June 1983
Final Report

DOT HS-806 568

U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

Evaluation of Safe Performance Secondary School Driver Education Curriculum Demonstration Project

DeKalb County Board of
Education
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Contract No. DOT-HS-6-01462
Contract Amount $4,277,771

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle	5. Report Date
Evaluation of Safe Performance Secondary School Driver Education Curriculum Demonstration Project	June 1983
	6. Performing Organization Code: G-6765
7. Author(s) J. R. Stock, J. K. Weaver, H. W. Ray, J. R. Brink, M. G. Sadof	8. Performing Organization Report No.: Final Report
9. Performing Organization Name and Address: Battelle Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201	10. Work Unit No. (TRAIS)
	11. Contract or Grant No.: DOT-HS-6-01462
12. Sponsoring Agency Name and Address: DeKalb County School System, 3770 North Decatur Road, Decatur, Georgia 30032 and U.S. Department of Transportation and National Highway Traffic Safety Administration, Washington, D.C. 20590	13. Type of Report and Period Covered: Final Report, December 1977 - June 1983
	14. Sponsoring Agency Code

15. Supplementary Notes

Contract Technical Manager - Clayton J. Hall, NHTSA

16. Abstract

The primary objective of this Project was to determine the crash reduction potential of a quality, competency-based driver training program known as the Safe Performance Curriculum (SPC). The experimental design called for the random assignment of 18,000 volunteer high school students in DeKalb County Schools, Georgia, to one of the following: (1) Safe Performance Curriculum (SPC) - a 70-hour course including classroom, simulation, range, and on-street training; (2) Pre-Driver Licensing (PDL) - a modified curriculum containing only the minimum training required to obtain a license: (3) Control - no formal driver education in the secondary school. The sample of students were monitored for a period of 2 to 4 years after assignment to assess measures of intermediate and ultimate performance. The primary measures of ultimate performance analyzed were the numbers and types of crashes and violations the students experienced in this time frame. Comparative analyses of SPC vs. PDL vs. Control groups were then made in terms of these ultimate measures.

Final detailed analyses showed a statistically significant short-term program effect with SPC and PDL groups having significantly lower accident and violation means during the first 6 months of licensed driving. However, with an increasing time period of observation, the comparative relative differences between group means decreased and were not statistically significant. Moreover, the short-term effect was additionally offset or neutralized by the earlier licensing of SPC and PDL group students, yielding a net effect of no statistically reliable differences among SPC, PDL, and Control groups of students in overall accident and violation means.

17. Key Words	18. Distribution Statement
Driver performance; driver education; Safe Performance Curriculum	This document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	115	

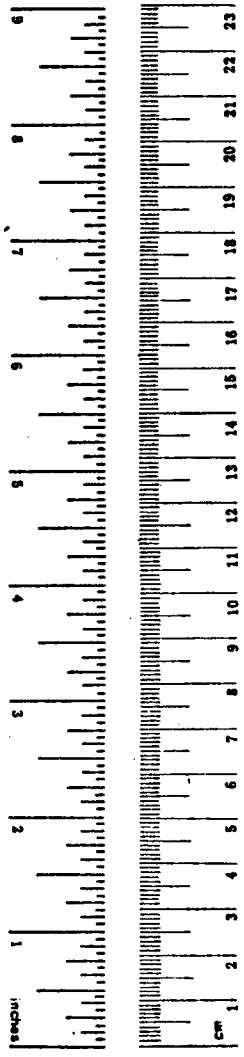
Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

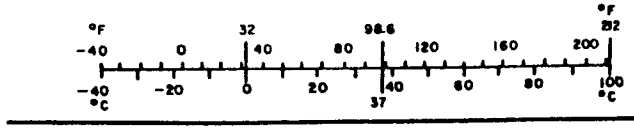
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



PREFACE

The participation and support of many individuals and organizations were required in the conduct of the project because of its size, complexity, and duration. The following persons, agencies, and firms contributed significantly to the successful completion of the "Safe Performance Secondary School Driver Education Curriculum Demonstration Project" and are acknowledged for their important project roles.

- The DeKalb County School System Administration and Board of Education. A special recognition is extended to Dr. James H. Hinson, Jr., Dr. Harold N. Dennis, and Mr. Ralph Dodson, for their guidance, relentless support, and professional commitment. During the project, Dr. Hinson was the Superintendent, Dr. Dennis was the Associate Superintendent, and Mr. Dodson was Director of the Finance Department.

- The administration and technical staff of the National Highway Traffic Safety Administration (NHTSA). Particularly Mr. Clay Hall, the NHTSA Contract Technical Manager. Mr. Hall's wisdom, understanding, and tireless efforts were essential to the project completion.

- By providing auto insurance coverage to the Control group students, as well as to the two experimental groups' students, the following insurance companies played a vital role in the selection and maintenance of an unbiased sample of student participants.

  Aetna Life & Casualty
  Allstate Insurance Company
  Cotton State Insurance
  CNA Insurance Company
  Fireman's Fund Insurance Company
  GEICO Insurance Company
  Horace Mann Insurance Company
  Kemper Insurance Companies
  Liberty Mutual Insurance Company
  Nationwide Insurance Company
  State Farm Mutual Insurance Company
  Transamerica Insurance Group
  United Services Automobile Association

- A special recognition is given to Mr. Frank Parker, Deputy Insurance Commissioner for the State of Georgia, for his cooperation and advise.

• The Columbus Laboratories of Battelle Memorial Institute for exemplary services in experimental design, and the collection, processing, and analysis of the project data. The Battelle Project Staff was directed by Dr. John R. Stock, and the principal staff persons were: Michael G. Sadof, Dr. Horace W. Ray, James R. Brink, Joan M. Weaver, Gary Yates, Mary Beth Zak Lohse, Glenn H. Beatty, and Betty S. Sullivan.

• The following automobile dealers and their manufacturers provided more than 500 driver education vehicles during the project.

Hix Green Buick Company
Frank Bush Chevrolet Inc.
Leiphart Chevrolet Inc.
Doug McCurdy Chevrolet Inc.
Lamar Ferrell Chevrolet Inc.
Hickman Datsun Inc.
Troncalli Motors Inc.
Honda Carland
Mitchell Motors
Royal Oldsmobile Company
McNamara Pontiac Inc.
Spreen Toyota Inc.

• Although many traffic safety professionals were utilized as project advisors and consultants, the following persons were instrumental in the project process and product.

Dr. James E. Aaron
Dr. Leroy Dunn
Mr. Carlton Fisher
Dr. W. Kent Jessee
Dr. Frances Kenel
Dr. Charles E. McDaniel
Dr. James McKnight
Dr. Robert L. Marshall
Mr. Raymond C. Peck
Dr. Glenn Peavy
Dr. Thomas A. Seals
Mr. Glenn Winningham

• Special recognition is given to the late Dr. Richard Bishop for developing the Safe Performance Curriculum conceptual base, and providing motivational guidance before and during the project.

- The Project Staff. Because of the professional integrity and performance of the following persons, the project was completed successfully.

Dr. Jack K. Weaver, Project Director
Monty O. Parker, Assistant Project Director
Carla S. Lirely, Curriculum Coordinator
Phyllis Bates, Administrative Assistant
Dan Cushman, Team Leader
Elaine Axton, Team Leader
Keith Hendrix, Team Leader
Belinda Joines, Team Leader
Keith Kenney, Team Leader
Michael Weaver, Instructor
Kal Kelliher, Instructor
Paul Stouffer, Instructor
Troy Martin, Instructor
Jack Anderson, Instructor
Charles Wilson, Instructor
William Wang, Instructor
Maudell Marable, Instructor
Larry Joines, Instructor
Talkoy Peoples, Instructor
Sue Nunn, Instructor
Sam Seat, Instructor
William Bast, Instructor
James Reeves, Instructor
Roberta Wykowski, Instructor
Cherry Posey, Data Collection Aide
Carroll Nordan, Data Collection Aide
Mildred Bagwell, Data Collection Aide
Leonard Moore, Instructional Aide
Janet Pierce, Instructional Aide
Cindy Rowe, Instructional Aide
Lionel Alls, Instructional Aide
Robert Day, Instructional Aide

• The DeKalb County School System Computer Center (DISPAC). The management and staff of DISPAC is recognized for the processing, storage, and maintenance of the project student files.

Also acknowledged for their participation in the project, are the Georgia Office of Highway Safety, the Georgia Department of Public Safety, the Georgia Department of Administrative Services (DOAS), more than 50 part-time persons that administered road tests, collected driver exposure data, performed data tabulation tasks, and served in various clerical roles, and the thousands of project student participants who were the subject of this study.

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I. PROJECT OVERVIEW

INTRODUCTION

The composite of high school driver education (HSDE) programs preceding the planning and initiation of the Safe Performance Secondary School Driver Education Curriculum Demonstration Project (SPC Project) has a significant history dating from the early 1930's. This history is included in a comprehensive review of HSDE and studies of teen-age drivers presented in The Driver Education Evaluation Program (DEEP) Study: A Report to the Congress (National Highway Traffic Safety Administration, 1975). A few excerpts from the review of the DEEP study, presented below, place the SPC Project in the context of the evolution of high school driver education programs.

> "Basically, the idea of training persons to operate motor vehicles stems from the assumption that trained or experienced persons will perform better in most traffic situations than untrained or inexperienced people. The beginning of driver and safety education was based primarily on this assumption, and most programs were implemented on the basis of their face validity for accident prevention. In addition to the commonsense emphasis placed on the skills required for driving, a similar emphasis was placed on the development of assumed safe-driving attitudes, with the belief that such attitudes would result in fewer crashes and that such attitudes could be manipulated or developed.
>
> Unfortunately, it was not until very recently that an attempt has been made to determine scientifically which behavioral variables (including attitudes and skills) have a causal relationship with crashes. Recent efforts have also sought to determine whether such variables can be manipulated or developed by means of effective training. Measurement of the extent to which a curriculum meets such instructional objectives and various performance requirements has also been emphasized recently. Furthermore, serious attempts are now being made to assess the degree to which such programs are successful in meeting their ultimate goal of crash prevention." (p. 25).
>
> "As is already apparent (from preceding sections), there are many considerations in a proper evaluation of driver education. For example, there must be a clear statement of the objectives against which the program is to be measured. Then, too, it is all too apparent from the failures of past studies in this area that a rigorous and proper research design must be employed in order that the results obtained have any potential for interpretation. Even before these requirements can be met, however, it must be possible to define and describe the program being evaluated. (As pointed out in the 'Issues' section of this report), HSDE programs vary widely among

the States, within any one State, within school districts, and usually even among teachers within the same school.

To lay the proper groundwork for a research and development program that would take these and other requirements into consideration, NHTSA awarded four separate but parallel contracts in 1968 for the purpose of developing 'a concrete plan or plans for evaluating the effectiveness of current or proposed driver education programs.' These contracts were awarded to New York University, Dunlap and Associates, the Institute for Educational Development, and American University. The final reports of these four studies were submitted during the summer of 1968. The four reports contained many common elements as well as a number of unique features (New York University, 1968; Dunlap and Associates, 1968; Kennedy, et al, 1968; Lybrand, 1968).

To synthesize the information provided in these reports into a single body of information and recommendations, a contract was awarded to the National Academy of Sciences, Highway Research Board (HRB)(now the Transportation Research Board), in 1969 (Harman, et al, 1969). Specifically the primary task involved in this contract was to synthesize the various evaluation plans and instruments included in the four final reports and to develop a single optimal plan for evaluating driver education. The plan that developed from this contract defined both short- and long-term efforts that would be required for a proper evaluation of HSDE. The immediate or short-term efforts that would be required included the following:

(1) Identification and analysis of the various tasks involved in driving, as well as the knowledge, skills, and attitudes required for the performance of these tasks

(2) Determination of program objectives, based on the foregoing task analysis as well as the requirements of the highway traffic system

(3) Development of an instrument for measuring the degree to which the program meets the short-term objectives for which its contents were intended.

An additional component of these short-term requirements was also specified, which involved:

(4) Development of specifications for measures of performance and for an appropriate research design.

The long-term efforts or requirements identified in the HRB report included:

(5) Development (and eventually validation) of actual performance measures based on the specifications already developed

(6) Actually conducting the long-term evaluation project(s)." (pp. 53-55).

The evaluation of the SPC Project is a part of the National Highway Traffic Safety Administration's now twelve-year on-going research program to evaluate secondary school driver education based, essentially, on the plan outlined by the Highway Research Board in the 1969 report. The primary objective of the study is to determine the crash reduction potential as well as the instructional effectiveness of a quality, competency-based driver training program known as the Safe Performance Curriculum (SPC).

Briefly, the HRB plan, as subsequently modified, called for an analysis of the driving task, identification of instructional objectives for driver education based on those tasks with a high or moderately high criticality, development of curriculum specifications and then a curriculum with a safe performance orientation, and finally, evaluation of that curriculum for its instructional effectiveness and crash reduction potential. The following components of the plan have been completed:

(1) Driver Education Task Analysis, 1970

(2) Instructional Objectives for Driver Education, 1971

(3) Curriculum Specifications for Secondary School Driver Education, 1973

(4) Instructional Program Development, 1973

(5) Program Evaluation Based on Training Acquisition Measures, 1974

(6) Safe Performance Curriculum Performance Measures Development, 1977.

The fifth listed item, program evaluation, was accomplished in a pilot program conducted in Kansas City, Missouri, where driver education is not a State requirement. The implementation took place in three high schools where driver education was not previously offered. Students who volunteered for the program were randomly assigned to one of the following:

(1) Safe Performance Curriculum (SPC) - a 70-hour course including classroom, simulation, range, and on-street training.

(2) Pre-Driver Licensing (PDL) - a modified curriculum including four-phase instruction but containing only the minimum training required for the student to obtain a license.

(3) Control - no formal driver education in the secondary school.

Difficulties were experienced throughout the implementation phases of the Kansas City Project including: maintaining control over random assignment of students to groups, delays in scheduling, inadequate instructor preparation, and the lack of a clear delineation of responsibility at the administrative levels. Because of these problems and, primarily, because sample sizes were smaller than anticipated and a relatively low percentage of students participating in the program obtained drivers' licenses, long-term follow-up measures (accidents and violations) were not obtained, although they were originally planned. Comparisons between the SPC and PDL groups were obtained on intermediate performance measures: written knowledge tests, range and on-road performance tests, a perceptual skills test, and an attitude measure.

The completed DeKalb County School System demonstration project was the next logical step in the evaluation procedure and provides answers to some of the questions that have been generated in past studies. The experimental design of the SPC demonstration involved the collection of empirical data from three randomly assigned independent groups of volunteer subjects. The procedure for randomly assigning the target of 18,000 high school students to SPC, PDL, and Control groups was controlled by a computer program and performed with regard to demographic variables producing a stratified random sampling design.

The sample of students were monitored for a period of two to four years after assignment to assess measures of intermediate and ultimate performance. The primary measures of ultimate performance analyzed were the numbers and types of crashes and violations students experienced in this time frame. The large sample size provides a narrow confidence interval, permitting the detection of a 10-15 percent difference in crash rates between groups, if it is present.

The evaluation questions to be answered by the SPC demonstration are organized into three major areas: Impact, Correlational (i.e., questions dealing with predictors of individual driving performance), and Administrative.

Impact

- Does enrollment (assignment) in the Safe Performance Curriculum (SPC) or the Pre-Driver Licensing Training (PDL) change the probability of crash/violation involvement during the period two to four years after course completion?
- Does completion (and licensing) of the SPC or PDL decrease the probability of crash/violation involvement (during the period two to four years after course completion) given students receiving their license at the time they would in the absence of the SPC or PDL?
- Does completion (and licensing) of the SPC or PDL change the probability of crash/violation involvement during the period two to four years after course completion?
- Do students completing instruction (and licensing) in the SPC experience different types of crashes, or crashes of different severity, than students completing instruction in the PDL or students who take no driver education in the secondary schools?
- Do students completing instruction (and licensing) in the SPC experience different types of violations, as reflected in their driving records, than students completing instruction in the PDL or students who take no driver education in the secondary schools?
- Do students completing instruction (and licensing) in the SPC experience fewer administrative license actions (suspensions/ revocations) than students completing instruction in the PDL or students who take no driver education in the secondary schools?
- Do students completing (and licensing) the SPC have higher driving knowledge test scores than those completing the PDL or those receiving no driver education in the secondary school?
- Do students completing (and licensing) the SPC perform better on an on-road performance test than those completing the PDL or those receiving no driver education in the secondary school?

Correlation

- To what extent do students with higher driving achievement test scores (e.g., driver knowledge and on-road performance test) tend to have better subsequent driving records, during the period two to four years after training, than those with lower achievement test scores?
- Is there any correlation between student personal characteristics measures and subsequent driving records (crashes and violations)?
- Do students with higher grade point averages have better subsequent driving records than students with lower grade point averages?
- Is there any correlation between sex, age, and socio-economic status as predictors of crashes and violations?

Administrative

- What are the comparative costs required to administer the SPC and PDL curricula?
- What are the problems encountered in the administration of the SPC such as selection and training of instructors?
- What are the requirements in facilities, equipment, personnel, and curriculum to administer the SPC?
- What are the comparative costs of the SPC and the savings by reduction of accidents?
- Are the assignments of students to groups being made randomly and according to the evaluation plan?
- Are the students enrolled in the curriculum to which they are assigned?
- Are students dropping out of one curriculum more frequently than the others? If so, why?

- Are the curricula being presented in a comprehensive, consistent fashion in accordance with the curriculum guidelines?
- Are the scheduling problems in the schools being worked out to the satisfaction of the principals, counselors, project staff, etc.?
- Are instructor concerns being brought to the attention of the proper individuals and are they being dealt with effectively?
- Are follow-up efforts uniformly successful across treatments in locating and acquiring follow-up data on the students?
- Are data being provided satisfactorily by DeKalb's Department of Information Services, Planning, Auditing and Control (DISPAC)? Georgia Department of Administrative Services (DOAS)?
- Is the project being accepted or criticized by the students, counselors, parents, principals, School Board, news media, general public?
- Are facilities and equipment availability adequate?

Principal Findings

Final results of the detailed analyses revealed that in those analyses where the entire driving records of all *assigned* project students were examined, no statistically significant differences were found among the overall accident means and overall violation means (number of accidents or violations per person) of SPC, PDL, and Control group students. These were the primary analyses directed toward the question of whether implementation of the SPC or PDL programs in a school system result in a change of accident or violation occurrence. In analyses controlling for time period of licensed driving, the *licensed* students of the driver education groups, SPC and PDL, were found to have statistically significant lower accident means and violation means than the *licensed* students of the Control group, during the first six months of licensed driving. During the second six-month period of licensed driving, SPC and PDL group violation means were lower than the Control group violation means, but not significantly so. There were

essentially no differences among SPC, PDL, and Control group accident means and violation means during the other six-month periods of licensed driving. Thus, it appears that the driver education programs, SPC and PDL, have the desired impact of reducing accident and violation occurrence, but this effect is short-term, so that with an increasing time period of observation, the comparative relative differences between group means decrease and are not statistically significant. Moreover, the short-term effect is additionally offset, or neutralized, by the earlier licensing of SPC and PDL group students, from about 23 to 32 days earlier, such that the net effect is no statistically reliable differences among SPC, PDL, and Control groups of students in the total aggregate (overall) accident and violation means. The neutralizing or offsetting effect is less for violation occurrence than for accident occurrence.

SPC Project Activity Summarization

On September 27, 1976, the DeKalb County School System and the National Highway Traffic Safety Administration entered into an agreement whereby the school system would perform certain administrative, instructional and evaluation tasks directly relating to the implementation and evaluation of the Safe Performance Secondary School Driver Education Curriculum Demonstration Project.

As indicated earlier, the Project design called for 18,000 students to be randomly assigned to two instructional groups, and one non-instructional group. Based on the Kansas City SPC pilot-project, it was assumed that 50 percent of the assigned students would become licensed drivers. Thus, an 18,000 subject sample size would be required to achieve a licensed driver sample of 9,000.

Project activities were carried out in the following three phases over a period of six years (1977-1983).

Phase I - Program Development
Phase II - Program Operations
Phase III - Data Analysis and Final Report

The primary objectives of Phase I were to (1) plan and construct instructional facilities (Driver Education Centers), (2) select and train the instructional staff, (3) up-date the Safe Performance Curriculum (SPC) and prepare an appropriate Instructor's Guide, (4) select a qualified project evaluation agency and prepare a project evaluation detailed plan, and (5) conduct and appraise a one-term (quarter) pilot course that utilized the SPC and the SPC delivery system.

Although some construction delays were encountered, all facilities were completed on or near schedule. Those delays which did occur were compensated for through minor adjustments in the pilot course schedule.

Using National Highway Traffic Safety Administration approved teacher selection criteria, the school system conducted a national search and was able to satisfactorily fill the twenty-five instructors positions as scheduled. More than two hundred and fifty driver education teachers applied for the twenty-five project instructional positions. A forty-five day instructor training program was carried out, as planned, prior to the start of the SPC pilot course.

Because of the large amount of traffic safety education information generated by the National Highway Traffic Safety Administration, American Driver and Traffic Safety Educators Association, private sector safety organizations, and certain university traffic safety centers, considerable up-dating of the original Safe Performance Curriculum was necessary. The curriculum modification and up-dating activity was carried out as scheduled, but involved substantially more person-hours of work than had been planned.

The pilot course was conducted as scheduled during the fall quarter of 1977. The curriculum and instructional delivery system were critiqued by the project evaluators, Battelle-Columbus, project staff and administration, and the National Highway Traffic Safety Administration officials. It was determined that the SPC curriculum and delivery system, as tested in the pilot course, were functional, and complied with objectives and concepts delineated in the Driver Education Task Analysis Report. Based on recommendations by the project administration and staff, minor logistical adjustments were approved by the National Highway Traffic Safety Administration and incorporated into the curriculum to be evaluated during Phases II & III of the project.

Since Phase I was essentially developmental in nature and scope, no impact data were generated. However, certain developmental findings were revealed for the Phase I Management Information Data. The most significant findings are: (1) socio-economic factors appear to influence the percentage of the students who apply for the driver education course, and (2) driver education centers which are configurated with thirty-vehicle driving ranges and thirty-place simulators are more cost-effective than centers utilizing fifteen-vehicle driving ranges and fifteen-car simulators.

Phase II was essentially operational in nature and scope. The primary Phase II objectives were to (1) conduct the instructional program and collect process related data, (2) monitor curriculum implementation, (3) conduct related in-service staff training, (4) monitor research design, and (5) analyze in-process data.

During the first year of Phase II, all project countermeasures (Administration, Instruction, Evaluation and Public Information) were implemented as planned. However, certain in-process implementation problems were encountered.

The most significant implementation problem was an unexpected low student enrollment in the second and third project quarters, Spring and Fall, 1978. The number of student applications for driver education slightly exceeded expectations, but due to student schedule conflicts, communication breakdowns, and student/counselor apathy, the numbers of SPC and PDL students scheduled for driver education were significantly less than anticipated.

Corrective measures were taken in the latter part of the first instructional year that normalized student enrollment.

The only other implementation problem of significance resulted from overburdening the man/machine capacities of the DeKalb County School System data processing department, DISPAC. Because the volume of student instructional/measurement data greatly exceeded expectations, several data processing delays were experienced during the 1978 operational year.

Although the machine capacity deficiency was not fully corrected, the main input deficiency was largely overcome by increasing the amount of human services being made available to the project evaluation countermeasures.

A major project public/private support effort was culminated late in 1978, when most of the nation's major automobile insurance companies agreed to give driver education insurance discounts to the project Control group students, students who applied for driver education but were selected for the non-treatment group, who demonstrate the required driving competencies by passing the University of Southern California On-Road-Performance-Test. Because of this cooperation on the part of the insurance companies and the Georgia Insurance Commission, much of the negative public attitude which was evident early in the project was eliminated.

The overall student application rate at the end of the eighth instructional quarter, June 1980, was somewhat less than pre-project expectations. Because of the logistical time lag between the student's application and the student's course enrollment, SPC and PDL groups, it was determined that the project instructional phase should be extended through a ninth and tenth quarter, ending March 1981. This extension was made to accommodate those students who had been assigned to a treatment group, but due to schedule conflicts, etc., had not been able to take the SPC or PDL course. Because of the higher than expected student licensing rate, the required number of licensed subjects, 9,000, was realized by the end of the ninth instructional quarter, November 1980.

By June 30, 1981, all Project Phase I and II tasks had been completed as planned. It should be noted that although student assignment was approximately 10 percent short of the 18,000 pre-project goal, the number of students completing the treatment and obtaining a driver's license, exceeded the 9,000 pre-project goal by 2,946 subjects. Thus, Phase II, Operational Phase, activities fully satisfied the data generation and experimental design requirements of the Project.

Phase III, Data Analysis and Final Report, began in January 1977 and continued through March 1983. In compliance with the Project Detailed Plan, interim data were processed and reported annually. Four analytical studies were prepared during the Project. These were: Statistical Analysis of Preliminary Data for the Safe Performance Curriculum Driving Knowledge Test (April 1979), Statistical Analysis of the Driving Habits, History and Exposure Survey for the Safe Performance Secondary School Driver Education Curriculum Demonstration Project (May 1980), Impact Assessment of the Safe

Performance Curriculum on On-Road Driving Test Performance (December 1980), and The Relationship of Intermediate Measures of Driving Performance and Personal Characteristics to Accident and Violation Occurrence for the Safe Performance Curriculum Driver Education Demonstration Project (September 1982).

Following the completion of Phase II, in 1981, the Project staff's time and efforts were primarily directed to the collection, tabulation, and processing of the driver performance and driver exposure data. Although a few logistical problems had to be overcome during FY 82, the collection of driver accident and violation data from the Georgia Department of Administrative Services computerized driver record files were very satisfactory.

Driving exposure data collection was one of the most difficult and perplexing evaluation tasks. Although the driver habits and history survey produced some useful driver behavior information, overall the data did not satisfy tests of reliability. In an effort to collect more reliable driving exposure data, the Project evaluation staff designed and implemented a telephone interview of a random sample of project students. Essentially, this approach required the selected students to report the specifics of the previous day's driving activities. A stratified sampling procedure provided driving exposure data for each day in the week and month of the year.

The telephone interviews began in October 1981, and were completed in September 1982. Three thousand Project students were randomly selected for the telephone interview sample. During FY 82, completed telephone interview forms were obtained for 1,815 Project students. The interviewed drivers were found to be very cooperative, and willingly provided the requested driving information.

A descriptive summary of the SPC Project is presented in Figure I-1, Project Flow, and Figure I-2, Schedule of Operational Tasks/Milestones.

Project Administrative Review

As stated earlier in this report, the Project design encompassed three activity phases. Each phase required the performance of a number of specific tasks. This review describes the tasks, and briefly discusses the administrative considerations related to the tasks.

FIGURE I-1. PROJECT FLOW

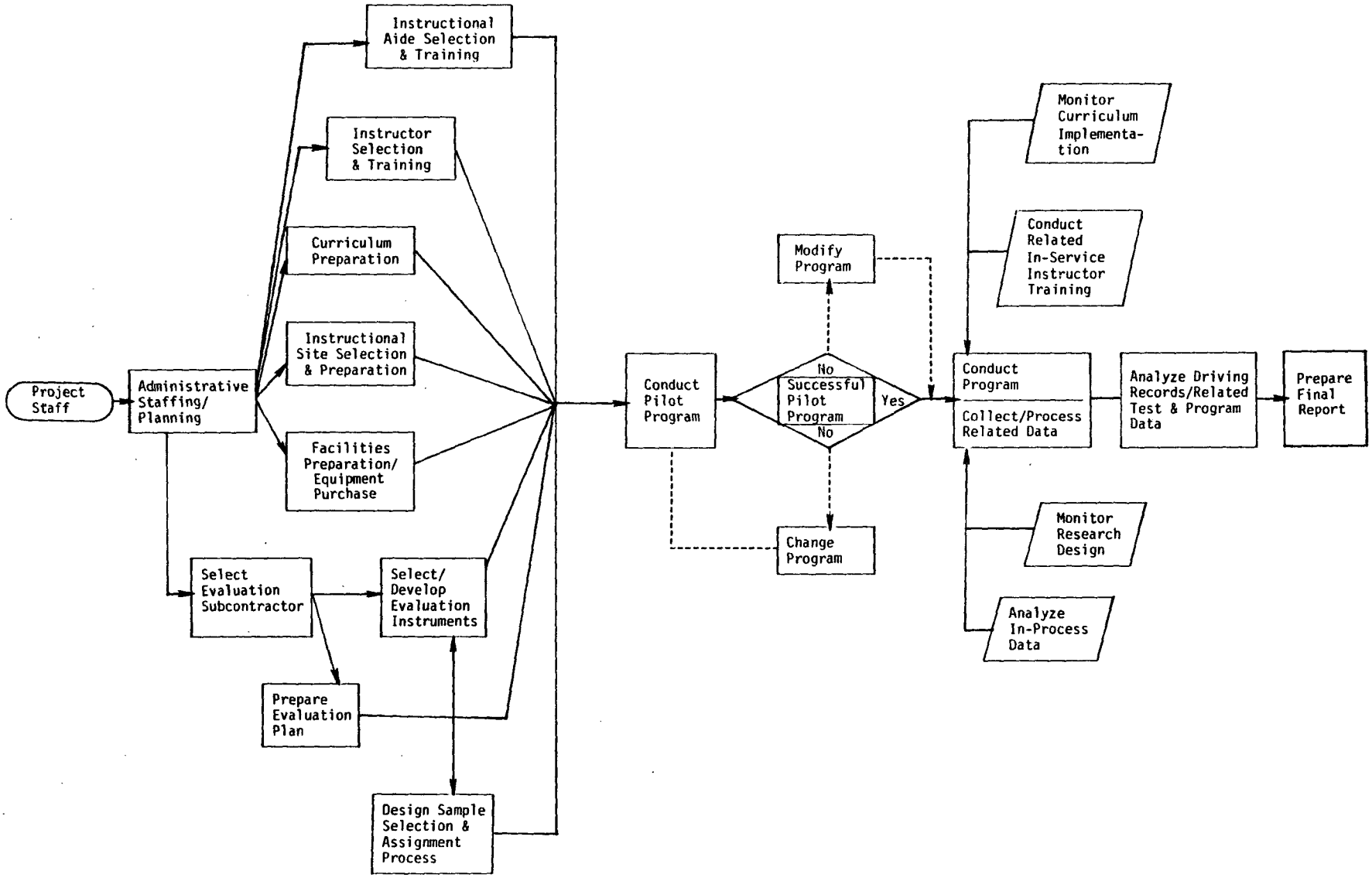
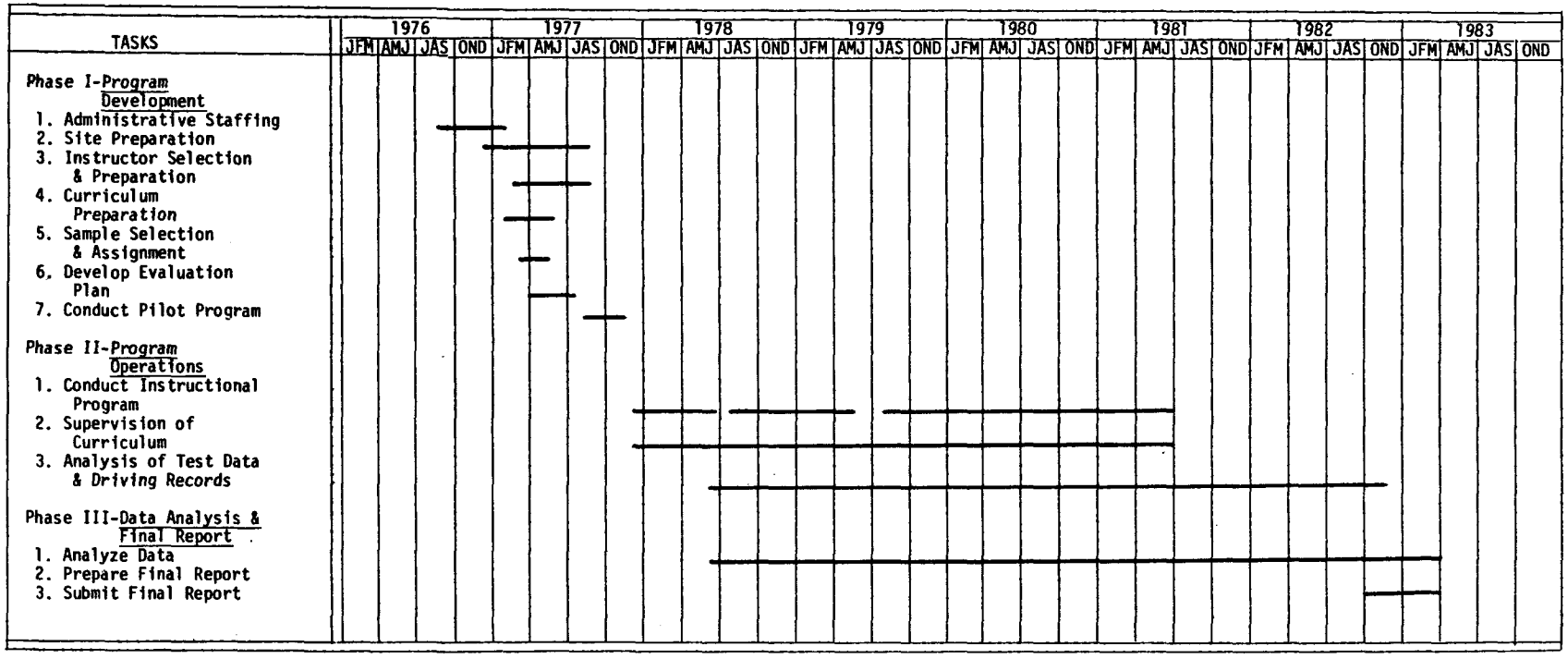


FIGURE I-2. SCHEDULE OF OPERATIONAL TASKS/MILESTONES



Phase I - Program Development

Task 1. Administrative Staffing

Following the award of the contract, the School System appointed three qualified persons to the following administrative positions: Project Director, Assistant Project Director (Facilities), and Curriculum Coordinator. Initial administrative planning relating to the Project research design, evaluation, reporting and curriculum implementation began with the appointment of Project administrative staff.

The Project Director position was filled in December 1976, after an extensive search and screening process. Although there were more than 100 applicants for the position, it was found that the number of candidates meeting the position criteria requirements was limited.

Some difficulties were also encountered in filling the Assistant Project Director and Curriculum Coordinator positions. Again, the School System received a large number of applications, but less than 5 percent of the applicants had the education and/or experience required. Thus, the Assistant Director position was not filled until April 1977, and the Curriculum Coordinator position was filled in May 1977. The delay in Project administration staffing resulted in an abnormal administrative work load during Phase I.

Task 2. Site Preparation

Four instructional sites, with the potential capability of providing cost-effective SPC and PDL driver education instruction for the School System's 7,600 students who became eligible for driver education each year, were selected and approved by the School System Administration and the School Board. The instructional sites were modified, as needed, to render them operational for Project implementation. Modifications included the construction of three thirty-vehicle and one fifteen-vehicle driving ranges, construction of one 5,000 square feet classroom/simulation building, and the renovation of three school buildings to prepare them for driver education classroom activities and simulation. Although some construction delays were experienced, all facilities were completed during Phase I. Minor pilot course instructional adjustments were made at two of the sites to accommodate construction delays. However, all pilot course activities were carried out in compliance with the SPC and PDL curriculum guide.

Concurrent with site preparation, existing school system facilities were prepared for driver education programming. Related instructional equipment such as simulators, range vehicles, and school buses were purchased or obtained through loan. Facilities preparation and equipment purchases were carried out as planned.

Some problems were encountered in obtaining the one hundred and twenty driver education vehicles required to implement the Project pilot course. The problem was ultimately resolved through an extensive effort on the part of certain vehicle manufacturers and the cooperation of community oriented automobile dealers. Timely assistance from the Highway Users Federation, the National Automobile Dealers Association, the American Driver and Traffic Safety Association and the DeKalb Chamber of Commerce were also very helpful in convincing dealers that they should participate in the driver education evaluation project.

Task 3. Instructor Selection & Preparation

Using a National Highway Traffic Safety Administration approved instructor selection process, a national search via professional literature, graduate school faculty, etc., was carried out to select twenty-five driver education teachers capable of teaching in a multi-phase driver education program. Four of the selected teachers who had special management skills and/or experience were designated as Team Leaders.

All of the selected instructors underwent an extensive ten-week training program prior to the project pilot program to prepare them to teach effectively the SPC and PDL Curricula. No significant problems were encountered in completing the selection and training activity as scheduled.

An Instructional Aide job description and job requirement statement was prepared by project staff. Using the description and statement as a guide, eight aides were employed. Prior to the start of the pilot program, aides were given approximately two weeks training to prepare them for their role in the program.

Task 4. Curriculum Preparation

Related curriculum information, materials, etc., developed by Human Resources Research Organization, Central Missouri State University, National Highway Traffic Safety Administration and others were examined, catalogued

and organized into a functional instructional format. An Instructors Guide for the SPC and PDL Curriculum was developed and reviewed by an Ad Hoc Advisory Committee composed of driver education experts.

Because of the large amount of curricular information that had been generated since the SPC was developed in 1971-72, the Advisory Committee suggested certain curriculum modifications and additions. Recommended modifications and additions were made prior to the Phase I pilot test of the curricula.

Task 5. Sample Selection & Assignment

In conjunction with project staff, Battelle personnel designed and developed a sample selection and assignment process. The selection and assignment process consisted of computer programs that stratified student project applicants, then randomly assigned the applicants to the SPC, PDL, and Control groups in equal numbers. The process was approved by the Project Director and NHTSA Project Contract Technical Manager.

Task 6. Develop Evaluation Plan

Upon award of contract, the School System began negotiations with Battelle Memorial Institute, Columbus Laboratories, to perform project evaluation tasks. In February 1977, a subcontract for project evaluation services was awarded to Battelle's Columbus Laboratories.

Subcontract negotiations were hampered by the lack of clearly established definitions as to the nature and scope of the evaluation effort. Subcontracting delays were ultimately overcome when representatives of the National Highway Traffic Safety Administration, Battelle, and the School System resolved definition and jurisdiction issues. Negotiations were lengthy and, although they resulted in a delay in getting the evaluation activities fully under way, understandings and agreements reached during the negotiations were vital to the development of the Project Detailed Plan.

The subcontractor for evaluation, Battelle-Columbus, prepared a detailed evaluation plan which was approved by Project Director and National Highway Traffic Safety Administration Contract Technical Manager. The plan encompassed the project research design, sample selection and assignment, data collection and treatment, and project monitoring. Because of the extended subcontract negotiations, significant delays were experienced in completing

the Detailed Plan. However, these delays did not preclude the successful completion of Project Phase I.

The evaluation subcontractor, in conjunction with the Project Director and the Project Contract Technical Manager, selected and/or developed measurement instruments to be utilized in collecting driver performance and driver knowledge data. It was found that appropriate measurement instruments were not available for measuring the student driving knowledge gain or range driving performance. Therefore, measurement instruments were developed and validated to perform this measurement task. The Mann Inventory was selected to measure the student's pre- and post-course personal and driving attitudes. The On-Road-Performance Test, developed by the University of Southern California, was selected as the post-course on-road test. To measure the student's end-of-course on-road driving performance, a special-teacher-administered on-road driver assessment instrument was developed by the project staff and reviewed by Battelle. Both the driving knowledge measurement instrument and the on-road driver assessment instrument were designed so as to be fully compatible with the SPC instructional objectives (Driver Education Task Analysis).

Task 7. Conduct Pilot Program

When all of the previous tasks were completed, a pilot program was carried out. The pilot program had a duration of one school quarter, sixty school days, and was designed to fully test the project instructional plan, curriculum, instructional effectiveness, and data collection capabilities.

Some minor instructional adjustments were made at two of the driver education centers because the paving contractors had not completed the driving ranges. Upon completion of the ranges, students were scheduled for additional range driving lessons as needed to bring them up to the desired driving performance level. End of pilot course on-road driving assessments did not show a significant difference between the driving capabilities of those students trained at the Centers with delayed range construction and those students trained at the completed course.

At the completion of the pilot program the Project Director and Project Contract Technical Manager had to decide which of the following alternatives would be in the best future interest of the Project: (1) approve the

curriculum and delivery system as tested and proceed with contract specified operations, (2) modify curriculum and/or delivery system to satisfy project requirements and program effectiveness criteria, if needed, and proceed with contract specified program operations, or (3) change curriculum and/or delivery system to meet contact and effectiveness criteria, if needed, and repeat pilot test.

With the benefit of information provided by the on-site evaluator, project instructional staff, and intermediate student performance data, it was decided that alternative (2) would be the best approach. Minor modifications in the curriculum content were made to bring the curriculum current with new traffic safety knowledge and/or information, e.g., alcohol and traffic safety, speed limits. No changes or modifications were made that affected the driving task oriented instructional objectives. The curriculum delivery system was determined to be satisfactory as designed, so no changes or modifications were needed.

Phase I - Administrative Findings

Since Phase I was essentially developmental in nature and scope, no impact measures were administered. However, certain Phase I management information measures were applied to the pilot program with the following findings.

(1) The project's thirty-place, one teacher, simulation installations were shown to be more cost-effective than the fifteen-place, one teacher, simulation installation when student's achievements were judged by intermediate measures, i.e., simulation tests, driving knowledge tests, and on-road performance tests.

(2) Thirty-vehicle driving ranges are most cost-effectively operated when vehicle control operations are carried out from a range control tower rather than from on-ground positions. It was also found that staff utilization and deployment is more cost-effective on thirty-vehicle ranges when compared to fifteen-vehicle ranges.

(3) The SPC curriculum delivery system can be more cost/time effectively carried out when students are block scheduled for an instructional duration of one hundred twenty minutes

per session, day, rather than the traditional sixty minutes per session. The one hundred twenty minutes instructional plan enables the student to participate in both classroom and laboratory learning experiences at each session, and reduces the amount of student travel time between the high school and the driver education centers by 50 percent.

Phase II - Program Operations

Task 1. Conduct Instructional Program

A total of 17,161 completed applications for driver education were received from students during the Project's ten quarters. Applications were scrutinized for previous application, age, and residency requirements, and the accepted students were randomly assigned to either the Safe Performance Curriculum (SPC), the Pre-Driver Licensing (PDL), or the Control (non-treatment) groups. In this process 16,750 eligible students were assigned to the three groups. However, to accommodate a logistical problem, the Quarter 10 students were divided into two groups, 10A and 10B, based upon an age cut-off. The 10B students were not included in the project.

Thus, at the completion of the Project Instructional Phase, 5,464 students had been assigned to the SPC group, 5,430 students had been assigned to the PDL group, 5,444 students had been assigned to the Control group, and a total of 16,338 students were randomly assigned to the project treatment and non-treatment groups.

Although the total number of students applying for driver education during the project was approximately 5 percent fewer than the planned 18,000, the combination of student course enrollment, course completion, and licensing rates were about 23 percent greater than expected. And, at the completion of the Project, 11,946 students had completed the course and obtained a driver's license. Therefore, the required 9,000 complete-and-licensed student experimental sample size was significantly exceeded.

The project instructional program was carried out in full compliance with the Project Detailed Plan. All project students were given their driver education instruction by the same instructional teams, Team Leaders, Teachers, and Teacher Aides. Curriculum modifications were not required, and the

program delivery system, i.e., classroom, simulation, and driving range, fully satisfied the instructional requirements of the curriculum.

To insure that project students *could not* participate in post-project driver education programs and, thus, contaminate the generated project data, post-project students, students born on or after March 15, 1965, were required to apply for driver education using essentially the same application form as that used by the project students. Post-project driver education applications were screened by computer for birthdate accuracy and previous application. Post-project applicants with birthdates prior to March 15, 1965 were randomly assigned to the SPC, PDL, or Control groups. SPC and PDL assigned students were permitted to enroll in the post-project driver education course, but their instructional and driving records were not included in the experimental sample population. The applications of previous applicants, i.e., project students, were rejected.

Task 2. Supervision of Curriculum

Curriculum supervision throughout the Project was carried out in accordance with project requirements. Instructional session monitoring was carried out by the Project Curriculum Coordinator, the On-Site Evaluator, the Project Director and Assistant Director, and the Team Leaders frequently on a non-scheduled basis. Also, curriculum implementation was monitored by the National Highway Traffic Safety Administration staff during frequent on-site visits.

To insure total and unbiased compliance with the project curriculum implementation design, a periodic curriculum implementation critique was carried out by a driver education expert not directly associated with the Project. During the Project, Dr. Glenn Peavy, Dr. Richard Bishop, and Dr. Robert Marshall conducted an on-site assessment of the Project instructional program.

Tasks 1 and 2 of Phase II were completed on June 12, 1981.

Task 3. Analysis of Test Data and Driving Records

A major problem encountered early in the Project was the implementation of the data processing and retrieval system. Preliminary estimates of the volume of data that would be generated were low. Thus, the data collection, processing, and retrieval capabilities for the Project had to be reassessed.

When the new data generation estimates were completed, it was determined

that to satisfy fully the Project data collection and analysis requirements, more machine and staff time would be needed than originally anticipated.

To meet the need for additional staff time, Battelle-Columbus (Evaluation Subcontractor) increased their project staff allocations, and one additional data collection and processing person was added to the DeKalb/National Highway Traffic Safety Administration Project administrative staff.

The need for additional machine time was not as easily resolved. Because the school system had just installed a new and expanded computer system, it was initially assumed that ample machine time would be available to the Project when the system became fully operational. Unfortunately, several other divisions of the school system were also awaiting completion of the computer system so they could increase their machine time.

Consequently, the school system's Department of Information Services, Planning, Auditing and Control, DISPAC, never had sufficient machine time to meet all requests. Thus, the Project data processing was frequently delayed. DISPAC recognized and appreciated the importance of processing the Project data, and made every effort to accommodate the Project data entry and retrieval requirements. However, most other school system data processing activities had tighter time frames and correspondingly higher priorities than the DeKalb/National Highway Traffic Safety Administration Driver Education Evaluation Project. The Project data processing problem was ultimately resolved by transferring a number of the DISPAC planned machine functions to Battelle.

During the Project, the data analysis sections of the Project Annual Reports and four in-process Analytical Reports were generated by the Project research staff, Battelle-Columbus. These Reports are described and discussed in the Analysis and Evaluation section of this report.

Fiscal Review

The schedule of the planned and actual completion dates for each of the Phase II and III Project countermeasure tasks is presented in Table I-1.

To accommodate the inflationary spiral that occurred between 1976 and 1983, the Project budget was increased from $4,132,046, NHTSA portion of $2,999,876 and Other portion of $1,132,170, to $4,277,771, NHTSA portion of

TABLE I-1. COUNTERMEASURE SCHEDULE OF PLANNED AND ACTUAL COMPLETION DATES

Countermeasure Administration & Management	Planned Date of Completion	Actual or Expected Date of Completion
Phase II Operational Tasks		
Student Selection & Assignment	February, 1981	March, 1981
Coordinate Instructional Program	March, 1981	June, 1981
Monitor Instruction	March, 1981	June, 1981
Prepare In-Service Instructional Training	May, 1980	May, 1980
Budget Management	March, 1983	March, 1983
Collect & Record Operational Data	March, 1981	June, 1981
Phases II & III Evaluation Tasks		
Operational Data Collection	March, 1981	June, 1981
Instructional Data Collection	June, 1981	July, 1981
Driving Data Collection	November, 1982	December, 1982
Administer On-Road-Performance Test (ORPT)	August, 1979	July, 1980
Management Data Processing	November, 1982	January & February, 1983
Management Data Analysis	February & March, 1983	March, 1983
Prepare Final Report	Febuary, 1983	March, 1983

TABLE I-1. (Continued)

Countermeasure Instruction	Planned Date of Completion	Actual or Expected Date of Completion
Phase II		
Conduct Instructional Program	March, 1981	June, 1981
Measure Student Instructional Performance	March, 1981	June, 1981
Monitor Research Design	March, 1981	June, 1981
Collect/Record Instructional Data	April, 1981	July, 1981
Conduct In-Service Instructional Training	June, 1980	June, 1980
Evaluation (Battelle-Columbus)		
Phases II & III		
Monitor Instructional Program	March, 1981	June, 1981
Select & Assign Students	November, 1980	February, 1981
Collect, Process & Analyze Instructional Data	March, 1981	July, 1981
Collect, Process & Analyze Driving Data	January, 1983	March, 1983
Public Information & Education		
Phases II & III		
Maintain Communications with Local Populace	November, 1980	November, 1980
Maintain Communications with National Interest Groups	February, 1983	March, 1983

$3,144,076 and Other portion of $1,133,795. This 4 percent budget increase resulted primarily from increased evaluation costs.

Although vehicle operation costs increased more than 200 percent, most of this increase resulted from the cost of gasoline, which increased from $.46 per gallon in 1977 to $1.37 per gallon in 1981, and staff salaries increased on an average of 30 percent, Project operational costs did not exceed the amount budgeted.

During the pilot program, it became apparent that the instructional phase of the program could be efficiently carried out with fewer driver education teachers than had been planned. Since the instructional staff had been especially selected and trained to teach the Safe Performance Curriculum and since it was relatively certain that some staff attrition would occur during the Project time frame, it was judged to be in the best interest of the Project to retain the full staff, and attempt to assign them to non-Project tasks.

This proved to be a good and very cost-effective decision. Shortly after the start of the instructional phase, the Project administration negotiated several short-term training contracts with the Georgia Office of Highway Safety, the Georgia Department of Public Safety, and selected public and private sector agencies. These contracts were carried out by the Project Instructors who had been assigned to non-Project tasks. In addition to reducing the Project personnel costs, the supplemental contracts produced funds which were used to defray other operational costs such as vehicle insurance, utilities, etc. Thus, much of the inflationary operational costs were off-set by the income produced through the short-term training contracts.

An analysis of the cost in achieving the Project objectives showed the total Project cost to be $261.83 per assigned student, $4,277,771 ÷ 16,338 assigned students. When the expenditures per assigned student are analyzed in terms of the Project tasks, costs are distributed as follows:

Project Administration		- $ 24.00
Facilities/Curriculum Preparation		- $ 74.00
Instruction		- $105.00
Data Collection/Analysis		- $ 57.00
Public Information/Support		- $ 1.83
	Total	$261.83

It should be noted that the $105.00 Instructional cost per assigned student was determined by dividing the total Instructional costs by the total number of assigned students, 16,338. Thus, the $105.00 amount per assigned student is, in fact, the mean Instructional cost per assigned student. When Instructional costs are disaggregated for each of the assigned groups, SPC, PDL and Control, the Instructional costs per assigned student are:

SPC Group	(72 hours of formal instruction/testing)	- $149.00
PDL Group	(24 hours of formal instruction/testing)	- $119.00
Control Group	(4 hours of group/individualized testing)	- $ 47.00.

II. ANALYSIS AND EVALUATION

METHODOLOGY

Experimental Design

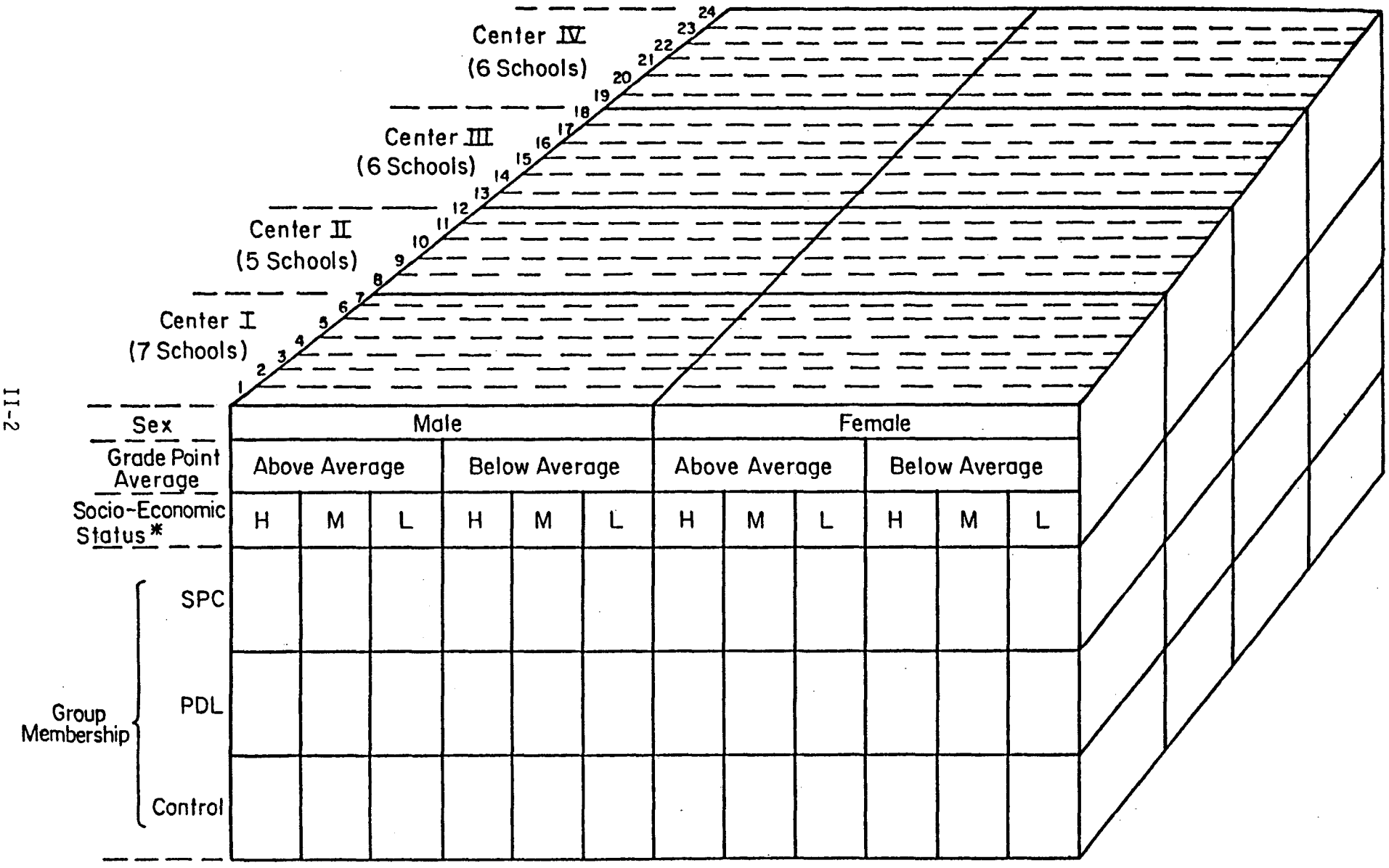
As indicated earlier, students volunteering for the experimental program were assigned at random to SPC, PDL, and Control groups. The random assignment was accomplished on a stratified random sampling basis. Thus, each student volunteer was classified by sex, academic achievement, and socioeconomic status. Then, for each secondary school, students of the same sex, academic achievement, and socioeconomic status (SES) were grouped together, and then randomly assigned to the three groups, SPC, PDL, Control, in equal numbers. This procedure was intended to equate or "match" the three groups on the factors of sex, grade point average, socioeconomic status, and secondary school representation. A detailed account of the operation and mechanics of the student selection and assignment system is presented in Appendix A.

The experimental design is illustrated in Figure II-1. As shown, driver education group students from one set of secondary schools received their training at a particular driving education center; students from another set of secondary schools received their training at a different center, etc. There were four such centers, serving students from 7, 5, 6, and 6 schools, respectively.

The design may be viewed as a six-factor experiment, the factors being group membership (three levels - SPC, PDL, and Control); socioeconomic status (three levels - high, medium, and low); grade point average (two levels - above and below average); sex (two levels); driving education center (four levels); and school (24 secondary schools total). As mentioned above, schools are grouped by driving education center, or schools are said to be "nested" under the center factor.

Socioeconomic status was defined according to head-of-household education and occupation level. Appendix A describes the procedure used to

FIGURE II-1. EXPERIMENTAL DESIGN



*Socio-Economic Status (SES)
H = High, M = Medium, L = Low

characterize each student as high, medium, or low SES.*

There is a total of 864 cells in the matrix shown in Figure II-1. That is, for any given school, all combinations of levels of the variables of sex, grade point average, socioeconomic status, and group membership yield 36 cells. This factorial arrangement is repeated for 24 secondary schools, yielding 36 x 24 = 864 cells total. However, as shown subsequently, analyses were accomplished in the context of a four-factor design, group membership, sex, SES, and grade point average, as the factors of school and driving education center were not of principal concern.

Over the duration of the experiment, the total number of subjects planned to be assigned to each group, SPC, PDL, and Control, was 6,000 per group, yielding a planned total sample size of 18,000 subjects.** The students assigned to each group were, generally, unevenly distributed over combinations of levels of the other factors, due to, for example, differing numbers of high, medium, and low SES students. However, as a result of the student assignment plan, there was essentially an equal number of students assigned to the SPC, PDL, and Control groups, overall, and for levels or combinations of levels of the other factors.

The experiment was originally planned to be conducted over a period of 8 school quarters, commencing with the Winter Quarter of school year 1977-1978. However, two additional quarters were added, to achieve more closely the targeted number of 18,000 assigned students. Throughout, successive groups of student volunteers were randomly assigned to SPC, PDL, and Control groups. A student was then assigned to the earliest possible instructional quarter that driver education was available in his/her respective school. However, a student was permitted to postpone his/her training to a later quarter, but not beyond the age of 17-1/2 years old.

In analyses presented subsequently, data are aggregated over all 10 quarters, as quarter is not considered a primary variable in the analysis.

*An additional "unknown" SES category was added, since for some students SES data were not available. In the assignment of students to groups, the unknown category was treated as another level of the variable, and within this level, as with other levels, students were assigned at random to the three groups.

**Actual numbers of students assigned are specified subsequently.

Accident and Violation Measures

The accident and violation measures that serve as the dependent variables in the evaluation analyses reported subsequently are as follows:

Accidents

- Total number of accidents. This is an overall measure of the total number of accidents in which the subject was the driver of a vehicle involved in the reportable crash. Georgia state law requires that a crash involving death, bodily injury, and/or more than $100 property damage be reported to local or state authorities.
- Number of fatal accidents. This represents the number of accidents in which the subject was the driver of a vehicle involved in a crash with one or more deaths. (Note that the fatality need not be the driver or in the subject's vehicle.)
- Number of injury accidents. Similarly, this represents the number of accidents with one or more persons injured, but no fatalities.
- Number of property damage accidents. This is the number of reported accidents with no injuries or deaths.

Violations

- Total number of violations. (Note that if a student received two violations on one occasion, this was counted as two violations.)
- Number of speeding violations.
- Number of driving-under-the-influence-of-intoxicants violations (DUI).
- Number of reckless operation violations.

Other Accident and Violation Measures

Throughout the course of the project, other accident and violation measures were defined and entered into the data base for future research. However, the above-defined measures are considered the primary ones and are used in the data analyses subsequently reported. Examples of the other accident and violation measures defined include:

- Number of fatalities. This number represents the total number of persons killed in each accident in which the subject was driving.
- Number of injuries. Similarly, this is a measure of the number of injured persons in each accident in which the subject was driving.
- Number of accidents where the subject received a citation.
- Total points accumulated through citations.
- Number of license suspensions or revocations.

Data Source

Data on the above accident and violation measures were obtained from the Georgia Department of Administrative Services (DOAS), Georgia Department of Public Safety. This source maintains driver history and records of crashes and violations for all licensed Georgia drivers on computer-readable magnetic tape. DOAS crash and violation records were accessed every six months, starting in March 1979. The last retrieval occurred on December 6, 1982. Analyses reported subsequently are based on crash and violation data of project students from this last and prior retrievals. It should be noted that driver licensing information and violation occurrence data are current within about one month or less of the retrieval date. However, the accident occurrence data are current as of December 31, 1981, i.e., about 11 months less in duration.

Intermediate Measures

In addition to the above ultimate measures of accidents and violations, data on many other measures were collected before, during, and after course completion to develop a safety and performance profile of each volunteer student. The principal intermediate measures are identified and described below. Table II-1 shows the numbers of students administered each of the measures, by group, SPC, PDL, and Control.

- Driving Knowledge Test. This is a 56-item multiple-choice test, designed to assess the knowledge required to perform the driving task. The test was constructed by the DeKalb Schools project team based upon an analysis of the objectives of the Safe Performance Curriculum. The test was administered in a 45-minute period, on a pre-post basis to each SPC and PDL student on the first and last day of the quarter in which the student took driver education. During the second project year, Control students were also administered this instrument.

- University of Southern California On-Road Performance Test (ORPT). This test, developed by the University of Southern California's Traffic Safety Center, provides for an in-car examination of driver performance conducted over a pre-selected route. Specially trained examiners rate the subject on various well-defined behaviors at specified points along the route. The examination requires about 30 minutes to administer. For the SPC demonstration, the test was administered to samples of Quarter 1 through 4 SPC, PDL, and Control students.

- Safe Performance On-Road Test (SPORT). This test, developed by the DeKalb County project team, is another on-road performance test. The test was administered to each SPC and PDL student at the end of the course and served as part of the student's final exam. The test assesses many of the same behaviors as the USC on-road test, namely: observing; communicating; adjusting speed; positioning; judging time, space, and distance; and hazard perception.

TABLE II-1. NUMBERS OF STUDENTS ADMINISTERED INTERMEDIATE MEASURES

Cumulative Quarters 1-10

SPC

Measure	Number of Students
USC ORPT	
Planned	1600
Administered	1543
In-Course Measures	
Planned	5500
Pre-Knowledge	4338
Post-Knowledge	4240
Pre-Mann	4165
Post-Mann	4047
Alcohol - I	4110
Alcohol - II	4102
Signs, Signals & Markings	3967
Lap 6	3950
Mid-Term	4193
Lap 10	3868
Time, Space & Distance	3570
Alcohol Post	3919
Lap 15	3671
Lap 18	3621
Simulation #1	3721
Simulation #2	3703
Off-Street Admin.	4122
Off-Street Passing	4064
SPORT	4751
Planned Surveys	5500
Exposure Survey I	1753
Exposure Survey II	847
Exposure Survey Revised	682

Retrieval Date - December 6, 1982

TABLE II-1. (Continued)
NUMBERS OF STUDENTS ADMINISTERED
INTERMEDIATE MEASURES

Cumulative Quarters 1-10

PDL

Measure	Number of Students
USC ORPT	
Planned	1600
Administered	1505
In-Course Measures	
Planned	5500
Pre-Knowledge	4384
Post-Knowledge	4258
Pre-Mann	4103
Post-Mann	3570
PDL Exam #1	4272
PDL Exam #2	4064
SPORT	4994
Planned Surveys	5500
Exposure Survey I	1662
Exposure Survey II	782
Exposure Survey Revised	700

Retrieval Date - December 6, 1982

TABLE II-1. (Continued)
NUMBERS OF STUDENTS ADMINISTERED
INTERMEDIATE MEASURES

Cumulative Quarters 1-10

CONTROL

Measure	Number of Students
USC ORPT	
Planned	600
Administered	519
In-Course Measures	
Planned	600
Pre-Knowledge	871
Post-Knowledge	746
Pre-Mann	859
Post-Mann	738
Planned Surveys	5500
Exposure Survey I	1643
Exposure Survey II	764
Exposure Survey Revised	694

Retrieval Date - December 6, 1982

- Mann Inventory. The Mann Inventory was developed by Dr. William Mann for investigating the relationship between personality/emotional/attitudinal factors and accident involvement. The Inventory consists of 63 items that reflect an individual's feelings toward himself, others, and established social mores. Reaction to items in the Inventory are expressed by checking one of five responses--always, usually, sometimes, rarely, or never. Based on responses to the items, various scale scores are calculated, to assess factors such as individual adjustment, aggressiveness, withdrawal, vacillation between extremes of aggression and withdrawal, risk-taking, and sociability. For the SPC demonstration, the Mann Inventory was administered in a 45-minute period, on a pre-post basis to each SPC and PDL student on the first and last day of the quarter in which the student took driver education. During the second project year, Control students were also administered the Inventory.

- Driving Habits, History, and Exposure Survey. This is a questionnaire designed by Battelle to obtain information on student driver training, amount of practice, driving habits, trips taken, self-reported accidents and violations, etc. Items were used from the Cape May Coast Guard Driver Questionaire, Illinois State University Driver Questionnaire, and the California Motorcycle Licensing Project Questionnaire. It is used as a measure of self-reported accidents, violations, and exposure.

- Telephone Exposure Survey. This was a survey conducted to obtain estimates of driving exposure, by means of contacting samples of SPC, PDL, and Control students by phone. Students provided estimates of miles driven "yesterday" for various activities (school, work, and recreation), and for various periods during the day and night.

Throughout the course of the project, the above intermediate measures were analyzed in four analytic studies. These studies were directed toward assessing the reliability of the measures; assessing program (SPC, PDL, and Control)

impact on the measures, e.g., program impact on driving knowledge and on-road test performance; and relating the various measures to accident and violation occurrence. The four analytic studies were cited previously (H. W. Ray, 1979; H. W. Ray, et al, 1980; H. W. Ray and J. R. Brink, 1980; and H. W. Ray and J. R. Brink, 1982) and are available from National Technical Information Service (NTIS). Technical summaries of the studies are provided in Appendix B.

Data Collection System

The data collection system for the evaluation of the SPC project consisted of thirteen program subsystems. These subsystems include: Selection and Assignment subsystem, Knowledge Test subsystem, Mann Inventory subsystem, On-Road Performance Test subsystem, Habits, History, and Exposure subsystem, Curriculum Based Data subsystem, Student Listing subsystem, Project Master File Statistics subsystem, Individual Inquiry subsystem, Request DOAS Records subsystem, and Create Analysis File subsystem. Collectively, these subsystems compiled, edited, updated, and processed the program, impact, and evaluation data for students into the Project Master File. The development and implementation of the subsystems, with the exception of the Selection and Assignment subsystem, began in March 1978 and was completed in January 1979. The Selection and Assignment subsystem development began in April 1977, and it was implemented in August 1977.

Complete documentation of the project data collection system has been compiled and has been published as a reference manual entitled Safe Performance Secondary School Driver Education Curriculum Demonstration Project: Data System Documentation. The reference manual for the project data collection system was submitted to the Project Director, DeKalb County School System.

Throughout the project the data collection system has generally operated efficiently. However, improvements were made to the data collection system on an ongoing basis to achieve greater accuracy* in the data collected, processed, stored, and analyzed subsequently. Some major improvements made to the system are described below. The data collection system was used to create the tables included in this report.

*Appendix E presents an assessment of the accuracy of data transfer from original accident reports (hardcopy) to the database at Battelle.

Grade Point Average

During 1980 it was discovered that the assignment of categories for grade point average, above or below average, was not calculated correctly. Therefore, a computer algorithm was developed that obtained from the DISPAC student records the grade point average of each student applicant for the quarter prior to applying for the project. Further, the algorithm calculated the median grade point average for the total class of which the student applicants were members. The student applicants were then classified into the categories, above or below average. The categories as well as the actual grade point average, prior to the course and a final GPA, are maintained on the project master file.

Create Analysis File Subsystem

In 1981 an examination of the student rates of licensing within six months of course completion or sixteenth birthday for early project participants revealed that the original date of license issuance had changed on DOAS records for a small number of student participants. In discussion with DOAS personnel, it was learned that the original date of license issuance could change under special circumstances, e.g., issuance of a different category of license. A procedure was devised in the create analysis file subsystem to maintain the original date of license issuance. The procedure involved a search of all previous DOAS retrieval tapes. The earliest original date of license issuance for each student participant was determined and that original date of license issuance is permanently maintained in the analysis files.

Request DOAS Records Subsystem

The request tapes sent to DOAS for the search of the Driver History and Accident files contain the names, birthdates, and license numbers of the student participants. In the course of a 1981 DOAS retrieval, it was observed that retrievals were not obtained for a small number of student participants whose license numbers and birthdates were known to be correct. It was learned that data were not retrieved from DOAS files because the names of the student participants on the request tape did not match the names on DOAS files.

Further investigation revealed that the last or surnames of these student participants had changed because of marriage, legal name change, etc. The DOAS personnel changed the programs executing the retrieval searches so that "hits" on birthdate and license number would yield a retrieval of DOAS data. The changed last or surname is provided on the retrieval tape. Of course, the names of the student participants are "stripped off" to maintain anonymity in the creation of the analysis tape.

Also in 1981, an examination of the retrieval statistics and the accident case numbers revealed that in the event that two project student participants, driving different cars, were involved in the same accident, the incidence of the accident would be retrieved for one of the students only. This would result in a small number of "undercounted" accidents. The retrieval algorithm was modified by DOAS personnel in the winter of 1981 to correct this deficiency.

Selection and Assignment Subsystem

The selection and assignment subsystem was adapted in April 1981 so that it could be used by the DeKalb driver education personnel for the assignment of post-project students after the completion of the operational phase, Phase II, of the project at the conclusion of the Winter Quarter, March 1981. The use of the adapted selection and assignment subsystem by the DeKalb driver education personnel insured that student participants of the demonstration project were *not* assigned subsequently to a driver education course in the DeKalb County School System. This procedure precluded contamination of the sample of student participants in the demonstration project.

Sample Characteristics

Tables II-2 through II-6 display pertinent characteristics of the sample. Table II-2 shows numbers of students assigned, enrolled, completed, and licensed by program. A student was considered to have enrolled if he/she attended class at least one day. A student was considered to have completed driver education if he/she successfully passed the final written and on-road examination.

Table II-2 indicates that the planned number of 6,000 students assigned to each of SPC, PDL, and Control groups was closely approximated, with 5,464,

TABLE II-2. KEY PERFORMANCE MEASURES: ASSIGNMENT PROGRESS

Cumulative Quarters 1-10

	Number of Students	Total n	Total %
SPC	Planned	6000	
	Assigned[1]	5464	(91.1)
	Enrolled[2]	4466	(81.7)
	Completed[3]	3996	(89.5)
	Licensed[4]	4829	(88.4)
PDL	Planned	6000	
	Assigned	5430	(90.5)
	Enrolled	4615	(85.0)
	Completed	3868	(83.8)
	Licensed	4681	(86.2)
Control	Planned	6000	
	Assigned, Enrolled, Completed[5]	5444	(90.7)
	Licensed	4588	(84.3)
Total	Planned	18000	
	Assigned	16338	(90.8)
	Enrolled[5]	14525	(88.9)
	Completed	13308	(91.6)
	Licensed	14098	(86.3)

[1]Number and percent students assigned of those planned
[2]Number and percent students enrolled of those assigned
[3]Number and percent students completed of those enrolled
[4]Number and percent students licensed of those assigned (as reflected in DOAS records retrieved December 6, 1982)
[5]Students assigned to control enroll and complete the null course

5,430, and 5,444 assigned to SPC, PDL, and Control groups, respectively, over the 10 experimental quarters. A total of 16,338 students were assigned, or 90.8 percent of the targeted number of 18,000 students.

Examination of enrollment rates in Table II-2, defined as percent of students enrolled of those assigned, indicates a slightly higher enrollment rate for PDL students, 85.0 percent, as compared to SPC students, 81.7 percent. Table II-3 shows analogous enrollment rates by secondary school. The percent of students completing once they have been scheduled and enrolled for quarters 1 through 10 is lower for PDL, 83.8 percent, as compared to 89.5 percent for the SPC group (Table II-2).

Table II-4 provides additional data incorporating retrieval information, as of the retrieval date of December 6, 1982. The number of students "Assigned and Retrieved" represents all those students with a DOAS record but not necessarily licensed. The number of students "Completed, Retrieved, and Licensed" are those students who satisfy the criteria for completing the course which is to have completed SPC or PDL and have a valid license on file. "Completed, Retrieved, and Licensed Within Six Months" carries the additional stipulation that the student received his/her license within six months of course completion or his/her sixteenth birthday, whichever is later. Percentages in Table II-4 are calculated by dividing the rows as indicated.

Table II-4 indicates that 73.1 percent of the students assigned to SPC completed, while 71.2 percent of the PDL students completed through quarter 10. Approximately 92 percent of the assigned students were retrieved from DOAS, while about 95 percent of the completing students were retrieved from the Georgia files.

Table II-5 presents data on licensing rate. This table has been prepared to show the number and percent of students who have been licensed before or within six months of their sixteenth birthday or the course completion date, whichever is later. The top portion of the table presents the number and percent of students, either assigned or completed, who are licensed at monthly intervals from course completion. The bottom portion provides a summary.

Examination of Table II-5 illustrates several points concerning the licensing rate. At the time of the retrieval, 84.3 percent of the assigned

TABLE II-3. ENROLLMENT BY SCHOOL

Cumulative Enrollment Quarters 1-10

	Assigned			Enrolled*		Proportion Enrolled	
	SPC	PDL	CNL	SPC	PDL	SPC	PDL
Avondale	182	180	179	155	163	85.2	90.6
Briarcliff	167	158	158	130	135	77.8	85.4
Cedar Grove	143	139	156	105	101	73.4	72.7
Chamblee	259	251	247	214	213	82.6	84.9
Clarkston	249	258	253	215	225	86.3	87.2
Columbia	205	200	203	179	159	87.3	79.5
Cross Keys	176	184	179	127	163	72.2	88.6
Druid Hills	149	152	153	118	122	79.2	80.3
Dunwoody	357	349	356	290	316	81.2	90.5
Gordon	133	134	139	98	110	73.7	82.1
Henderson	273	285	284	219	248	80.2	87.0
Lakeside	380	373	377	326	320	85.8	85.8
Lithonia	173	154	167	122	121	70.5	78.6
Peachtree	299	302	304	257	255	86.0	84.4
Redan	362	346	357	302	306	83.4	88.4
Sequoyah	203	196	205	169	168	83.3	85.7
Shamrock	297	292	286	242	247	81.5	84.6
Southwest DeKalb	296	300	295	245	234	82.8	78.0
Stone Mountain	334	344	338	279	317	83.5	92.2
Towers	240	238	241	193	202	80.4	84.9
Tucker	340	340	339	297	306	87.4	90.0
Walker	199	199	202	164	163	82.4	81.9
Open West	21	28	13	10	10	47.6	35.7
Open East	27	28	13	10	11	37.0	39.3
TOTAL	5464	5430	5444	4466	4615	81.7	85.0

*A student is considered enrolled if he/she physically appears in class at least one day.

TABLE II-4. SAMPLE SIZE (NUMBER AND PERCENT[1] OF STUDENTS)

Cumulative Quarters 1-10

		TOTAL	
		n	%
1) Assigned	SPC	5464	
	PDL	5430	
	CONTROL	5444	
	TOTAL	16338	
2) Completed	SPC	3996	73.1
% = 2/1	PDL	3868	71.2
	CONTROL	5444	100.0
	TOTAL	13308	81.5
3) Assigned and	SPC	5133	93.9
Retrieved	PDL	5061	93.2
% = 3/1	CONTROL	4867	89.4
	TOTAL	15061	92.2
4) Completed and	SPC	3926	98.2
Retrieved	PDL	3812	98.6
% = 4/2	CONTROL	4867	89.4
	TOTAL	12605	94.7
5) Completed,	SPC	3141	57.5
Retrieved, and	PDL	2983	54.9
Licensed in 6 mo.[2]	CONTROL	3203	58.8
% = 5/1	TOTAL	9327	57.1
6) Completed,	SPC	3141	78.6
Retrieved, and	PDL	2983	77.1
Licensed in 6 mo.[2]	CONTROL	3203	58.8
% = 6/2	TOTAL	9327	70.1

[1]Percentages are calculated by dividing rows as indicated
[2]Licensed within 6 months of course completion or 16th birthday

DOAS Retrieval Date - December 6, 1982

TABLE II-5. LICENSING PROGRESSION

Cumulative Quarters 1-10

		SPC				PDL				CONTROL		
		N	N/A	N/C	N/CL	N	N/A	N/C	N/CL	N	N/A	N/CL
Before Completion		1215	22.2	30.4	32.4	1164	21.4	30.1	32.2	1168	21.5	25.5
Number of months after course completion or 16th birthday, whichever is later.	1	2444	44.7	61.2	65.2	2267	41.7	58.6	62.8	2322	42.7	50.6
	2	2720	49.8	68.1	72.6	2515	46.3	65.0	69.6	2609	47.9	56.9
	3	2862	52.4	71.6	76.4	2667	49.1	69.0	73.9	2796	51.4	60.9
	4	2984	54.6	74.7	79.6	2801	51.6	72.4	77.6	2935	53.9	64.0
	5	3068	56.1	76.8	81.9	2898	53.4	74.9	80.3	3076	56.5	67.0
	6	3141	57.5	78.6	83.8	2983	54.9	77.1	82.6	3203	58.8	69.8
SUMMARY												
Licensed within 6 months		3857	70.6	-	-	3620	66.7	-	-	3203	58.8	69.8
- Complete		3141	57.5	78.6	83.8	2983	54.9	77.1	82.6	-	-	-
- Incomplete[1]		716	13.1	-	-	637	11.7	-	-	-	-	-
Licensed		4829	88.4	-	-	4681	86.2	-	-	4588	84.3	100.0
- Complete		3747	68.6	93.8	100.0	3611	66.5	93.4	100.0	-	-	-
- Incomplete[1]		1082	19.8	-	-	1070	19.7	-	-	-	-	-
Learner's Permit Only		304	5.6	-	-	380	7.0	-	-	279	5.1	-
-Complete		179	3.3	4.5	-	201	3.7	5.2	-	-	-	-
-Incomplete[1]		125	2.3	-	-	179	3.3	-	-	-	-	-
Not retrieved		331	6.1	-	-	369	6.8	-	-	577	10.6	-
-Complete		70	1.3	1.8	-	56	1.0	1.4	-	-	-	-
-Incomplete[1]		261	4.8	-	-	313	5.8	-	-	-	-	-

[1]If course not completed, refers to end of quarter to which student is assigned.

DOAS Retrieval Date - December 6, 1982

N = Number of students
N/A = % of assigned
N/C = % of complete
N/CL = % of completed and licensed

Control students were licensed, while 88.4 percent of the SPC and 86.2 percent of the PDL students were licensed. Between 70.6 percent and 58.8 percent of the assigned students are licensed within six months among programs. Of the students who have completed the course and are licensed at this time, 69.8 percent of the Controls and 83.8 percent of the SPC and 82.6 percent of the PDL groups have been licensed within six months. A significant number of students who complete the courses obtain their driver's licenses before completing the courses, SPC 22.2 percent, PDL 21.4 percent, and Control 21.5 percent.

Table II-6 presents the composition of the sample of student participants broken out by socioeconomic status, grade point average, and sex for students assigned, licensed, and completed and licensed. For assigned students, the numbers for the three experimental groups, SPC, PDL, and Control, across the categories of demographic variables should be equal. The numbers will not be equal to the extent that the groups of students, after stratification, were not divisible by three when assigned randomly to SPC, PDL, and Control groups. Further, the numbers will not be equal to the extent that after assignment, assigned students were detected to have been previously assigned. Such students were selected out and given their previous assignments.

For assigned and licensed students, the percentages for the three experimental groups across the categories of demographic variables appear to be essentially equal with the exception of the assigned SPC group on high- and low grade point average. The data indicate a slightly higher percentage of high GPA students for the SPC group, 59.7 percent, than for the PDL or Control groups, 57.3 percent and 56.9 percent, respectively. This minor discrepancy occurred in quarters 6, 7, and 8 as a result of the earlier-described improper calculation of categories of grade point average. (See earlier discussion.) This minor discrepancy is judged *not* to be a threat to the validity of the sample assignment.

For the complete and licensed students, the composition of SPC, PDL, and Control on SES and sex is essentially the same. However, the percent of high GPA students among the SPC group, 65.3 percent high GPA, and the PDL group, 65.8 percent high GPA, is somewhat higher than among the Control group, 59.6 percent high GPA. This difference probably reflects a self-selection factor in completing the SPC and PDL programs.

TABLE II-6. GROUP MAKEUP

Cumulative Quarters 1-10

	Program	n	SES				GPA			SEX	
			High	Medium	Low	Unknown	High	Low	Unknown	Male	Female
A	SPC	5464	1600 (29.3)	3016 (55.2)	521 (9.5)	327 (6.0)	3261 (59.7)	2203 (40.3)	0 (0)	2801 (51.3)	2663 (48.7)
	PDL	5430	1594 (29.4)	2991 (55.1)	516 (9.5)	329 (6.1)	3113 (57.3)	2316 (42.7)	1 (.0)	2781 (51.2)	2649 (48.8)
	CONTROL	5444	1589 (29.2)	3008 (55.3)	517 (9.5)	330 (6.1)	3096 (56.9)	2345 (43.1)	3 (.1)	2835 (52.1)	2609 (47.9)
	TOTAL	16338	4783 (29.3)	9015 (55.2)	1554 (9.5)	986 (6.0)	9470 (58.0)	6864 (42.0)	4 (.0)	8417 (51.5)	7921 (48.5)
L	SPC	4829	1459 (30.2)	2692 (55.7)	416 (8.6)	262 (5.4)	2990 (61.9)	1839 (38.1)	0 (0)	2512 (52.0)	2317 (48.0)
	PDL	4681	1467 (31.3)	2597 (55.5)	371 (7.9)	246 (5.3)	2831 (60.5)	1849 (39.5)	1 (.0)	2470 (52.8)	2211 (47.2)
	CONTROL	4588	1436 (31.3)	2571 (56.0)	341 (7.4)	240 (5.2)	2735 (59.6)	1852 (40.4)	1 (.0)	2466 (53.7)	2122 (46.3)
	TOTAL	14098	4362 (30.9)	7860 (55.8)	1128 (8.0)	748 (5.3)	8556 (60.7)	5540 (39.3)	2 (.0)	7448 (52.8)	6650 (47.2)
C	SPC	3747	1176 (31.4)	2128 (56.8)	275 (7.3)	168 (4.5)	2447 (65.3)	1300 (34.7)	0 (0)	1998 (53.3)	1749 (46.7)
	PDL	3611	1218 (33.7)	2011 (55.7)	217 (6.0)	165 (4.6)	2375 (65.8)	1236 (34.2)	0 (0)	1953 (54.1)	1658 (45.9)
	CONTROL	4588	1436 (31.3)	2571 (56.0)	341 (7.4)	240 (5.2)	2735 (59.6)	1852 (40.4)	1 (.0)	2466 (53.7)	2122 (46.3)
	TOTAL	11946	3830 (32.1)	6710 (56.2)	833 (7.0)	573 (4.8)	7557 (63.3)	4388 (36.7)	1 (.0)	6417 (53.7)	5529 (46.3)

A = All students assigned to a program
L = Students assigned and licensed (not necessarily completing course)
C = Students completing course and currently holding a valid Georgia Driver's License
DOAS Retrieval Date - December 6, 1982

RESULTS

Overall Accident and Violation Involvement

Table II-7 presents the number and percent of students who were involved, as a driver, in one or more accidents, i.e., accident involved; the number and percent of students who were cited and convicted for one or more violations, i.e., violation involved; and the number and percent of students who were accident or violation involved. Data are presented for all students assigned, licensed students, and complete and licensed students. The reader will note that the assigned percentages of students involved are calculated from the entire sample of assigned students and not only from those cases that were retrievable from DOAS. For complete and licensed students, SPC and PDL students that complete their respective courses and are licensed are compared to licensed Controls. In Table II-7 and subsequent tables, data arise from a DOAS record retrieval date of December 6, 1982. (Note the previous discussion of the different currentness of the licensing information, violation occurrence data, and the accident occurrence data.) All calculations and statistics were generated for the results analysis using SPSS - Statistical Package for the Social Sciences, Second Edition (N. H. Nie, et al, 1975).

Inspection of the accident involvement percentages in Table II-7 shows a greater percentage of SPC students involved in an accident than PDL or Control students. Involvement percentages are 28.6 percent, 26.5 percent, and 26.7 percent for assigned SPC, PDL, and Control students, respectively. Corresponding percentages for licensed students are 32.3 percent, 30.7 percent, and 31.7 percent; for complete and licensed students 32.6 percent, 30.7 percent, and 31.7 percent for SPC, PDL, and Control students, respectively.

The pattern of results for violations is similar, with the SPC students having the highest percent of violation involvement for all assigned students, 45.6 percent, and for complete and licensed students, 52.1 percent. For licensed students, however, violation involvement percentages are almost identical for the three groups, 51.5 percent, 51.5 percent, and 51.4 percent for SPC, PDL, and Control students, respectively.

In considering accident *or* violation involvement, SPC students have the highest rates, for assigned, licensed, and complete and licensed students,

TABLE II-7. OVERALL ACCIDENT AND VIOLATION INVOLVEMENT

Cumulative Quarters 1-10

		Assigned		Licensed		Comp-Lic	
		η	%	η	%	η	%
Number of Students	SPC	5464		4829		3747	
	PDL	5430		4681		3611	
	CONTROL	5444		4588		4588	
	TOTAL	16338		14098		11916	
Accident Involved	SPC	1563	28.6	1562	32.3	1221	32.6
	PDL	1437	26.5	1435	30.7	1109	30.7
	CONTROL	1456	26.7	1455	31.7	1455	31.7
	TOTAL	4456	27.3	4452	31.6	3785	31.7
Violation Involved	SPC	2491	45.6	2488	51.5	1951	52.1
	PDL	2417	44.5	2411	51.5	1862	51.6
	CONTROL	2361	43.4	2356	51.4	2356	51.4
	TOTAL	7269	44.5	7255	51.5	6169	51.6
Accident or Violation	SPC	2790	51.1	2786	57.7	2185	58.3
	PDL	2651	48.8	2644	56.5	2044	56.6
	CONTROL	2633	48.4	2628	57.3	2628	57.3
	TOTAL	8074	49.4	8058	57.2	6857	57.4

Licensed: Students holding a valid Georgia license according to DOAS records.
Comp-Lic: Students who completed the course and licensed (control students complete the null course).
η : Number of students
% : Number of students involved/number of students in sample
DOAS Retrieval Date - December 6, 1982

51.1, 57.7, and 58.3 percent for the three categories.

An examination of Table II-7 reveals that the violation involvement percentages are slightly more than 60 percent greater than the accident involvement percentages for the three categories of assigned, licensed and complete and licensed students.

Mean Number of Accidents

Table II-8 presents the mean number of accidents overall, along with accident means for the three types of accidents--fatal, injury, and property damage. In this table, the number of accidents is averaged so that the multiple accidents offender with more than one crash will affect the mean. The table shows accident means by program, and for assigned, licensed, and complete and licensed students. For overall accidents, Table C-1 in Appendix C presents frequency distributions of number of accidents associated with the various means in Table II-8, i.e., frequency distributions by program, for assigned, licensed, and complete and licensed students.

As Table II-8 shows, for assigned students, the SPC group has the highest accident mean for overall accidents. This mean is 0.3776, as compared to accident means of 0.3611 and 0.3643 for PDL and Control students, respectively. For licensed students, there is essentially no difference in the overall mean among SPC, PDL, and Control groups, with means of 0.4270, 0.4185, and 0.4320, respectively. For complete and licensed students, the SPC and Control groups have the highest overall means, with accident means of 0.4259 and 0.4320, respectively, as compared to a mean for PDL students of 0.4090. As will be shown later, the small differences displayed between these program means are not statistically significant for assigned, licensed, or complete and licensed students.

The greatest difference between means of overall accidents, that between PDL complete and licensed students, mean of 0.4090, and Control complete and licensed students, mean of 0.4320, is less than 6 percent. This difference is significantly less than the targeted 10 to 15 percent difference.

In considering accident type, for injury and property damage accidents, which have significant frequencies of occurrence, differences in accident means between SPC, PDL, and Control groups are negligible for assigned,

TABLE II-8. MEAN NUMBER OF ACCIDENTS BY PROGRAM AND ACCIDENT TYPE

Cumulative Quarters 1-10

	Program	η	FATAL Σx	FATAL $\bar{x}$	INJURY Σx	INJURY $\bar{x}$	PROPERTY DAMAGE Σx	PROPERTY DAMAGE $\bar{x}$	OVERALL ACCIDENTS Σx	OVERALL ACCIDENTS $\bar{x}$
A	SPC	5464	7	.0013	426	.0780	1630	.2983	2063	.3776
	PDL	5430	6	.0011	423	.0779	1532	.2821	1961	.3611
	CNL	5444	5	.0009	426	.0783	1552	.2851	1983	.3643
L	SPC	4829	7	.0014	426	.0882	1629	.3373	2062	.4270
	PDL	4681	6	.0013	423	.0904	1530	.3269	1959	.4185
	CNL	4588	5	.0011	425	.0926	1552	.3383	1982	.4320
C	SPC	3747	6	.0016	322	.0859	1268	.3384	1596	.4259
	PDL	3611	4	.0011	311	.0861	1162	.3218	1477	.4090

A = All students assigned to a program
L = Students assigned and licensed (not necessarily completing course)
C = Students completing course and currently holding a valid Georgia Driver's License
Σx = number of occurrences

$$\bar{x} = \frac{\Sigma x}{\eta}$$

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licensed, and complete and licensed students. For fatal accidents, the relatively small number of fatal accidents makes any meaningful comparisons difficult. The assigned SPC student group has 7 fatal accidents, the PDL group has 6, and the Control group has 5.

Table II-9 displays mean number of accidents broken out by program and sex. An examination of Table II-9, for assigned students, shows SPC, PDL, and Control group accident means to be essentially equal for males, while the mean for the SPC female group is larger than either the PDL or Control female group means. This interaction effect is not statistically significant, however, as will be shown later. For licensed students, a similar program by sex interaction pattern is displayed, but again is not statistically significant. For complete and licensed students, for males, SPC and PDL group means are lower than Control, whereas, for females, the SPC group mean is again higher than PDL or Control female means. However, this interaction effect is also not statistically significant.

The significant effect reflected in Table II-9 is the difference between male and female accident means across treatment groups, with marked sex differences for assigned, licensed, and complete and licensed students. Male accident means are in excess of 1.5 times larger than female accident means, throughout the table. These results compare with those of other research that indicate that male drivers of this age group have twice as many accidents as female drivers of this age group (Teen Driver Facts, revised 1982).

Table II-10 displays mean number of accidents broken out by program and grade point average (GPA). As indicated in the table, within GPA categories, the mean number of accidents for SPC, PDL, and Control groups do not differ a great deal. However, the means of the high GPA category groups are significantly lower than the means of the low GPA category groups. The differences range from about 22 percent to about 37 percent. This pattern is the same for the assigned, licensed, and complete and licensed students. There are no significant interactions of program by GPA accident means, which will be shown later.

Table II-11 displays mean number of accidents broken out by program and socioeconomic status (SES). Within SES categories, SPC, PDL, and Control group means do not differ substantially. However, there are significant differences among the SES categories, with the low SES category groups having

TABLE II-9. MEAN NUMBER OF ACCIDENTS

CONTROLLING FOR SEX

Cumulative Quarters 1-10

		Assigned			Licensed			Completed and Licensed		
		η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
Male	SPC	2801	1312	.4684	2512	1311	.5219	1998	1028	.5145
	PDL	2781	1331	.4786	2470	1329	.5381	1953	1008	.5161
	CNL	2835	1334	.4705	2466	1334	.5410	2466	1334	.5410
Female	SPC	2663	751	.2820	2317	751	.3241	1749	568	.3248
	PDL	2649	630	.2378	2211	630	.2849	1658	469	.2829
	CNL	2609	649	.2488	2122	648	.3054	2122	648	.3054

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TABLE II-10. MEAN NUMBER OF ACCIDENTS

CONTROLLING FOR GPA

Cumulative Quarters 1-10

		Assigned			Licensed			Completed and Licensed		
		η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
High	SPC	3261	1132	.3471	2990	1131	.3783	2447	928	.3792
	PDL	3113	996	.3199	2831	996	.3518	2375	832	.3503
	CNL	3096	1057	.3414	2835	1056	.3861	2835	1056	.3861
Low	SPC	2203	931	.4226	1839	931	.5063	1300	668	.5138
	PDL	2316	965	.4146	1849	963	.5208	1236	645	.5218
	CNL	2345	926	.3949	1852	926	.5000	1852	926	.5000
Unknown	SPC	0	-	-	0	-	-	0	-	-
	PDL	1	0	0	1	0	0	0	-	-
	CNL	3	0	0	1	0	0	1	0	0

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TABLE II-11. MEAN NUMBER OF ACCIDENTS

CONTROLLING FOR SES

Cumulative Quarters 1-10

		Assigned			Licensed			Completed and Licensed		
		η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
High	SPC	1600	599	.3744	1459	599	.4106	1176	491	.4175
	PDL	1594	611	.3833	1467	611	.4165	1218	470	.3859
	CNL	1589	613	.3858	1436	612	.4262	1436	612	.4262
Middle	SPC	3016	1241	.4115	2692	1240	.4606	2128	961	.4516
	PDL	2991	1152	.3852	2597	1151	.4432	2011	889	.4421
	CNL	3008	1159	.3853	2571	1159	.4508	2571	1159	.4508
Low	SPC	521	118	.2265	416	118	.2837	275	84	.3055
	PDL	516	98	.1899	371	97	.2615	214	48	.2212
	CNL	517	109	.2108	341	109	.3196	341	109	.3196
Unknown	SPC	327	105	.3211	262	105	.4008	168	60	.3571
	PDL	329	100	.3040	246	100	.4065	165	70	.4242
	CNL	330	102	.3091	240	102	.4250	240	102	.4250

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the lowest accident means. This pattern is the same for assigned, licensed, and, complete and licensed students. The least differences between accident means for SES categories range from approximately 42 percent to about 49 percent. Again, there are no significant interactions of program by SES accident means.

Mean Number of Violations

Table II-12 displays mean number of violations by program and violation type. The last column of the table shows mean number of total violations. Data are displayed by assigned, licensed, and complete and licensed students, as with the accident data. For total violations, Appendix C presents frequency distributions of number of violations, by program, for assigned, licensed, and complete and licensed students.

Table II-12 shows essentially no differences between SPC, PDL, and Control assigned students in mean total violations. For licensed students, and complete and licensed students, the means of total violations are lower for SPC and PDL groups, as compared to the Control group. For licensed students, SPC and PDL group total violation means are 1.1050 and 1.1079, respectively, as compared to a Control group mean of 1.1582. As is shown later, however, the differences between these means are not statistically significant, nor are the observed differences between program violation means for complete and licensed students statistically significant.

In considering violation type, program differences may be observed in the DUI category, for licensed and complete and licensed students, but with essentially no differences for assigned students. For licensed students, DUI means are 0.0369, 0.0355, and 0.0392 for SPC, PDL, and Control groups, respectively. For complete and licensed students, DUI means are 0.0328, 0.0324, and 0.0392 for SPC, PDL, and Control groups, respectively. These differences

TABLE II-12. MEAN NUMBER OF VIOLATIONS BY PROGRAM AND VIOLATION TYPE

Cumulative Quarters 1-10

	Program	n	Speeding		Reckless		DUI		Other		Totals	
			Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$
A	SPC	5464	2368	.4334	30	.0055	179	.0328	2762	.5055	5339	.9771
	PDL	5430	2341	.4311	31	.0057	166	.0306	2656	.4891	5194	.9565
	CNL	5444	2321	.4263	39	.0072	181	.0332	2779	.5105	5320	.9772
L	SPC	4829	2368	.4904	30	.0062	178	.0369	2760	.5715	5336	1.1050
	PDL	4681	2339	.4997	31	.0066	166	.0355	2650	.5661	5186	1.1079
	CNL	4588	2321	.5059	39	.0085	180	.0392	2774	.6046	5314	1.1582
C	SPC	3747	1861	.4967	18	.0048	123	.0328	2149	.5735	4151	1.1078
	PDL	3611	1779	.4927	26	.0072	117	.0324	2000	.5539	3922	1.0861

A = All students assigned to a program
L = Students assigned and licensed (not necessarily completing course)
C = Students completing course and currently holding a valid Georgia Driver's License

Σx = Number of occurrences

$\bar{x} = \frac{\Sigma x}{n}$

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are not, however, statistically significant, as assessed by a Chi Square (χ^2) test*.

Program differences may also be observed in the Reckless violation category, as shown in Table II-12, for assigned, licensed, and complete and licensed students. For example, for licensed students, means are 0.0062, 0.0066, and 0.0085 for SPC, PDL, and Control groups, respectively. Again, these differences are not statistically significant, as assessed by the same kind of Chi Square test as used to test for DUI offenses.**

Examination of the speeding violations in Table II-12 reveals there are essentially no differences between SPC, PDL, and Control groups, for assigned, licensed, and complete and licensed students.

Table II-13 shows mean number of violations by program and sex, for assigned, licensed, and complete and licensed students. For assigned students, for males, SPC and PDL group means are lower than Control group means, whereas, for females, SPC and PDL group means are higher than Control group means. For licensed and complete and licensed students, for males, SPC and PDL group means are again lower than Control group means, whereas, for females, essentially no differences are evident between SPC, PDL, and Control group means. As is discussed later, the observed interaction of program by sex for assigned students is not statistically significant, "marginally" significant for licensed students, and significant for complete and licensed students.

*To test the statistical significance of these differences, an individual student was characterized as having a DUI offense (one or more), vs. not. A frequency (contingency) table of program, SPC, PDL, Control, by DUI involvement vs. not was then tabulated, and the value of χ^2 computed for this table. This was done separately for assigned, licensed, and complete and licensed students. The values of χ^2 and associated significance levels were:

- Assigned students - χ^2 = .7772, Sig. = .6780
- Licensed students - χ^2 = .5705, Sig. = .7518
- Complete and licensed students - χ^2 = 1.7109, Sig. = .4251.

**The values of χ^2 and associated significance levels were:

- Assigned students - χ^2 = 1.3938, Sig. = .4981
- Licensed students - χ^2 = 1.8770, Sig. = .3912
- Complete and licensed students - χ^2 = 3.7469, Sig. = .1536

TABLE II-13. MEAN NUMBER OF VIOLATIONS

CONTROLLING FOR SEX

Cumulative Quarters 1-10

		Assigned			Licensed			Completed and Licensed		
		n	Σx	$\bar{x}$	n	Σx	$\bar{x}$	n	Σx	$\bar{x}$
Male	SPC	2801	3935	1.4049	2512	3934	1.5661	1998	3106	1.5546
	PDL	2781	3841	1.3812	2470	3835	1.5526	1953	2941	1.5059
	CNL	2835	4087	1.4416	2466	4083	1.6557	2466	4083	1.6557
Female	SPC	2663	1404	.5272	2317	1402	.6051	1749	1045	.5975
	PDL	2649	1353	.5108	2211	1351	.6110	1658	981	.5917
	CNL	2609	1233	.4726	2122	1231	.5801	2122	1231	.5801

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As with accidents, Table II-13 reveals marked sex differences in mean violation rates, with male violation means being about 2.5 times larger than female violation means. Other research shows that male teenagers have more than three times as many traffic convictions as female teenagers (D. M. Harrington, 1971).

Table II-14 displays mean number of violations by program and GPA (high vs. low). Within GPA levels, SPC, PDL, and Control group means are quite close, for assigned, licensed, and complete and licensed students. Thus, no, or negligible, program by GPA interaction effects are evident. However, high GPA students have lower violation means than low GPA students, as was the case for accidents. The low GPA student violation means are about 1.5 times larger than the high GPA student violation means.

Table II-15 shows mean number of violations by program and SES levels. For assigned students, differences in mean number of violations are negligible between SPC, PDL, and Control groups, for high, middle, or low SES students. For licensed students, and for the high SES level, the SPC group has the highest violation mean, as compared to the PDL and Control group. However, for middle-level and low-level SES students, SPC and PDL groups have a lower violation mean than the Control group. This same interaction pattern is reflected for complete and licensed students. These interactions of program by SES violation means are not significant, however.

In considering differences between SES levels in Table II-15, low category SES groups have the lowest mean number of violations, for assigned, licensed, and complete and licensed students, thus reflecting the same pattern of relationship of SES categories to violations as previously shown for accidents. The least differences between violation means for the SES categories range from about 17 percent to approximately 33 percent.

Analyses of Variance

An analysis of variance was performed of the number of accidents and of the number of violations for the assigned, licensed, and complete and licensed students in quarters 1-10. Thus, six separate analyses were conducted. The analysis of variance performed in each case was a four-factor randomized design.

TABLE II-14. MEAN NUMBER OF VIOLATIONS

CONTROLLING FOR GPA

Cumulative Quarters 1-10

		Assigned			Licensed			Completed and Licensed		
		η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
High	SPC	3261	2683	.8228	2990	2683	.8973	2447	2188	.8942
	PDL	3113	2444	.7851	2831	2443	.8629	2375	2031	.8552
	CNL	3096	2590	.8366	2735	2588	.9463	2735	2588	.9466
Low	SPC	2203	2656	1.2056	1839	2653	1.4426	1300	1963	1.5100
	PDL	2316	2750	1.1874	1849	2743	1.4835	1236	1891	1.5299
	CNL	2345	2729	1.1638	1852	2725	1.4714	1852	2725	1.4714
Unknown	SPC	0	-	-	0	-	-	0	-	-
	PDL	1	0	0	1	0	0	0	-	-
	CNL	3	1	.3333	1	1	1.0000	1	1	1.0000

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TABLE II-15. MEAN NUMBER OF VIOLATIONS

CONTROLLING FOR SES

Cumulative Quarters 1-10

		Assigned			Licensed			Completed and Licensed		
		η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
High	SPC	1600	1598	.9987	1459	1598	1.0953	1176	1311	1.1148
	PDL	1594	1476	.9260	1467	1476	1.0061	1218	1175	.9647
	CNL	1589	1531	.9635	1436	1529	1.0648	1436	1529	1.0648
Middle	SPC	3016	3137	1.0401	2692	3134	1.1642	2128	2452	1.1523
	PDL	2991	3116	1.0418	2597	3113	1.1987	2011	2384	1.1855
	CNL	3008	3133	1.0416	2571	3131	1.2178	2571	3131	1.2178
Low	SPC	521	340	.6526	416	340	.8173	275	213	.7745
	PDL	516	321	.6221	371	319	.8598	217	173	.7972
	CNL	517	349	.6750	341	349	1.0235	341	349	1.0235
Unknown	SPC	327	264	.8073	262	264	1.0076	168	175	1.0417
	PDL	329	281	.8541	246	274	1.1301	165	190	1.1515
	CNL	330	307	.9303	240	305	1.2708	240	305	1.2708

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The four factors and levels are: (1) program - SPC, PDL, and Control groups, (2) sex - male and female, (3) socioeconomic status (SES) - high, middle, low, and unknown, and (4) grade point average (GPA) - high and low. The analysis of variance results reported in this section of the report and in subsequent sections were generated using the SPSS package for computation (N. H. Nie, et al, 1975. See Section 22.1.3, Factorial Designs with Unequal Cell Frequencies, Classical Experimental Model).

It should be noted that only the two analyses--that of accidents and that of violations for the *assigned* students in quarters 1-10--meet the assumption of random assignment to the three treatment groups. The licensed and complete and licensed students in quarters 1-10 were randomly assigned initially, but through *self-selection* mechanisms only a portion of the assigned students became licensed, or completed the course and became licensed. Therefore, the analysis of variance results for the licensed and complete and licensed students in quarters 1-10 must be interpreted and generalized with caution, particularly results for complete and licensed students.

The results of the six anlayses of variance are presented in Tables II-16 through II-21. Tables II-16 through II-18 show the results of accident data analysis and Tables II-19 through II-21 present the results of analysis of violations data. In interpreting the results of each analysis of variance, reference should be made to previous tables presenting mean number of accidents and violations data for students in quarters 1-10.

The results of the analysis of variance of number of accidents for *assigned* students in quarters 1-10 are shown in Table II-16. The analysis of the main effects reveals that the means of number of accidents do not differ significantly among the three treatment groups, SPC, PDL, and Control. This is indicated by the significance levels of the F-test. The significance level is .313 which is greater than $p \leq .05$, a commonly used acceptance level of significance. All three demographic variables, sex, SES, and GPA, yielded significant main effects, i.e., female mean accidents are lower than male mean accidents, low category SES mean accidents are lower than high, middle, and unknown category SES mean accidents, and high GPA mean accidents are lower than low GPA mean accidents for assigned students in quarters 1-10.

TABLE II-16. ANALYSIS OF VARIANCE OF NUMBER OF ACCIDENTS FOR ASSIGNED STUDENTS QUARTERS 1-10

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	254.312	7	36.330	77.006	.001
PROGRAM	1.098	2	.549	1.163	.313
SEX	167.373	1	167.373	354.765	.001
SES	52.845	3	17.615	37.337	.001
GPA	18.969	1	18.969	40.207	.001
2-WAY INTERACTIONS	29.939	17	1.761	3.733	.001
PROGRAM SEX	1.698	2	.849	1.800	.166
PROGRAM SES	1.064	6	.177	.376	.895
PROGRAM GPA	1.120	2	.560	1.187	.305
SEX SES	5.468	3	1.823	3.864	.009
SEX GPA	7.321	1	7.321	15.517	.001
SES GPA	11.418	3	3.806	8.067	.001
3-WAY INTERACTIONS	5.232	17	.308	.652	.851
PROGRAM SEX SES	2.220	6	.370	.784	.582
PROGRAM SEX GPA	.126	2	.063	.134	.875
PROGRAM SES GPA	2.216	6	.369	.783	.583
SEX SES GPA	.853	3	.284	.603	.613
4-WAY INTERACTIONS	2.859	6	.476	1.010	.417
PROGRAM SEX SES GPA	2.959	6	.476	1.010	.417
EXPLAINED	292.340	47	6.220	13.184	.001
RESIDUAL	7683.522	16286	.472		
TOTAL	7975.963	16333	.488		

None of the three program two-way interactions are significant. All significance of F-test results are greater than $p \leq .05$. Alternatively, all three of the demographic variable two-way interactions were significant. This implies a differential effect of one demographic variable in combination with the several levels of the other demographic variable. For example, male means of number of accidents *may* change from high to low GPA categories while female means *may not*.

None of the three-way interactions are significant nor is the four-way interaction.

The pattern of results of the analysis of variance of number of accidents for licensed and complete and licensed students in quarters 1-10 is the same as those for assigned students. These results are shown in Tables II-17 and II-18. The program main effects are not significant, while the three demographic variable main effects are significant. The three program two-way interactions are not significant and the three demographic variable two-way interactions are significant, with the exception of the SES by GPA interaction for complete and licensed students, which is just shy of being significant at the .05 level. None of the three-way interactions nor the four-way interaction is significant.

The results of the analysis of variance of number of violations for *assigned* students in quarters 1-10 are shown in Table II-19. The analysis indicates that the program main effects are not significant, i.e., the differences among the means of number of violations for the three treatment groups are not significant at $p \leq .05$. The main effects of the three demographic variables are significant, female mean number of violations are lower than male mean number of violations, low category SES mean number of violations are lower than high, middle, and unknown category SES mean number of violations, and high GPA mean number of violations are lower than low GPA mean number of violations.

The three program by demographic variables two-way interactions are not significant. All three demographic variable two-way interactions are significant.

None of the three-way interactions are significant. The program four-way interaction is significant. The implications of significant four-way interactions are difficult to interpret.

TABLE II-17. ANALYSIS OF VARIANCE OF NUMBER OF ACCIDENTS FOR LICENSED STUDENTS QUARTERS 1-10

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	254.880	7	36.411	69.694	.001
PROGRAM	.416	2	.208	.398	.672
SEX	153.437	1	153.437	293.690	.001
SES	34.667	3	11.556	22.118	.001
GPA	44.161	1	44.161	84.527	.001
2-WAY INTERACTIONS	23.549	17	1.391	2.663	.001
PROGRAM SEX	1.483	2	.741	1.419	.242
PROGRAM SES	1.270	6	.212	.405	.876
PROGRAM GPA	1.678	2	.839	1.606	.201
SEX SES	5.279	3	1.760	3.368	.018
SEX GPA	6.157	1	6.157	11.786	.001
SES GPA	6.909	3	2.303	4.408	.004
3-WAY INTERACTIONS	4.036	17	.237	.454	.972
PROGRAM SEX SES	1.596	6	.266	.509	.802
PROGRAM SEX GPA	.136	2	.068	.130	.878
PROGRAM SES GPA	1.881	6	.313	.600	.731
SEX SES GPA	.801	3	.267	.511	.675
4-WAY INTERACTIONS	2.664	6	.444	.850	.531
PROGRAM SEX SES GPA	2.664	6	.444	.850	.531
EXPLAINED	285.229	47	6.069	11.616	.001
RESIDUAL	7339.300	14048	.522		
TOTAL	7624.529	14095	.541		

TABLE II-18. ANALYSIS OF VARIANCE OF NUMBER OF ACCIDENTS FOR COMPLETED AND LICENSED STUDENTS QUARTERS 1-10

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	197.061	7	28.152	55.509	.001
PROGRAM	.940	2	.470	.927	.396
SEX	118.860	1	118.860	234.359	.001
SES	22.684	3	7.561	14.910	.001
GPA	32.329	1	32.329	63.747	.001
2-WAY INTERACTIONS	17.443	17	1.026	2.023	.008
PROGRAM SEX	1.153	2	.577	1.137	.321
PROGRAM SES	2.121	6	.354	.697	.652
PROGRAM GPA	.693	2	.342	.673	.510
SEX SES	4.893	3	1.631	3.216	.022
SEX GPA	4.103	1	4.103	8.090	.005
SES GPA	3.809	3	1.270	2.503	.058
3-WAY INTERACTIONS	7.670	17	.451	.890	.587
PROGRAM SEX SES	2.002	6	.334	.658	.684
PROGRAM SEX GPA	.322	2	.161	.317	.728
PROGRAM SES GPA	3.133	6	.522	1.030	.404
SEX SES GPA	2.240	3	.747	1.472	.221
4-WAY INTERACTIONS	2.049	6	.341	.673	.671
PROGRAM SEX SES GPA	2.048	6	.341	.673	.671
EXPLAINED	224.222	47	4.771	9.407	.001
RESIDUAL	6033.554	11897	.507		
TOTAL	6257.776	11944	.524		

TABLE II-19. ANALYSIS OF VARIANCE OF NUMBER OF VIOLATIONS FOR ASSIGNED STUDENTS QUARTERS 1-10

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	3875.502	7	553.643	245.217	.001
PROGRAM	2.009	2	1.004	.445	.641
SEX	2980.786	1	2980.786	1320.237	.001
SES	248.683	3	82.894	36.715	.001
GPA	352.856	1	352.856	156.286	.001
2-WAY INTERACTIONS	306.057	17	18.003	7.974	.001
PROGRAM SEX	9.593	2	4.791	2.122	.120
PROGRAM SES	8.877	6	1.479	.655	.686
PROGRAM GPA	7.066	2	3.533	1.565	.210
SEX SES	53.309	3	17.770	7.871	.001
SEX GPA	122.389	1	122.389	54.208	.001
SES GPA	89.730	3	29.910	13.248	.001
3-WAY INTERACTIONS	39.575	17	2.328	1.031	.421
PROGRAM SEX SES	11.980	6	1.997	.884	.506
PPOGRAM SEX GPA	2.668	2	1.334	.591	.554
PROGRAM SES GPA	20.568	6	3.428	1.518	.169
SEX SES GPA	7.908	3	2.636	1.168	.321
4-WAY INTERACTIONS	36.681	6	6.114	2.708	.013
PROGRAM SEX SES GPA	36.681	6	6.114	2.708	.013
EXPLAINED	4257.816	47	90.592	40.125	.001
RESIDUAL	36769.961	16286	2.258		
TOTAL	41027.777	16333	2.512		

The pattern of results of the analysis of variance of number of violations for licensed and complete and licensed students in quarters 1-10 shown in Tables II-20 and II-21 is similar to those for assigned students with one notable exception. The program by sex two-way interaction is significant, for complete and licensed students. For licensed students, the program by sex interaction is "just shy" of being significant at the .05 level, $p = .055$, as shown in Table II-20. This interaction effect reflects the Control male group mean number of violations is significantly higher than the SPC and PDL male group mean number of violations, while the female SPC, PDL, and Control group means do not differ significantly (See Table II-13).

Analysis By Period of Licensed Driving

It is of interest to examine program effects on accidents and violations for fixed calendar time periods of licensed driving, e.g., program comparisons for the first two years of licensed driving. In contrast to analyses presented previously in this report, such analyses control for length of time period of licensed driving, as well as permitting analysis of program effects over time.

Table II-22 shows mean number of accidents by program and period of licensed driving, for licensed students, and complete and licensed students. Means are given for four different time periods: 1st 6 months of licensed driving; 2nd 6 months of licensed driving; 3rd 6 months of licensed driving; and the 4th 6-month period of licensed driving. The last column in Table II-22 shows the mean number of accidents for the total two-year period, i.e., accident means for the first two years of licensed driving.

In this table, the sample of students for the Period 1 analysis, licensed students, consists of all *licensed* students with at least 6 months of licensed driving prior to January 1, 1982. This restriction arose from the fact that, as of the last retrieval from the Georgia DOAS accident records, December 6, 1982, DOAS had not yet recorded in their accident files accidents occurring *on* January 1, 1982, or *after* this date. Thus, without this sample restriction, accident records for some students would have been incomplete during the first 6 months of licensed driving.

Similarly, the sample of students for the Period 1 analysis, complete and licensed students, consists of all complete and licensed students with at least 6 months of licensed driving prior to January 1, 1982.

TABLE II-20. ANALYSIS OF VARIANCE OF NUMBER OF VIOLATIONS FOR LICENSED STUDENTS QUARTERS 1-10

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	4207.916	7	601.131	248.192	.001
PROGRAM	2.935	2	1.468	.606	.546
SEX	2958.617	1	2958.617	1221.540	.001
SES	148.015	3	49.338	20.371	.001
GPA	628.248	1	628.248	259.388	.001
2-WAY INTERACTIONS	297.885	17	17.523	7.235	.001
PROGRAM SEX	14.085	2	7.042	2.908	.055
PROGRAM SES	23.608	6	3.935	1.625	.137
PROGRAM GPA	8.731	2	4.366	1.802	.165
SEX SES	50.351	3	16.784	6.930	.001
SEX GPA	133.296	1	133.296	55.034	.001
SES GPA	56.393	3	18.798	7.761	.001
3-WAY INTERACTIONS	38.512	17	2.265	.935	.531
PROGRAM SEX SES	16.499	6	2.750	1.135	.340
PROGRAM SEX GPA	2.127	2	1.063	.439	.645
PROGRAM SES GPA	17.301	6	2.884	1.191	.309
SEX SES GPA	6.682	3	2.227	.920	.431
4-WAY INTERACTIONS	31.348	6	5.225	2.157	.045
PROGRAM SEX SES GPA	31.348	6	5.225	2.157	.045
EXPLAINED	4575.661	47	97.354	40.195	.001
RESIDUAL	34024.801	14049	2.422		
TOTAL	38600.462	14095	2.739		

TABLE II-21. ANALYSIS OF VARIANCE OF NUMBER OF VIOLATIONS FOR COMPLETED AND LICENSED STUDENTS QUARTERS 1-10

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	3556.732	7	508.105	213.406	.001
PROGRAM	5.149	2	2.575	1.081	.340
SEX	2441.481	1	2441.481	1025.431	.001
SES	100.500	3	33.500	14.070	.001
GPA	543.592	1	543.592	228.311	.001
2-WAY INTERACTIONS	237.233	17	13.955	5.861	.001
PROGRAM SEX	15.857	2	7.928	3.330	.036
PROGRAM SES	25.498	6	4.248	1.784	.099
PROGRAM GPA	8.185	2	4.093	1.719	.180
SEX SES	45.860	3	15.287	6.421	.001
SEX GPA	88.280	1	88.280	37.078	.001
SES GPA	39.460	3	13.153	5.524	.001
3-WAY INTERACTIONS	53.556	17	3.150	1.323	.169
PROGRAM SEX SES	20.906	6	3.484	1.463	.188
PROGRAM SEX GPA	.686	2	.343	.144	.866
PROGRAM SES GPA	24.168	6	4.028	1.692	.120
SEX SES GPA	13.299	3	4.433	1.862	.134
4-WAY INTERACTIONS	23.708	6	3.951	1.660	.128
PROGRAM SEX SES GPA	23.708	6	3.951	1.660	.128
EXPLAINED	3871.228	47	82.367	34.594	.001
RESIDUAL	28325.935	11897	2.381		
TOTAL	32197.163	11944	2.696		

TABLE II-22. MEAN NUMBER OF ACCIDENTS, BY PROGRAM AND PERIOD OF LICENSED DRIVING

Licensed Students

Program	Period 1			Period 2			Period 3			Period 4			Total Two Year Period		
	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
SPC	4497	474	.1054	4047	396	.0979	3302	285	.0863	2599	256	.0985	2599	1029	.3959
PDL	4296	458	.1066	3871	376	.0971	3158	261	.0826	2515	232	.0922	2515	977	.3885
Control	4135	505	.1221	3689	371	.1006	3000	280	.0933	2354	224	.0952	2354	989	.4201
	F = 2.589			F = .050			F = .846			F = .313			F = 1.071		
	Sig. = .076			Sig. = .952			Sig. = .429			Sig. = .731			Sig. = .343		

Completed and Licensed Students

Program	Period 1			Period 2			Period 3			Period 4			Total Two Year Period		
	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
SPC	3545	362	.1021	3191	309	.0968	2592	223	.0860	2037	205	.1006	2037	802	.3937
PDL	3375	341	.1010	3070	296	.0964	2502	198	.0791	1977	181	.0916	1977	745	.3768
Control	4135	505	.1221	3689	371	.1006	3000	280	.0933	2354	224	.0952	2354	989	.4201
	F = 4.035			F = .066			F = 1.411			F = .446			F = 1.847		
	Sig. = .018			Sig. = .936			Sig. = .244			Sig. = .640			Sig. = .158		

Period 1 - 1st 6 months of licensed driving
Period 2 - 2nd 6 months of licensed driving
Period 3 - 3rd 6 months of licensed driving
Period 4 - 4th 6 months of licensed driving
η = Sample Size
Σx = Number of Accidents
$\bar{x}$ = Mean Number of Accidents = $\frac{\Sigma x}{\eta}$

Samples for analyses for the other periods are defined similarly. Thus, the Period 2 sample, for licensed students, consists of all licensed students with at least one year of licensed driving prior to January 1, 1982. For this sample, accident means are computed for accidents occurring during the 2nd 6-month period of licensed driving. The sample for analysis of accidents and violations for the total 2-year period is restricted to licensed students, or complete and licensed students, with at least two years of licensed driving prior to January 1, 1982.

It may be noted that sample sizes are smaller for the later periods, as compared to the earlier periods. Thus, for example, for licensed Control group students, for Period 4, and also for the total 2-year period, the accident mean, 0.0952, is based on 2,354 licensed students. This sample size may be compared to the Period 1 sample of 4,135 licensed students, and compared to the original total sample of 4,588 licensed Control group students. Thus, the Period 4 sample, as well as the total 2-year period sample, is only about one-half the size of the total sample of all licensed Control group students. Interpretation of analysis results is to be qualified accordingly, because of these restricted samples.

Inspection of the accident means in Table II-22, licensed students, shows lower means for SPC and PDL students, as compared to Control students, for Period 1, 1st 6 months of licensed driving. The means are 0.1054, 0.1066, and 0.1221 for SPC, PDL, and Control groups, respectively. However, essentially no group differences are evident for Periods 2, 3, and 4. For the total 2-year period, SPC and PDL groups show lower accident means than the Control group, with means of 0.3959, 0.3885, and 0.4201, respectively. These group differences for the total 2-year period apparently reflect group differences occurring during Period 1, as there are no group differences in Periods 2, 3, and 4.

Inspection of the accident means in Table II-22 for complete and licensed students shows a similar pattern to those for licensed students, with lower means for SPC and PDL students, as compared to Control students, for Period 1. The means are 0.1021, 0.1010, and 0.1221 for SPC, PDL, and Control groups for Period 1. Again, as with licensed students, no differences are evident for Periods 2, 3, and 4. For the total 2-year period, SPC and PDL group accident means are lower than the Control group, with these differences being

accounted for by group differences during the first 6 months of licensed driving.

To test the statistical significance of observed group differences in accident means, an analysis of variance was performed for each of the 4 periods, and for the total 2-year period, for licensed, and for complete and licensed students. As with previously reported analyses of variance, for a given period, data were analyzed as a four-factor randomized design, with number of accidents as the dependent variable, and program, sex, SES, and GPA (grade point average) as the independent factors.

Table II-23 presents the analysis of variance of number of accidents for the first 6 months of licensed driving, for licensed students. The main effects of program, which is the principal effect of concern in these analyses, yields an F value of 2.589, with an associated significance of .076. Thus, the observed differences between program means in Period 1, licenced students, are not statistically significant using a .05 level of significance, although the attained level of significance of .076 may be interpreted by some as strongly "suggestive" of real program differences.

For Periods 2, 3, and 4, licensed students, there are clearly no statistically reliable differences between program accident means. F values shown in Table II-22* are low, with significance levels not approaching statistical significance.

For the total 2-year period, licensed students, observed differences between program accident means are not statistically significant, Table II-24, with a program main effect F value of 1.071, and an associated significance of .343.

Table II-25 presents the analysis of variance of number of accidents for the first 6 months of licensed driving, for *complete and licensed students*. As indicated in the table, differences between Period 1 program accident means are statistically significant, using a .05 level of significance. The program main effect F ratio is 4.035, with an associated significance level of .018, for Period 1. There are no statistically significant program differences for

*As with other F values shown, these are program main effect F ratios arising from a four-factor analysis of variance, with program, sex, SES, and GPA as the four independent factors.

TABLE II-23. ANALYSIS OF VARIANCE OF NUMBER OF ACCIDENTS DURING THE FIRST SIX MONTHS OF LICENSED DRIVING, FOR LICENSED STUDENTS

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	14.282	7	2.040	18.010	.001
PROGRAM	.587	2	.293	2.589	.076
SEX	5.676	1	5.676	50.102	.001
SES	1.057	3	.352	3.110	.026
GPA	5.047	1	5.047	44.549	.001
2-WAY INTERACTIONS	.947	17	.050	.440	.976
PROGRAM SEX	.047	2	.033	.294	.745
PROGRAM SES	.265	6	.044	.390	.886
PROGRAM GPA	.255	2	.127	1.125	.325
SEX SES	.049	3	.016	.144	.934
SEX GPA	.027	1	.027	.235	.628
SES GPA	.282	3	.094	.831	.477
3-WAY INTERACTIONS	.703	17	.041	.365	.991
PROGRAM SEX SES	.206	6	.034	.304	.935
PROGRAM SEX GPA	.233	2	.116	1.027	.358
PROGRAM SES GPA	.194	6	.032	.286	.944
SEX SES GPA	.039	3	.013	.114	.952
4-WAY INTERACTIONS	.548	6	.091	.806	.566
PROGRAM SEX SES GPA	.548	6	.091	.806	.566
EXPLAINED	16.379	47	.348	3.076	.001
RESIDUAL	1458.867	12879	.113		
TOTAL	1475.247	12925	.114		

12928 CASES WERE PROCESSED.

TABLE II-24. ANALYSIS OF VARIANCE OF NUMBER OF ACCIDENTS DURING THE FIRST TWO YEARS OF LICENSED DRIVING, FOR LICENSED STUDENTS

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	101.059	7	14.437	32.710	.001
PROGRAM	.946	2	.473	1.071	.343
SEX	53.465	1	53.465	121.134	.001
SES	8.711	3	2.904	6.579	.001
GPA	24.096	1	24.096	54.594	.001
2-WAY INTERACTIONS	11.561	17	.680	1.541	.074
PROGRAM SEX	1.477	2	.739	1.674	.188
PROGRAM SES	1.102	6	.184	.416	.868
PROGRAM GPA	2.272	2	1.136	2.573	.077
SEX SES	3.117	3	1.039	2.354	.071
SEX GPA	.789	1	.789	1.785	.182
SES GPA	3.409	3	1.136	2.575	.053
3-WAY INTERACTIONS	4.176	17	.246	.556	.924
PROGRAM SEX SES	1.045	6	.174	.395	.883
PROGRAM SEX GPA	1.515	2	.757	1.716	.180
PROGRAM SES GPA	1.563	5	.261	.590	.738
SEX SES GPA	.279	3	.093	.211	.889
4-WAY INTERACTIONS	2.693	6	.449	1.017	.413
PROGRAM SEX SES GPA	2.693	6	.449	1.017	.413
EXPLAINED	119.488	47	2.542	5.760	.001
RESIDUAL	3274.062	7418	.441		
TOTAL	3393.550	7465	.455		

7468 CASES WERE PROCESSED.

TABLE II-25. ANALYSIS OF VARIANCE OF NUMBER OF ACCIDENTS DURING THE FIRST SIX MONTHS OF LICENSED DRIVING, FOR COMPLETED AND LICENSED STUDENTS

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	11.088	7	1.584	14.426	.001
PROGRAM	.886	2	.443	4.035	.018
SEX	4.996	1	4.996	45.500	.001
SES	.677	3	.226	2.055	.105
GPA	2.926	1	2.926	26.651	.001
2-WAY INTERACTIONS	1.233	17	.073	.661	.843
PROGRAM SEX	.049	2	.024	.222	.801
PROGRAM SES	.503	6	.084	.764	.598
PROGRAM GPA	.061	2	.031	.278	.757
SEX SES	.134	3	.045	.407	.748
SEX GPA	.090	1	.090	.817	.366
SES GPA	.388	3	.129	1.177	.317
3-WAY INTERACTIONS	.729	17	.043	.390	.988
PROGRAM SEX SES	.284	6	.047	.432	.858
PROGRAM SEX GPA	.165	2	.083	.752	.472
PROGRAM SES GPA	.269	6	.045	.408	.874
SEX SES GPA	.041	3	.014	.125	.945
4-WAY INTERACTIONS	.450	6	.075	.683	.664
PROGRAM SEX SES GPA	.450	6	.075	.683	.664
EXPLAINED	13.499	47	.287	2.616	.001
RESIDUAL	1208.488	11006	.110		
TOTAL	1221.988	11053	.111		

11055 CASES WERE PROCESSED.

Periods 2, 3, and 4. For the total 2-year period, complete and licensed students, differences between program accident means also are not statistically significant, using a .05 significance level, with a program main effect F value of 1.847 and a significance of .158, Table II-26.

The results from these analyses of accident data indicate that the SPC and PDL programs appear to have an effect in reducing accident occurrence during the first 6 months of licensed driving for both licensed and complete and licensed students. However, the program effects are neutralized, or "wear" off after six months.

Table II-27 presents mean number of violations, by program and period of licensed driving, for licensed students, and complete and licensed students. The sample of students for each time period is the same as for the accident analysis, Table II-22. The sample of students was so selected for comparison of results for accidents and violations.

Analyses of variance of the violation data in Table II-27 were performed in the same fashion as for the accident analysis. For licensed students, the complete analyses of variance for Period 1 and for the total 2-year period are given in Tables II-28 and II-29. Corresponding analyses of variance for complete and licensed students are given in Tables II-30 and II-31. Program main effect F ratios and associated significance levels from these analyses are provided in Table II-27, for each licensed driving period.

The results from these analyses of the violation data shown in Table II-27 are readily summarized. For the total 2-year period, for both *licensed* and *complete and licensed* students, the SPC group mean number of violations is lower than the PDL group mean number of violations, and the PDL group mean number of violations is lower than the corresponding Control group mean number of violations. SPC, PDL, and Control group means are 0.7053, 0.7674, and 0.8152, respectively for licensed students. Corresponding violations means for complete and licensed students are 0.7050, 0.7446, and 0.8152 for SPC, PDL, and Control groups, respectively. For both licensed and complete and licensed students, these differences are statistically significant, as shown by the F ratios and associated significance levels. These total 2-year program differences are accounted for almost entirely by program differences during Periods 1 and 2, as no, or negligible, program effects on violations are evident during Period 3 or Period 4. That is, the program effects appear

TABLE II-26. ANALYSIS OF VARIANCE OF NUMBER OF ACCIDENTS DURING THE FIRST TWO YEARS OF LICENSED DRIVING, FOR COMPLETED AND LICENSED STUDENTS

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	80.399	7	11.486	26.442	.001
PROGRAM	1.604	2	.802	1.847	.158
SEX	44.070	1	44.070	101.459	.001
SES	8.996	3	2.999	6.904	.001
GPA	14.781	1	14.781	34.029	.001
2-WAY INTERACTIONS	13.069	17	.769	1.770	.027
PROGRAM SEX	1.512	2	.756	1.740	.176
PROGRAM SES	2.902	6	.484	1.113	.352
PROGRAM GPA	1.065	2	.533	1.226	.294
SEX SES	3.393	3	1.131	2.604	.051
SEX GPA	.492	1	.492	1.133	.287
SES GPA	4.140	3	1.380	3.177	.023
3-WAY INTERACTIONS	4.070	17	.239	.551	.927
PROGRAM SEX SES	1.221	6	.203	.468	.832
PROGRAM SEX GPA	1.077	2	.539	1.240	.290
PROGRAM SES GPA	1.363	6	.227	.523	.791
SEX SES GPA	.387	3	.129	.297	.828
4-WAY INTERACTIONS	1.550	6	.275	.633	.704
PROGRAM SEX SES GPA	1.550	6	.275	.633	.704
EXPLAINED	99.187	47	2.110	4.859	.001
RESIDUAL	2744.715	6319	.434		
TOTAL	2843.902	6366	.447		

6368 CASES WERE PROCESSED.

TABLE II-27. MEAN NUMBER OF VIOLATIONS, BY PROGRAM AND PERIOD OF LICENSED DRIVING

Licensed Students

Program	Period 1			Period 2			Period 3			Period 4			Total Two Year Period		
	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
SPC	4497	662	.1472	4047	643	.1589	3302	645	.1953	2599	501	.1928	2599	1833	.7053
PDL	4296	667	.1553	3871	683	.1764	3158	611	.1935	2515	529	.2103	2515	1930	.7674
Control	4135	725	.1753	3689	693	.1879	3000	633	.2110	2354	503	.2137	2354	1919	.8152
	F = 3.075 Sig. = .047			F = 2.388 Sig. = .092			F = .622 Sig. = .537			F = .862 Sig. = .422			F = 4.410 Sig. = .012		

Completed and Licensed Students

Program	Period 1			Period 2			Period 3			Period 4			Total Two Year Period		
	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$	η	Σx	$\bar{x}$
SPC	3545	493	.1391	3191	505	.1583	2592	504	.1944	2037	402	.1973	2037	1436	.7050
PDL	3375	481	.1425	3070	533	.1736	2502	462	.1847	1977	419	.2119	1977	1472	.7446
Control	4135	725	.1753	3689	693	.1879	3000	633	.2110	2354	503	.2137	2354	1919	.8152
	F = 5.963 Sig. = .003			F = 2.073 Sig. = .126			F = 1.146 Sig. = .318			F = .543 Sig. = .581			F = 4.136 Sig. = .016		

Period 1 - 1st 6 months of licensed driving
Period 2 - 2nd 6 months of licensed driving
Period 3 - 3rd 6 months of licensed driving
Period 4 - 4th 6 months of licensed driving
η = Sample Size
Σx = Number of Violations
$\bar{x}$ = Mean Number of Violations = $\frac{\Sigma x}{\eta}$

TABLE II-28. ANALYSIS OF VARIANCE OF NUMBER OF VIOLATIONS DURING THE FIRST SIX MONTHS OF LICENSED DRIVING, FOR LICENSED STUDENTS

SOURCE OF VARIATION			SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS			75.163	7	10.880	52.935	.001
PROGRAM			1.264	2	.632	3.075	.047
SEX			40.405	1	40.405	196.584	.001
SES			2.297	3	.765	3.725	.011
GPA			20.667	1	20.667	100.547	.001
2-WAY INTERACTIONS			7.653	17	.450	2.190	.004
PROGRAM	SEX		1.407	2	.704	3.423	.033
PROGRAM	SES		1.843	6	.307	1.494	.177
PROGRAM	GPA		.597	2	.298	1.452	.235
SEX	SES		.651	3	.217	1.056	.367
SEX	GPA		2.149	1	2.149	10.456	.001
SES	GPA		.692	3	.231	1.122	.339
3-WAY INTERACTIONS			1.650	17	.097	.472	.965
PROGRAM	SEX	SES	.253	6	.042	.205	.975
PROGRAM	SEX	GPA	.259	2	.129	.630	.533
PROGRAM	SES	GPA	.978	6	.163	.793	.576
SEX	SES	GPA	.066	3	.022	.107	.956
4-WAY INTERACTIONS			1.182	6	.197	.958	.452
PROGRAM	SEX	SES	1.182	6	.197	.958	.452
	GPA						
EXPLAINED			86.648	47	1.844	8.969	.001
RESIDUAL			2646.962	12878	.206		
TOTAL			2733.610	12925	.211		

12928 CASES WERE PROCESSED.

TABLE II-29. ANALYSIS OF VARIANCE OF NUMBER OF VIOLATIONS DURING THE FIRST TWO YEARS OF LICENSED DRIVING, FOR LICENSED STUDENTS

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	1032.922	7	147.546	118.389	.001
PROGRAM	10.991	2	5.496	4.410	.012
SEX	589.997	1	589.997	473.405	.001
SES	25.265	3	8.422	6.757	.001
GPA	240.736	1	240.736	193.163	.001
2-WAY INTERACTIONS	71.838	17	4.226	3.391	.001
PROGRAM SEX	8.037	2	4.019	3.224	.040
PROGRAM SES	5.319	6	.886	.711	.641
PROGRAM GPA	.896	2	.449	.359	.698
SEX SES	8.946	3	2.982	2.393	.067
SEX GPA	32.873	1	32.873	26.377	.001
SES GPA	10.133	3	3.378	2.710	.044
3-WAY INTERACTIONS	25.874	17	1.522	1.221	.240
PROGRAM SEX SES	3.223	6	.537	.431	.858
PROGRAM SEX GPA	1.079	2	.539	.433	.649
PROGRAM SES GPA	21.905	6	3.651	2.929	.008
SEX SES GPA	.982	3	.327	.263	.852
4-WAY INTERACTIONS	16.781	6	2.797	2.244	.037
PROGRAM SEX SES GPA	16.781	6	2.797	2.244	.037
EXPLAINED	1147.315	47	24.411	19.587	.001
RESIDUAL	9244.921	7418	1.246		
TOTAL	10392.235	7465	1.392		

7468 CASES WERE PROCESSED.

TABLE II-30. ANALYSIS OF VARIANCE OF NUMBER OF VIOLATIONS DURING THE FIRST SIX MONTHS OF LICENSED DRIVING, FOR COMPLETED AND LICENSED STUDENTS

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	62.108	7	8.873	45.735	.001
PROGRAM	2.314	2	1.157	5.963	.003
SEX	34.945	1	34.945	180.128	.001
SES	1.744	3	.581	2.997	.030
GPA	13.198	1	13.198	68.029	.001
2-WAY INTERACTIONS	7.440	17	.438	2.256	.003
PROGRAM SEX	1.302	2	.651	3.357	.035
PROGRAM SES	1.706	6	.284	1.466	.187
PROGRAM GPA	.657	2	.329	1.694	.184
SEX SES	.879	3	.293	1.511	.210
SEX GPA	1.433	1	1.433	7.387	.007
SES GPA	.692	3	.231	1.189	.313
3-WAY INTERACTIONS	1.982	17	.111	.571	.915
PROGRAM SEX SES	.385	6	.064	.330	.921
PROGRAM SEX GPA	.530	2	.265	1.367	.255
PROGRAM SES GPA	.590	6	.098	.507	.803
SEX SES GPA	.219	3	.073	.376	.770
4-WAY INTERACTIONS	1.287	6	.214	1.105	.357
PROGRAM SEX SES GPA	1.287	6	.214	1.105	.357
EXPLAINED	72.716	47	1.547	7.975	.001
RESIDUAL	2135.148	11006	.194		
TOTAL	2207.864	11053	.200		

11055 CASES WERE PROCESSED.

TABLE II-31. ANALYSIS OF VARIANCE OF NUMBER OF VIOLATIONS DURING THE FIRST TWO YEARS OF LICENSED DRIVING, FOR COMPLETED AND LICENSED STUDENTS

SOURCE OF VARIATION			SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS			869.546	7	124.221	102.354	.001
PROGRAM			10.038	2	5.019	4.136	.016
SEX			500.810	1	500.810	412.651	.001
SES			24.991	3	8.330	6.864	.001
GPA			192.282	1	192.282	158.434	.001
2-WAY INTERACTIONS			65.900	17	3.935	3.243	.001
PROGRAM	SEX		6.312	2	3.156	2.600	.075
PROGRAM	SES		10.800	6	1.800	1.483	.181
PROGRAM	GPA		.096	2	.048	.040	.961
SEX	SES		13.380	3	4.460	3.675	.012
SEX	GPA		22.310	1	22.310	18.382	.001
SES	GPA		8.312	3	2.771	2.283	.078
3-WAY INTERACTIONS			30.792	17	1.811	1.492	.089
PROGRAM	SEX	SES	3.903	6	.650	.536	.781
PROGRAM	SEX	GPA	1.854	2	.927	.764	.466
PROGRAM	SES	GPA	21.735	6	3.622	2.985	.007
SEX	SES	GPA	2.217	3	.739	.609	.609
4-WAY INTERACTIONS			15.798	6	2.633	2.170	.044
PROGRAM	SEX	SES	15.798	6	2.633	2.170	.044
	GPA						
EXPLAINED			983.035	47	20.916	17.234	.001
RESIDUAL			7669.998	6319	1.214		
TOTAL			8652.033	6366	1.359		

6368 CASES WERE PROCESSED.

to "wear" off, or to be neutralized, after the first year of licensed driving, as far as violations are concerned.

Repeated Measures

An examination of program effects on accident and violation occurrence for the four periods of licensed driving was also performed using a "repeated measures" design. Data are presented in Tables II-32 and II-33, for mean number of accidents and mean number of violations, respectively. In these tables, the *same* sample of students is followed for the four periods, so that SPC, PDL, and Control group comparisons for one period are based on the same students as for another period.* This provides for better controlled between-periods comparisons, because of the common sample, but leads to much more restricted sample sizes for the earlier periods, as compared to the previous analyses. Also, in order to evaluate further the relation of the apparent short-term program effect on accident and violation occurrence to longer-term measures of accident and violation occurrence, the mean number of accidents and violation was computed for the total 2-year period *and* the total aggregate project period. These are shown in Tables II-32 and II-33, also.

An examination of the means of numbers of accidents and violations in Tables II-32 and II-33 shows the same pattern of results for Periods 1 through 4 as for the previous analyses. Thus, for accidents, program differences in mean number of accidents are observed in Period 1 only, with these differences being reflected in program differences for the total 2-year period, for both licensed and complete and licensed students. For the total aggregate project period, for licensed students, the absolute differences among the mean number of accidents are decreased and the relative differences are, now, very small. The total aggregate project period means of number of accidents for the complete and licensed students reflect a smaller absolute difference between the SPC and Control groups and a slightly larger absolute difference between the PDL and Control groups. However, again, the relative differences are smaller, now. Thus, although program effects appear to be evidenced in the

*The sample of students followed consists of students with at least two years of licensed driving prior to January 1, 1982.

TABLE II-32. MEAN NUMBER OF ACCIDENTS, BY PROGRAM AND PERIOD OF LICENSED DRIVING (REPEATED MEASURES) AND TOTAL AGGREGATE PROJECT PERIOD

Licensed Students

Program	Period 1		Period 2		Period 3		Period 4		Total 2-Yr. Period		Total Aggregate Project Period	
	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$
SPC (n = 2599)	275	.1058	264	.1016	234	.0900	256	.0985	1029	.3959	1469	.5652
PDL (n = 2515)	287	.1141	251	.0998	207	.0823	232	.0922	977	.3885	1412	.5614
Control (n = 2354)	309	.1313	231	.0981	225	.0956	224	.0952	989	.4201	1382	.5871

F = 0.371
Sig. = .690

Completed and Licensed Students

Program	Period 1		Period 2		Period 3		Period 4		Total 2-Yr. Period		Total Aggregate Project Period	
	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$
SPC (n = 2037)	212	.1041	205	.1006	180	.0884	205	.1006	802	.3937	1148	.5636
PDL (n = 1977)	212	.1072	193	.0976	159	.0804	181	.0916	745	.3768	1058	.5352
Control (n = 2354)	309	.1313	231	.0981	225	.0956	224	.0952	989	.4201	1382	.5871

F = 1.711
Sig. = .181

TABLE II-33. MEAN NUMBER OF VIOLATIONS, BY PROGRAM AND PERIOD OF LICENSED DRIVING (REPEATED MEASURES) AND TOTAL AGGREGATE PROJECT PERIOD

Licensed Students

Program	Period 1		Period 2		Period 3		Period 4		Total 2-Yr. Period		Total Aggregate Project Period	
	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$
SPC (n = 2599)	406	.1562	428	.1647	498	.1916	501	.1928	1833	.7053	3695	1.4217
PDL (n = 2515)	440	.1750	473	.1881	488	.1940	529	.2103	1930	.7674	3666	1.4577
Control (n = 2354)	439	.1865	482	.2048	495	.2103	503	.2137	1919	.8152	3674	1.5607

F = 2.430
Sig. = .089

Completed and Licensed Students

Program	Period 1		Period 2		Period 3		Period 4		Total 2-Yr. Period		Total Aggregate Project Period	
	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$	Σx	$\bar{x}$
SPC (n = 2037)	304	.1492	332	.1630	398	.1954	402	.1973	1436	.7050	2910	1.4286
PDL (n = 1977)	318	.1608	366	.1851	369	.1866	419	.2119	1472	.7446	2804	1.4183
Control (n = 2354)	439	.1865	482	.2048	495	.2103	503	.2137	1919	.8152	3674	1.5607

F = 2.803
Sig. = .061

differences among mean number of accidents for the first 6-month period of licensed driving, the magnitude and significance of these effects are diminished and essentially neutralized over time.

For violations, the repeated measures analysis reveals that the program effects are greatest in Periods 1 and 2 and begin to diminish in Period 3, although still evident, for both licensed and complete and licensed students. A comparison of the means of number of violations for the total 2-year period and the total aggregate project period indicates a diminishing increase from the former to the latter period in the absolute differences among program means for both licensed and complete and licensed students. It appears, therefore, that the program effects on violation occurrence are significantly longer lasting than the program effects on accident occurrence.

Mean Number of Days of Licensed Driving

The differential effect of the three programs, SPC, PDL, and Control, on the licensure of student participants was assessed earlier in the report, Table II-5, Licensing Progression, in terms of the numbers and percentages of students obtaining a license by specified times in the program process, e.g., within six months of course completion or 16th birthday, whichever is later. Another method for assessing differential program effect on student licensure is to calculate the mean number of days of licensed driving of the licensed students of the three program groups as of a specified date. The mean number of days of licensed driving was calculated for the licensed students of the three groups using two as-of-dates, i.e., January 1, 1982--the date when the accident data of DOAS computer files were current, and December 6, 1982--the date of the latest retrieval from DOAS files when the licensing and violation data are current within one month or less. The means of the number of days of licensed driving for the licensed students of the three program groups for the two as-of-dates are presented in Table II-34.

An examination of Table II-34 reveals that the means of number of days of licensed driving are significantly greater for the SPC and PDL groups of students than for the Control group students for both as-of-dates. This result reflects that SPC and PDL students obtain their licenses significantly earlier on average than do the Control students, thus yielding greater numbers

TABLE II-34. MEAN NUMBER OF DAYS OF LICENSED DRIVING

Licensed Students

Program	As of 1/01/82		As of 12/06/82	
	η	$\bar{x}$	η	$\bar{x}$
SPC	4643	811.89	4829	1112.29
PDL	4476	813.01	4681	1109.23
Control	4354	789.34	4588	1079.84

of days of licensed driving from a common as-of-date. In comparing the means of the SPC and PDL groups with the means of the Control group, the differences among means range from about 23 days for the earlier as-of-date to a high of about 32 days for the later as-of-date. The means of the earlier as-of-date are equivalent to slightly more than 2 years and 2 months of licensed driving, while the means for the later as-of-date are equivalent to about 3 years of licensed driving.

The implicit consequence of the program effect of increased licensure of of SPC and PDL group students compared to Control group students in both numbers of students licensed in a given period of time, Table II-5, and in mean days of licensed driving, Table II-34, is that SPC and PDL group licensed students have a longer period of time than Control group licensed students in which accidents and violations can occur when measured from a common as-of-date. In this way, the program effect of increased licensure of SPC and PDL group students appears to offset, or neutralize, over time the program effect of reducing accident and violation occurrence of SPC and PDL group students when compared to the accident and violation occurrence of Control group students. The nature of these counteracting effects is illustrated best in Table II-32, licensed students, comparing the number of accidents, Σx, in Period 1 with the number of accidents in total aggregate project period, taking into account the comparative number of students, η, in each of the three groups, SPC, PDL, and Control. This offsetting of program effects is less apparent for violation occurrence as shown in Table II-33, licensed students.

Telephone Survey of Yesterday's Driving Exposure

As discussed earlier in this report, the collection of valid and reliable driving exposure data proved to be one of the most difficult and perplexing evaluation tasks of the project. The analytic study presenting the statistical analysis of the pre-post administration of the Driving Habits, History, and Exposure Survey instrument indicates that because of the low reliability of the exposure data obtained, the Survey was of limited value for exposure measurement (H. W. Ray, et al, May 1980). A shorter, revised form of the Driving Habits, History, and Exposure Survey was constructed and administered to all senior-year student participants in May 1981. Because of the questionable validity of much of the data obtained and the problems of administration experienced, it was determined that the shorter, revised form of the Survey would not be administered again to all senior-year student participants in May 1982.

A further attempt to collect driving exposure data involved a procedure for obtaining odometer readings from students' cars. The procedure was devised and was pilot tested in quarters 9 and 10. A number of problems were encountered. The initial equipment used would not fit all makes of automobiles, so the equipment was modified. Difficulties were encountered in having the students come to a facility to have the equipment installed. The procedure was revised such that the students were visited at home where the equipment was installed. However, because difficulties continued to be encountered, the procedure for obtaining odometer readings was discontinued.

In a final attempt to collect driving exposure data for use in comparing the three groups, SPC, PDL, and Control, on driving exposure, a method was devised for obtaining limited driving exposure data from a random sample of *licensed* student participants in the three groups. The method involved a telephone interview of the selected licensed student participants in which the student participants were asked a short, structured set of questions concerning driving exposure experience on the day prior (yesterday) to the telephone interview. The interview protocol and survey form are shown in Appendix D. The telephone survey design involved the assignment of all *licensed* student participants in quarters 4 through 8 to strata of program, SPC, PDL, and Control, and sex, male and female. All selected students were assigned random

numbers. Using the random numbers within strata, the students were assigned in approximately equal numbers to one of the seven days of the week (when the interview was to be conducted), and to one of the four quarters of the year, Fall, Winter, Spring, and Summer, of the 1981-82 school year. Daily and seasonal variation effects were taken into account in the design. Thus, 28 lists of the names of selected licensed student participants were produced for use by the telephone interviewers. It should be noted that the telephone interviewers were not informed of the program membership, i.e., SPC, PDL, and Control, of the student names on the lists. The telephone survey was initiated in October 1981 and completed in September 1982.

The results of the telephone survey of yesterday's driving exposure for the sample of licensed students selected is shown in Table II-35. An examination of the results reveals that the daily lists of student names combined for the four quarters contained about 420 names per list per day, yielding approximately 140 licensed students for each of the three groups, SPC, PDL, and Control, stratified by sex. It appears that a small number of substitutions of Wednesday-Thursday and Saturday-Sunday list names were made. This small number of substitutions should not affect the overall comparisons of exposure, discussed later. Table II-35 further indicates that interviews conducted on Friday and Saturday to obtain exposure data for Thursday and Friday were least successful, i.e., 179 and 206 completed forms, drove yesterday, responses were achieved. The unable-to-contact category of results also were highest for these two days. This particular result appears to be a function of contacted persons' disposition to respond "wrong number" or "doesn't live here" to telephone contacts made on Friday and Saturday, especially during the evening. Sunday calls about Saturday driving obtained the smallest number of refusals to participate. The results of the other days in the week are approximately equivalent across categories of results. Of 2,941 attempted contacts for telephone interviews, completed telephone survey forms were achieved for 1,779 students contacted, a completion rate of about 60 percent.

The 1,535 completed forms, drove yesterday, and 244 completed forms, did not drive yesterday, were edited for completeness, internal consistency, and accuracy of data prior to analysis of miles driven and hours of driving yesterday. Of the 1,535 drove-yesterday forms, 20 were eliminated in editing, yielding 1,515 for analysis. Of the 244 did-not-drive-yesterday forms, 18

TABLE II-35. TELEPHONE SURVEY OF YESTERDAY'S DRIVING EXPOSURE SAMPLE

Four Quarters Combined

	C.D.*	C.N.D.	R.P.	C.N.C.	U.C.	Students on Lists
Monday	239	38	9	56	79	421
Tuesday	229	28	10	76	78	421
Wednesday	228	30	9	68	81	416
Thursday	179	27	9	83	102	400
Friday	206	30	10	77	99	422
Saturday	217	44	3	79	84	427
Sunday	237	47	10	63	77	434
TOTAL	1535	244	60	502	600	2941

*C.D. - Form completed, drove yesterday.
C.N.D. - Form completed, did not drive yesterday, no license, or does not drive.
R.P. - Refused to participate.
C.N.C. - Could not contact at time of calls--not at home, away at college, and busy signals.
U.C. - Unable to contact--wrong or unknown number, disconnected number, unpublished number, not living at home or whereabouts unknown, deceased.

were eliminated in editing, leaving 226 for analysis.

An analysis of the day of the week and month of yesterday driving exposure was performed using the 1,515 drove-yesterday forms of the telephone survey. Of the 1,515 drove-yesterday forms, 1,470 had complete data for both day of the week *and* month of yesterday driving exposure. The numbers of licensed students that drove yesterday for each day of the week of each of the three groups, SPC, PDL, and Control, are shown in Table II-36.

The yesterday driving exposure is equally distributed over the days of the week with the exception of Thursday and Friday, which was discussed previously. Across the days of the week, the yesterday driving exposure for the three groups is equally distributed; each group reflects about 33 percent of the total number of students. Within the days of the week, the numbers for the three groups, SPC, PDL, and Control, are relatively comparable. The numbers for Thursday and Sunday differ most, with Control students reflecting less than 30 percent for these two days. However, these differences are not significant in the overall pattern of numbers of licensed students that drove yesterday for each day of the week of the three groups. Thus, the effects of daily variation in yesterday driving exposure for the licensed students of the three groups appear to be balanced.

The number of licensed students that drove yesterday for each month of each of the three groups are presented in Table II-37. An examination of Table II-37 reveals that the two months at the beginning and conclusion of the telephone survey of yesterday driving exposure, October 1981 and September 1982, yielded small total numbers of licensed students responding. This result, no doubt, is a function of start-up and closing-out the activity. The total numbers for the remaining months, although uneven, reflect a comparative balance across months. The within month numbers of licensed students for each of the three programs, SPC, PDL, and Control, do not differ greatly across the months. Only 8 of the 36 within month numbers for the three programs are less than 30 percent or greater than 40 percent of the monthly totals. The effects of monthly variation on yesterday driving exposure are, thus, balanced across the three programs.

The objective of the various efforts to obtain driving exposure data is to make comparisons among the three groups of students, SPC, PDL, and Control, of relative driving exposure. Differences in driving exposure among the three

TABLE II-36. NUMBER OF LICENSED STUDENTS DROVE YESTERDAY BY DAY OF WEEK AND PROGRAM

Program	Day of the Week							
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
SPC	71 (31.7)*	75 (34.1)	71 (31.6)	52 (30.4)	64 (33.0)	69 (33.0)	85 (37.4)	487 (33.1)
PDL	71 (31.7)	74 (33.6)	72 (32.0)	71 (41.5)	64 (33.0)	71 (34.0)	75 (33.0)	498 (33.9)
Control	82 (36.6)	71 (32.3)	82 (36.4)	48 (28.1)	66 (34.0)	69 (33.0)	67 (29.5)	485 (33.0)
TOTAL	224	220	225	171	194	209	227	1470

TABLE II-37. NUMBER OF LICENSED STUDENTS DROVE YESTERDAY BY MONTH AND PROGRAM

Program	Month												
	Oct 1981	Nov 1981	Dec 1981	Jan 1982	Feb 1982	Mar 1982	Apr 1982	May 1982	Jun 1982	Jul 1982	Aug 1982	Sep 1982	Total
SPC	14 (30.4)*	69 (34.5)	55 (36.9)	34 (29.3)	20 (22.0)	69 (40.6)	34 (34.0)	62 (36.3)	27 (27.0)	42 (33.9)	46 (30.3)	15 (29.4)	487 (33.1)
PDL	16 (34.8)	62 (31.0)	46 (30.9)	44 (37.9)	35 (38.5)	51 (30.0)	35 (35.0)	50 (29.2)	36 (36.0)	49 (39.5)	54 (35.5)	20 (39.2)	498 (33.9)
Control	16 (34.8)	69 (34.5)	48 (32.2)	38 (32.8)	36 (39.6)	50 (29.4)	31 (31.0)	59 (34.5)	37 (37.0)	33 (26.6)	52 (34.2)	16 (31.4)	485 (33.0)
TOTAL	46	200	149	116	91	170	100	171	100	124	152	51	1470

*Column Percentages

groups could account for differences in accident and violation occurrence. Thus, the various driving exposure data collection efforts were pursued, finally resulting in the conduct of the telephone survey of yesterday's driving exposure of licensed students from the three groups.

In order to make direct comparisons among the three groups, the estimates of miles driven and time of driving for the three categories of School driving, Work driving, and Recreation driving for each of the 6-hour yesterday driving exposure periods on the telephone survey form were summed, independently (See Telephone Survey Form, Appendix D). Thus, a sum of miles driven yesterday and a sum of hours of driving yesterday were obtained for each of the four yesterday driving periods, 6 AM-Noon, Noon-6 PM, 6 PM-Midnight, and Midnight-6 AM, for each of the licensed students that drove yesterday. The four period sums were in turn summed to obtain a total miles driven and a total hours of driving for yesterday. The mean number of miles driven yesterday and mean number of hours of driving yesterday were calculated for the four 6-hour driving periods and total day for the three groups, SPC, PDL, and Control. Separate means were calculated by sex, male and female, and the total for each of the three groups. Finally, the means were calculated two ways, i.e., using two different denominators. In the first way, the denominator used included both the number of students that *did* drive yesterday, responded "Yes", and the number of students that *did not* drive yesterday, responded "No", to obtain a mean for the *total* of number of licensed students responding. The second way of calculating the means used the denominator of the number of students that *drove* yesterday in a given 6-hour period and for the total day. Thus, comparisons of the means can be made among the three groups for only the licensed students that drove *and* for the total number of licensed students responding, responding "Yes" and "No".

The means of the number of miles driven yesterday for each of the three groups, SPC, PDL, and Control, and by sex within group are shown in Table II-38. Examination of Table II-38 reveals that 1,741 licensed students provided responses to the telephone survey that could be used for analysis. Of the 1,741 respondents, 1,515 drove yesterday and 226 did not drive yesterday (about 87 percent driving); 929 respondents were males and 812 respondents were females (about 53 percent males); 820 males drove yesterday of the 929 (about 88 percent); and 695 females drove yesterday of the 812 (about 86 percent). The

TABLE II-38. MEAN NUMBER OF MILES DRIVEN YESTERDAY
TELEPHONE SURVEY RESULTS

Program Sex	Drive Yesterday Yes	No	Total	Daily Driving Periods 6AM-Noon η	6AM-Noon $\bar{x}$	Noon-6PM η	Noon-6PM $\bar{x}$	6PM-M'nite η	6PM-M'nite $\bar{x}$	M'nite-6AM η	M'nite-6AM $\bar{x}$	Total Day η	Total Day $\bar{x}$
Male	275	30	305		5.69*		9.53		8.43		1.07		24.72
				181	(9.59)**	225	(12.92)	160	(16.07)	38	(8.39)	275	(27.41)
SPC Female	225	43	268		4.55		6.17		5.86		0.30		16.87
				144	(8.46)	172	(9.61)	113	(13.90)	12	(6.75)	225	(20.10)
Total	500	73	573		5.16		7.96		7.23		0.71		21.05
Male	269	41	310		6.81		12.24		6.78		2.06		27.89
				163	(12.95)	230	(16.49)	160	(13.14)	21	(30.45)	269	(32.14)
PDL Female	248	32	280		5.18		6.40		4.59		1.03		17.20
				161	(8.99)	190	(9.43)	116	(11.08)	15	(19.27)	248	(19.42)
Total	517	73	590		6.03		9.47		5.74		1.57		22.82
Male	276	38	314		10.70		11.85		7.12		1.72		31.40
				188	(17.88)	216	(17.20)	156	(14.34)	21	(25.71)	276	(35.72)
Control Female	222	42	264		4.91		7.40		4.49		0.43		17.22
				138	(9.36)	180	(10.86)	119	(9.96)	11	(10.23)	222	(20.48)
Total	498	80	578		8.06		9.82		5.92		1.13		24.93

*$\bar{x}$ = Σx/Total

**($\bar{x}$) = $\Sigma x/\eta$

totals by group, driving and not driving by group, and males and females--driving and not driving--by group appear to be relatively balanced across the SPC, PDL, and Control groups.

The numbers of licensed students driving yesterday for each of the four 6-hour periods are comparatively well balanced in total and by sex across the three groups, with the exception of the PDL group male-female ratio in the 6 AM-Noon period and the SPC group male-female ratio in the Midnight-6 AM period. These differences are not extreme, however, and should not affect significantly the comparisons of mean number of miles driven yesterday among the three groups. A study of the means of number of miles driven yesterday, calculated both ways, for the four 6-hour periods, and total day indicates that males drove more, on average, than females for all four periods and total day across the three groups. The largest differences between male and female means of number of miles driven yesterday during the 6-hour periods and total day are for the Control group. This result is accounted for by the higher mean number of miles driven during 6-hour periods and total day by the Control group males. This difference in male and female driving exposure is consistent with other research.

In comparisons of the three groups, SPC, PDL, and Control, the Control group, as a whole (total), drove more yesterday, on average, than the SPC and PDL groups, as a whole (total). These differences among the three group means for total day are accounted for, again, by the larger means of the Control group males, because the means for total day of the Control group females are comparable to the means of the SPC and PDL group females. The differences among means of number of miles driven yesterday for total day of the three groups are not large: Control group mean of 24.93, PDL group mean of 22.82, and SPC group mean of 21.05, respectively. Thus, the differences among the three groups in driving exposure as measured by the telephone survey results of mean number of miles driven yesterday do not appear to be sufficient to account for differences, if any, among the three groups in means of accident and violation occurrence.

A similar analysis was performed for the means of number of hours of driving yesterday for each of the three groups, by sex and total, for the four 6-hour periods and total day. Again, the means were calculated in two ways, using two denominators. The means of number of hours of driving yesterday are

presented in Table II-39. Table II-39 reveals that, again, the male means of number of hours of driving yesterday are greater than the female means across the four 6-hour periods and total day and across the three groups, with the exception of one group by period "block", that of the PDL group in the Midnight-6 AM period. For this block the male and female means are essentially equal.

The differences among the means of number of hours of driving yesterday for the three groups are generally accounted for, again, by the larger means of the Control group males. The differences among means for the three groups, as a whole (total), are not large: Control group mean of 0.79, PDL group mean of 0.72, and SPC group mean of 0.68, respectively. As with miles driven yesterday, the differences of means of number of hours driven yesterday for the three groups are not sufficient to account for differences in means of accident and violation occurrence among the three groups, if any occur.

Intermediate Measures Results

As described and discussed earlier in this report, four of the principal intermediate measures administered to the student participants of the SPC Demonstration Project were the Driving Knowledge Test, the University of Southern California On-Road Performance Test (ORPT), the Safe Performance On-Road Test (SPORT), and the Mann Inventory. Several studies, cited earlier, were conducted to analyze the results of these four intermediate measures including comparisons among the three groups, SPC, PDL, and Control, comparisons using the demographic variables, and the relation with accident and violation occurrence. The discussion of intermediate measures that follows in based on these analytic studies.

The Driving Knowledge Test is a 56-item multiple choice test constructed by the DeKalb project team based on the objectives of the Safe Performance Curriculum. The Driving Knowledge Test was administered in a 45-minute period on a pre-posttraining schedule to the SPC and PDL students throughout the project, and to a sub-sample of Control students, mostly from quarters three and four. The Driving Knowledge Test achieved reliabilities of $r = .80$ using four different methods of calculation using the pre- and post-scores of students in the SPC and PDL groups from quarters one and two (N's greater than 1,000

TABLE II-39. MEAN NUMBER OF HOURS OF DRIVING YESTERDAY
TELEPHONE SURVEY RESULTS

Program Sex	Drive Yesterday Yes	No	Total	Daily Driving Periods 6AM-Noon η	6AM-Noon $\bar{x}$	Noon-6PM η	Noon-6PM $\bar{x}$	6PM-M'nite η	6PM-M'nite $\bar{x}$	M'nite-6AM η	M'nite-6AM $\bar{x}$	Total Day η	Total Day $\bar{x}$
Male	275	30	305	181	0.19* (0.32)**	225	0.33 (0.44)	160	0.25 (0.48)	38	0.03 (0.26)	275	0.81 (0.89)
SPC Female	225	43	268	144	0.15 (0.29)	172	0.22 (0.34)	113	0.16 (0.38)	12	0.01 (0.20)	225	0.54 (0.65)
Total	500	73	573		0.17		0.28		0.21		0.02		0.68
Male	269	41	310	163	0.21 (0.40)	230	0.37 (0.50)	160	0.22 (0.42)	21	0.04 (0.62)	269	0.84 (0.96)
PDL Female	248	32	280	161	0.18 (0.32)	190	0.23 (0.33)	116	0.15 (0.36)	15	0.04 (0.69)	248	0.60 (0.67)
Total	517	73	590		0.20		0.30		0.18		0.04		0.72
Male	276	38	314	188	0.30 (0.51)	216	0.37 (0.54)	156	0.23 (0.47)	21	0.05 (0.78)	276	0.96 (1.09)
Control Female	222	42	264	138	0.17 (0.33)	180	0.25 (0.37)	119	0.16 (0.35)	11	0.01 (0.28)	222	0.59 (0.71)
Total	498	80	578		0.24		0.32		0.20		0.03		0.79

*$\bar{x}$ = Σx/Total

**$\bar{x}$ = $\Sigma x/\eta$

in each group). The gains in Driving Knowledge Test scores from pre- to posttest for SPC students in quarters one and two were significantly greater than the gains for PDL students. The posttest mean for SPC students was 48.18 and for PDL students was 44.43. These mean scores represent 86 and 79 percent correct, respectively. The numbers of students in each group were 955 and 994, respectively. Males scored higher on the posttest than females. High and medium level Socioeconomic Status (SES) students scored higher on the post-test than low level SES students. Above average Grade Point Average (GPA) students scored higher on the posttest than below average GPA students. (H. W. Ray, April 1979.)

The analysis of the Driving Knowledge Test scores relation to accident and violation occurrence was based on the test scores and accident and violation experience of 3,302 licensed students that had at least two years of licensed driving (1,541 SPC students, 1,530 PDL students, and 231 Control students). The analysis of Driving Knowledge Test posttest scores and accident and violation involvement, one or more accidents or violations versus none, yielded no significant relationships. The significance of the t-test values were $p = .246$ for accident involvement and $p = .428$ for violation involvement. An analysis of the mean number of accidents and mean number of violations for students scoring above and below the median Driving Knowledge Test posttest score yielded no significant relationship with accident means, but indicated a significant relationship with mean number of violations. Higher scoring students had a mean of 0.656 violations while the lower scoring students had a mean of 0.786 violations. Regression analyses, using number of accidents and number of violations, respectively, as the dependent variable, with Driving Knowledge Test posttest scores as the independent variable, yielded essentially the same results, *no* significant relationship with mean number of accidents and *a* significant relationship with mean number of violations. (H. W. Ray and J. R. Brink, September 1982.)

Several analyses were performed with the results of the University of Southern California On-Road Performance Test (ORPT). The ORPT provides for an in-car examination of driver performance conducted over a pre-selected route. Specially trained examiners rate the driver on various well-defined behaviors at specified points, along the route. Test scores are expressed as percentage correct responses. The ORPT requires about 30 minutes to administer, at the site.

The sample of students for the first ORPT analytic study, from which the results presented are taken, consisted of SPC, PDL, and Control students assigned to quarters three, four, and five that: had successfully completed the course (SPC and PDL), were licensed, and were administered the ORPT *after* receiving their licenses. The resultant analysis sample was composed of 459 students, 100 SPC students, 117 PDL students, and 242 Control students. These samples were relatively well equated in terms of sex, days of licensed driving to ORPT administration, age at ORPT, and age at licensing, but *not* well equated in terms of SES, GPA, and route of ORPT (there were two ORPT routes). These variables were found not to relate to ORPT score differences. The analysis of ORPT scores revealed that SPC students scored higher than PDL and Control students on ORPT total test score *and* on the four subtest scores of Observing, Controlling, Judgment, and Other. Further, PDL students scored higher than Control students on ORPT total test score and on the four subtest scores. Thus, driver education students, as a group, scored higher than Control students on the ORPT scores. The total ORPT test score means were 68.75, 64.82, and 62.10 for SPC, PDL, and Control groups, respectively. (H. W. Ray and J. R. Brink, December 1980.)

Another study analyzed the relationship of ORPT scores to accident and violation occurrence. The sample used for this analysis consisted of licensed students that had at least two years of licensed driving that had been administered the ORPT. The bulk of these licensed students were from quarters one through four. The resultant sample was composed of 2,732 students, 1,188 SPC students, 1,166 PDL students, and 378 Control students. About 57 percent were males (1,564) and about 43 percent were females (1,168). Examination of accident and violation occurrence of students was confined to the first two years of licensed driving. Thus, each student's involvement history covered a fixed time period of licensed driving.

For the analysis, the total ORPT test score served as the primary independent variable, with analyses also performed using each of the four major subtest scores. (The ORPT can be scored to yield 13 subscores plus a total score.) The analysis of the reliability of the total ORPT test scores, calculated in various ways, yielded reliabilities of r approaching .90, a high reliability. The interrater reliability of total score for a small subsample of students was found to be markedly lower, r = .69. The analysis relating

means of total ORPT test scores and accident and violation involvement, one or more accidents or violations versus none, yielded *no* significant relationship for accident involvement and *a* significant relationship with violation involvement. However, the relationship was in an inverse direction, i.e., high ORPT total scores relate to higher violation involvement.

The analysis relating means of total ORPT test scores and number of accidents and violations accentuated the results cited above. Both mean number of accidents and mean number of violations were significantly related to mean ORPT total test scores in an inverse direction. To further study these "unexpected" results, the sample of students was divided into male and female subsamples. Analyses of ORPT total test scores and accident and violation occurrence were performed separately for the male and female subsamples. It was found that males score significantly higher than females on total ORPT test scores, means of 65.29 and 62.61, respectively. Further, the male group total ORPT test scores are significantly related to number of accidents and number of violations in an inverse direction, while the female group total ORPT test scores are *not* significantly related to number of accidents and number of violations. Regression analyses of total ORPT test scores and number of accidents and number of violations by sex confirmed these results. Analysis of the scores on the four subtests of ORPT and number of accidents and number of violations by sex revealed that for accidents, for males, the Controlling subtest scores are significantly related to number of accidents in an inverse direction. For violations, for males, the Controlling and Observing subtest scores are significantly related to number of accidents in an inverse direction. Also, for violations, for females, the Controlling subtest scores are significantly related to number of violations in an inverse direction. It was hypothesized that the inverse relationship for males of ORPT scores and accident and violation occurrence may be due to a driving exposure factor, i.e., better-performing male students may drive more, thus increasing driving exposure. (H. W. Ray and J. R. Brink, September 1982.)

The Safe Performance On-Road Test (SPORT) was developed by the DeKalb project team. The SPORT covers most of the content areas covered by the ORPT, but it is simpler to administer and score. The SPORT was administered to each SPC and PDL student at the completion of training as part of the final examination. The SPORT was administered as a mastery test so that to pass the test

a student had to achieve satisfactory performance in all six areas covered by the test, as judged by the examiner. Multiple administrations were permitted in order that students could pass areas of the test previously rated unsatisfactory.

The analysis of the SPORT scores and accident and violation occurrence used a sample of 1,890 SPC students and 1,955 PDL students that had been administered the SPORT and had at least two years of licensed driving. There were about 56 percent males (2,164) and about 44 percent females (1,681). Almost all were assigned to quarters one through five. Whereas, SPC students in the sample were evaluated on all six areas of the test, PDL students were evaluated on only four areas of the test, because of differing course objectives. Thus, a "pass" had a different meaning for SPC students and for PDL students. Consequently, separate analyses were conducted for SPC and PDL students. It should be noted that approximately 70 percent of the students passed the SPORT on the first administration, for both SPC and PDL groups.

In the analysis, the accident and violation records of those students that passed the SPORT on the *first administration* were contrasted with the accident and violation records of those students that did not pass the test on the first administration. Analyses were performed of accident and violation involvement, one or more accidents or violations versus none, and number of accidents and violations. For accidents, there were *no* significant differences between SPC students and PDL students that passed SPORT on first administration and SPC and PDL students that failed on first administration in terms of accident involvement and in terms of mean number of accidents. For the total sample, SPC and PDL groups combined, the "pass" students' accident involvement was 30.9 percent and mean number of accidents was 0.395, while the "fail" students' accident involvement was 32.7 percent and mean number of accidents was 0.426. None of the differences are significant. Similar results were yielded for violation involvement and number of violations. Again, for the total sample, the pass students' violation involvement was 43.6 percent and the mean number of violations was 0.746, while the fail students' violation involvement was 41.8 percent and the mean number of violations was 0.739. Thus, there appears to be little, if any, relationship between performance on the SPORT and accident and violation occurrence. (H. W. Ray and J. R. Brink, September 1982.)

The Mann Inventory was developed by Dr. William Mann for investigating

the relationship between personality/emotional/attitudinal factors and accident occurrence. The Inventory contains 63 items that express an individual's feelings toward himself, others, and established social mores. Response to items in the Inventory are expressed by checking one of five alternatives: always, usually, sometimes, rarely, or never. Based on responses to the items, various scale scores are calculated, to assess factors such as individual adjustment, aggressiveness, withdrawal, vacillation between extremes of aggression and withdrawal, risk-taking, and sociability. Separate scoring keys have been devised for males and females. For the SPC Demonstration Project, the Mann Inventory was administered in a 45-minute period, on a pre- posttest basis to each SPC and PDL student on the first and last day of the quarter in which the student took driver education. During the second project year, Control students also were administered the Inventory.

The sample of students used for the analysis of the Mann Inventory consisted of licensed students with at least two years of licensed driving and with both a pre- and posttest administration of the Inventory. In addition, the sample was confined to students that had an acceptable "lie scale" score. The lie scale is designed to assess whether or not a respondent is providing truthful responses to the Inventory items. Approximately 6 percent of the students did not achieve an acceptable lie scale score. The resultant sample was comprised of 2,735 students, 1,559 (or 57 percent) were males, and 1,176 (or 43 percent) were females. There were 1,359 SPC students, 1,159 PDL students, and 217 Control students in the sample. Almost all were assigned to quarters one through five.

An analysis was performed of the reliabilities of the various scale scores yielded by the Mann Inventory. There were ten scale scores analyzed, with separate analyses for males and females because of the different scoring keys used for the two sexes. The scales are: (1) well-adjusted, (2) satisfactory adjustment - periodic withdrawal, (3) satisfactory adjustment - periodic aggression, (4) aggressive, (5) withdrawn, (6) vacillation between aggression and withdrawal--these are the six original scales developed by Dr. William Mann--, (7) sociability, (8) risk-taking and power-seeking, (9) asocial--these three scales were developed in a Coast Guard study of recruits by John A. Whittenburg, et al--and (10) adjustment scale--developed by Dr. Mann as the overall adjustment or A-Scale. The scale score reliabilities were calculated by several methods for each sex. In addition, the pre- posttest correlations

were calculated for each scale score and by sex. The reliabilities for the various scales ranged from r = .77 and r = .73 for males and females, respectively, on scale (7) sociability to r = .06 and r = .21 for males and females, respectively, on scale (6) vacillation between aggression and withdrawal. The pre- posttest correlations ranged from r = .65 and r = .66 for males and females, respectively, on scale (7) to r = .33 and r = .38 for males and females, respectively, on scale (6). Thus, in general, the reliabilities and pre- posttest correlations for the scale scores are unimpressive, ranging from marginally acceptable to not at all acceptable.

Each of the ten Mann Inventory scale scores was related to accident and violation occurrence, for males and for females, in terms of accident and violation involvement, one or more accidents or violations versus none, and number of accidents and number of violations. In addition, the scores for each of the 63 items on the Inventory were related to accident and violation occurrence.

Five of the ten Mann Inventory scales showed a statistically significant relationship to accident and violation involvement and number of accidents and number of violations for males. The better the adjustment of males, A-Scale (10) Adjustment, the lower their rates of accidents and violations. The same relationship is reflected for scale (1) Well Adjusted for males. The more sociable males are, scale (7) Sociability, the lower their rates of accidents and violations. Again, the same relationship is reflected for scale (9) Asocial for males. The greater males' tendencies toward risk-taking and power-seeking, the higher their rates of accidents and violations. The most marked of the above cited relationships occurs with the Adjustment scale (A-Scale) scores. "Well-adjusted" males, highest scoring one-third of males on this scale, have a mean accident rate of 0.36, while relatively "poorly adjusted" males, lowest scoring one-third of males on this scale, have a mean accident rate of 0.56. The corresponding violation means for high- and low-scoring males on this scale were 0.68 and 1.15, respectively.

For females, three of the ten Inventory scales related significantly to accident and violation involvement and number of accidents and number of violations. These were scale (10) Adjustment (A-Scale), scale (1) Well Adjusted, and scale (6) Vacillation between Aggression and Withdrawal. Two of the ten scales related significantly to violation involvement and number of accidents

and number of violations, but not to accident involvement. These were scale (3) Satisfactory Adjustment - Periodic Aggressiveness and scale (7) Sociability. Thus, two of the Mann Inventory scales were significantly related to accidents and violations for females, but not for males. Again, the most marked relationship for females was with the Adjustment scale (A-Scale) and accident and violation rates. Mean accident rates for high- and low-scoring females on the Adjustment scale were 0.25 and 0.35, respectively, with corresponding violation means of 0.30 and 0.50 for high- and low-scoring females, respectively.

The analysis of the 63 Mann Inventory items and accident and violation occurrence revealed that 26 items were significantly related to accident occurrence; 27 items were significantly related to violation occurrence; and 17 items were significantly related to both accident and violation occurrence. It is hypothesized that in subsequent uses of the Mann Inventory, consideration should be given to using a multiple regression approach for differentially weighting items in a regression equation that are related to accident and violation occurrence to obtain "criterion scaled" composite scores.

III. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The major result of this demonstration project was that the improved driver education program, Safe Performance Curriculum, was not an effective accident reduction countermeasure. The SPC group did not have lower rates of accident involvement (Table II-7), one or more accidents versus none, nor lower mean number of accidents (Table II-8) than the Pre-Driver Licensing group or the Control group for assigned students, licensed students, or students that completed the course and were licensed. The PDL group of students had the lowest rates of accident involvement and lowest mean number of accidents for assigned, licensed, and complete and licensed students of the three experimental groups, SPC, PDL, and Control. However, there were no statistically significant differences in accident rates among the three groups for assigned students, licensed students, or complete and licensed students.

The results of the analysis of violation rates of the three experimental groups were very similar to those for accident rates. Again, the SPC was not an effective violation reduction countermeasure. The Control group of students had the lowest rates of violation involvement (Table II-7) of the three experimental groups for assigned, licensed, and complete and licensed students, while the PDL group of students had the lowest mean number of violations (Table II-12) of the three groups for assigned students and complete and licensed students. For the licensed students, the SPC group and PDL group mean number of violations were essentially the same. However, again, there were no statistically significant differences in violation rates among the SPC, PDL, and Control groups. Thus, the answer to the major evaluation question of the project is that there were no significant differences among the three experimental groups in either accident or violation rates.

Further in-depth analyses were performed in an effort to isolate and identify the program effects that brought about the primary results of no significant differences among the three experimental groups. The analysis of mean number of accidents by 6-month periods of licensed driving over a two-year period (Table II-22) for licensed and complete and licensed students revealed that the SPC and PDL groups reflected an "almost" significant accident

reduction effect in the first 6-month period for licensed students and a significant accident reduction effect in the first 6-month period for complete and licensed students. The accident means for the second, third, and fourth 6-month periods did not differ. But, the absolute differences of the first 6-month period were reflected in the differences among total two-year period accident means, although they were no longer significant statistically. This outcome demonstrated that the relative differences among accident means of the three groups diminished over time, thus resulting in no significant differences after two years.

The analysis of mean number of violations by 6-month periods of licensed driving over a two-year period (Table II-27) for licensed and complete and licensed students yielded similar, but more pronounced, results. The SPC and PDL groups showed a significant violation reduction effect in the first 6-month period for both licensed and complete and licensed students. The SPC group violation reduction effect was "near" significance in the second 6-month period for licensed students, while the reduction effect had "worn off" for the PDL group, and was significant for the complete and licensed students. The differences among the mean number of violations for the three groups in the third and fourth 6-month period were not significant. Because of the longer duration of the violation reduction effect, at least for the SPC group, the differences among the violation means for the total two-year period for the three groups were statistically significant. Thus, for violations the relative differences among group means were sufficient to yield significance after two years of licensed driving.

As part of an effort to determine whether or not the three experimental groups differed on some aspect of driving exposure, an analysis was performed of the number of days of licensed driving from two "as of" or "effectiveness" dates for the three groups. The first as-of-date used for the analysis was January 1, 1982, the current date of accident occurrence data in the Georgia Department of Administrative Services computer files. The second as-of-date used for calculations of number of days of licensed driving was December 6, 1982, the date of the DOAS retrieval of data and current within about a month for licensing and violation occurrence data. The calculations using the January 1, 1982 as-of-date showed that the SPC group and the PDL group, on average, had about 23 days and 24 days more of licensed driving, respectively,

than the Control group. Using the December 6, 1982 as-of-date, the SPC group and the PDL group, on average, had about 32 days and 29 days more of licensed driving, respectively, than the Control group (Table II-34). These results mean that in computing accident and violation occurrence from a common as-of-date, the SPC and PDL groups had a significantly longer period of licensed driving than the Control group during which accidents and violations could occur. Thus, the program effect of earlier licensing for the SPC group and PDL group contributed significantly to the findings of no significant differences among the three experimental groups in accident and violation rates. Hence, it is hypothesized that the short duration program effects of accident reduction and the more pronounced violation reduction for the SPC and PDL programs are "offset" by the effect of diminishing relative differences over time and the program effect of earlier licensing of the SPC and PDL group students to produce a result of no significant differences among SPC, PDL, and Control accident and violation rates.

Other results obtained in this demonstration project were the findings that females had significantly lower accident and violation rates than males; that above average grade point students had significantly lower accident and violation rates than below average grade point students; and that lower level socioeconomic status students, had significantly lower accident and violation rates than either higher level or middle level socioeconomic status students. It is hypothesized that this last finding is a function of less access to an automobile by lower level SES students, thus reducing the exposure for potential accident and violation occurrence. The findings of sex and grade point average related accident and violation rates are supported by other research.

The procedure for the conduct of the telephone survey of yesterday driving demonstrated promise as a means for collecting short-term driving exposure data. The results of the telephone survey indicated that the three groups, SPC, PDL, and Control, did not differ appreciably in the numbers that drove yesterday during the four 6-hour periods and total day, the mean number of miles driven yesterday, or the mean number of hours of driving yesterday, by 6-hour period and total day. Although certainly not definitive, the results of the telephone survey of yesterday driving reflected a pattern and regularity by group and by sex that lend credibility to the results obtained of short-term driving exposure.

The interim measures of the Driving Knowledge Test and the University of

Southern California On-Road Performance Test did yield significant posttest SPC program impact gains, when comparing the posttest means of the SPC group and the PDL group. The reliability coefficient values achieved by the Driving Knowledge Test were in the acceptable range, thus it warrants future use as an interim measure of driving knowledge. The ORPT yielded internal consistency reliability coefficients in the acceptable to excellent range. The inter-rater reliability achieved for total test was only acceptable. The ORPT has had considerable research and is judged to be a sound, precise measure of driving performance. The Driving Knowledge Test scores were not related to accident occurrence, but were related to violation occurrence. The ORPT scores yielded curious results in relation to accident and violation occurrence. For females, only one subtest of the ORPT related to violation occurrence. However, for males, the ORPT scores had an inverse relationship to accident and violation occurrence. It is hypothesized that males, who score high on the ORPT drive more, and thus have more driving exposure. The ORPT warrants further examination of the relationship of its scores to accident and violation rates.

The scores of five of the ten Mann Inventory scales related significantly to accident and violation occurrence, for both males and females (the Inventory has different scoring keys for the two sexes). However, the reliabilities of the Mann Inventory scale scores were in the marginally acceptable to not at all acceptable range. It is hypothesized that in subsequent use relating Mann Inventory scale scores to accident and violation occurrence, the Inventory items that relate to accident or violation occurrence should be differentially weighted in a regression equation to obtain a composite criterion scales score. This procedure should increase the reliability of the Mann Inventory scores and should increase the relationship of Inventory scores to accident and violation occurrence.

RECOMMENDATIONS

It has been concluded that the SPC and PDL programs did not achieve the desired goals of accident and violation reduction over the aggregate project period, but the SPC and PDL programs did achieve significant accident and violation reduction effects in the first 6 months of licensed driving. It was hypothesized that the short duration program effects of accident and violation

reduction were offset by the effect of diminishing relative differences over time *and* the program effect of earlier licensing of the SPC and PDL students. The results of these antagonistic effects appear to indicate that secondary driver education, as exemplified by the SPC and PDL programs, must be restructured to somehow exploit and emphasize the short duration accident and violation reduction impact and the positive interim measures impacts achieved. Several ingredients of the required restructuring form the basis of the recommendations as follows:

(1) Revise the licensing criteria and procedures for persons in the age range 15 through 19 years. It is recommended that applicants for a driver's license be at least 16 years of age and that applicants in the age range of 16 through 19 years be issued initially a provisional/restricted license. The provisional/restrictive license would be used to limit the licensees' exposure to high risk driving circumstances for a one-year period. At the end of the one-year period, the driving provision/restriction could be removed or extended dependent upon the drivers' accident and violation records.

(2) Modify the Safe Performance Curriculum (SPC). Although the SPC group of students performed significantly better on the On-Road Performance Test and Driving Knowledge Test than the PDL group of students, the accident and violation rates of the SPC and PDL groups were not significantly different. In fact, they were quite similar. Thus, it would appear that the extensive difference in curricula and instructional time between the SPC and PDL programs is not warranted. It is recommended that the SPC be selectively modified to yield, essentially, a "beefed up", objective-based PDL program.

(3) Explicitly specify a socioeconomic goal, as well as a traffic safety goal, for secondary driver education. It is readily evident that secondary driver education serves a significant socioeconomic goal for students and parents, and, perhaps, for the general populace. In recent years, however, the traffic safety goal of secondary driver education, that of accident and

violation reduction, has been greatly emphasized and focused upon. This emphasis has somewhat diminished the socioeconomic significance of secondary driver education. It is recommended that secondary driver education be structured as a system designed to achieve both traffic safety and socioeconomic goals.

(4) Further develop an interim measure of driver potential for accident and violation occurrence. Several scale scores of the Mann Inventory, a measure of personality/emotional/attitudinal factors, related significantly to accident and violation occurrence, for both male and female student participants (separate scoring keys are used for males and females). The reliabilities of the scale scores, however, ranged from marginally acceptable to not acceptable. Thus, if the Mann Inventory is to be used as an interim measure predictor of accident and violation occurrence, further development is required to achieve higher reliability of measurement while retaining or improving prediction capability. This type of measure fills an important gap in assessing attitudes toward safe driving and/or risk taking. It is recommended that development of an interim measure of personality/emotional/attitudinal factors predictive of accident and violation occurrence be continued.

(5) Further develop an instructional unit on alcohol and drug use in driving for secondary driver education. The effect of the SPC instructional unit on alcohol could not be detected in an evaluation of the comparative DUI violation rates of the three project groups, SPC, PDL, and Control. The means of the number of DUI violations for the three groups were very similar. An evaluation of the impact of instruction on alcohol use in driving upon DUI violation rates was not emphasized in the SPC demonstration project. Nonetheless, the significance of alcohol use in driving on accident and violation occurrence is well documented. Further, the significance of drug use in driving on accident and violation occurrence is now being defined and documentation is underway. Thus, the need for effective instruction on alcohol and drug use in driving

in secondary driver education is established. It is recommended that efforts to develop an effective instructional unit on alcohol and drug use in driving for implementation in secondary driver education be continued.

The stratified random assignment of more than 16,000 student applicants to the SPC demonstration project makes the base of data collected and processed until the conclusion of the project unique in scope and depth, and in its potential for analysis by classical, large sample statistical methods. The data base and the computerized system for processing and analyzing the data provide a rare opportunity for assessing the long-term, longitudinal effects of the SPC demonstration project. Thus, the recommendation is as follows:

(6) Continue to collect and analyze the driver history and accident records of the SPC demonstration project student participants. At about 6-month intervals a search is made of the computerized driver history and accident records of the project student participants maintained by the Georgia Department of Administrative Services. (The searches are made at 6-month intervals so that data are not lost during periodic system purges.) The data collection, processing, and analysis procedures are all computerized and the process is routine, as described earlier. The analysis would provide for an evaluation of the longitudinal effects of the SPC demonstration project. It is recommended that the collection, processing, and analysis of the driver history and accident records of SPC project student participants be continued in order to evaluate the long-term effects of the project.

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APPENDIX A

VOLUNTEER STUDENT SELECTION AND ASSIGNMENT SYSTEM

OVERVIEW OF THE SYSTEM

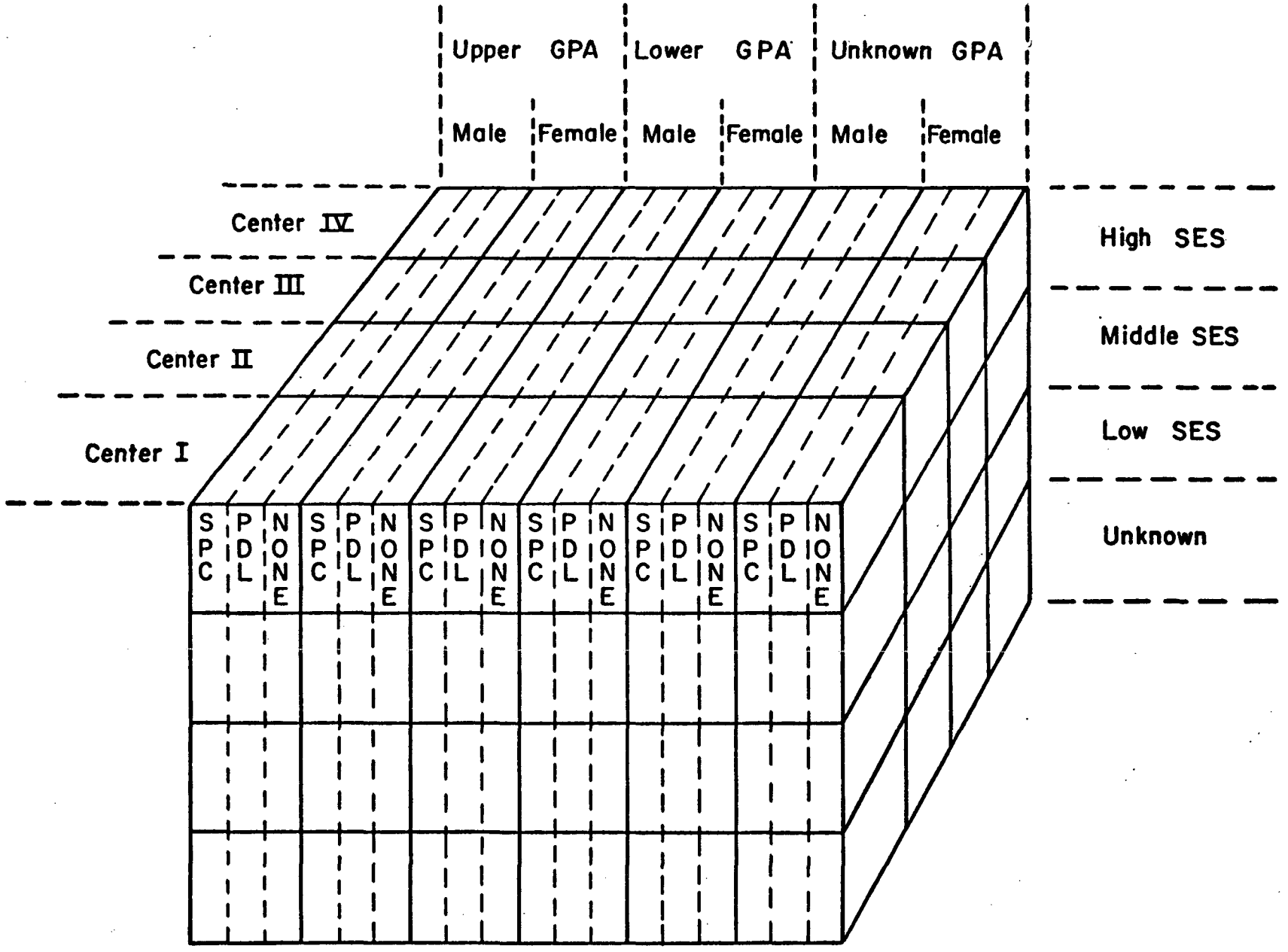
The objective of the selection and assignment system was to produce three groups of students, equal in number, and matched by sex, academic achievement, and socioeconomic status. The first group received the Safe Performance Curriculum (SPC), the second took the Pre-Driver Licensing Course (PDL), and third group received no formal school training (Control). Students volunteered for project participation by completing a consent form which was signed by a parent. Selection and assignment was accomplished so that all students had an equal chance of being selected and assigned to any one of the three groups.

There were four driver education range sites from which all SPC and PDL students received their training. One site served several high schools. All students participating in the project from the same high school were scheduled at the same site. A site could serve an equal number of SPC and PDL students. This number of students plus an equal number of Control students defined the number of slots available at that site.

The first constraint on the selection and assignment system was to fill all available slots. Where the sum of the volunteers from all high schools using a particular site was less than or equal to the number of slots at that site, all volunteers were selected for project participation. In the case where there were more volunteers than slots, the selection of students to be involved in the project was done randomly, within each high school. The system guaranteed that the random selection process did not select out a disproportionate number of students from any one high school.

Each student was classified by sex (male, female), academic achievement (high, low, unknown), and socioeconomic status (high, medium, low, unknown). For each high school, students of the same sex, academic achievement, and socioeconomic status were grouped together, and then randomly assigned to the three groups in equal numbers. This is shown in Figure A-1.

FIGURE A-1. SCHEMATIC DISPLAY OF CATEGORIES OF THE VOLUNTEER POPULATION



OPERATION OF THE SYSTEM

An outline of the operation of the system is given in Figure A-2. A student volunteered by completing a student consent form. This form requested from the high school counselor, the student, and the student's parent:

Data	Source
DeKalb County student number	Counselor
High school code	Counselor
Name	Student
Sex	Student
Birthdate	Student
Social Security Number	Student
Occupation of Head of Household	Parent
Educational Level of Head of Household	Parent

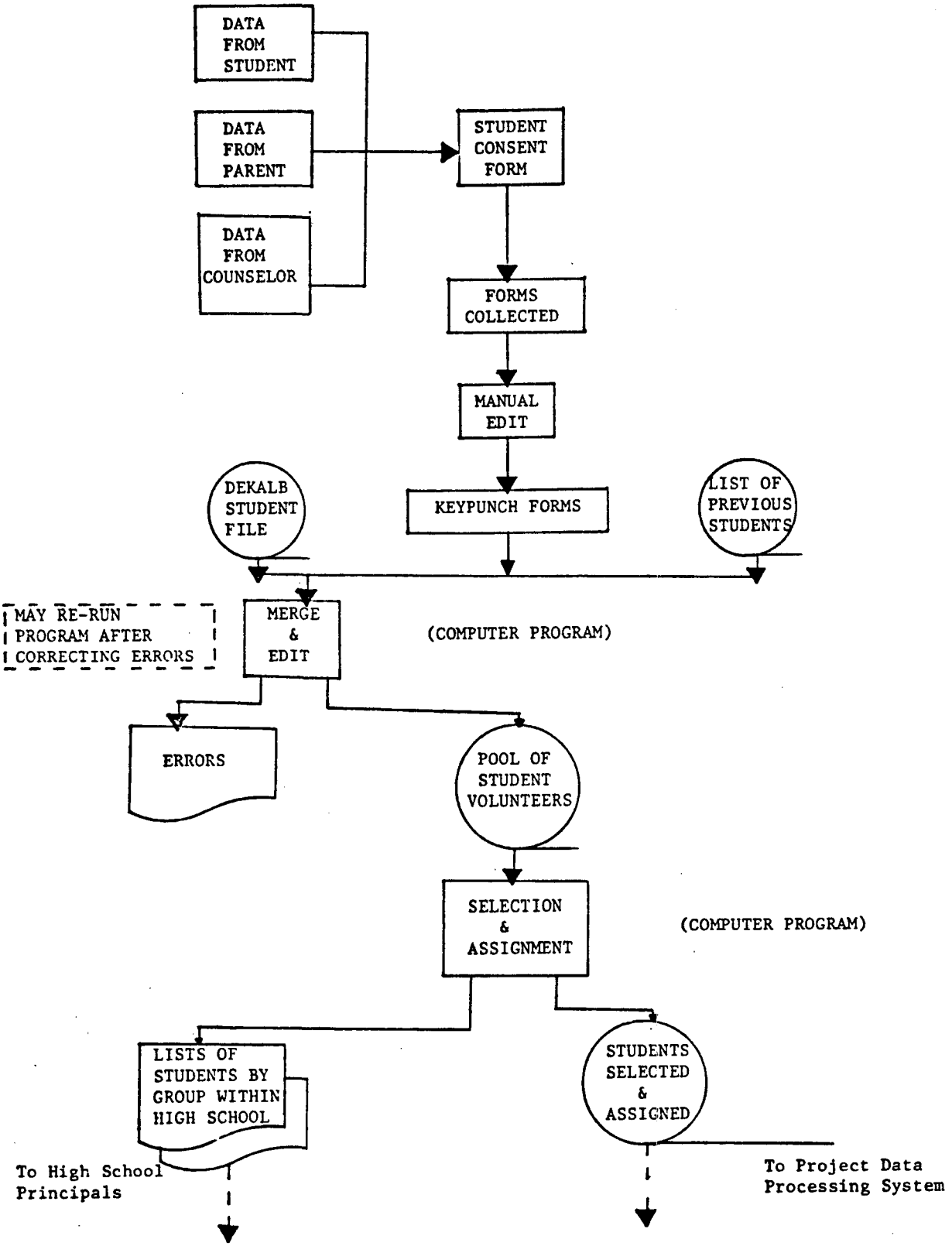
The forms were returned by the student to the high school, and then collected by project personnel. The forms were manually inspected to see that they were filled out correctly.

The data on the form was then keypunched, and the student number was used to obtain more information on the student from the DeKalb student files at DISPAC, such as:

Grade Point Average/Percentile Ranking*
Current Grade of Student
Sex
Birthdate
Full Name.

*For the 1977-78 school year, actual grade point average was used. In other school years, the student's percentile ranking in his/her grade was used.

FIGURE A-2. THE SELECTION AND ASSIGNMENT SYSTEM



A computer program took each student, merged the two sources of data, and checked name, sex, and birthdate from the consent form against the school file. Also, each student was checked on whether he/she met project age qualifications.

A duplication check was implemented to prevent duplicate records from being entered. This might have occurred if a student assigned to the Control group in one year attempted to get into the SPC or PDL groups the next year.

The students who so qualified formed the folunteer pool for the computer program which actually did the selection and assignment. Any errors found during the computer edit were corrected before the selection and assignment was made.

The selection and assignment program produced:

(1) For each high school, three alphabetical lists of students selected for the project, the SPC students, the PDL students, and the Control students. These lists were sent to the high school Principal, who was responsible for seeing that students were scheduled into the group to which they were assigned.

(2) A computer file of the students selected with all their data from the consent form and school file plus the group to which they were assigned, and the student project number assigned to each student by the program. This file was used by the project Data Processing System to enter the students on the Project Master File.

It was assumed that selection and assignment would be made during the course of normal class registration for the school district, and also done shortly before each quarter so that students who did not volunteer previously (such as new transfers) could have an opportunity to do so. The system was flexible enough so that selection and assignment could be done anytime, at the Project Director's request, on any number of students.

However, once a student had been assigned to a group (SPC, PDL, or Control), he/she must be scheduled for that group and could not be processed

through the selection and assignment system again. It was the Project Director's responsibility to see that scheduling was carried our properly and to handle any scheduling difficulties (such as students transferring schools within the district). In no case was a student ever to be placed in a group other than the one to which he/she was originally assigned.

The Assignment Procedures for the First Project Year

During the last half of April 1977, the DeKalb County School District registered students for the entire 1977-78 school year. The selection and assignment system was used for the first time on students volunteering during that time. Two preliminary steps were taken for this first assignment:

(1) Data Review
Some statistical analysis was done on the student data, such as

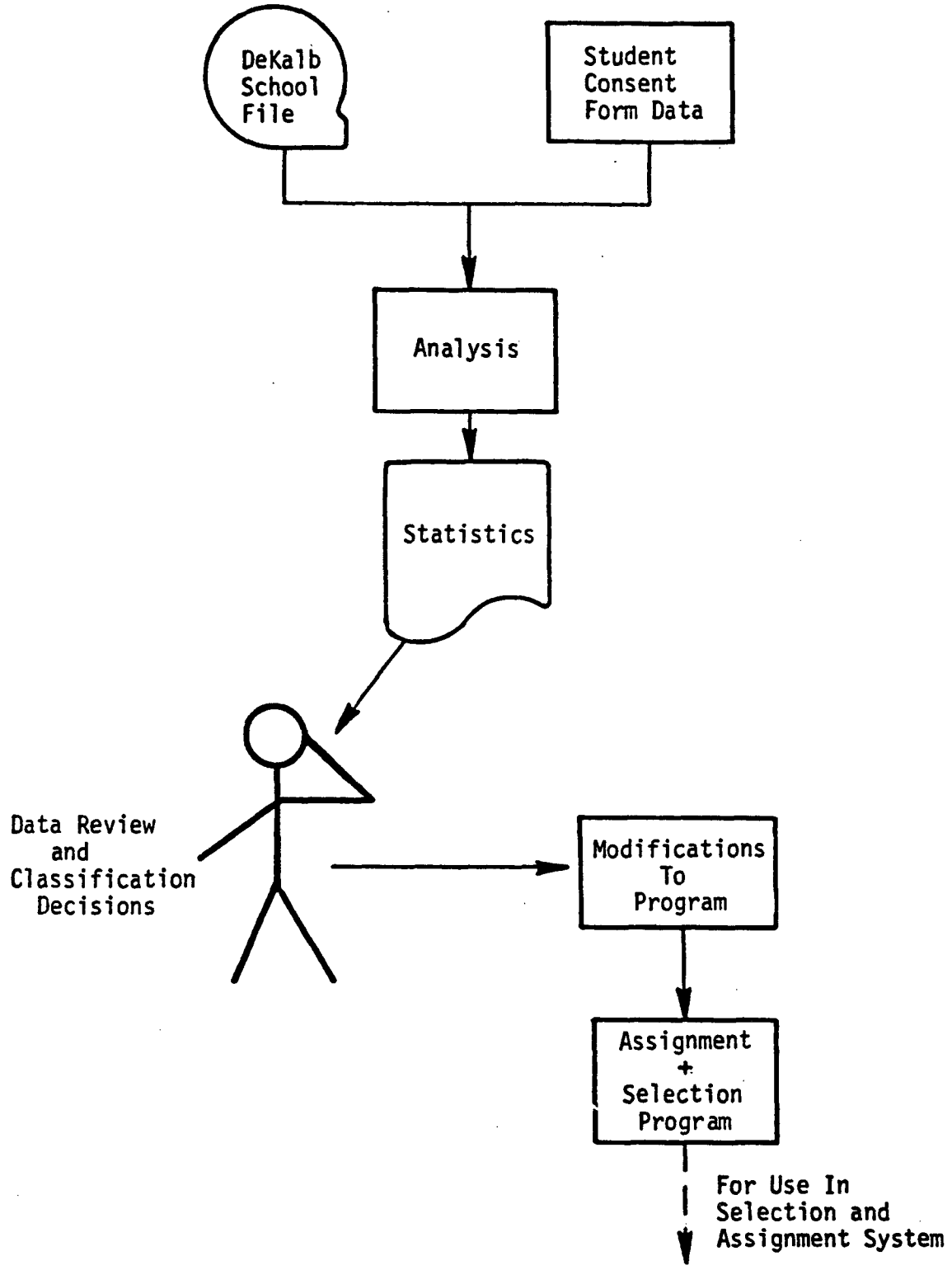
- median grade point average for current 9th graders in the district
- two-way distribution of head of household educational level and occupation
- assessment of missing data.

(2) Classification Decisions
The information gained from the data review was used to

- determine the value of grade point average used in classifying high and low academic achievement
- determine socioeconomic status (high, medium, low) from parents' educational level and occupation.

The criteria developed for classification of academic achievement and socioeconomic level remained the same during the life of the project. The flow chart in Figure A-3 illustrates the preliminary steps for the first project year.

FIGURE A-3. PRELIMINARY STEPS TO SELECTION AND ASSIGNMENT



A problem for the first selection and assignment was that upcoming 11th and 12th graders were to be assigned to the pilot project at the same time upcoming 10th graders were assigned for the first year of the project. Since the selection and assignment system worked without regard to the quarter driver education is given, the pilot project students had to be assigned separately. The selection and assignment program was used twice - once to select from a volunteer pool of 16-year-old students for the pilot project, and once to select from a volunteer pool of younger students for regular project participation.

The Assignment Procedures After the First Project Year

After the first selection and assignment, the system operated as illustrated by the flowchart in Figure A-2, discussed previously. Since age was the criteria used to allow students to register for driver education, there was no need to separate the volunteer pool by grade. All qualified volunteers went into the pool from which selection and assignment was then made.

MECHANICS OF THE SYSTEM

The selection and assignment procedures were the same for both the pilot demonstration and the regular project demonstration. These two sets of volunteers, however, were processed through the system separately. The steps that each went through are outlined below.

Step 1. Each participating school solicited volunteers.

Step 2. Each participating school collected all completed student consent forms from the volunteers. A copy of the student consent form is shown in Exhibit A-4.

Step 3. Information contained in the forms collected in Step 2 was used to group the volunteers into several categories reflecting their socioeconomic

INFORMATION AND APPLICATION FORM – 1977 DEKALB COUNTY DRIVER EDUCATION PROGRAM

INTRODUCTION

The DeKalb County School System has recently been awarded a research contract by the National Highway Traffic Safety Administration to study high school driver education. A major objective of this contract will be to evaluate driver education as a means of reducing the number and severity of traffic accidents.

Financing provided by this contract will make it possible for the DeKalb County School System to substantially improve the current driver education program. Additionally, the school system program will be expanded to provide quality driver education for approximately twice as many students as are currently receiving instruction.

Because of the research nature of the federally funded program, driver education will be offered to 67% of the students who apply. The remaining 33% will not be offered driver education. Each student applying, therefore, will have a 2 out of 3 chance of being selected for driver education instruction. Assignment will be made randomly to each of two driver education instructional groups and a non-instruction group, insuring an equal opportunity for all applicants. Applicants may apply only once during their high school career, and there will be no provision for re-assignment into another group.

The two driver education courses being offered differ in their curriculum format. One course requires additional instructional time in order to fully present the material. Those selected for this group, therefore, will receive additional academic credit.

Final evaluation will be completed by a study of driving records. All applicants (both driver education groups and the group not receiving instruction) will have their driving record reviewed for 2 to 4 years after they have received a driver's license. This review will be conducted by number, thus insuring that personal driving records remain confidential.

BENEFITS

Students who are selected for driver education will receive the following benefits:

- Preparation for getting a driver's license
- The most modern driver education programming, utilizing simulation and driving range instruction
- The use of new automobiles for instruction
- Potential for reduced insurance costs for successful completion
- High school credit for successful completion
- No student cost – no laboratory fees or materials to purchase

WHO CAN APPLY FOR THE PROGRAM?

Students applying for driver education must:

- Reach legal licensing age (15 years) by the beginning of the quarter in which driver education is taken
- Have not already taken a driver education course
- Not already have a driver's license
- Plan to obtain a driver's license as soon as possible after completing the course

HOW TO APPLY FOR DRIVER EDUCATION

Complete the attached application (in full) and return it promptly to your school principal.

EXHIBIT A-4 (Continued)

APPLICATION – DATA FORM FOR DRIVER EDUCATION

PLEASE PRINT ALL THE INFORMATION REQUESTED. ALL INFORMATION WILL BE HELD CONFIDENTIAL AND USED FOR SCHEDULING AND RESEARCH PURPOSES ONLY.

INFORMATION TO BE ENTERED BY SCHOOL COUNSELOR:

Student Number _____

High School Code _____

INFORMATION TO BE ENTERED BY STUDENT:

(1) Full name (Please Print) _____
(Last Name) (First Name) (Middle Initial)

(2) Sex (check one) male ☐ (1) female ☐ (2)

(3) Birthdate __ /__ /__
month day year (last two digits)

(4) Social Security Number ___-__-____

INFORMATION TO BE ENTERED BY PARENT OR GUARDIAN:

(5) Occupation of head of the household (check one)

Proprietor, manager, or official	☐	(1)
Professional or technical worker	☐	(2)
Sales person or clerical worker	☐	(3)
Craftsman, foreman, or skilled worker	☐	(4)
Machine operator or semiskilled worker	☐	(5)
Service worker	☐	(6)
Laborer or unskilled worker	☐	(7)

What is the job of the head of the household called? (Please print) _____

(6) Education completed of the head of the household (check one).

Graduate Degree	☐	(1)
Undergraduate Degree (B.A., B.S., etc.)	☐	(2)
Technical or Vocational School (past high school)	☐	(3)
High School	☐	(4)
Eighth Grade	☐	(5)

How many years of school have been completed by the head of the household? _____

I understand that my son/daughter applying for driver education will be randomly placed by the computer into one of the following three groups:

(a) Driver Education (10 Quarter Hours Credit)
(b) Driver Education (5 Quarter Hours Credit)
(c) No Driver Education

(Check One)

☐ I accept the placement of my son/daughter in this program and understand and accept that the research design involves a two-four year follow-up of traffic violations and/or accidents of students in this program. (All information will remain confidential/and anonymous.)

☐ I do not desire my child to be involved in any school driver education program.

Date _____

_____
(Parent's Signature)

status. For this purpose, volunteers were cross-tabulated on the basis of occupation and educational level of the head of each household, as shown in Table A-1. The resulting two-way frequency distribution was used to determine an association of each cell in Table A-1 with one of the following descriptive nomenclatures:

(a) High socioeconomic status (H)
(b) Middle socioeconomic status (M)
(c) Low socioeconomic status (L)
(d) Unknown socioeconomic status (U).

The association table thus provided was used for classifying the socioeconomic status of all subsequent student volunteers for the remainder of the program.

Step 4. DISPAC provided the grade point average (GPA)/percentile ranking for each student in the DeKalb County System who entered the 10th, 11th, or 12th grades in the 1977-78 school year.* Battelle used the 11th and 12th grade data to compute a median GPA for the pilot demonstration, and the 10th grade data to compute a median GPA for the regular project demonstration.

Step 5. The information on the student consent forms was keypunched, in coded form, onto machine-readable cards.

Step 6. Each student in the program was assigned a socioeconomic status (H, M, L, U) from the Socioeconomic Table produced by Step 3.

*For the 1977-78 school year, a grade point greater than or equal to 4.0 classified a student as high, otherwise the student was classified as low.

TABLE A-1. THE SOCIOECONOMIC STATUS TABLE

	Advanced Degree	Bachelor Degree	Technical School	High School	Eighth Grade	Unknown
Manager	H	H	M	M	M	U
Professional	H	M	M	M	M	U
Craftsman	M	M	M	M	M	U
Machine Operator	M	M	M	M	M	U
Clerk	L	L	L	L	L	U
Service Worker	L	L	L	L	L	U
Laborer	L	L	L	L	L	U
Unknown	U	U	U	U	U	U

Step 7. Each student was tagged with the following information in computer memory.

(a) Sex (M/F)
(b) Grade point average (H/L/U)
(c) Socioeconomic status (H/M/L/U)
(d) Driving Center code
(e) High School code
(f) Learner's Permit Number (Social Security Number)
(g) Student number assigned by school
(h) Student number assigned by project.

Step 8. For each driver education center, the number of available slots was compared with the number of volunteer students (from all high schools supporting that center) who were available to fill those slots. If the number of volunteers was greater than the number of slots, then the assignment procedure continued with Step 9. If, on the other hand, the number of slots was greater than the number of volunteers, then all of the volunteers were assigned to the program and the assignment procedures continued with Step 12.

Step 9. For a given driver education center, school (assigned to that center), and cell (in the sampling matrix for that school), the number of volunteers to be selected in that cell was calculated by means of the equation:

$$S_i = V_i \, S_j / V_j,$$

where S_i = number of volunteer students selected and assigned for the project year from Cell i,

V_i = number of volunteer students for Cell i,

S_j = number of slots available for the project year at Driver Education Center j,

V_j = number of volunteer students for Driver Education Center j.

Step 10. For those schools with a surplus of volunteer students as determined in Step 8, the selection of volunteers in a given cell and a given school proceeded as follows. Volunteers were arranged in ascending order by the number formed from the last three digits of the student's identification number; it was presumed that the volunteers in a given school and cell combination were then in random order.

Step 11. The students to be assigned to Cell i in the program were selected by taking the first S_i volunteers in the list compiled in Step 12, where S_i is obtained from Step 9.

Step 12. The four driver education centers were arranged in random order. Next, within each center, the schools were arranged in random order. Next, within each school, the sixteen cells (determined by sex, GPA, and SES) were arranged in random order. Finally, within each school and cell combination, the volunteer students (who were selected in either Step 10 or Step 11) were arranged in ascending order by the number formed from the last three digits of the student's identification number; it was presumed that the volunteers within each school and cell combination were then in random order.

Step 13. Volunteers in positions 1, 4, 7, . . . on the list generated in Step 12 were assigned to the Safe Performance Curriculum (SPC); volunteers in positions 2, 5, 8, . . . were assigned to the Pre-Driver License Course (PDL); and volunteers in

positions 3, 6, 9, . . . were assigned to the Control group (consisting of selected volunteers who received no formal training by the school system).

Three lists were printed for each high school - SPC students, PDL students, and Control students, each in alphabetical order. These lists were given to the high school Principal. In addition, each student had his/her group added to the information from Step 7. For each student, all this information was written to a computer file for later use by the project Data Processing System.

APPENDIX B

TECHNICAL SUMMARIES OF ANALYTIC STUDIES

(1) Statistical Analysis of Preliminary Data for the Safe Performance Curriculum Driving Knowledge Test

(2) Statistical Analysis of the Driving Habits, History and Exposure Survey for the Safe Performance Secondary School Driver Education Curriculum Demonstration Project

(3) Impact Assessment of the Safe Performance Curriculum on On-Road Driving Test Performance

(4) The Relationship of Intermediate Measures of Driving Performance and Personal Characteristics to Accident and Violation Occurrence for the Safe Performance Curriculum Driver Education Demonstration Project

DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

TECHNICAL SUMMARY

CONTRACTOR	CONTRACT NUMBER
Battelle Columbus Laboratories 505 King Avenue Columbus, Ohio 43201	DOT-HS-6-01462
REPORT TITLE Statistical Analysis of Preliminary Data for the Safe Performance Curriculum Driving Knowledge Test	**REPORT DATE** April 1979
REPORT AUTHOR(S) Horace W. Ray	

The primary objective of the Safe Performance Secondary School Driver Education Curriculum Demonstration Project is to determine the crash reduction potential of a quality, competency-based driver training program known as the Safe Performance Curriculum (SPC). The experimental design calls for the random assignment of 18,000 volunteer high school students in DeKalb County Schools to one of the following: (1) Safe Performance Curriculum (SPC) - a 70-hour course including classroom, simulation, range, and on-street training; (2) Pre-Driver Licensing (PDL) - a modified curriculum containing only the minimum training required to obtain a license; (3) Control - no formal driver education in the secondary school. The sample of students are being monitored for a period of two to four years after assignment to assess measures of intermediate and ultimate performance. The primary measures of ultimate performance to be analyzed are the numbers and types of crashes and violations the students experience in this time frame. Comparative analyses of SPC vs. PDL vs. Control groups will then be made in terms of these ultimate measures.

Data on many other intermediate measures have been collected before, during, and after course completion to develop a safety and performance profile of each volunteer. These other measures include a driving knowledge test, to be used in comparative analyses to evaluate the relative effectiveness of SPC training, PDL training, and the training students receive in the absence of any school training (Control training). The driving knowledge test is also to be used as a predictor variable in correlational studies directed toward assessing the relationship between intermediate measures and ultimate measures (crashes and violations) of driving performance.

The driving knowledge test is a 56-item multiple-choice test, designed to assess the knowledge required to perform the driving task. The test was constructed by the DeKalb Schools project team based upon an analysis of the objectives of the Safe Performance Curriculum. The test contains items covering the various units and knowledge objectives of the Safe Performance Curriculum. The test is administered in a 45-minute period, on a pre-post basis to each SPC and PDL student on the first and last day of the quarter in which the student is taking driver education. During the second project year, Control students were also administered this instrument.

The purpose of this analytic study was to analyze preliminary data for the driving knowledge test. The preliminary data for the analysis arose from pre-post administration of the test to Quarter One and Quarter Two SPC and PDL students. The analysis included assessment of the reliability of the knowledge test, analysis of test score distributions, comparative analyses of SPC and PDL group test performance, assessment of students' level of mastery of knowledges required for the driving task, as indicated by the test, and identification of any student knowledge deficiencies, if they exist.

(Continue on additional pages) (Continued)

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Sample sizes for the analysis were on the order of 1,000 SPC and 1,000 PDL students, the exact sample sizes depending on the particular analysis. Analysis methodologies employed for estimating test reliability included Cronbach Alpha and three other internal consistency methods. Analyses of variance were accomplished for comparative analysis of SPC and PDL group performance on the knowledge test.

Principal findings and conclusions of this study include the following:

- The reliability of the test is estimated to be approximately r = .80, which may be considered to be an adequate level of reliability for a nonstandardized achievement test.
- The SPC program is superior to the PDL program in terms of driving knowledge gained by students, as measured by the test, and this superiority holds true for any type of student defined by sex, socioeconomic status level, and grade-point average. The superiority of the SPC also holds true for subtests of the total test as well as total test scores.
- SPC students acquire a high level of mastery of knowledges required for the driving task, as measured by the test (a mean of 48.2 on the post-test out of a possible 56).

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

TECHNICAL SUMMARY

CONTRACTOR Battelle Columbus Laboratories 505 King Avenue Columbus, Ohio 43201	CONTRACT NUMBER DOT-HS-6-01462
REPORT TITLE Statistical Analysis of the Driving Habits, History and Exposure Survey for the Safe Performance Secondary School Driver Education Curriculum Demonstration Project	REPORT DATE May 1980
REPORT AUTHOR(S) Horace W. Ray, Michael G. Sadof, James R. Brink	

The primary objective of the Safe Performance Secondary School Driver Education Curriculum Demonstration Project is to determine the crash reduction potential of a quality, competency-based driver training program known as the Safe Performance Curriculum (SPC). The experimental design calls for the random assignment of 18,000 volunteer high school students in DeKalb County Schools to one of the following: (1) Safe Performance Curriculum (SPC) - a 70-hour course including classroom, simulation, range, and on-street training; (2) Pre-Driver Licensing (PDL) - a modified curriculum containing only the minimum training required to obtain a license; (3) Control - no formal driver education in the secondary school. The sample of students are being monitored for a period of two to four years after assignment to assess measures of intermediate and ultimate performance. The primary measures of ultimate performance to be analyzed are the numbers and types of crashes and violations the students experience in this time frame. Comparative analyses of SPC vs. PDL vs. Control groups will then be made in terms of these ultimate measures.

Data on many other measures have been collected before, during, and after course completion to develop a safety and performance profile of each volunteer. These other measures include a Driving Habits, History, and Exposure Survey, designed to: (1) Determine how much and what type of driving a student does, i.e., assess driving exposure, (2) obtain self-reports on the number and types of accidents and violations in which the student is involved, and (3) determine how Control group students learn to drive. The exposure data (e.g., number of miles driven per month) were to be used in the final impact analyses to detect and control for any differences that might exist in driving exposure among SPC, PDL, and Control groups. Self-reports of accident occurrence were to be used in impact analyses comparing SPC, PDL, and Control groups, along with accidents as contained in official records, so as to capture accident occurrences not appearing in the official records.

The Driving Habits, History, and Exposure Survey was developed by the DeKalb Schools project team, using as a basis a survey developed by Wittenburg for application to a military population. The survey was to be administered in six-month intervals, commencing six months after course completion and during an equivalent time period for Control students. The multiple administration would yield 3-4 administrations for each student, thus providing for obtaining data at various time points in a student's driving history.

The primary purpose of this analytic study was to assess the reliability of the Driving Habits, History, and Exposure Survey instrument. The scope of the analysis included reliability assessment of personal reports of collisions, violations, and driving exposure estimates. Additionally, an assessment was made of student response rates and the adequacy of the design of items and questions to obtain the desired information.

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Battelle Columbus Laboratories 505 King Avenue Columbus, Ohio 43201	DOT-HS-6-01462
REPORT TITLE Statistical Analysis of the Driving Habits, History and Exposure Survey for the Safe Performance Secondary School Driver Education Curriculum Demonstration Project	REPORT DATE May 1980
REPORT AUTHOR(S) Horace W. Ray, Michael G. Sadof, James R. Brink	

The reliability assessment was made primarily by comparing student Survey responses with responses from an individual student interview, for a selected sample of project students. Also, Survey responses for collision and violation involvement were compared with official records of collision and violation involvement.

Principal findings and conclusions of this study include: (1) The overall reliability of the Survey for assessing total number of collisions is not impressive, with reliability coefficients on the order of .50 to .55. (2) For Survey items dealing with total number of collisions involved in, student non-response rates are close to 25%. This missing data tends to limit the usefulness of the existing Survey for assessing collisions. (3) Due to the design of the Survey instrument, students responding with zero violations cannot be separated from students not responding at all, thus rendering the existing instrument of little value as a measure of violations. (4) A well-designed survey instrument may have greater reliability for assessing violations than for assessing collisions. (5) In the area of driving exposure, because of inadequate design of Survey items for measuring exposure, and because a low reliability is suggested for those exposure items analyzed, the existing Survey is of quite limited value for exposure measurement. (6) Part of the observed unreliability of student Survey responses may be due to the large group setting in which the Survey was administered, along with the length of the Survey.

Based on the above results, it was recommended that a new and improved version of the Survey be developed, of shorter length than the existing Survey, with better-designed items, and administered in a small group setting. It was also recommended that additional exposure data be collected through odometer readings from students' cars.

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TECHNICAL SUMMARY

CONTRACTOR	Battelle Columbus Laboratories 505 King Avenue Columbus, Ohio 43201	CONTRACT NUMBER DOT-HS-6-01462
REPORT TITLE	Impact Assessment of the Safe Performance Curriculum on On-Road Driving Test Performance	REPORT DATE December 31, 1980
REPORT AUTHOR(S)	Horace W. Ray and James R. Brink	

The primary objective of the Safe Performance Secondary School Driver Education Curriculum Demonstration Project is to determine the crash reduction potential and the instructional effectiveness of a quality, competency-based driver training program known as the Safe Performance Curriculum (SPC). The experimental design calls for the random assignment of 18,000 volunteer high school students in DeKalb County Schools to one of the following: (1) Safe Performance Curriculum (SPC) - a 70-hour course including classroom, simulation, range, and on-street training, (2) Pre-Driver Licensing (PDL) - a modified curriculum containing only the minimum training required to obtain a license; (3) Control - no formal driver education in the secondary school. The sample of students will be monitored for a period of two to four years after assignment to assess measures of intermediate and ultimate performance. The primary measures of ultimate performance to be analyzed are the numbers and types of crashes and violations the students experience in this time frame. Comparative analyses of SPC vs PDL vs Control groups will then be made in terms of these ultimate measures.

Data on many other variables are being collected before, during, and after course completion in order to develop a safety and performance profile of the volunteer students. The measures include an on-road driving performance test which has been administered to a subsample of the driving population. The on-road test used was developed by the University of Southern California's Traffic Safety Center under contract to the National Highway Traffic Safety Administration.

The USC On-Road Performance Test (ORPT) provides for an "in-car" examination of driver performance conducted over a pre-selected route by two trained individuals -- an examiner who sits in the front right passenger seat and directs the driver over the standardized route, and a coder or rater who occupies the center rear passenger seat and rates the subject on various behaviors at specified points along the route. The various driver behaviors observed by the rater are judged as either correct or incorrect, e.g., a particular aspect of a turn made correctly or incorrectly. These judgments are recorded on specially designed route maps. Test scores are then expressed as percentage correct responses. The examination requires approximately 30 minutes to administer.

The USC ORPT is to be used in two ways, for the SPC demonstration and evaluation: (1) to serve as an intermediate dependent measure of driving performance, in comparative analyses assessing the relative effectiveness of SPC, PDL, and Control training, and (2) to serve as an independent variable in relating ORPT test scores to accident and violation involvement, so as to assess the predictive value of the

(Continue on additional pages) (Continued)

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TECHNICAL SUMMARY

CONTRACTOR	Battelle Columbus Laboratories 505 King Avenue Columbus, Ohio 43201	CONTRACT NUMBER DOT-HS-6-01462
REPORT TITLE	Impact Assessment of the Safe Performance Curriculum on On-Road Driving Test Performance	REPORT DATE December 31, 1980,
REPORT AUTHOR(S)	Horace W. Ray and James R. Brink	

test in forecasting an individual's future crash and violation records. The analyses conducted in this study focus on the first stated use of the test, i.e., use of the test as a dependent variable in comparing SPC, PDL, and Control groups. Subsequent analyses will address the question of the predictive value of ORPT test scores as an independent variable in predicting accident and violation involvement.

The primary objective of this study was to assess the relative effectiveness of SPC training, PDL training, and training students receive in the absence of a formal in-school driver training program, in terms of performance on the USC ORPT. Other objectives of the study included: (1) assessment of the relationship between ORPT test scores and socioeconomic status, sex, and grade-point average, and (2) assessment of the nature of ORPT test score distributions.

The on-road test was administered to students over two driving routes located near two of the driver education centers. The data base for this analysis arose from the testing of Year Two SPC, PDL, and Control students over these routes. The analysis sample was confined to SPC and PDL students who completed the training successfully; who were known to be licensed; and who were tested on the ORPT after receiving their license. The resultant analysis sample yielded a total of 459 students--100 SPC students, 117 PDL students, and 242 Control students.

To assess program impact, the total test score on the USC ORPT (percentage correct responses) was used as the primary dependent variable. However, analyses were also accomplished using four major sub-test scores: (1) Observe, (2) Control, (3) Judgement, and (4) "Other".

The analysis approach called for (1) an assessment of group (SPC, PDL, Control) differences on selected control variables (sex, SES, grade-point average, driving route, number of days between licensing and ORPT administration, and age at licensing), (2) relating each control variable to ORPT test scores, and (3) based on the results of (1) and (2), conducting appropriate comparative analyses of SPC, PDL, and Control groups in terms of ORPT test scores.

Principal findings and conclusions of this study include:

- The SPC training yields higher levels of on-road driving test performance than either the PDL training or the training Control students receive, as measured by the USC On-Road Performance Test, with no or negligible differences between PDL and Control training. However, although statistically significant, the superiority of the SPC training does not appear to be large, with observed mean percent correct

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DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

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responses on the total test being 68.75, 64.82, and 62.10 for SPC, PDL, and Control groups, respectively, representing a 6.06% superiority of the SPC group mean over the PDL group mean, and a 10.71% superiority of the SPC group mean as compared to the Control group mean. Whether such group differences in terms of on-road performance test scores will translate into group differences in collision or violation involvement will be ascertained in the final impact analyses.

- Analyses using sub-tests of the total test yields results consistent with the above finding of the superiority of the SPC training as compared to PDL and Control training, in terms of the USC On-Road Performance Test.
- The above findings on the superiority of the SPC training need to be qualified, in that SPC, PDL, and Control groups of students compared in the analysis cannot be considered to be randomly equivalent groups, because of constraints in obtaining students for testing and because of definition of restricted samples of students judged appropriate for the analysis. Although procedures were taken to control for extraneous measured factors in the comparative analyses of groups, pertinent unmeasured factors not in the data base could bias obtained results in unknown ways, in the absence of not being able to assume randomly equivalent groups.

  Findings on the superiority of the SPC training also need to be qualified, in that the sample of students judged appropriate for analysis represented a restricted sample of all students receiving the ORPT test (e.g., students licensed at an earlier age in the analysis sample than for the total sample). Therefore, generalization of findings to an unrestricted population must be made with caution.
- The factors of socio-economic status, sex, and grade-point average are essentially unrelated to ORPT test scores.

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TECHNICAL SUMMARY

CONTRACTOR Battelle Columbus Laboratories 505 King Avenue Columbus, Ohio 43201	CONTRACT NUMBER DOT-HS-6-01462
REPORT TITLE The Relationship of Intermediate Measures of Driving Performance and Personal Characteristics to Accident and Violation Occurrence for the Safe Performance Curriculum Driver Education Demonstration Project.	REPORT DATE September 1, 1982
REPORT AUTHOR(S) Horace W. Ray and James R. Brink	

The primary objective of the Safe Performance Secondary School Driver Education Curriculum Demonstration Project is to determine the crash reduction potential of a quality, competency-based driver training program known as the Safe Performance Curriculum (SPC). The experimental design calls for the random addignment of 18,000 volunteer high school students in DeKalb County Schools to one of the following: (1) Safe Performance Curriculum (SPC) - a 70-hour course including classroom, simulation, range, and on-street training; (2) Pre-Driver Licensing (PDL) - a modified curriculum containing only the minimum training required to obtain a license; (3) Control - no formal driver education in the secondary school. The sample of students are being monitored for a period of two to four years after assignment to assess measures of intermediate and ultimate performance. The primary measures of ultimate performance to be analyzed are the numbers and types of crashes and violations the students experience in this time frame. Comparative analyses of SPC vs. PDL vs. Control groups will then be made in terms of these ultimate measures.

Data on many other intermediate measures have been collected before, during, and after course completion to develop a safety and performance profile of each volunteer. These other measures include on-road performance tests that have been administered to subsamples of the volunteer population, a driving knowledge test, and a measure of students' personal characteristics. The measure used to assess students' personal characteristics was the Mann Inventory, developed by Dr. William Mann for investigating the relationship between personality/emotional/attitudinal factors and accident involvement.

The primary purpose of this analytic study was to assess the relationship of the above intermediate measures to the ultimate measures of accident and violation occurrence in the volunteer population. Additionally, as part of the analyses, the reliability of the above measures was also assessed.

One of the on-road performance tests administered and analyzed as part of this study was developed by the University of Southern California's Traffic Safety Center. The USC On-Road Performance Test (ORPT) provides for an "in-car" examination of driver performance conducted over a pre-selected route. A coder or rater rates the student on various behaviors at specified points along the route, with the various driver behaviors observed by the rater being judged as either correct or incorrect. Test scores are then expressed as percentage correct responses. The examination requires approximately 30 minutes to administer. As perception of hazards and rapid response to them is assumed to be of primary importance, most of the performance variables refer to awareness of hazards, searching for hazards, or response to hazards.

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In addition to the above USC on-road performance test, a second on-road performance test was developed by project personnel and administered as part of the SPC demonstration project. This test, the Safe Performance On-Road Test (SPORT), was administered to each SPC and PDL student at the end of the course, and served as part of the student's final exam. The test assesses many of the same behaviors as the USC on-road test, such as: observing; communicating; adjusting speed; positioning; judging time, space, and distance; and hazard perception.

The driving knowledge test analyzed in this study was a 56-item multiple-choice test, designed to assess the knowledge required to perform the driving task. The test was constructed by the DeKalb Schools project team based upon an analysis of the objectives of the Safe Performance Curriculum.

The Mann Inventory analyzed as part of this study consists of 63 items that reflect an individual's feeling toward himself, others, and established social mores. Based on responses to the items, various scale scores are calculated, to assess factors such as individual adjustment, aggressiveness, withdrawal, vacillation between extremes of aggression and withdrawal, risk-taking, and sociability.

For the SPC demonstration, both the driving knowledge test and the Mann Inventory were administered in a 45-minute period, on a pre-post basis to each SPC and PDL student on the first and last day of the quarter in which the student took driver education.

The samples of students utilized in analyzing the above measures ranged in size between 2,700 and 3,800 students, depending on the particular measure analyzed. In conducting the analyses relating each measure to accident and violation occurrence, various statistical methodologies were employed, including regression analysis, analysis of variance, non-parametric tests, and graphical analyses. Examination of accident and violation occurrence was confined to students' first two years of licensed driving, so as to provide for a fixed time period of driving exposure.

Principal findings and conclusions of this study include the following:

USC On-Road Performance Test (ORPT)

- For a given rater, the reliability of the ORPT (as estimated by a split-half technique) is high (approaching .90). However, inter-rater analyses indicate variations between raters in evaluating student performance, with the inter-rater reliability for the total test estimated to be .69.
- A statistically significant inverse relationship was found between ORPT scores and accident and violation occurrence, in that better-performing (higher-scoring)

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students on the ORPT have a higher rate of accident and violation involvement than poorer-performing students. However, when controlling for sex, little if any relationship was found between ORPT scores and accident and violation occurrence, for females, although the inverse relationship of ORPT scores to accident and violation occurrence remained for males. It is hypothesized that this inverse relationship for males is attributable to a driving exposure factor, in that better-performing males on the ORPT may drive more, leading to higher accident and violation rates for the better-performing males.

Safe Performance On-Road Test (SPORT)

- Student performance on the SPORT was found to be essentially unrelated to accident and violation occurrence, in that students who passed the test on the first administration had essentially the same accident and violation rates as students who failed the test on the first administration.

Driving Knowledge Test

- Although the reliability of the driving knowledge was moderately high (.80), student performance on this test was found to be essentially unrelated to accident occurrence. However, a statistically significant relationship was found between driving knowledge posttest scores and violation occurrence, with higher-scoring (above the median) students showing a lower mean number of violations than lower-scoring (below the median) students.

Mann Inventory

- The reliability of the Mann Inventory is not impressive, with only two of the ten Inventory scales yielding posttest reliabilities as high as the mid-seventies, and with pre-post correlations even lower.
- Five of the ten Inventory scales were found to be significantly related to accidents and violations for males, and five scales significantly related for females. One of the more marked relationships involved the overall adjustment scale, with better-adjusted individuals showing lower rates of accident and violation involvement. The mean accident rate for relatively "well-adjusted" males (top-scoring one-third of the males on the scale) was .36 (36 accidents per 100 students), as compared to a mean accident rate of .56 (56 accidents per 100 students) for relatively "poorly adjusted" males (lowest-scoring one-third of the males on the scale). Corresponding accident means for females were .25 and .35 for relatively well-adjusted and poorly adjusted females. Violation rates for well- and poorly adjusted males were .68 and 1.15,

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respectively; with corresponding violation rates for females being .30 and .50, for well- and poorly adjusted females.

- Analyses of the other Mann Inventory scales significantly related to accidents and violations indicated that: (1) The greater males' tendencies toward risk-taking and power-seeking, as assessed by the Mann, the higher their rate of accident and violation involvement; (2) females with tendencies toward "periodic aggressiveness" have higher mean accident and violation rates than females not exhibiting such tendencies; (3) females with tendencies toward vacillation between aggression and withdrawal have higher mean accident and violation rates than females not exhibiting such tendencies; (4) the more sociable individuals are (males or females), as assessed by the Mann, the lower their rate of accident and violation involvement.
- Item analyses showed that about one-half of the 63 individual Mann Inventory items were significantly related to either accident or violation involvement. In any subsequent analyses relating Mann Inventory responses to accident and violation involvement, consideration should be given to "criterion scaling" individual Inventory items that are related to accident and violation involvement, and differentially weighting the items in a regression equation. Such an approach may yield a composite score, based on item responses, that is more strongly related to accident and violation involvement than any of the existing scales investigated during this study.

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APPENDIX C

FREQUENCY DISTRIBUTIONS OF NUMBER OF ACCIDENTS, AND NUMBER OF VIOLATIONS, BY PROGRAM

TABLE C-1. FREQUENCY DISTRIBUTION OF NUMBER OF ACCIDENTS, BY PROGRAM

Number of Accidents	SPC f	SPC %	PDL f	PDL %	Control f	Control %
Assigned Students						
0	3901	71.4	3993	73.5	3988	73.3
1	1178	21.6	1066	19.6	1067	19.6
2	294	5.4	267	4.9	281	5.2
3	73	1.3	65	1.2	86	1.6
4	14	.3	31	.6	15	.3
5	2	.0	6	.1	6	.1
6	2	.0	2	.0	1	.0
	5464	100.0	5430	100.0	5444	100.0
Licensed Students						
0	3267	67.7	3246	69.3	3133	68.3
1	1177	24.4	1064	22.7	1066	23.2
2	294	6.1	267	5.7	281	6.1
3	73	1.5	65	1.4	86	1.9
4	14	.3	31	.7	15	.3
5	2	.0	6	.1	6	.1
6	2	.0	2	.0	1	.0
	4829	100.0	4681	100.0	4588	100.0
Completed and Licensed Students						
0	2526	67.4	2502	69.3	3133	68.3
1	928	24.8	832	23.0	1066	23.2
2	227	6.1	213	5.9	281	6.1
3	53	1.4	40	1.1	86	1.9
4	11	.3	22	.6	15	.3
5	1	.0	1	.0	6	.1
6	1	.0	1	.0	1	.0
	3747	100.0	3611	100.0	4588	100.0

TABLE C-2. FREQUENCY DISTRIBUTION OF NUMBER OF VIOLATIONS, BY PROGRAM

Number of Violations	SPC f	SPC %	PDL f	PDL %	Control f	Control %
			Assigned Students			
0	2973	54.4	3013	55.5	3083	56.6
1	1240	22.7	1175	21.6	1093	20.1
2	573	10.5	591	10.9	549	10.1
3	304	5.6	292	5.4	325	6.0
4	153	2.8	154	2.8	159	2.9
5	92	1.7	80	1.5	94	1.7
6	55	1.0	51	.9	54	1.0
7	25	.5	32	.6	36	.7
8	20	.4	12	.2	20	.4
9	15	.3	14	.3	15	.3
10	2	.0	5	.1	7	.1
11	3	.1	3	.1	6	.1
12	5	.1	3	.1	0	.0
13	2	.0	0	.0	1	.0
14	0	.0	1	.0	2	.0
15	2	.0	4	.1	0	.0
	5464	100.0	5430	100.0	5444	100.0
			Licensed Students			
0	2341	48.5	2270	48.5	2232	48.6
1	1237	25.6	1171	25.0	1089	23.7
2	573	11.9	589	12.6	548	11.9
3	304	6.3	292	6.2	325	7.1
4	153	3.2	154	3.3	159	3.5
5	92	1.9	80	1.7	94	2.0
6	55	1.1	51	1.1	54	1.2
7	25	.5	32	.7	36	.8
8	20	.4	12	.3	20	.4
9	15	.3	14	.3	15	.3
10	2	.0	5	.1	7	.2
11	3	.1	3	.1	6	.1
12	5	.1	3	.1	0	.0
13	2	.0	0	.0	1	.0
14	0	.0	1	.0	0	.0
15	2	.0	4	.1	0	.0
	4829	100.0	4681	100.0	4588	100.0

TABLE C-2. (Continued)

FREQUENCY DISTRIBUTION OF NUMBER OF VIOLATIONS, BY PROGRAM

Number of Violations	SPC f	SPC %	PDL f	PDL %	Control f	Control %
	Completed and Licensed Students					
0	1796	47.9	1749	48.4	2232	48.6
1	972	25.9	915	25.3	1089	23.7
2	460	12.3	460	12.7	548	11.9
3	235	6.3	226	6.3	325	7.1
4	122	3.3	111	3.1	159	3.5
5	62	1.7	62	1.7	94	2.0
6	42	1.1	40	1.1	54	1.2
7	20	.5	19	.5	36	.8
8	13	.3	11	.3	20	.4
9	13	.3	9	.2	15	.3
10	2	.1	3	.1	7	.2
11	2	.1	0	.0	6	.1
12	5	.1	2	.1	0	.0
13	2	.1	0	.0	1	.0
14	0	.0	1	.0	2	.0
15	1	.0	3	.1	0	.0
	3747	100.0	3611	100.0	4588	100.0

APPENDIX D

DRIVER EXPOSURE DATA COLLECTION
(Telephone Survey Form)

TELEPHONE SURVEY GUIDELINES

(1) HELLO (First Name of Driver)

(2) This is Mr., Mrs., or Miss (Last Name) the Battelle Memorial Institute.

(3) We are conducting a telephone survey for the U.S. Department of Transportation, to learn more about young drivers and their automobiles.

(4) (Ask driver if he/she has a driver's license). If answer is NO, do not continue the telephone survey.

(5) (Ask driver if he/she drove yesterday). If answer is NO, do not continue the telephone survey.

(6) (Driver's First Name), May I ask you a few questions about the car you drive, and the purpose for which the car was used yesterday? The questions will only take about 2 to 3 minutes and your answers are very important to the Department of Transportation.

(7) (If the driver agrees to the telephone interview, proceed with the survey questions).

(8) If the driver does not agree to the telephone interview, write NR (No Response) in *red* at the top right corner of the survey form.

NOTE: If driver asks how his/her name was chosen, your response will be -- "Your name was randomly selected from the DeKalb County Driver Education List".

DRIVER EXPOSURE DATA COLLECTION
(Telephone Survey Form)

Name _____ Project ID _____ Phone No. _____

Exposure Date: _____ Day: MON TUE WED THU FRI SAT SUN

Driver: Do you have a drivers license? YES NO
(If YES, please continue.)

Did you drive yesterday? YES NO

Exposure Data:

Did you drive between 6 A.M. - Noon? YES NO

Purpose:	SCHOOL	WORK	RECREATION
Est. Miles:	_____	_____	_____
Est. Time:	_____	_____	_____
No. of Riders:	_____	_____	_____

Did you drive between Noon - 6 P.M.? YES NO

Purpose:	SCHOOL	WORK	RECREATION
Est. Miles:	_____	_____	_____
Est. Time:	_____	_____	_____
No. of Riders:	_____	_____	_____

Did you drive between 6 P.M. - Midnight? YES NO

Purpose:	SCHOOL	WORK	RECREATION
Est. Miles:	_____	_____	_____
Est. Time:	_____	_____	_____
No. of Riders:	_____	_____	_____

Did you drive between Midnight - 6 A.M.? YES NO

Purpose:	SCHOOL	WORK	RECREATION
Est. Miles	_____	_____	_____
Est. Time:	_____	_____	_____
No. of Riders:	_____	_____	_____

(Telephone Survey Form) (Continued)

Vehicle Description:

TYPE	CONDITION	(NUMBER OF) CYLINDERS	SIZE	MODEL	OWNER
CAR	EXCELLENT	4	SMALL	SEDAN	FAMILY
TRUCK	GOOD	6	MEDIUM	SPORT	DRIVER
MOTORCYCLE	POOR	8	LARGE	OTHER	OTHER

Does the vehicle have seat belts? YES NO

Do you wear seat belts when you drive? YES NO

Telephone Survey conducted by: _____ Date: _____

APPENDIX E

ACCIDENT OCCURRENCE HARDCOPY ANALYSIS

A major aspect of the data collection portion of the Safe Performance Secondary School Driver Education Curriculum Demonstration Project involves the collection of data on driver history, accidents, and violations from the files of the State of Georgia's Department of Administrative Services (DOAS). Because one of the major questions in this study involves accident rates, it is appropriate to measure the accuracy of data transfer from the original accident reports (hardcopy) to the database at Battelle. Such a measurement can provide a level of confidence in the data being analyzed, can pinpoint potential problems, and can determine data which lack reliability.

In order to measure this accuracy, a stratified sample of accidents were selected from the Battelle database as of April 1982 and the hardcopy accident reports were retrieved from the Georgia Department of Public Safety. The following samples were selected:

- Fatality sample - All accidents of 15 students who were involved in a fatal accident (a fatal accident is defined to be an accident with at least one fatality).
- Injury sample - All accidents of 94 students who were involved in at least one injury accident, randomly selected from the available 1097 injury accidents (an injury accident is defined to be an accident with at least one injury, but no fatalities).
- Multiple accident sample - All accidents of 26 students who were involved in more than one accident, randomly selected from the 960 students who were involved in more than one accident.
- Property damage sample - All accidents of 29 students who were involved in exactly one accident which was neither an injury nor a fatal accident, randomly selected from the 3963 students who were involved in exactly one such accident.

These samples were selected using the SPSS SAMPLE procedure.

The rationale behind this particular stratification include the reasons as follows:

Fatality accidents are a sensitive issue and thus the reporting of all of these accidents should be carefully checked.

Injury accidents span most of the reporting fields and thus most fields can be checked for accurate data transfer from the accident reporting form to the Battelle database.

Because many students are involved in more than one accident, the multiple accident sample can be used to test the matching algorithm of accidents to students.

Finally, the property damage sample encompass the remaining possibilities of accident selection and also represent the least amount of reporting required for an accident.

The fatality sample turned up no discrepancy between the accident report and the database as to whether or not a fatality was involved in the accident. However, one case revealed a discrepancy in the total number of injuries involved in the accident and another case revealed an incorrect birthdate on the accident report.

The injury accidents revealed no discrepancy between the accident report and the database as to whether or not an injury was involved in the accident. In one case, however, a student's birthdate was incorrectly recorded on the accident report.

The multiple accidents sample revealed no discrepancy between the accident reports and the database as to whether or not the student was involved in all of the accidents on record in the Battelle database. Of the accident reports requested, however, three accident reports could not be retrieved from the Georgia Department of Public Safety.

All accident data recorded in the Battelle database was checked against the accident reports on many of the accidents. A consistent discrepancy was discovered in a portion of the 7-record (the Codes Master Record containing accident position, road conditions, etc.), but that turned out to be a

labeling problem on fields not used to date. A few other discrepancies between the accident report and the Battelle database were discovered on several other minor reporting fields, namely, such fields as codes E, F, G, H, I, L, O, and P on the accident report. Eleven of the 29 property damage accidents had such a discrepancy.

During the course of this endeavor, the violations recorded on the accident report were checked against the violations recorded on the history portion of the DOAS records. The accident report records which violation the officer cites, but does not record whether or not a conviction results. Hence, it is not surprising that a great deal of discrepancy exists between these data. As a result, the violation recorded on the accident report is not a reliable indication of a conviction, but it probably could be used as the officer's opinion of guilt.

In summary, the major fields of interest from the accident reporting form were transferred accurately to the Battelle database. The only major problem area seemed to be that of an incorrect birthdate on the accident report, but this posed no real problem because the DOAS match between students and accident cases was accurate. There were a few problems with fields of little interest.