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The construction and evaluation of a test to measure the knowledge of accident prevention of twelfth grade pupils

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THE CONSTRUCTION AND EVALUATION OF A TEST TO MEASURE THE KNOWLEDGE OF ACCIDENT PREVENTION OF TWELFTH GRADE PUPILS

Submitted by

Dorothy Esther Howland

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First Reader: Leslie W. Irwin, Professor of Health and Physical Education

Second Reader: Charles D. Merrill, Instructor in Physical Education

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CHAPTER I

THE PROBLEM

Statement of the problem.--The following study is an effort to construct and evaluate a test which purports to measure understandings of twelfth grade pupils in certain areas of accident prevention. Have the pupils about to graduate from high school developed knowledges of safety precautions which will help them in the prevention of the majority of accidents frequently occurring in normal activities?

Justification of the study.--At the present time the principal cause of death for all children between three and nineteen years of age is accident. In the year 1945 there were 96,000 fatal accidents in the United States, and of these, 7,000 were school children. During any school year about 500,000 school children are injured, and about one-half of the fatal accidents are caused by the automobile.

The accident rate per thousand children for junior and senior high school ages is ninety and nine tenths. As the child progresses in the education program the accident rate progresses. It has been estimated that about 17,000 accidents in physical activities alone occur among the 4,000,000 high school students in the United States and that these accidents result in a loss of approximately 70,761 days from activity in class.[1/]

Regarding the magnitude of the accident problem and the responsibility of the school in preparing high school pupils to effectively protect

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1/ ——— , Accident Facts, National Safety Council, Chicago, Illinois, 1949.

themselves and others from dangers, Clemensen and LaPorte[1] state:

> "Each year nearly one hundred thousand deaths are traceable directly to accidents; over three hundred thousand permanently disabling injuries come from the same source; the number of minor injuries reaches from eight million to ten million. This means that every day nearly three hundred persons are killed in America, nearly one thousand are permanently disabled, and over twenty-five thousand receive more or less serious injuries. These deaths and injuries are traceable to accidents most of which could have been prevented if all persons concerned had been properly trained in safety-education procedures and had acted accordingly.
>
> "...About one-third of the deaths are traceable to automobile accidents; another third to home accidents; and the rest to industrial, athletic and other accidents. The bicycle alone is responsible for over seven hundred deaths and thirty thousand injuries each year.
>
> "If a greater reduction in accidents is to be made it will be necessary to co-operate in a democratic manner in an all-out effort to save lives and prevent injuries. Perhaps the most important thing is to get every individual more safety-minded. Since this is an educational problem, the teaching staff and the student body in our high schools should be able to do much to improve the situation."

In the Eighteenth Yearbook of the American Association of School Administrators[2] is written:

> "...the problem of safety has emerged as one of the major problems of our civilization. The home can no longer handle it unaided. The community and the school must each assume a share of the responsibility, and the school must add safety to the other activities that help children to live more effectively. It is to the school particularly, that we must look for the development of the knowledge, the attitudes, the habits, and the skills that are necessary if we are to live with reasonable safety in the modern world.

1/ Jessie Williams Clemensen and William Ralph LaPorte, Your Health and Safety, Harcourt, Brace and Company, New York, 1946, p. 467.

2/ Safety Education, Eighteenth Yearbook of the American Association of School Administrators, American Association of School Administrators, Washington, District of Columbia, 1940, p. 9-15.

"...On the average, one out of every three children is due, according to our present experience, to be killed or injured in a traffic accident; and none of us can expect to go for a longer period than twelve years without being killed or injured in an accident. These are conditions which we should be able to improve.

"...Here is a chance to test the effectiveness of our democratic procedure. Can we bring ourselves to the point of dealing with the situation drastically and effectively? The problem is essentially educational. Not only will the school have to be responsible for giving young people the attitudes of mind and the techniques of safety but the public as a whole must be educated to the seriousness of the accident problem and the possibility of solving it successfully."

In 1937 the Executive Committee of the American Association of School Administrators selected safety education as the topic for the nineteen hundred and forty yearbook. Previous to this date many localities were successfully conducting programs in safety education but the school administrators "felt that the time had come for the organized profession to take a more positive stand on the safety movement."[1/]

As a result of this study it became evident that nearly 99 per cent of school superintendents considered that the school does have the responsibility of offering safety education in the curriculum.

In the year 1922, safety education was introduced into the schools on a national scale and today a number of state legislatures have made the teaching of safety mandatory. Most of the teaching has been done in the elementary grades, and the results have been very gratifying as shown by the reduction of 30 per cent of fatal motor accidents in the age group of five to fourteen.

1/ ibid. p. 5.

However, 129 per cent increase in such accidents in the 15 to 24 year old group has occurred. In regard to these figures we read in the Eighteenth Yearbook,[1] "the figures constitute a challenge to accomplish with the upper grades what has been done with the lower age group, to evolve a safety education program which will carry over into after school years."

In 1940 the Safety Education Projects of the Research Division, National Education Association published a bulletin[2] in which 283 courses of study in Safety Education are listed. These courses are issued by State Boards of Education, City Boards of Education, County Boards, and Non-School Organizations. Among these courses, provision made for instruction of senior high school pupils is conspicuously less than for the other grades, except in courses in highway safety and driver training.

The Massachusetts Department of Education with the co-operation of the Massachusetts Department of Public Health has recently published and outline of study, "Life's Everyday Health Problems", for use in secondary schools. In the preview of the unit, "Accident Prevention", we find that the authors agree that provision should be made for the instruction of high school pupils in prevention of accidents. In writing of the magnitude and cost of accidents, we read--[3]

> "...Such a waste is obviously a reflection on our reputation for solving problems of nationwide concern and it is now evident that

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1/ Ibid. p. 45.

2/ Problems and Topics in Safety Education, Safety Education Projects, Research Division, National Education Association, Washington, District of Columbia, 1940.

3/ "Life's Everyday Health Problems", Unit IX Preventing Accidents, Massachusetts Department of Education with the cooperation of the Massachusetts Department of Public Health, 1949.

"only an intelligently awakened populace will force a reduction in the annual accident figures. ...It is in the schools where correct attitudes and understandings can best be developed and where needed skills and essential information can be acquired.

"High school pupils, well-trained in safety education procedures, will produce an effective force with respect to the job of eliminating many needless accidents."

Whether or not the high school pupil has received instruction in safety education as a separate course, it is important that the school have an objective measure to determine to what degree the pupil is prepared to meet the responsibilities of good citizenship, and family living. Williams and Oberteuffer have stated[1] that, "Even though all persons do not engage in hazardous occupations, it is desirable that all citizens know of these dangers to others, support appropriate legislative control, and encourage the efforts of education. Moreover, many young persons in schools today will engage in hazardous work. It is a matter of prime importance to them to be informed and to be able to bring to their work an understanding and cooperative point of view."

By means of a valid and reliable objective test the counselors of high school pupils can determine more accurately the ability of the senior pupil to utilize the essentials of accident prevention which he has learned in school or elsewhere "into a discipline important in itself as a means of effective citizenship."[2]

1/ Jesse F. Williams and Delbert Oberteuffer, Health in the World of Work, McGraw Hill Book Company, Inc., New York, 1942. p. 249.

2/ Safety Education, Eighteenth Yearbook of the American Association of School Administrators, American Association of School Administrators, Washington, District of Columbia, 1940, p. 47.

Scope and limitations of the study.--This test is designed to measure the knowledge and understanding of accident prevention of pupils in the twelfth grade.

The test consists of 100 multiple-choice items. 50 items measure knowledge of the causes of accidents on the highway. 25 items measure the understanding of the causes of accidents in the school and its recreational activities, and 25 items measure the knowledge of the causes of accidents in and about the home.

The test was administered to 168 unselected senior high school pupils in Fall River and New Bedford. The number was equally divided between boys and girls. In the New Bedford High School 26 girls and 16 boys received the test. In the New Bedford Vocational High School 27 girls and 34 boys took the test. 34 boys and 31 girls in the Bradford Matthew Chaloner Durfee High School[1/] in Fall River received the test. The test was administered in each school by one teacher.

The entire group of 65 Fall River pupils had been receiving instructions in safety in one 43 minute class period, once a week for 25 weeks. The 103 New Bedford pupils had not received any instruction in safety.

The distribution of the intelligence quotients for those pupils as stated by school records was as follows. 1.1 per cent of the scores was between the range of 70 and 80. 8.8 per cent of the scores was between the range of 80 and 90. 20.2 per cent was between 90 and 100. 33 per cent was between 100 and 110. 25 per cent was between 110 and 120. 10 percent was between 120 and 130 and 1.7 per cent was between 130 and 140.

1/ To be referred to as B. M. C. Durfee High School in subsequent instances.

Present Status of Instruments Measuring Knowledge of Accident Prevention

At the present time comparatively very little is being done by many schools to determine how well prepared are the pupils about to assume adult responsibilities, to aid in the serious problem of accident prevention. "Accident prevention represents a major problem and requires further study and research and the more effective utilization of present knowledge regarding prevention and control."[1]

The following instruments related to accident prevention have been found.

Brewer - Schramel Health Knowledge and Attitude Test[2] contains five questions on accident prevention. This test is designed for grades four to eight.

Byrd Health Attitude Scale.[3]--This test contains one hundred test items and is to be used for high school and college pupils. There are ten questions on the subject of accident prevention.

1/ D. B. Armstrong and W. Graham Cole, "Can Child Accidents Be Prevented in Your Community?" American Journal of Public Health (May, 1949) 39:592.

2/ John W. Brewer and H. E. Schrammel, Brewer-Schrammel Health Knowledge and Attitude Test, Bureau of Educational Measurements, Kansas State Teachers College, Emporia Kansas, 1935.

3/ Oliver E. Byrd, Byrd Health Attitude Scale, Leland Stanford Junior Junior University, Stanford Univserity, California, 1940.

Gates-Strang Health Knowledge Test.[1]--This test has two forms, one for grades three to eight, and the other for grades seven to twelve. The test for grades seven to twelve contains 60 multiple-choice questions, and five of these are related to accident prevention.

Health Inventory for High School Students[2] has been designed as a health measure for use in grades nine to twelve. It contains 106 items, and seven are devoted to First Aid.

Health and Safety Education Test,[3] for high school pupils lists seven questions in accident prevention among 75 others.

Health Test[4] for grades three to eight contains three questions on the subject of care of victims of accidents.

Kilander Health Knowledge Test.[5]--For high school seniors and college freshmen contains 100 multiple-choice items, and of this number five are included on subject of accident prevention.

1/ Arthur I. Gates and Ruth Strang, Gates-Strang Health Knowledge Test, Bureau of Publications, Teachers College, Columbia University, New York City, 1937.

2/ Gerwin Neher, Health Inventory For High School Students, California Test Bureau, Los Angeles, California, 1942.

3/ Lester D. Crow, Loretta C. Ryan and Clifford L. Brownell, Health and Safety Education Test, Acorn National Achievement Tests, Rockville Centre, New York, 1947.

4/ Robert K. Speer and Samuel Smith, Health Test, Acorn Publishing Co., Rockville Center, Long Island, New York, 1946.

5/ Holger Frederick Kilander, Kilander Health Knowledge Test, Panzer College of Physical Education and Hygiene, East Orange, New Jersey.

Test Materials to Accompany Your Health and Personality,[1]--This is a test furnished to teachers as an aid in using the textbook Your Health and Personality.[2] The test consists of eight true-false tests, one for each of the eight health units included in the textbook. One test of 52 questions is entirely on the subject of safety and accident prevention.

1/ Howard S. Hoyman, Test Materials to Accompany Your Health and Personality, Harcourt, Brace and Company, New York, 1948.

2/ Howard S. Hoyman, Your Health and Personality, Harcourt, Brace and Company, New York, 1948.

CHAPTER II

THE PLAN OF THE EXPERIMENT

Procedure.--As this test is designed to measure the knowledge of accident prevention of senior high school pupils in any locality it is not based upon specific objectives of any course outline. The general objectives for this test were determined and selected from the content of nine textbooks recently published and used in the teaching of safety and health in secondary schools. In addition to the textbooks several syllabi published by city and state Departments of Education were studied and objectives and test content selected. These sources are listed in the bibliography.

The general objectives in teaching safety education have been stated as follows by the National Education Association of the United States.[1/]

To save lives.

To prevent accidents.

To develop in pupils a feeling of responsibility for their own safety and the safety of others.

To awaken a safety consciousness in pupils.

To develop in pupils a feeling of responsibility as an influence on others.

To develop a spirit of cooperation in solving the problems of safety.

To develop in the child a consciousness of helpfulness in preventing accidents.

1/ _____, Problems and Topics in Safety Instruction, National Education Association of the United States, Washington, District of Columbia, 1940. p. 4.

To develop an attitude of respect for the rights of others.

To develop confidence in oneself in time of emergency.

To develop a desire to keep safe and avoid accidents.

To instil the desire to make of safety a good adventure.

To encourage and challenge clear thinking on the part of the children.

To eliminate the practice of taking foolish chances.

To develop a consciousness of hazards due to uncontrolled emotions and antisocial attitudes.

To train children to use safely the products of a mechanical age.

To help the pupils form safety habits.

To develop habits of conduct that will enable children to meet the situations of daily life without accident.

To create habits of obedience to all safety rules and regulations.

To provide experiences that will develop habits.

To acquire habits and skills which will not only function in school but also out of school.

To develop good citizenship through safety education.

To determine what constitutes a safe environment.

To obtain a viewpoint of safety that is not colored by emotion.

To control the tendency to "show off."

The Massachusetts Department of Education with the co-operation of the Massachusetts Department of Public Health in a recent syllabus[1/] for teaching

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1/ _____ "A Guide to Health Teaching in the Senior High School", Massachusetts Department of Education, Boston, Massachusetts, 1949. p.3,12.

safety in the senior high school have stated certain desirable outcomes of such a course.

1. A keener realization of the responsibility of the individual for the safety of others and the realization of the effect his conduct may have upon their safety.

2. The more mature understanding of the causes of accidents and how they may be prevented.

3. The development of an active interest and cooperation in the protection of the life, health and property of the community.

4. The development of attitudes, habits, and skills that will permit efficient, safe participation in all phases of school activities.

5. The development of responsibility in the individual in maintaining a safe home.

6. The understanding of the common causes of home accidents and means of prevention.

7. The formation of correct habits and the acquiring of attitudes which will make the home a safe place in which to live.

8. The acquiring of knowledges and skills which may be applied to emergency health problems, such as burns, poisoning, wounds, fractures, dislocations and suffocation.

In the syllabus named on the foregoing page [1] the obligations of the pedestrian are stated, and the teaching outline covers the following.

1/ Ibid. p.35-36

The Pedestrian

- contrasting conditions
- state law consideration
- safe walking rules
- safe riding habits

Individual differences

- traffic rule ignorance
- poor judgment
- selfish attitude
- absent-mindedness
- age-especially pre-school age and elderly persons
- physical characteristics

Pedestrian obligations

- cooperative attitude
- understanding automotive limitations
- understanding driver's problem
- consideration of others

Pedestrian problems

- crossing between intersections
- disregarding traffic helps
- stepping out from between parked cars
- playing in the streets
- consideration of all hazards

Acceptance of responsibility

- knowledge of sound driving practises
- knowledge of state law requirements
- consideration of driver differences
- development of good personal habits

It was in consideration of the listed references, and an analysis of accident facts as published by the National Safety Council[1] that the objectives of the test were formulated.

1/ _____, Accident Facts, National Safety Council, Chicago, Illinois, 1949.

Construction of the Test.--The general suggestions for constructing this objective test were taken from Measurement and Evaluation in the Secondary School, by Greene, Jorgensen, and Gerberich.[1]

The content of the test was designed to measure the degree of attainment of pupils in the desired outcomes which have been listed previously. Items were provided which involved the ability to apply and use facts as well as the knowledge of facts. Highly factual aspects were minimized. The items were arranged topically but no attempt was made in this initial form to range the items according to difficulty.

The introductory portion of each item included as much as possible to to eliminate repetition of the same introductory words in each of the alternatives. All items had four alternate answers. No item was constructed from a selected statement from a textbook in its exact form and items having obvious answers were not used.

The test was well printed on good paper in an attractive form. The response positions were planned to occur in a columnar arrangement in convenient proximity to each statement as this consistency of position aids the pupil and facilitates the scoring of results.

Provision was made for complete directions to the pupils, and a sample item was given to show how answers were to be recorded. It was planned that one minute of working time would be adequate for each three items, or approximately thirty minutes for the entire test.

1/ Harry A. Greene, Albert N. Jorgensen and J. Raymond Gerberich, Measurement and Evaluation in the Secondary School, Longmans, Green and Company, New York, 1943.

The plan for scoring was predetermined to allow one point of credit for each correct answer, and no correction for chance was allowed. No varying weights were assigned to the scores resulting from different sections of the test.

After the test was entirely designed it was submitted to three professional experts in the specific areas of the test, from which the concepts of the test items were constructed. These specialists accepted the test as valid, offering a few minor changes which were incorporated in the test.

Administration of the Test.--Permission to administer the Test was secured from the principal of the New Bedford High School, of the B. M. C. Durfee High School in Fall River, and of the Director of the New Bedford Vocational High School. In each case the head of the school designated a supervising instructor to make the necessary arrangements for the administration of the Test. Pupils' individual school records were the source of information regarding the intelligence quotient which was ascertained in eachcase.

The Test was administed to 168 senior high school pupils in the schools mentioned above. New Bedford and Fall River are adjoining cities of very similar socio-economic background.

It was unplanned that the total number of pupils taking the Test should be equally divided between boys and girls.

Scoring.--All tests were scored by the writer. One point was allowed for each correct response, making a possible score of 100 for the entire test.

A Test in Accident Prevention

Dorothy E. Howland, R. N.

Date _____

Name _____

School _____

Grade _____ Time test started _____

Age _____ Time test finished _____

Scores

Highway Items _____

School Items _____

Home Items _____

Total Score _____

Remarks _____

_____

_____

DIRECTIONS: Following are some questions about prevention of accidents on the highway, in school and in the home. Read carefully each question and the answers. Then mark only the ONE best answer with a cross (x).

If you mark more than one answer to a question, the question will be marked wrong.

SAMPLE EXERCISE

A. We should heed traffic signals -

a.	when it is slippery.	___ a
b.	at night.	___ b
c.	when we are learning to drive.	___ c
d.	at all times.	x d

---

1. Brakes are correctly adjusted when they stop a car going 20 miles an hour in

a.	5 - 10 ft.	___ a
b.	10 - 20 ft.	___ b
c.	20 - 30 ft.	___ c
d.	30 - 40 ft.	___ d

2. When two cars reach an intersection at approximately the same time the wise driver should

a.	argue about the law.	___ a
b.	demand his rights.	___ b
c.	insist on going first.	___ c
d.	yield to the other driver and avoid trouble.	___ d

3. Drivers having the most accidents are

a.	those who surrender their right of way.	___ a
b.	those who do not have the right of way.	___ b
c.	those who maintain the letter of the law.	___ c
d.	those who expect the other driver to maintain the letter of the law.	___ d

4. You may more safely drive a car

a.	when you have had no alcoholic drinks.	___ a
b.	when you have had a few drinks.	___ b
c.	when you have been drinking heavily.	___ c
d.	when you have a competent driver with you altho you have been drinking.	___ d

5. To compensate for slippery streets, one should

a. put on chains. ___ a
b. slow down. ___ b
c. rely on brakes. ___ c
d. sound horn frequently. ___ d

6. One should learn how to drive under the instruction of

a. a professional expert. ___ a
b. devoted relative. ___ b
c. automobile salesman. ___ c
d. boy or girl friend. ___ d

7. If you feel sleepy while driving

a. slow down. ___ a
b. eat a snack. ___ b
c. stop the car and pull off the road and take a short nap ___ c
d. sing out loud to arouse yourself. ___ d

8. As a young driver becomes older he usually becomes a safe driver because

a. because he becomes more cautious. ___ a
b. he becomes a driving mechanic. ___ b
c. he knows the routes better. ___ c
d. he buys higher priced cars. ___ d

9. The best driver

a. does not allow his attention to be diverted. ___ a
b. is able to drive with only one hand on the wheel. ___ b
c. is able to pass nearly all the cars on the road. ___ c
d. knows how to repair the car. ___ d

10. One should come to a dead stop at stop signs because

a. the other fellow has the right of way. ___ a
b. you are driving in a congested area. ___ b
c. you may otherwise be fined. ___ c
d. the motorcycle officers may be watching from a hidden stop. ___ d

11. One should never overtake a car unless

a. you cannot see anyone in your way. ___ a
b. there are three lanes. ___ b
c. you have some reason to speak to the other driver. ___ c
d. you are positive there is ample space ahead. ___ d

12. The factor which will most successfully reduce automobile accidents is

a. more carefully constructed automobiles. ___ a
b. better highways. ___ b
c. stricter highway regulations. ___ c
d. more careful and skillful drivers. ___ d

13. When driving after dark it is best to

a. keep off city streets. ___ a
b. sound the horn more often. ___ b
c. cut down on speed. ___ c
d. check the headlights. ___ d

14. The action of automobile drivers resulting in the most injuries is

a. cutting in. ___ a
b. exceeding speed limits. ___ b
c. passing on a curve. ___ c
d. failure to signal. ___ d

15. When a pedestrian is crossing the street on a go signal and his green light changes, the following should proceed:

a. all cars. ___ a
b. the pedestrian. ___ b
c. cars going in opposite direction to pedestrian. ___ c
d. cars going in same direction as pedestrian. ___ d

16. When following another car going 45 miles an hour a driver should allow at least

a. 150 feet. ___ a
b. 25 feet. ___ b
c. 10 feet. ___ c
d. 250 feet. ___ d

17. It has been proven that most vehicles involved in accidents are found to be in the following condition:

a. with no major defects. ___ a
b. gas pedal stuck. ___ b
c. brakes defective. ___ c
d. defective headlights. ___ d

18. After getting off a bus a pedestrian should

a. walk to the nearest curb. ___ a
b. cross the street in front of the bus. ___ b
c. pass in back of the bus. ___ c
d. stand in the street until the bus goes by. ___ d

19. If a pedestrian is caught out in the middle of the traffic he should -

a. try to dodge out of the way. ___ a
b. stand still. ___ b
c. get to either curb as soon as possible. ___ c
d. walk along in the street until there is a slack in cars. ___ d

20. Most of the automobiles in accidents are

a. taxis. ___ a
b. commercial cars. ___ b
c. passenger cars. ___ c
d. buses. ___ d

21. The action of pedestrians resulting in the most deaths and injuries is

a. crossing between intersections. ___ a
b. walking on rural highways. ___ b
c. coming from behind a parked car. ___ c
d. waiting for, or getting off Buses. ___ d

22. The best driver to teach one to drive a car is

a. one who has been driving a long time. ___ a
b. an expert in handling a car. ___ b
c. one who can tell you the hazards you are most likely to encounter. ___ c
d. one with the best mechanical background. ___ d

23. Most automobile accidents occur

a. between 6 - 8 a. m. ___ a
b. between 12 p. m. - 2 a. m. ___ b
c. between 6 - 8 p. m. ___ c
d. between 2 - 4 p. m. ___ d

24. The day of the week in which the most accidents occur is

a. Sunday. ___ a
b. Saturday. ___ b
c. Monday. ___ c
d. Tuesday. ___ d

25. The largest ratio of accidents occurs in following age group of drivers:

a. 65 years and over. ___ a
b. 25 years - 64 years. ___ b
c. under 18 years. ___ c
d. 18 - 24 years. ___ d

26. If forced on to soft shoulders while driving one should

a. apply the brakes heavily. ___ a
b. try to pull the machine quickly back on the road. ___ b
c. point the car straight ahead and keep up speed. ___ c
d. point the car straight ahead and gradually slow down. ___ d

27. Reduction in annual accidents will be most satisfactorily accomplished if

a. the police departments are enlarged. ___ a
b. more laws are set up for traffic regulations. ___ b
c. buildings are more carefully reconstructed. ___ c
d. the citizens as a whole become more interested in accident precaution. ___ d

28. The way to reduce accident toll on the highways is

a. for each person to take responsibility for the safety of others. ___ a
b. for each person to look out only for himself. ___ b
c. for everyone to learn the treatment of injured persons. ___ c

29. At intersections one should

a. demand their right of way. ___ a
b. approach at usual speed. ___ b
c. rely on the other driver's respect for traffic regulations. ___ c
d. slow down. ___ d

30. The stopping distance of cars at 40 miles per hour is

a. 250 ft. ___ a
b. 100 ft. ___ b
c. 25 ft. ___ c
d. 50 ft. ___ d

31. Most automobile accidents are due to

a. the condition of the automobile. ___ a
b. the condition of the road. ___ b
c. the condition of the weather. ___ c
d. the driver. ___ d

32. The driver of the car who has an accident usually

a. did not have the right of way. ___ a
b. was on the wrong side of the road. ___ b
c. was cutting in. ___ c
d. crashed the signal. ___ d

33. The safest driver is probably

a. courteous. ___ a
b. daring. ___ b
c. one who has been driving longest. ___ c
d. one who knows the traffic regulations best. ___ d

34. Even small amounts of alcohol

a. act as a stimulant. ___ a
b. slow down the mental faculties. ___ b
c. shorten the reaction time. ___ c
d. increase alertness. ___ d

35. Carbon monoxide gas

a. has a strong odor. ___ a
b. can be easily detected. ___ b
c. acts slowly. ___ c
d. is odorless. ___ d

36. When a pedestrian is standing in a safety zone

a. he should stand back to approaching traffic. ___ a
b. face the approaching traffic. ___ b
c. stand close to the curb. ___ c
d. relinquish all responsibility for his safety. ___ d

37. An injured person on the highway should be

a. placed in an upright position and questioned. ___ a
b. covered warmly and placed in a car. ___ b
c. kept comfortable lying down until ambulance takes patient to hospital. ___ c
d. rushed to the hospital at once in first car which comes along. ___ d

38. Because there is four times more traffic during the daytime, it is wise

a. to drive faster at night. ___ a
b. to allow more time for travel. ___ b
c. try to get ahead by cutting in. ___ c
d. pick out the roads where you can speed. ___ d

39. It costs less to drive a car

a. when going over 60 miles per hour. ___ a
b. at night. ___ b
c. at moderate speed. ___ c
d. in rainy weather. ___ d

40. Drivers on narrow streets should keep

a. as near the middle of the street as possible. ___ a
b. as near the right curb as possible. ___ b
c. going at full speed. ___ c
d. close to the cars ahead. ___ d

41. The safe cyclist riding at night displays

a. a white tail light. ___ a
b. a white headlamp. ___ b
c. a red head lamp. ___ c
d. a blue tail light. ___ d

42. On rural roads the pedestrian should walk

a. facing the traffic. ___ a
b. back to the traffic on the right hand side of the road. ___ b
c. in the center of the road between traffic. ___ c
d. on the left hand side facing the traffic. ___ d

43. The driver who drinks will probably

a. make better time. ___ a
b. keep his car in better control. ___ b
c. detect mechanical defects quickly. ___ c
d. stand high on the list of traffic killers. ___ d

44. When it is doubtful which car enters an intersection first

a. the car on the right should be conceded the right of way. ___ a
b. the car on the left should be conceded the right of way. ___ b
c. the car on the main thoroughfare should be conceded the right of way. ___ c
d. the larger car should be conceded the right of way. ___ d

45. The safe cyclist rides

a. with the traffic. ___ a
b. against the traffic. ___ b
c. in the middle lane. ___ c
d. holding on to a fender or mud guard. ___ d

46. When approaching the crown of a hill the car should

a. be kept well to the right. ___ a
b. be kept over to the left. ___ b
c. be speeded up. ___ c
d. overtake any cars immediately ahead. ___ d

47. A good driver does not leave his car unattended until

a. he has checked on parking space. ___ a
b. he has stopped the motor. ___ b
c. he has stopped the motor and set the brakes firmly. ___ c
d. he has set the brakes firmly. ___ d

48. When approaching a car at night the driver should

a. direct his lights on a low beam. ___ a
b. direct his lights on the high beam. ___ b
c. flash his lights. ___ c
d. turn on the parking lights. ___ d

49. Passenger cars have the right of way above

a. street bus. ___ a
b. bicycle. ___ b
c. no type vehicle. ___ c
d. all commerical vehicles. ___ d

50. A good driver

a. passes on the right side of a street car. ___ a
b. follows other cars closely. ___ b
c. brakes the car suddenly at intersections. ___ c
d. stops and signals pedestrians to pass at crosswalks, if pedestrian appears confused. ___ d

51. Reduction of one's weight is best accomplished by

a. excessive sweating. ___ a
b. eliminating all starchy foods. ___ b
c. eating two meals a day. ___ c
d. carefully following physician's orders. ___ d

52. All sports should be permanently omitted.

a. when a physician so directs. ___ a
b. when there are any physical defects. ___ b
c. when one is fatigued after strenuous sports. ___ c
d. after one ceases to excel in sports. ___ d

53. To be cautious and on the lookout for dangers

a. signifies unwholesome traits. ___ a
b. is cowardly. ___ b
c. is the best preventive against accident. ___ c
d. is entirely unnecessary. ___ d

54. Coaches consider indulgence in alcohol and tobacco

a. good sportsmanship. ___ a
b. a habit to be avoided. ___ b
c. a stimulating preparation for games. ___ c
d. a sign of player's manliness. ___ d

55. It is necessary that an athlete's heart be examined

a. once a year. ___ a
b. before the season's practice only. ___ b
c. periodically. ___ c
d. only when there is illness. ___ d

56. You are safest from accidents when you are

a. at home. ___ a
b. at school. ___ b
c. on the highway. ___ c
d. in industrial plants. ___ d

57. A hiking party walking along a highway should walk

a. in single file. ___ a
b. in single file and keep to the right hand side. ___ b
c. in single file and keep to the left hand side facing traffic. ___ c

58. The most important thing to accomplish in a school fire drill is

a. to empty the building in record time. ___ a
b. to prevent excitement and panic. ___ b
c. to keep lines moving rapidly. ___ c
d. to close all windows before leaving the room. ___ d

59. Accidents are best prevented by

a. avoiding all possible hazards. ___ a
b. becoming safety-minded. ___ b
c. not participating in any sports. ___ c
d. expecting everyone to look out for himself. ___ d

60. Accidents in school buildings occur most frequently

a. in classrooms. ___ a
b. in shops. ___ b
c. on stairs. ___ c
d. in Gymn. ___ d

61. Most accidents among school children take place among those in

a. the first three grades. ___ a
b. senior high school. ___ b
c. elementary grades. ___ c
d. 8th and 9th grades. ___ d

62. The most common form of injury in sports is

a. strained muscles. ___ a
b. sprains. ___ b
c. broken bones. ___ c
d. eye injuries. ___ d

63. Most injuries in sports take place in.

a. football. ___ a
b. baseball. ___ b
c. track. ___ c
d. basketball. ___ d

64. If a player feels ill he should

a. continue playing until exhausted. ___ a
b. take a chance on weakening the team. ___ b
c. ask to be removed from the team. ___ c
d. leave the team immediately. ___ d

65. The existence of physical defects can best be determined by

a. school nurse. ___ a
b. reputable physician. ___ b
c. physical education director. ___ c
d. athletic coach. ___ d

66. One should sit on the top row of bleachers only

a. if there is a back rail. ___ a
b. if all other bleachers are filled. ___ b
c. if you can see better there. ___ c
d. if your friends are there. ___ d

67. The bicyclist should

a. ride on the sidewalk. ___ a
b. ride in groups spread out over the highway. ___ b
c. use a lane near the edge of the pavement. ___ c
d. hold on to a moving vehicle. ___ d

68. Accidents in school shops will be reduced most effectively

a. when machinery is improved. ___ a
b. when school day is shorter. ___ b
c. when classes are smaller. ___ c
d. when care taken by each operator is perfected. ___ d

69. Most accidents associated with schools take place in

a. football activities. ___ a
b. baseball activities. ___ b
c. on apparatus. ___ c
d. in unorganized activities. ___ d

70. When a player in sports is about to fall he should try to

a. throw his weight on his knees. ___ a
b. throw his weight on his hands. ___ b
c. roll sidewise and backward up on to his feet. ___ c
d. fall backward. ___ d

71. Poison ivy is recognized

a. by its shiny dark green leaves arranged in groups of 3. ___ a
b. because it has no berries. ___ b
c. because it resembles a small shrub. ___ c
d. because of its strong unpleasant odor. ___ d

72. Most accidents are due to

a. carelessness. ___ a
b. forgotten safety rules. ___ b
c. lack of co-operation. ___ c
d. out-of-date facilities. ___ d

73. Electrical equipment can be judged dependable if

a. it appears to be made well. ___ a
b. the cost is average. ___ b
c. the label states "inspected by Underwriters Laboratories" ___ c
d. the label bears the manufacturer's name. ___ d

74. Chief among the personal causes of home accidents is

a. physical handicaps. ___ a
b. poor judgment. ___ b
c. low incomes. ___ c
d. overcrowding. ___ d

75. Spectators are not welcome

a. in the gymnasium. ___ a
b. at sports practice. ___ b
c. on the playground. ___ c
d. on the deck of the swimming pool. ___ d

76. Chief among the mechanical causes of home accidents are

a. needed repairs. ___ a
b. lack of light. ___ b
c. objects scattered about and out of place. ___ c
d. improper equipment. ___ d

77. The type of accident in the home causing the most injuries to little children is

a. burns. ___ a
b. falls. ___ b
c. taking poison. ___ c
d. those from broken toys. ___ d

78. The leading cause of death for people between the ages of 3 years and 22 years is

a. heart disease. ___ a
b. tuberculosis. ___ b
c. children's diseases. ___ c
d. accidents. ___ d

79. The most efficient way to do a job

a. is the quickest way. ___ a
b. is the safest way. ___ b
c. is the easiest way. ___ c
d. requires the least preparation. ___ d

80. The Nation having the most accidents is

a. United States. ___ a
b. Great Britain. ___ b
c. France. ___ c
d. Russia. ___ d

81. Until one is accustomed to it, the length of time sufficient for direct sun is

a. 30 minutes. ___ a
b. 15 minutes. ___ b
c. 1 hour. ___ c
d. 2 hours. ___ d

82. Fallen electric wires should be

a. cut. ___ a
b. examined. ___ b
c. tied up. ___ c
d. let absolutely alone. ___ d

83. The principal cause of falls is

a. fainting. ___ a
b. rushing about. ___ b
c. slippery sidewalks. ___ c
d. disorderliness. ___ d

84. The single immediate factor most seriously threatening life is

a. war. ___ a
b. traffic accidents. ___ b
c. industrial accidents. ___ c
d. accidents in sports. ___ d

85. In case of serious accident one should promptly

a. try home remedies. ___ a
b. send for a person skilled in First Aid. ___ b
c. call a physician promptly. ___ c
d. wait and see if the victim improves. ___ d

86. A good conductor of electricity is

a. rubber. ___ a
b. glass. ___ b
c. the human body. ___ c
d. cloth. ___ d

87. Electrical cords should be disconnected

a. immediately after use, preferably a wall outlet. ___ a
b. from the wall outlet. ___ b
c. from the appliance. ___ c
d. only when the appliance is to be stored. ___ d

88. In attempting to put out a flame, one should

a. smother or drench the burning material. ___ a
b. smother or drench the flame. ___ b
c. fan the flame. ___ c

89. If one's clothing should take fire,

a. one should run. ___ a
b. stand up and try to smother the flame. ___ b
c. lie down and wrap up in something heavy. ___ c
d. go out of doors. ___ d

90. A gas flame should be

a. yellow. ___ a
b. blue. ___ b
c. irregular. ___ c
d. noisy. ___ d

91. All electric light cords in laundries and out of doors should

a. be kept high overhead. ___ a
b. be sufficiently long. ___ b
c. be conveniently located. ___ c
d. have waterproof covering. ___ d

92. Classes of people most likely to be injured are

a. elderly women. ___ a
b. housewives. ___ b
c. women and girls. ___ c
d. men and boys. ___ d

93. Alcohol causes

a. loss of judgment. ___ a
b. more efficient work. ___ b
c. steadier nerves. ___ c
d. more muscular energy. ___ d

94. The responsibility for safety lies with the

a. employees. ___ a
b. employer. ___ b
c. supervisors. ___ c
d. employees and employer together. ___ d

95. In case of fire or escaping gas the clearer air lies

a. very near the floor. ___ a
b. near the ceiling. ___ b
c. around the windows. ___ c
d. at about the height of a grown person. ___ d

96. Only cleaning fluids should be used

a. which will not burn. ___ a
b. which will not fade garments. ___ b
c. which will not irritate the hands. ___ c
d. which do not leave white rings. ___ d

97. The wounds to be considered seriously are

a. only the deep wounds. ___ a
b. only those which bleed. ___ b
c. only those which are infected. ___ c
d. all wounds. ___ d

98. Before taking medicine one should

a. read the label. ___ a
b. shake the bottle. ___ b
c. read the label twice. ___ c
d. drink some water. ___ d

99. A bite from any animal should be

a. treated like any other wound. ___ a
b. treated with ointment. ___ b
c. washed out with water. ___ c
d. washed out with running water and shown at once to a physician. ___ d

100. Most accidents are due to

a. mechanical failures. ___ a
b. poor fire regulations. ___ b
c. the individual human element. ___ c
d. inadequate police protection. ___ d

BE SURE TO MARK DOWN TIME YOU COMPLETE TEST.

CHAPTER III

FINDINGS OF THE STUDY.

Introduction.--The purpose of this study was to construct and evaluate a test to measure the knowledge of accident prevention acquired by senior high school pupils. A total of 168 pupils were tested by this instrument.

The evaluation of this Test includes some measures of central tendency and variability, an individual item analysis to show the differentiating aspect and difficulty of the test items. The significance level of the test items was established.

Rearrangement of the test items is indicated to establish sequence according to difficulty.

Graphic representations were constructed to show the relationship of scores made by the pupils in the two cities in which the Test was given, and the relationship of scores achieved by the boys and by the girls tested in this study.

Table 1

The Distribution of the Intelligence Quotients of the 168 Senior High School Pupils to Whom the Test was Administered.

Classification of Pupils	Mean	S. D.	Range	N
Total Group	106.25	12.25	77 - 140	168
Fall River Pupils	108.68	13.57	78 - 140	65
New Bedford Pupils	104.93	12.00	77 - 133	103
Total Number Boys	108.06	12.39	78 - 140	84
Total Number Girls	105.21	12.39	77 - 133	84

Table 1 shows the distribution of the intelligence quotients of the 168 pupils tested. The intelligence quotients were obtained by the instructors from school records where the Test was given. The range of the intelligence quotients for the entire group was 77 - 140. The mean of this group was 106.25 and the sigma was 12.25. 65% of the pupils tested had an intelligence quotient lying between 94 and 118.50, which indicates an approximately normal distribution.

The range of intelligence quotients of the Fall River pupils was 78-140. Their mean intelligence quotient was 108.68, and the sigma was 13.57.

The range of intelligence quotients of the New Bedford pupils was 77 - 133. The mean intelligence quotient for these pupils was 104.93.

The range of intelligence of the 84 boys tested in this study was 78 - 140. Their mean intelligence quotient was 108.06. Thesigma was 12.39.

The 84 girls tested in the study had a range of 77 - 133 in intelligence quotients. Their mean intelligence quotient was 105.21, and the sigma was 12.39 which was identical to that of the boys.

Consideration of Difference in Mean I Q Among Various Groups.

Fall River Pupils		vs.	New Bedford Pupils
$\overline{X}$	108.68		104.93
σ	13.57		12.00
N	65		103

Total Boys		vs.	Total Girls
$\overline{X}$	108.06		105.21
σ	12.39		12.39
N	84		84

It can be assumed that there is no difference in Fall River and New Bedford population means of intelligent quotients.

Table 2

Results of the Total Scores Obtained on the Test Administered to 168 Senior High School Pupils.

Classification of Pupils	Mean	S. D.	Range	N
Total Group	74.57	6.81	53 - 91	168
Total Fall River Pupils	76.05	5.88	65 - 91	65
Total New Bedford Pupils	73.68	7.02	53 - 85	103
Fall River Girls	74.46	5.46	65 - 87	31
New Bedford High School Girls	73.74	6.69	58 - 85	26
Fall River Boys	77.37	5.16	66 - 91	34
New Bedford High School Boys	78.50	3.87	71 - 85	16
Vocational High School Girls	68.22	5.83	57 - 82	27
Vocational High School Boys	77.03	3.60	53 - 85	34
Total Number Girls	74.34	7.26	57 - 87	84
Total Number Boys	77.07	5.79	53 - 91	84

Table 2 shows the range of the total scores made on the Test by 168 pupils. The mean for the entire group is 74.57, and the sigma is 6.81. Approximately 68 per cent of the total scores were distributed between 81.38 and 67.76. Other items tabulated in the above table show the mean and sigma of test scores achieved by the total number of Fall River pupils, the total number of New Bedford pupils; the Fall River girls, the New Bedford High School girls, the Vocational High School girls; the Fall River boys, the New Bedford High School boys and the New Bedford Vocational High School boys. Also the scores of the Test achieved by the total number of boys and the total number of girls is revealed.

Parts of Test

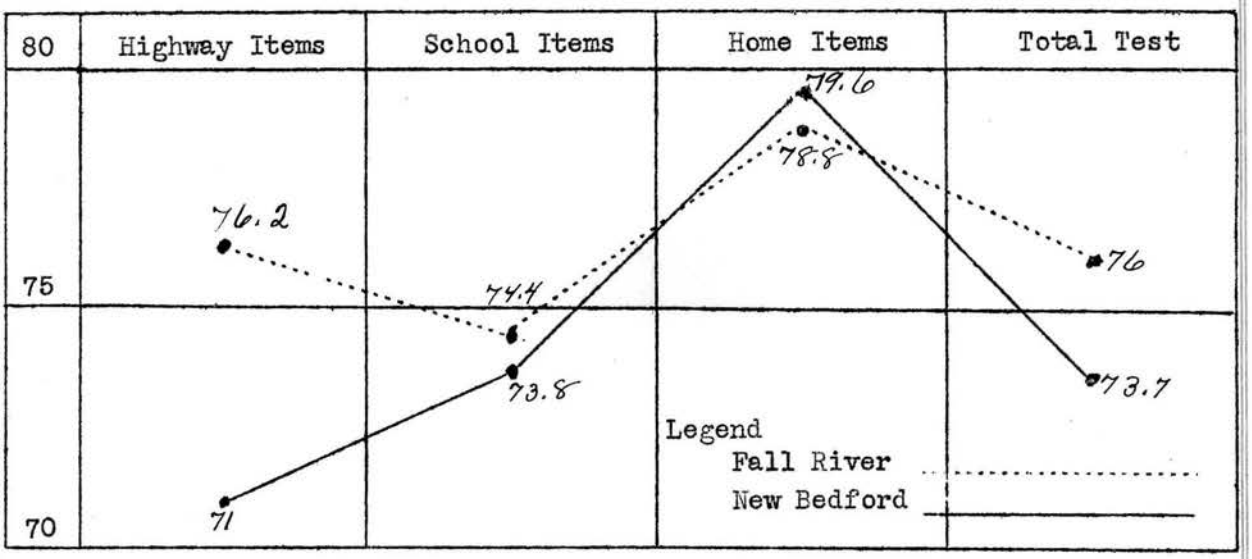

Chart 1. Profile of Achievement Levels Differentiating Mean Scores.

To illustrate the differences between the correct responses.

This chart shows differences in achievement levels obtained by the New Bedford and Fall River groups in the different areas of the Test. The Fall River pupils' average score was 76.2 per cent on the 50 items related to highway safety; on the 25 items related to school safety this group's average score was 74.4 per cent; on the 25 items testing knowledge of home safety the average score was 78.8 per cent.

The New Bedford pupils' average score in the highway area was 71 per cent; in the school area the average score was 73.8 per cent; in the area of the home safety the average score was 79.6 per cent.

The highest score, 79.8 per cent, was achieved in the home safety area by the New Bedford group. The lowest score was achieved in the highway safety area by the New Bedford group.

The highest score made by both groups was in the home safety area.

The widest variance was in the highway safety area. Fall River achieved a score of 76.2 per cent and the New Bedford pupils averaged 71 per cent. The difference between the two was five points. In the other two areas the variance was one point.

This chart shows an insignificant difference between the Fall River group and New Bedford group. The Fall River pupils had had instruction in safety for a limited period of time and the New Bedford group had received no classroom instruction in safety education.

The average total score made by Fall River pupils was 76 per cent; New Bedford pupils' average total score was 73.7 per cent.

The total scores show a stability of measurement in the Test.

The average percentages on this graph were calculated from the arithmetic mean of the test scores.

Parts of Test

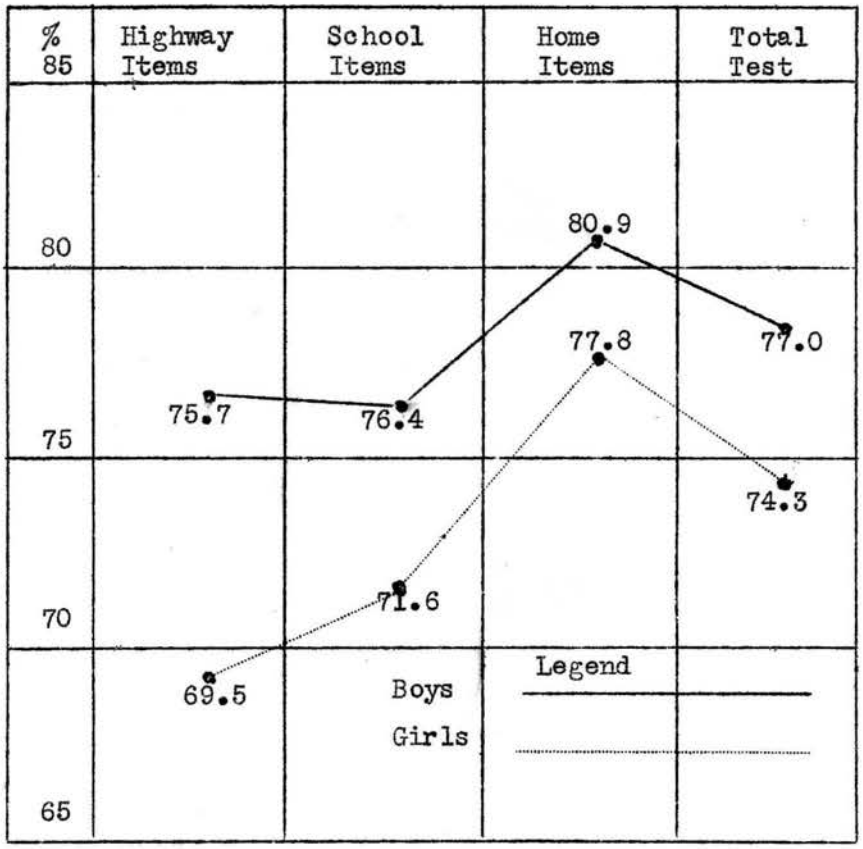

Chart 2. Showing Differences in Achievement Levels Obtaining by the Boys and Girls.

Chart 2 shows difference in achievement levels obtained by the total number of boys and girls in the different areas of the Test. The girls made an average score of 69.5 per cent on the 50 items related to highway safety; on the 25 items related to school safety they made an average score of 71.6 per cent; on the 25 items testing knowledge of home safety the girls' average score was 77.88 per cent. The total number of girls achieved an average score of 74.33 per cent in the total test.

The boys made an average score of 75.7 per cent on the 50 items related to highway safety; on the 25 items related to school safety they made an average score of 76.4 per cent; on the 25 items testing knowledge of home safety the boys' average score was 80.9 per cent. The total number of boys achieved an average score of 77.0 per cent in the total test.

The highest score, 80.9 per cent, was achieved by the boys in the division of the home items, and the lowest score, 69.5 per cent, was achieved by the girls in the division of highway items.

The widest variance in distribution of scores was in the highway items. This was a difference of 6.2 per cent.

The closest similarity of scores was in the area of home items with a variance of only 3.1 per cent.

In the school items the variance in scores was 4.8 per cent.

The findings of this chart demonstrate that the boys in the total group were superior in knowledge of accident prevention in all areas of the Test. The chart reveals that the girls of the population tested have a marked lesser knowledge of highway accident prevention.

Analysis of Test Items.--An analysis of each item was made to determine the differentiating capacity of each item. The following formula was used to compute the critical ratio between the percentage of correct responses in the upper 27% and the percentage of correct responses in the lower 27% of senior high school pupils taking this test.

$$CR = \frac{\text{Diff}_{p1p2}}{\text{SE Diff}_{p1p2}}$$

$$\text{SE Diff}_{p1p2} = \sqrt{\text{SE}_{p1}^2 + \text{SE}_{p2}^2}$$

Critical Ratio of the Items in the Test between the Number Right in the Upper Twenty-seven Per Cent and the Number Right in the Lower Twenty-seven Per Cent.

Table 3

Individual Item Analysis

Test Items	Percentage of Correct Responses U 27%	L 27%	Diff. %	SE Diff	CR
1	16	9	7	6.92	1.01
2	100	98	2	2.08	.96
3	16	27	- 11	8.55	- 1.26
4	100	93	7	4.30	1.63
5	89	53	36	8.80	4.09
6	98	98	-	-	-
7	100	76	24	6.35	3.78
8	93	89	4	6.02	.67
9	100	100	-	-	-
10	76	60	16	9.68	1.65
11	84	69	15	8.78	1.71
12	98	98	-	-	-
13	96	59	37	7.88	4.70
14	89	78	11	6.00	1.83
15	84	56	28	9.19	3.05
16	87	40	47	8.85	5.31

Critical Ratio (Continued) Table 3 (Continued)

Test Items	Percentage of Correct Responses U 27%	L 27%	Diff. %	SE Diff	CR
17	32	18	14	8.96	1.56
18	93	80	13	6.90	1.87
19	56	37	19	10.22	1.95
20	96	78	18	6.73	2.68
21	76	20	56	8.70	6.45
22	29	22	7	7.84	.89
23	73	53	20	9.95	2.01
24	47	42	5	11.54	.44
25	87	69	18	8.50	2.12
26	93	80	13	6.90	1.89
27	100	98	2	2.08	.96
28	98	93	5	4.34	1.15
29	98	93	5	4.34	1.15
30	49	20	29	9.51	3.04
31	98	78	20	6.50	3.07
32	84	62	22	9.01	2.42
33	56	32	24	10.10	2.38
34	60	42	18	11.72	1.54
35	78	53	25	9.65	2.59
36	67	27	40	9.65	4.15
37	100	89	11	4.65	2.37
38	98	98	-	-	-
39	100	96	4	2.91	1.37
40	89	82	7	7.36	.95
41	76	33	43	9.44	4.55
42	45	35	10	10.50	.95
43	100	100	-	-	-
44	78	67	11	9.31	1.19
45	93	71	22	7.75	2.84
46	98	80	18	6.30	2.86
47	93	87	6	6.29	.95
48	96	93	3	4.79	.63
49	60	60	-	-	-
50	100	93	7	4.30	1.63
51	89	82	7	7.36	.95
52	100	82	18	5.71	3.16
53	100	96	4	2.91	1.37
54	98	96	2	3.59	.56
55	93	62	31	8.14	3.81
56	89	47	42	8.75	4.80
57	96	67	29	7.56	3.84
58	93	73	20	7.85	2.68
59	78	69	9	9.18	.98
60	27	4	23	7.05	3.26
61	34	9	25	8.20	3.05

Critical Ratio (Continued) Table 3 (Concluded)

Test Items	Percentage of Correct Responses U 27%	L 27%	Diff. %	SE Diff	CR
62	60	22	42	9.55	4.40
63	98	87	11	5.41	2.03
64	60	67	- 7	10.00	- .70
65	93	72	21	7.65	2.76
66	89	80	9	7.55	1.19
67	100	96	4	2.91	1.37
68	100	89	11	4.65	2.37
69	93	60	33	8.20	4.20
70	53	33	20	10.25	1.91
71	96	82	14	5.46	2.57
72	100	93	7	4.30	1.63
73	93	84	9	6.65	1.35
74	93	53	40	3.30	4.82
75	72	35	37	9.80	3.78
76	76	57	19	9.75	1.95
77	47	40	7	10.41	.67
78	98	73	25	6.93	3.51
79	98	96	2	3.59	.56
80	96	87	9	5.75	1.57
81	78	62	16	9.46	1.69
82	98	82	16	6.10	2.62
83	53	40	13	10.32	1.26
84	93	73	20	7.85	2.68
85	98	89	9	5.11	1.76
86	93	47	46	6.88	6.68
87	80	73	17	8.90	1.92
88	69	62	7	9.98	.70
89	100	98	2	2.08	.96
90	98	69	29	7.19	4.04
91	89	62	27	7.01	3.85
92	51	22	29	8.35	3.48
93	100	100	-	-	-
94	98	80	18	6.30	2.86
95	98	57	41	7.66	5.21
96	98	82	16	6.10	2.62
97	98	93	5	4.34	1.15
98	89	62	27	7.01	3.85
99	98	93	5	4.34	1.15
100	93	62	31	8.14	3.81

In order to confirm the results of the Test the foregoing table of differences and critical ratio was calculated. Inasmuch as one Test was given to one group it was necessary to make a strata analysis and the 27 per cent of the lower scores was correlated with the 27 per cent of the upper scores. The Standard of Measurement used was Mills[1/] Critical Ratio Level of 2.576.

The findings show that the pupils in the group tested had an unsatisfactory awareness of the content of item number one. This lack of awareness is also shown to a more or less similar degree in items number 3, 10, 17, 19, 22, 23, 24, 33, 34, 35, 42, 44, 49, 59, 64, 70, 76, 77, 81.

The results appear to demonstrate a lack of awareness in the following items, and these findings cannot be accepted as definite. These items are number 21, 30, 36, 41, 60, 61, 62, 75, 92.

In the area of highway safety lie 58.4 per cent of the pupils' failures. 22.2 per cent of the failures lie in the area of school safety. 19.4 per cent of the failure lie in the area of home safety.

Findings for items number 2, 4, 9, 27, 37, 39, 43, 50, 53, 67, 68, 72, 89, 93, demonstrate a nearly perfect knowledge of the content of the items.

Items 7 and 52 indicate similar findings, but can not be accepted as definite because the level of critical ratio is not an accepted difference between the two samples.

A moderate degree of understanding of accident prevention was shown in 37 per cent of the responses to the items; and there was 15 per cent that

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1/ Frederick C. Mills, Statistical Methods, (Revised), Henry Holt and Company, New York, 1938, p.471.

might have lain in this area but were questionable due to an unacceptable ratio.

Table 4

Item Analysis Data

Item	P_H	P_L	Discrimination Index	Difficulty Index
1	- 13%	-22%	+ 8	- 31
2	100	98	7	95
3	- 13	2	- 7	5
4	100	91	23	85
5	85	38	33	56
6	98	98	0	93
7	100	66	47	69
8	91	85	8	75
9	100	100	0	100
10	66	47	12	54
11	79	58	15	60
12	98	98	0	93
13	95	44	44	61
14	85	71	12	66
15	79	41	26	55
16	82	20	43	51
17	8	- 10	22	14
18	91	73	18	69
19	41	17	18	38
20	95	71	27	70
21	66	- 7	64	41
22	5	- 4	17	11
23	64	38	17	51
24	29	23	5	36
25	82	58	17	61
26	91	73	18	69
27	100	98	7	95
28	98	91	17	84
29	98	91	17	84
30	32	- 7	45	30
31	98	71	37	72
32	79	50	20	58
33	41	8	29	36
34	47	23	16	42
35	71	38	21	53
36	56	2	53	38
37	100	85	31	80

Table 4 (Continued)

Item	P_H	P_L	Discrimination Index	Difficulty Index
38	98 %	98 %	0	93
39	100	95	17	90
40	85	76	8	68
41	66	11	41	44
42	26	14	11	32
43	100	100	0	100
44	71	56	9	58
45	91	62	26	66
46	98	73	35	73
47	91	82	11	74
48	95	91	8	82
49	47	47	0	48
50	100	91	24	85
51	85	76	8	68
52	100	76	39	74
53	100	95	17	90
54	98	95	9	89
55	91	50	34	61
56	85	29	39	54
57	95	56	37	65
58	91	64	24	66
59	71	58	9	58
60	2	- 27	7	5
61	11	- 22	27	17
62	47	- 4	54	35
63	98	82	28	77
64	47	56	- 5	+ 58
65	91	62	26	66
66	85	73	11	67
67	100	91	24	85
68	100	85	31	80
69	91	47	35	60
70	38	11	23	36
71	95	76	23	73
72	100	91	24	85
73	91	79	13	72
74	91	38	41	58
75	62	14	34	44
76	66	44	14	53
77	29	20	8	36
78	98	64	41	68
79	98	95	9	89
80	95	82	17	76
81	71	50	14	56
82	98	76	33	74

Table 4 (Concluded

Item	P_H	P_L	Discrimination Index	Difficulty Index
83	38%	20%	13	38
84	91	64	24	66
85	98	85	24	79
86	91	29	47	55
87	73	64	6	60
88	58	50	5	52
89	100	98	7	95
90	98	58	66	44
91	85	50	26	60
92	35	- 4	48	31
93	100	100	0	100
94	98	73	35	73
95	98	44	53	61
96	98	76	33	74
97	98	91	17	84
98	85	50	26	60
99	98	91	17	84
100	91	50	34	61

The formulas[1/] used for the computation of findings in above Table 4 are given below.

1. $$P_H = \frac{R_H - \frac{W_H}{K-1}}{N_H - NR_H}$$

2. $$P_L = \frac{R_L - \frac{W_L}{K-1}}{N_L - NR_L}$$

From these formulas the discrimination and difficulty indices were computed from the item-analysis chart.

P_H and P_L are the proportions corrected for chance guessing in the highest 27 per cent and lowest 27 per cent respectively.

1/ Frederick Davis, Item Analysis Data, Graduate School of Education, Harvard University, Cambridge, Massachusetts, 1946.

R_H and R_L are the number of testees who answering the item correctly were in the high and low groups.

W_H and W_L are the number of testees who answered incorrectly.

N_H and N_L are the number of testees in each group.

NR_H and NR_L are the number of testees who did not answer the items in each group.

K designates the number of choice answers in each item.

A discrimination index over 20 is satisfactory for most purposes.

A difficulty index 50 ± 20 is satisfactory for most purposes.

Table 5

Classification of Test Items According to Difficulty

Very Easy	Easy	Medium	Difficult	Very Difficult
Item No.	Item No.	Item No.	Item No.	Item No.
2	6	5	18	1
4	7	10	19	3
9	8	11	21	17
12	20	13	30	22
27	28	14	34	60
38	29	15	42	61
39	31	16	62	
43	37	23	70	
53	46	24	75	
93	47	25	77	
	48	26	83	
	50	32	90	
	52	33	92	
	54	35		
	58	36		
	63	40		
	64	41		
	66	44		
	67	45		
	68	49		
	72	51		
	73	55		
	78	56		
	79	57		
	80	59		
	82	65		
	89	69		
	94	71		
	96	74		
	97	76		
	99	81		
		84		
		85		
		86		
		87		
		88		
		91		
		95		
		98		
		100		

Table 5 shows 10 per cent of the test items as very easy with a difficulty index above 90; 32 per cent of the test items were easy with a difficulty index between 66 and 90; 41 per cent of the test items were of medium difficulty with a difficulty index between 36 and 65; 13 per cent of the test items were difficult with a difficulty index between 20 and 36; 6 per cent of the test items were very difficult with a difficulty index below 20.

Table 6

Classification of Items Showing Satisfactory Discrimination Index

Test Item No.	Test Item No.	Test Item No.	Test Item No.	Test Item No.
4	23	39	63	84
5	25	41	65	85
7	26	45	67	86
11	28	46	68	90
13	29	50	69	91
15	30	52	70	92
16	31	53	71	94
17	32	55	72	95
18	33	56	74	96
19	34	57	75	97
20	35	58	78	98
21	36	61	80	99
22	37	62	82	100

The above table shows that 65 per cent of the Test items have a discrimination index above 15.

CHAPTER IV

SUMMARY AND CONCLUSIONS.

Summary

The purpose of this study was to construct and evaluate an objective test purporting to measure the knowledge which senior high school pupils have acquired in the field of accident prevention.

In the test there were one hundred multiple-choice items, each allowing four choice responses.

The problem was planned to determine how well high school pupils are prepared to protect themselves and others against the common hazards of everyday activities and to determine within what areas classroom instruction in accident prevention should be more meaningfully developed.

The test was administered to 168 unselected high school pupils, in two adjoining cities, with unusually similar socio-economic backgrounds. These pupils' intelligence quotients conformed to the normal pattern. This population was divided equally between boys and girls. Approximately only one half of these pupils had received a limited number of hours in classroom instruction in safety education. The pupils who had had this instruction were members of one school.

The items for this test were derived from a compilation and selection of the contents of authoritative secondary school textbooks on the subject of safety and accident prevention, and from statistics compiled from federal, state and private research. Several syllabi used by State Departments of Education were studied to determine objectives of safety education programs

in various localities.

Conclusions

1. There is a definite need that an enlarged and intensified safety education program be instituted in the curricula of secondary schools.

2. There should be an especially trained supervisor in charge of the safety education program as a division in the local school health department.

3. The greatest need of instruction is in the highway safety area.

4. There is more specific need for safety instruction among girl high school students than among the boys.

5. The prevention of accidents may be enhanced by an instructional program planned to alter the personal and social attitudes of high school students.

6. The success of the National and State accident prevention programs are dependent upon adequate safety education in local schools.

7. Mortality rates will be significantly reduced as a result of intensified courses in accident prevention and safety education.

8. The test constructed for this study is valid because its contents,are based on textbooks, courses of study, reports of national and regional committees, and the writings of subject matter specialists.

9. The test constructed for this study is reliable because in an acceptable number of the items a true constancy is revealed by the formulae used in computation to prove (1) difficulties and (2) variability between the strata used in this proof.

CHAPTER V

LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH.

Limitations

The following limitations are stated:

1. The limited number of the pupils tested.
2. Lack of diversity of geographical locations of residence of pupils tested.
3. Scanty number of specific areas included in the test.
4. Limited number of items included in each area of the test.

Suggestions for Further Research

The following suggestions for further research are made:

1. The test be given at other grade levels.
2. Further techniques be applied to establish proof of reliability.
3. Study of the habits and attitudes of pupils in the high school grades.
4. Unit courses of study in accident prevention be established and properly integrated for all grades in the elementary and secondary schools.

APPENDIX

Key to Test Items

Item Number	Correct Response Letter	Item Number	Correct Response Letter	Item Number	Correct Response Letter	Item Number	Correct Response Letter
1	d	26	d	51	d	76	c
2	d	27	d	52	a	77	a
3	b	28	a	53	c	78	d
4	a	29	d	54	b	79	b
5	b	30	b	55	c	80	a
6	a	31	d	56	b	81	b
7	b	32	a	57	c	82	d
8	a	33	a	58	b	83	b
9	a	34	b	59	b	84	b
10	a	35	d	60	d	85	c
11	d	36	b	61	d	86	c
12	d	37	c	62	a	87	a
13	c	38	b	63	a	88	a
14	b	39	c	64	c	89	c
15	b	40	b	65	b	90	b
16	a	41	b	66	a	91	d
17	a	42	d	67	c	92	d
18	a	43	d	68	d	93	a
19	b	44	a	69	d	94	d
20	c	45	a	70	c	95	a
21	a	46	a	71	a	96	a
22	c	47	c	72	a	97	d
23	c	48	a	73	c	98	c
24	b	49	c	74	b	99	d
25	d	50	d	75	d	100	c

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