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ABSTRACT

To use the school curriculum to achieve the goal of producing more knowledgeable citizens who have an appreciation for highway safety would require extensive preparation of attractive, innovative teaching materials. However, it would not be difficult to incorporate knowledge and skills relevant to safe driving in other courses and to ensure its carry over to driver education. Examples of such information are cited from the science, government, social studies, biology, sociology, psychology, and health curricula. A procedure is suggested that may provide relatively high payoff per dollar spent when compared with possible alternatives, e.g., elaborate expansion of driver education programs to provide increased behind-the-wheel training. A program of graduated licensing involving parental participation and official endorsement at several levels of proficiency would require convincing parents, license administrators, enforcement personnel, and driver education personnel of its value. As to the question, "Have the Schools Failed?" the answer depends very much on what the schools were expected to do. Given the resources available and the state of the art in driver education, the schools do not appear to have done badly. Yet even limited resources can always be used more effectively. (Author/LH)

HAVE THE SCHOOLS FAILED?

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Driver education has become a standard feature in the curriculum of most schools. Yet in some ways it has remained very much a stepchild in the school system. Although there is probably no other course that is so likely to result in actual application, driver education has never enjoyed the status of more traditional courses, such as math, English, or science. The critics of driver education are many, and in recent years their combined attacks have led to serious reconsideration of the driver education program (McGuire and Kersh, 1969). After all, if we cannot demonstrate that students receiving driver education have fewer accidents and violations than students who do not take the course, how can we justify continuing such an expensive program?

I do not know of any other high school course that is evaluated on the same terms as driver education. The English teacher is not evaluated on the basis of the correspondence his students write in later life. The math teacher is not evaluated on the basis of how well his students balance their check books. The home economics teacher is not evaluated on the basis of how well the students select or prepare meals. Yet the driver education teacher is held responsible for the subsequent driver records accumulated by his students. One might wonder whether the criteria applied to driver education are realistic. Should the driver education teacher be responsible only for whether the student can drive safely or whether he actually does drive safely? His subsequent performance is the result of many factors (such as peer influence, home pressures, and the student's own personality), which are beyond the influence or control of the driver education teacher (see Carlson and Klein, 1970).

In psychology we have become increasingly aware of the limitations of psychotherapy. Even intensive long term treatment does not guarantee positive results. The patient may be no better off than if he had received no treatment at all. Yet we have expected the driver education teacher to bring about major changes in the attitudes of his students—attitudes that have been developing within a family, a peer group, and a larger society for at least 14 or 15 years. And all this in 30 and 6! It is not surprising that driver education is seen by some as something less than a success.

There is a serious question, then, of whether the expectations of driver education have exceeded anything that could reasonably be accomplished. To answer the question, "Have the Schools Failed?", it is first necessary to define what the schools were supposed to do.

Haddon (1968) has stated that there are two general goals for driver education:

> First, the program should provide basic instruction in driving techniques, a knowledge of how to handle a car in special circumstances, environments, and emergencies, and a knowledge of local and state motor vehicle and traffic laws and ordinances.
>
> Second, and just as important, we should be turning out a far more knowledgeable breed of citizen who will know enough about highway safety to demand and support higher and higher (safety) standards.

The first of these general goals is a realistic one for a driver education course. But this first goal will be returned to later.

The second goal listed by Haddon requires far more time and information than can realistically be provided in driver education. Under this goal is subsumed what we have referred to as "attitude." Attitudes are not easily developed or changed. We know that the home is the most

influential factor in children's development, and what the school can do is limited by comparison. Yet the school can provide important information in a way that could engender the development of healthy attitudes toward driving and highway safety.

Let us review the interrelationships among all courses in a high school curriculum in terms of skill training. We teach basic concepts of math and English in specific courses, but then we enhance the skill level of students by requiring use of these basic concepts in other courses, i.e., we do not allow the student to "forget" English skills when he leaves the English class. We require use of writing skills in social studies, biology, and other courses. We require use of math concepts in our more technical shop and home economics courses. In this manner, we are actually providing many more "instructional hours" than actual "course hours" in any given subject.

But we do not use this approach in driver education. We fail to introduce driving skill related material or require knowledge of appropriate skills in other courses. Because of this, we are limiting our "instructional hours" in this area to actual "course hours."

At relatively little increase in cost, there are a number of places in the existing school curriculum where information relevant to safe driving could be presented and serve as illustration of concepts being taught. For example, a high school, or even junior high school, course in science or physics could include discussion of velocity changes and how they affect the "g's" experienced by the body. The space program has focused attention on changes in body weight experienced by the astronauts during blastoff and the reduced g's experienced on the surface,

of the room. These same principles apply to what occurs in an automobile crash. The change in the velocity, the distance in which it occurs, and the resulting g's can be expressed in the following equation:

$$g = \frac{(\text{mph})^2}{30 \times (\text{stopping distance in feet})}$$

"This formula reveals that the decelerative forces increase as the square of the speed. In other words, the crash forces at 60 mph are 9 times as great as they are at 20 mph...But just as important as the speed is the stopping distance. Let us postulate a stopping distance of 2 feet (against a bridge abutment) at 30 miles per hour, $g = (30)^2/30 \times 2$. The car sustains a blow of 15 g. The right seat passenger is about 2 feet from the forward structures, and reaches these when they have come to rest. By deformation of these structures we may postulate a stopping distance of 2 inches for this passenger...a generous allowance. Inserting a stopping distance of 1/6 foot in the above formula, the...passenger (is subjected) to 180 g..." and consequently such abrupt crashes "are almost routinely fatal." (Campbell, 1962, reported in Haddon, 1967).

Haddon points out that this example illustrates two major aspects of transportation injury. First, the occupant, if he is not restrained in some way as with seat belts or air bags, is likely to be subjected to forces much greater than those sustained by the automobile (in this case 180 g as compared with 15 g). However, the use of a restraint system would enable the occupant to ride down the crash at the same rate as or more slowly than the vehicle. In the example used, the

vehicle experienced a blow of only 15 g, a force much lower than the 35 g or more that are typically experienced in fatal crashes. A second major point illustrated by the example is that speed alone is not the only major factor in crash severity. The type of crash also makes a substantial difference. If the collision is abrupt and the vehicle stops instantaneously, the severity of the crash is greater. However, if the object struck allows some deflection of the vehicle or absorbs some of the impact, the crash can be attenuated (Haddon, 1967).

Students could be given assignments to determine the g forces of different kinds of crashes at various speeds with belted and unbelted occupants to determine the probability of survival.

Another aspect of survival concerns whether the force on the human body is concentrated or distributed. Crashes in which the impact on the body is concentrated are more likely to result in serious injury or death than those in which force is distributed. Vehicle design has been changed to take this into account, and dashboards are now less likely to have sharp protrusions. Incidentally, some of the early research in this area might be of interest to high school students, namely, the investigations of DeHaven (1942) of persons who survived suicide attempts by jumping from high places. He found that the probability of survival was enhanced if the person landed in such a way that the impact was distributed over a large portion of the body rather than being concentrated. Also, if he landed in soft earth, he was more likely to survive than if he landed on a harder surface. In any event, a science course offers an excellent place to discuss such concepts and relate them to crash survivability and the use of restraint systems.[1]

A course in government or civics can provide an opportunity for class discussion of such topics as legislated use of seat belts or motorcycle helmets. The evidence indicates that the use of helmets is associated with decreased fatality rates among motorcyclists. Likewise, the use of seat belts has been shown to be associated with decreased incidence of serious injury or death among drivers involved in crashes (Campbell, 1968). The benefits of such injury reduction are obvious. Australia has passed laws requiring belt usage, and the usage has increased dramatically (Andreassend, 1972; Australian Bureau of Census and Statistics, 1973). Yet what are the rights of the individual as opposed to the rights of society? Does a motorcyclist have the right to subject himself to increased risk, even though it may increase the insurance costs and/or taxes of others, to say nothing of the loss of young life after society has invested so much time, effort, and money into their rearing and education? If it is legitimate to require the use of motorcycle helmets, what about the use of seat belts? The evidence for them is at least as strong. In discussing the pros and cons of required usage, hopefully good data concerning the benefits of usage could be imparted.

Social studies could include discussions on the impact of the motor vehicle on life style and on a nation's economy. The depletion of energy sources could also be discussed in such courses. The fact that the world's major supplies of fuel oil reside in the Mideast and in Russia has serious political implications. The Alaskan pipeline involves grave ecological considerations that cannot be ignored. An impending energy crisis may have an effect on how much driving is

done and at what speeds. Indeed, the energy crisis may eventually do more to solve the highway safety problem than any of our conscientiously developed countermeasures.

Biology is an excellent subject in which to discuss the balance of nature and how man has interfered with that balance. Air pollution, much of which results from vehicle exhaust, is affecting both plant and animal life. Lower speeds result in lower fuel consumption and less pollution. Improvements in automotive engines may eventually prove effective, but the support for such efforts could be engendered at the high school level now.

Biology is also an appropriate place to discuss the history of man. Man as we know him has changed little in thousands of years. The hunter and gatherer is now a cliff dweller in the metropolis. But are his basic needs any different from what they were 50,000 years ago? The recorded history of man suggests that man has always sought to travel at the fastest speeds possible. The nimblest runner, the quickest horse, the swiftest ship, the most rapid train, the speediest car, and the fastest plane are what man seeks. Perhaps we are wasting our time to admonish young people to slow down and live. Perhaps it would make better sense to recognize that the nature of man is such that he craves speed. Instead of building vehicles that feel as if they are standing still at 60 mph, why not provide feedback to the driver so that he can get the exhileration of speeding at 40 or 45 mph? Accentuate the experience of speed rather than de-emphasize it.

A course in sociology provides an opportunity to explore the social factors associated with high accident and violation rates. What might

account for the differences in accident experience between males and females? Why might young people from broken homes experience different accident patterns from other young people? Why do young males who smoke have higher accident rates than other young males? How are occupation and marital status associated with accident experience?

In a psychology course one can explore the personal and interpersonal satisfactions to be gained from the motor vehicle. What does a car mean to a young man? It has been suggested that for the young male in our society the acquisition of a first car represents a rite of passage to the adult world (Klein, 1972). For many, an automobile represents power and prestige. How else might a young person achieve such satisfaction? The effects of stress or life crises on a person's driving could be explored in a psychology course. In such a course it would also be possible to pursue the effects of drugs on behavior. Here it should be pointed out that little is known about the effects on driving of marijuana or hard drugs. However, there is much known about one drug, namely, alcohol, and the literature in this area provides a basis for many a thoughtful class discussion.

Health courses provide an excellent opportunity for discussing traffic accidents and injury. High school students are more likely to die from motor vehicle accidents than from any other cause. For young white males (age 15 through 24) in North Carolina, motor vehicle deaths exceed deaths from all other causes combined. Anyone concerned about health problems of young people cannot ignore the toll taken by motor vehicle accidents.

To use the school curriculum to achieve the goal of producing more knowledgeable citizens who have an appreciation for highway safety would require extensive preparation of attractive, innovative teaching materials. Some such activities already go on even as early as kindergarten, but overall the effort is minimal. A well-coordinated effort would have to be made to encourage the use of such materials by teachers with a variety of training. The teachers themselves would have to be convinced of the value of using such materials. One selling point might be that driving holds high motivational value for most high school students. If a teacher wants to get a concept across, couching it in terms of the driving task may make the concept more palatable. If the materials are used solely to illustrate principles, and if issues are discussed openly and honestly and not in a preaching manner, the student will be free to grasp the essential meaning of the material and develop more informed, if not more constructive, attitudes regarding his own driving behavior.

Now to return to the first goal, namely, instruction in driving and in traffic law. Driver education should focus on this first goal. Usually much of the necessary knowledge of state laws can be gleaned from the driver handbooks provided by the state. But how much driving can be taught in the standard 30 and 6 driver education course? There are pressures to extend driver education to a full semester and include time on driver simulators and increased time behind the wheel, either on ranges or on the highway. Special facilities for teaching emergency procedures would be desirable. Financial considerations immediately pose formidable obstacles. It may therefore be worthwhile to consider developing a pro-

gram in which schools collaborate with the home. I am proposing a system whereby the young driver is introduced more gradually into the driving population than is currently the case. We have collected data in North Carolina that show that young drivers experience higher risk of accident, taking into account their presence in the driving population (not just the licensed population) (see Figure 1). Their overrepresentation in accidents is highest at the earliest ages (≤ 16) and gradually decreases up through age 24. From age 25 through age 54 drivers are underrepresented in accidents compared to their presence in the driving population. Above age 54 there is a gradual increase in accident risk (Waller and Reinfurt, 1973). These results are similar to those found elsewhere in the country. The fact that the young person shows a gradual decline in accident risk suggests strongly that inexperience is at least part of his problem. A more gradual introduction to driving should therefore be of benefit.

Upon the successful completion of driver education and successful performance on license examination, the young person could be given a limited license whereby he could drive only during certain low risk daylight hours, e.g., 9 am to 4 pm. Such driving could occur only in the presence of a responsible adult (parent or guardian). After a period of perhaps six months (the time would have to be determined, but it would be the same for all drivers) the daylight hours would be extended to include the early morning, e.g., 6 am to 9 am, and the evening, 4 pm to 6 pm. The responsible adult would have to be present during these extensions of time but would no longer be required in the middle of the day. Again after a period of perhaps six months, the hours from 6 pm to 10 pm could be added with the adult present. The adult could be

eliminated during the other hours. After another six months the rest of the night hours could be added but only with the adult present.

It may be desirable to bring the young person back to the driver education class just before fully licensing him to review and refresh his information. Frequently the course content makes better sense after one has some on-the-road experience, yet almost always the behind-the-wheel training follows the classroom work.

This proposal recognizes that sheer passage of time is no guarantee that a student will gain experience under responsible supervision. Some will and some will not. In this regard it would be possible to base graduation from one level of licensure to another on a combination of both experience (defined as length of time licensed rather than actual driving) and demonstrated skill, e.g., a higher score on the road test.

As he graduates from one level of proficiency to the next, his license would be endorsed accordingly. Since such a program would function most effectively if there were adequate enforcement, it would be possible to require drivers during the learning process to display some indication of their status. In this way other drivers, as well as enforcement personnel, would be alerted to the learning status of the young driver, and the young driver would know he must be driving in accordance with the rules governing his license. Such an identification system is currently used in England and in New South Wales, Australia and appears to pose no great problems (see Henderson and Messiter, 1970).

Extending the period of time during which young drivers are limited raises problems. Parents are tired of chauffeuring children, and young people are eager to get out from under parental control. Yet the age

at which driver education and initial licensing occur could be lowered so that behind-the-wheel experience began at perhaps age 13-1/2 or 14 instead of 15 or 16. Parents who now have to chauffeur children could simply swap places with them. In the driving situation parents can communicate their own perceptions of hazard in the driving of others on the road as well as in the driving of their own children. By lowering the age of initial licensing, young people could be eligible for a full-fledged license at the same age they may now acquire one. However, by that time they would have much more monitored experience than is now usually the case, and this behind-the-wheel training would be at minimal cost to the taxpayer.

At the present time, upon full licensure it is probable that most young people immediately embark upon night driving with other young people, a situation characterized by complexity. Few driver education courses include instruction in night driving. Inexperience in driving combined with inexperience in complex social situations can lead to tragedy. If a young person could develop his initial driving skill under less challenging circumstances, he may be better able to handle his driving when the social pressures are more complicated.

This proposal also recognizes the differences among youth in the availability of supervising parents and of a vehicle to drive. Clearly for some, this proposal has little merit. For such youngsters more adequate programs must be developed. Indeed, there may need to be a variety of programs tailor-made for the various kinds of students who must be trained.

This proposal simply suggests one procedure that may provide relatively high payoff per dollar spent when compared with possible alternatives, e.g., elaborate expansion of driver education programs to provide increased behind-the-wheel training. A program of graduated licensing involving parental participation and official endorsement at several levels of proficiency would require convincing parents, license administrators, enforcement personnel, and driver education personnel of its value. Before this or any other program is implemented on a large scale, there should be careful evaluation of pilot programs to provide a basis for wise investment of limited dollars.[2]

As to the question, "Have the Schools Failed?" the answer depends very much on what the schools were expected to do. Given the resources available and the state of the art in driver education, the schools do not appear to have done badly. Yet even limited resources can always be used more effectively. Two courses of action that are considered worthy of further investigation are:

1. The development of materials to be used throughout the high school curriculum and aimed at increasing the student's information about, appreciation of, and concern for highway safety.
2. A graduated driver license, whereby the young driver is introduced more gradually into the driving population on the basis of experience and demonstrated skill. Such a program would require the coordinated efforts of driver education instructors, driver license administrators, enforcement personnel, and parents.

While such courses of action would be costly, they would not cost as much as elaborate expansion of behind-the-wheel training within the school system. Failure to provide meaningful driver education and training programs may be the costliest route of all.

Footnotes:

[1]Under the auspices of the National Highway Traffic Safety Administration, material has been prepared for use in teaching physics. It is entitled, "Physics and Automotive Safety," by Peter Kortman and C. Edwin Witt, and is available from the Superintendent of Documents.

[2]There is currently a project in California that is experimenting with parent participation in driver education. The evaluation of this pilot program should be of relevance to the proposal made here (see Sparks and Urlaub, 1973).

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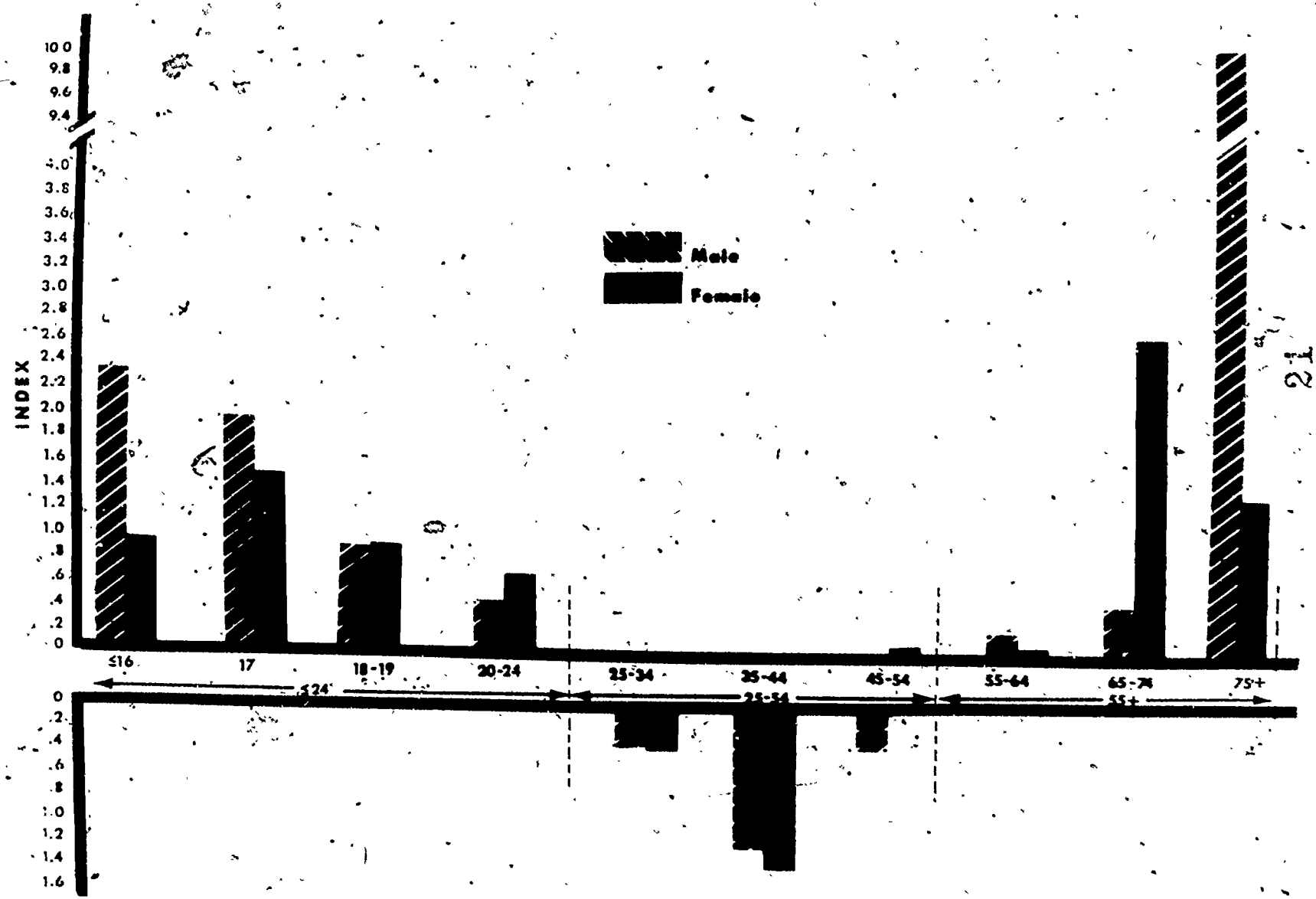
Figure 1: Over- and under-representation in the accident population compared with presence in the driving population at risk, by age and sex. (See Waller and Reinfurt, 1973, for further explanation.)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