David P. Cozzolino	P.O. Box 8, Lebanon 24266
Scott	Danny Meade	261 East Jackson Street, Gate City 24251
Shenandoah	Willaim R. Ritenour	P.O. Box 488, Woodstock 22664
Smyth	David Burton	P.O. Box 987, Marion 24354
Southampton	W. F. Grizzard, Jr.	P.O. Box 26, Courtland 23837
Spotsyvania	Philip Hodson	P.O. Box 104, Spotsylvania 22553
Stafford	Paul W. Thompson	37 Enon Road, Falmouth 22406
Surry	Alvin Wl Wilson	P.O. Box 317, Surry 23883
Sussex	Johnny E. Hayes	P.O. Box 1368, Sussex 23884
Tazewell	Lockard E. Conley	209 W. Fincastle Tnpk., Tazewell 24651
Warren	John A. Grubbs	111 East Criser Road, Front Royal 22630
Washington	Tom Williams	812 Thompson Drive, Abingdon 24210
Westmoreland	Stanley R. Carey	P.O. Box 1060, Montross 22520
Wise	Ralph Hamilton	P.O. Box 1217, Wise 24293
Wythe	Curtis L. Campbell	1570 W. Reservior St., Wytheville 24382

York	Michael H. Wirt	302 Dare Road, Yorktown 23692

CITIES

CITY	SUPERVISOR/DIRECTOR	ADDRESS
Alexandria	John D. Johnson, III.	3810 W. Braddock Rd., Alexandria 22302
Briston	Bill Campbell	222 Oak Street, Bristol 24201
Buena Vista	F. L. Tomlin	P.O. Box 110, Buena Vista 24416
Charlottesville	Helen H. Poore	P.O. Box 911, Charlottesville 22902
Chesapeake	Dr. H.T. Gillette, III.	1021 Great Bridge Blvd., Chesapeake 23320
Colonial Heights	M. Kenneth Wright	512 Boulevard, Colonial Heights 23834
Covington	Max Sharver	340 E. Walnut Street, Covington 24426
Danville	Christopher J. Dunlap	P.O. Box 9600, Danville 24543
Falls Church	Nancy Hendrickson	301 N. Washington St., Falls Church 22046
Franklin	Virginia L. Ricks	800 W. Second Avenue, Franklin 23851
Fredericksburg	Mark E. Williams	817 Princess Anne St., Fredericksburg 22401
Galax	Roger B. Sharpe	223 Long Street, Galax 24333
Hampton	Steve Washington	1819 Nickerson Blvd., Hampton 23663
Harrisonburg	Reggie Smith	475 E. Washington, Harrisonburg 22801
Hopewell	Dick Hoagland	103 North 11th Ave., Hopewell 23860
Lynchburg	Richard B. Ballowe, II.	3525 John Capron Rd., Lynchburg 24502
Manassas	Jackie Smoot	8500 Public Works Dr., Manassas 22110
Manassas Park	David Melton	1 Park Center, Ct. #A, Manassas Park 22111
Martinsville	Ron Epperly	P.O. Box 5548, Martinsville 24115
Newport News	Donald V. Hammond	12098 Jefferson Ave., Newport News 23606
Norfolk	John W. Hazelette	5555 Raby Road, Norfolk 23502
Norton	William Hutchinson	P.O. Box 498, Norton 24273
Petersburg	Jim Ransom	920 E. Wythe Street, Petersburg 23803
Poquoson	Sandra G. Martin	63 Hudgins Road, Poquoson 23662
Portsmouth	Gerard J. Gavin	3920 Burton's Point Rd., Portsmouth 23704
Radford	William R. Wright	P.O. Box 3698, Radford 24143
Richmond	Walter Brown	1311 Overbrook Road, Richmond 23220-1405
Roanoke	Chauncey L. Logan	P.O. Box 13145, Roanoke 24031
Salem	Michael A. Bryant	19 North College Avenue, Salem 24153

CITY	SUPERVISOR/DIRECTOR	ADDRESS
Stauton	Darlene B. Hiner	P.O. Box 900, Staunton 24402-0900
Suffolk	Larry E. Garland	P.O. Box 1549, Suffolk 23434
Virginia Beach	David L. Pace	1612 New York Ave., Virginia Beach 23454
Waynesboro	Thomas P. Muncy	301 Pine Avenue, Waynesboro 22980
Williamsburg/		
James Ci.Co.	Frank Labrecque	597 Jolly Pond Road., Williamsburg 23187-7328
Winchester	Mady Wratchford	P.O. Box 551, Winchester 22601

TOWNS

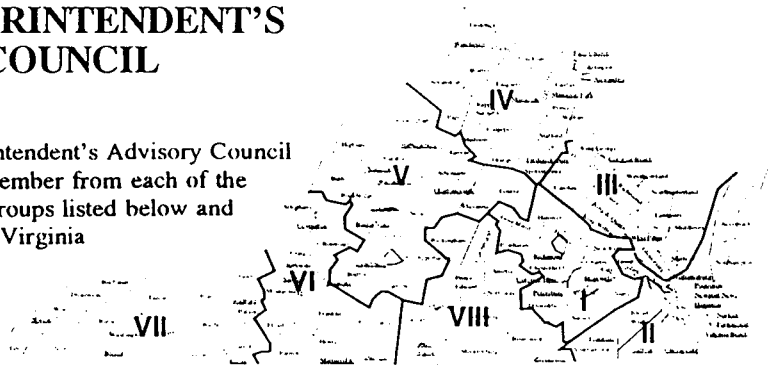
TOWN	SUPERVISOR/DIRECTOR	ADDRESS
Colonial Beach	Gordon Combs	300 Garfield Ave., Colonial Beach 22443
West Point	Dr. K.Jane Massey-Wilson	1600 Main Street, West Point 23181
VSDB-Hampton	Ruth Berman	700 Shell Road, Hampton 23661
VSDB-Staunton	Marvin Mahler	E. Beverly Street, Staunton 24401-0943

APPENDIX H

Virginia Educational Regions Map

STATE SUPERINTENDENT'S ADVISORY COUNCIL

The State Superintendent's Advisory Council is composed of one member from each of the eight regional study groups listed below and representatives of the Virginia Association of School Superintendents.



REGIONAL STUDY GROUP NO. I

Chairman - Thomas R. Fulghum, Superintendent
Chesterfield County Public Schools
P.O. Box 10
Chesterfield, VA 23832
(804) 748-1411

County	*County*	*County*	*City*
Charles City	Hanover	Prince George	Colonial Heights
Chesterfield	Henrico	Surry	Hopewell
Dinwiddie	New Kent	Sussex	Petersburg
Goochland	Powhatan		Richmond

REGIONAL STUDY GROUP NO. II

Chairman - Alfred R. Butler, IV, Superintendent
Franklin City Public Schools
800 West Second Avenue
Franklin, VA 23851
(804) 569-8111

County	*City*	*City*	*City*
Accomack	Chesapeake	Poquoson	Williamsburg/
Isle of Wight	Franklin	Portsmouth	James City
Northampton	Hampton	Suffolk	
Southampton	Newport News	Virginia Beach	
York	Norfolk		

REGIONAL STUDY GROUP NO. III

Chairman - J. Richard Garnett, Jr., Superintendent
Fredericksburg City Public Schools
817 Princess Anne Street
Fredericksburg, VA 22401
(703) 372-1130

County	*County*	*City*	*Town*
Caroline	Mathews	Fredericksburg	Colonial Beach
Essex	Middlesex		West Point
Gloucester	Northumberland		
King and Queen	Richmond		
King George	Spotsylvania		
King William	Stafford		
Lancaster	Westmoreland		

REGIONAL STUDY GROUP NO. IV

Chairman - James E. Upperman, Superintendent
Manassas City Public Schools
9000 Tudor Lane
Manassas, VA 22110
(703) 361-0166

County	*County*	*County*	*City*
Arlington	Frederick	Prince William	Alexandria
Clarke	Loudoun	Rappahannock	Fairfax
Culpeper	Madison	Shenandoah	Falls Church
Fairfax	Orange	Warren	Manassas
Fauquier	Page		Manassas Park
			Winchester

REGIONAL STUDY GROUP NO. V

Chairman - Glen H. Stark, Superintendent
Rockbridge County Public Schools
417 Morningside Drive
Lexington, VA 24450
(703) 463-7386

County	*County*	*City*	*City*
Albemarle	Fluvanna	Bedford	Waynesboro
Amherst	Greene	Buena Vista	
Appomattox	Highland	Charlottesville	
Augusta	Louisa	Harrisonburg	
Bath	Nelson	Lexington	
Bedford	Rockbridge	Lynchburg	
Campbell	Rockingham	Staunton	

REGIONAL STUDY GROUP NO. VI

Chairman - Dennis G. Witt, Superintendent
Patrick County Schools
P.O. Box 346
Stuart, VA 24171
(703) 694-3163

County	*County*	*City*
Alleghany Highlands	Henry	Covington
Botetourt	Montgomery	Danville
Craig	Patrick	Martinsville
Floyd	Pittsylvania	Roanoke
Franklin	Roanoke	Salem

REGIONAL STUDY GROUP NO. VII

Chairman - Larry A. Massie, Superintendent
Russell County Public Schools
P.O. Box 8
Lebanon, VA 24266
(703) 889-6500

County	*County*	*County*	*City*
Bland	Grayson	Smyth	Bristol
Buchanan	Lee	Tazewell	Galax
Carroll	Pulaski	Washington	Norton
Dickenson	Russell	Wise	Radford
Giles	Scott	Wythe	

REGIONAL STUDY GROUP NO. VIII

Chairman - James M. Anderson, Jr., Superintendent
Prince Edward County Public Schools
Rt. 5, Box 680
Farmville, VA 23901
(804) 392-8893

County	*County*	*County*	*County*
Amelia	Charlotte	Halifax/South Boston	Nottoway
Brunswick	Cumberland	Lunenburg	Prince Edward
Buckingham	Greensville/Emporia	Mecklenburg	

APPENDIX I

Survey Evaluation Form

Survey Evaluation Form

Directors of Transportation

(or Training Officer)

In an effort to provide a comprehensive review of the survey instrument, please respond to each of the seven(7) questions below. You are encouraged to provide additional comments and suggestions in the space provided or write them on the actual survey instrument. Please return your completed survey and this evaluation form in the enclosed, stamped, pre-addressed envelope.

Thank you for your efforts in making this research more productive.

[Circle your responses]

1. Are the questions clear? YES NO
2. Is the survey format easy to follow? YES NO
3. Is the survey excessive in length? YES NO
4. Do you sense a need for additional responses to the multiple choice questions?

   YES NO

If so, place these additions on the survey by the appropriate question.

5. Does the print size make for difficult reading? YES NO
6. Indicate any question that is not easy to understand.**(circle your responses)**

   1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
   19 20 21 22 23 24 25 26 27 28 29 30 31 32

7. Approximately how long did it take you to complete the survey?

   _____ minutes

APPENDIX J

Cover Letter for the Transportation Director's Survey

February 17, 1997

Dear

Virginia's school buses transport over eight hundred thousand students daily in route to logging 116,000,000 annual miles. Unfortunately, a comparison of school buses to other forms of registered vehicles revealed that Virginia's school buses are involved in an unusually high number of accidents per hundred million miles of travel. Because little is known about the reason for this phenomenon, a clearer understanding of school bus driver training programs will add valuable information to the research on school bus accident reduction.

Within your packet you will find four envelopes. One envelope addressed to yourself and the remaining envelopes to three of your school division's school bus drivers. **Please distribute the letters to the drivers using your inter-school mailing system.**

As a director of transportation, you are one of a small number of individuals who can access the training program school bus drivers undergo. You can assist in this effort by completing the enclosed questionnaire (yellow in color). **To assure a true representation of training programs from all parts of Virginia, it is important that you complete and return the questionnaire.**

Please answer all questions completely. Your confidentiality will be protected and no name is required on the questionnaire. There is an identification number in the upper right corner of the survey used for data collection purposes only. The code number allows us to check you off the mailing list as having returned the questionnaire. At no point will your name be placed on the questionnaire.

The results of the research will be provided to the Virginia Department of Education-Pupil Transportation Services (VDOE-PTS), representatives in state government, local education authorities (LEAs), and interested citizens. If you have questions about this study or are interested in a summary of the results, please write or call (804) 349-6429. Thank you for your input.

Please return the completed questionnaire in the enclosed, preaddressed, stamped envelope by February 28, 1997.

Sincerely,

James O. (J. O.) Crews Project Director
In Cooperation with:
Dr. Barbara V. Goodman
Director of Pupil Transportation Services
Virginia Department of Education
Richmond, Virginia 23216-2060

APPENDIX K

Cover Letter for the School Bus Driver's Survey

February 17, 1997

Dear

Virginia's school buses transport over eight hundred thousand students daily in route to logging 116,000,000 annual miles. Unfortunately, a comparison of school buses to other forms of registered vehicles revealed that Virginia's school buses are involved in an unusually high number of accidents per hundred million miles of travel. Because little is known about the reason for this phenomenon, a clearer understanding of school bus driver training programs will add valuable information to the research on school bus accident rate reduction.

As a school bus driver, you are one of a small number of individuals who can access the training program school bus drivers undergo. You can assist in this effort by completing the enclosed questionnaire (yellow in color). **To assure a true representation of training programs from all parts of Virginia, it is important that you complete and return the questionnaire.**

Please answer all questions completely. Your confidentiality will be protected and no name is required on the questionnaire. There is an identification number in the upper right corner of the survey used for data collection purposes only. The code number allows us to check you off the mailing list as having returned the questionnaire. At no point will your name be placed on the questionnaire.

The results of the research will be provided to the Virginia Department of Education-Pupil Transportation Services (VDOE-PTS), representatives in state government, local education authorities (LEAs), and interested citizens. If you have questions about this study or are interested in a summary of the results, please write or call (804) 349-6429. Thank you for your input.

Please return the completed questionnaire in the enclosed, pre-addressed, stamped envelope by February 28, 1997.

Sincerely,

James O. (J. O.) Crews, Project Director
In Cooperation with:
Dr. Barbara V. Goodman
Director of Pupil Transportation Services
Virginia Department of Education
Richmond, Virginia 23216-2060

APPENDIX L

Cover Letter Sent With School Division Survey Packets

February 17, 1997

Dear

During the third week of December, 1996, you responded to a pilot survey on school bus driver training. Thank you for your response. The information you provided initiated revisions which le d to the finished questionnaire, now being distributed to school bus drivers and other directors of transportation.

In another act of assistance, **please distribute the three enclosed surveys to the driver named on each envelope.** Each envelope contains a survey instrument and a pre-addressed, stamped envelope to be used in returning the completed questionnaire.

The three drivers chosen from your school division to participate in the study were selected at random from a list of school bus drivers acknowledged by your school division. Lists were provided the researcher by the Virginia Department of Motor Vehicles (VDMV) in cooperation with the Virginia Department of Education-Pupil Transportation Services (VDOE-PTS).

Please encourage the drivers selected to respond. An increased response rate will increase the probability of receiving a more representative sample.

Thank you for your assistance, and **thank you for putting the safety of children at the center of your concern.**

Sincerely,

James O. (J. O.) Crews, Project Director
In Cooperation with:
Dr. Barbara V. Goodman
Director of Pupil Transportation Services
Virginia Department of Education
Richmond, Virginia 23216-2060

APPENDIX M

Post Card Follow Up

Dear:

On February 17, 1997, you were mailed a survey packet containing material for you and three of your school bus drivers. If any of the three drivers no longer works for your school division, please choose other drivers to complete the survey.

If you and your bus drivers have already returned the completed questionnaires, please accept my sincere thanks. If not, please do so today. Because this survey was sent to only Virginia directors of transportation or school bus drivers, it is extremely important that your responses be included in the study to ensure results accurately reflect the opinions of Virginia's pupil transportation system.

If by some chance you did not receive the questionnaires or they were misplaced, please call me right now, (804) 349-6429 or (804) 572-3004, and I will get another set in the mail to you today.

Sincerely,

James O. Crews
Project Director
In cooperation with Dr. Barbara V. Goodman
Director of Pupil Transportation Services
Richmond,VA 23216

APPENDIX N

Third Correspondence

March 17, 1997

Dear _____:

You were recently mailed a questionnaire which is a major part of a statewide study of school bus driver training in Virginia's Local Education Authorities (LEAs). As of yet, we have not received your completed questionnaire.

It has been encouraging to have received a large number of completed questionnaires. However, to develop a complete picture, it will be necessary to receive input from you and others who have not yet responded. Experience tells researchers that those of you who have not yet responded may have had very different experiences in school bus driver training.

This study is the first statewide research on this subject to be conducted. Thus, the results will be of interest to many citizens, school officials, and lawmakers, all of whom are concerned about the safety of children. The data gathered and the usefulness of it are dependent on how accurately we are able to describe the training school bus drivers are offered.

Because of the importance of receiving your input, I have sent this information by certified mail to insure delivery. Replacement questionnaires have been included in this packet in case previous correspondence did not reach you. I urge you to please complete and return the completed questionnaire as quickly as possible.

Should you like to have a copy of the results, I will be happy to send you one. To do so, I will need you to enclose your name, address, and the phrase "Results Requested" on the last sheet of the questionnaire. Survey results should be available by mid-summer.

Thank you for your help in moving us one step closer to the completion of this study.

Sincerely,

James O. (J. O.) Crews
Project Director

In cooperation with Dr. Barbara Goodman
Virginia Department of Education Director of Transportation

VITA

Education

James Oris Crews was born August 31, 1955, in Halifax County, Virginia. He graduated from Halifax County High School in 1973. He earned a Bachelor of Science degree in Mathematics, with an endorsement to teach, from Averett College (Danville, VA) in 1979. In 1984, he received the Master of Arts degree in Administration and Supervision from Longwood College, Farmville, VA. He completed requirements for the Certificate of Advanced Graduate Studies in 1996 from Virginia Polytechnic Institute and State University, Blacksburg, VA. He completed requirements for the Doctor of Education in Educational Administration degree at Virginia Polytechnic Institute and State University in the fall of 1997.

Experience

After graduating from Averett College in 1979, he pursued a career as a teacher of mathematics at Halifax County Junior High School. During the years he was employed at that school, he served as teacher, mathematics department chairperson, football coach, and track coach. In addition, he served on the adjunct faculty at Longwood College. In 1989, he transferred to Project IDEA, a school for gifted and talented students of the Halifax County Public School system.

In 1992, he was promoted to the position of assistant principal at Halifax County Middle School. In this position he was responsible for discipline, scheduling, grade reporting, teacher evaluation, and curriculum development.

In 1994, he was promoted to the position of principal of C. H. Friend Elementary School, South Boston VA.

In 1996, he was promoted to his current position as the Director of Energy Management Services for the Halifax County Public School system.

Professional Associations

During his professional career, he was a member of the Piedmont Area Council of Teachers of Mathematics, Virginia Mathematics League, Virginia Middle School Association, Halifax County Education Association, Virginia Education Association, and National Education Association.