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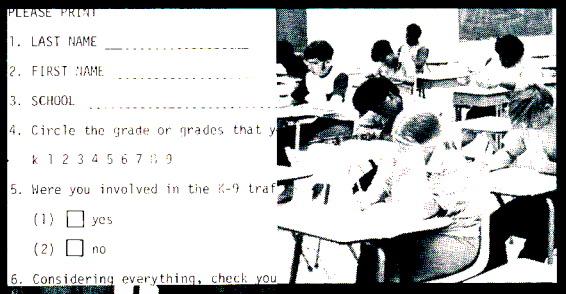
the evaluation of the north carolina k-9 traffic safety curriculum



Susan S. Padgett
Patricia F. Waller

HIGHWAY SAFETY
RESEARCH CENTER

University of North Carolina, Chapel Hill, N.C.

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The Evaluation of the North Carolina K-9 Traffic Safety Curriculum

Susan S. Padgett
Patricia F. Waller

The University of North Carolina
Highway Safety Research Center
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ABSTRACT

The Research Triangle Institute, in cooperation with the North Carolina Department of Public Instruction, Appalachian State University, East Carolina University, and several teachers from local school systems, developed a pilot traffic safety curriculum for use in kindergarten through the ninth grades. Through workshops, teachers were involved in the curriculum development from the beginning. The curriculum was implemented in fourteen public schools in the state, and was taught by both workshop and nonworkshop participants.

The Highway Safety Research Center conducted the evaluation of the traffic safety curriculum in three phases.

First, the amount of knowledge that students acquired was measured by tests administered before and after the curriculum was taught. These knowledge tests were administered to a sample of students in experimental and control classes from grades three, six, and nine.

Findings based on the testing include the following:

1. There was a statistically significant increase in knowledge in grades three and six.

2. There was no statistically significant increase in knowledge for grade nine. Possible reasons for this are discussed in the report.

Second, the extent to which the children modified their pedestrian and bicyclist behavior was examined. The behavior of children leaving school was filmed before and after the curriculum was taught. Films were made at control and experimental elementary schools located in the same school district. A panel of judges viewed the films and recorded their observations. The number of behavioral observations was limited, and except for interjudge reliabilities, no statistical analyses were performed. These limitations should be kept in mind when interpreting the results based on behavioral observations.

The findings based on the filming include the following:

1. Interjudge reliability was high, .90 or above.

2. There was no evidence of improvement in pedestrian and bicyclist behavior.

Third, a questionnaire was mailed to each teacher who used the curriculum in order to determine how useful the materials were, how much they were actually used, which parts were not used and why, and what changes should be made.

Findings, based on the questionnaire, include the following:

1. For the most part, the teachers rated the curriculum "good," used it "considerably" or "somewhat," found using the materials to be "reasonable," and considered the suggested activities to be "most helpful" and the films to be "least helpful." This latter comment appeared to be related at least in part to the unavailability of the films.

2. In general, the teachers used the curriculum both as a separate unit and integrated into the existing curriculum on grade levels K-6; and solely as a separate unit on grade levels 7-9.

3. Compared with the nonworkshop teachers, a larger proportion of the workshop participants used the materials developed for the different areas.

4. The materials which were reported unused by the majority of both the workshop and nonworkshop teachers focused on farm machinery and minicycle safety for grades 4-6, tractor safety for grade 7, and auto trip planning for grade 8. Some of these areas had been designated optional.

5. The major reason provided for not teaching an area was inadequate time.

In summary, a K-9 traffic safety curriculum was developed and pilot tested in four school districts, two in the eastern part of the state and two in the western region. The evaluation showed that the curriculum was generally well accepted and used by the teachers. Furthermore, at the elementary school level, the curriculum resulted in a significant increase in students' traffic safety knowledge. However, the behavioral observations failed to reflect this increased knowledge.

On the basis of the findings, the following recommendations are made:

1. Curriculum revisions should include some focus on behavioral practice of the traffic safety principles being taught.

2. Possibilities should be explored for involving additional personnel who can reinforce the traffic safety behaviors taught by the classroom teacher. Such auxiliary personnel might include cross-walk guards, school bus drivers, and parents.

3. Because the implementation of the curriculum was relatively smooth at the elementary school level, because the results looked most promising at this level, and because there appear to be considerable problems in the administration of the curriculum at the junior high level, serious consideration should be given to focusing available resources on the elementary school level and omitting the junior high program.

4. Because the evidence indicates that the teachers accepted and used the curriculum and students at the elementary school level showed significant increases in knowledge, evaluation of any expanded program should focus more heavily on the behavioral measures of effectiveness.

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I. INTRODUCTION

Death and injury to pedestrians and bicyclists in traffic accidents is a major health problem. Both nationally and in North Carolina about one-fifth of traffic fatalities are pedestrians. In North Carolina in 1973, 2640 pedestrians and 1004 bicyclists were either killed or injured as a result of traffic accidents. Moreover, among these individuals involved in accidents, 45.2 percent of the pedestrians, and 70.6 percent of the bicyclists were under 15 years of age.

Because children figure so heavily in these statistics, it appears that countermeasures aimed at the under-15 year age group would be worthwhile. Consequently an educational traffic safety program for kindergarten through ninth grade was developed under the direction of the Research Triangle Institute, with Appalachian State University and East Carolina University assuming responsibility for certain portions. In addition, teachers from the participating schools provided their input through a series of workshops.

The curriculum was implemented on a pilot basis in the fall of 1974 in 14 public schools in Buncombe County and Asheville, and in Pitt County and Greenville. These school districts were selected because their locations were felt to be representative of the various traffic conditions in the State.

The traffic safety curriculum was implemented initially on a pilot basis so that evaluation could be built in from the beginning, and revisions in the curriculum could be made based on the outcomes of the evaluation. The program was evaluated in terms of changes in pupil knowledge, changes in pupil behavior, and teachers' reaction to and use of the curriculum materials.

II. METHOD

The evaluation of the kindergarten through ninth grade traffic safety curriculum was conducted in three parts. The first concerned the extent to which the students acquired the information included in the curriculum; that is, how much did they learn. The second concerned the extent to which the students showed a change in their actual pedestrian and bicyclist behavior. The third part of the evaluation concerned the extent to which the teachers actually made use of the curriculum materials and what changes they would recommend.

To determine the extent of knowledge increase, tests were developed for the third, sixth, and ninth grade levels based on the curriculum content. Forty items were developed at each designated grade level, and the schools in which the curriculum was being taught were designated experimental schools. Control schools were selected from within the same school systems and on the basis of input from the local teachers and administrators as to which schools could be considered comparable. Within each grade level, four schools were used, two designated as experimental and two as control. To insure better geographic coverage of the state, for each grade level one experimental and one control group were located in both the western and the eastern areas. Three classes were tested within each school, resulting in a total of twelve classes tested for each grade level. Twenty test items at each grade level were randomly chosen for pretests which were administered at both experimental and control schools early in the semester. After the curriculum had been taught in the experimental schools, post-tests including all forty items at each grade level were administered to the same students previously tested.

The analysis of these data was designed to answer a basic question: How much knowledge did the student acquire as a result of the program? A statistical test (2-sided t test for paired data) was chosen to indicate whether the change in amount of knowledge was great enough to be significant.

Table 1 illustrates the evaluation design used.

Table 1. Design for knowledge testing.

	Experimental Schools	Control Schools
Before curriculum	Pre-test	Pre-test
Treatment	Exposure to curriculum	No exposure to curriculum
After curriculum	Post-test	Post-test

In the second part of the evaluation, a filming system was developed and utilized for recording the pedestrian and bicyclist behavior in the school area, again before and after the curriculum was used. Observations were filmed at two elementary schools, one control and one experimental school in the same school district. Schools were selected to be filmed on the basis of their covering the same grade levels, and having children walking and riding bicycles home from school. Again input from the local teachers and administrators was used in the selection of these schools.

A super 8 movie camera on a tripod was used. It was placed at an obscure, elevated location near the schools' crosswalks. The camera was turned on and off with a ten-foot cable release. Thus, the children were unaware that they were being filmed. The total fimling time was approximately four minutes; however, this represents about 15 minutes of behavior since the camera was operated only when the children were actually crossing the street.

Films were made in September and again in February. It was anticipated that there might be seasonal variations in students' behavior at the crosswalks, that is, in the springtime the students might be more active than earlier in the year. A control school was included in the design to take into account any such seasonal effects. In addition, at both schools both before and after the curriculum was taught, the films were made in bright clear weather.

A coding sheet was developed for recording observations of the filmed pedestrian and bicyclist behavior. The sheet provided space for tallies of the following:

(1) students walking across the street

(2) students running across the street

(3) students walking bikes across street

(4) students riding bikes across street

(5) students remaining on curb until signal indicated right-of-way

(6) student failing to remain on curb until signal indicated right-of-way

(7) students crossing within the marked crosswalks

(8) students crossing outside the marked crosswalks

The behaviors numbered 1, 3, 5, and 7 were drawn directly from the curriculum materials and were among those behaviors the curriculum was attempting to foster.

If a student engaged in unsafe behavior at any point while crossing the intersection (see numbers 2, 4, 6, and 8) only his unsafe behavior was recorded. For example, if in crossing a student walked three quarters of the way, and ran the last quarter, he was counted as running.

To increase the reliability of the observations made, a panel of three judges was selected to view the films. The judges were not told which school was experimental and which was control. First, the films were viewed and the observations recorded by each judge independently. A measure of the inter-judge reliability (the ratio of within variation to total variation) indicated high agreement (see Appendix A).

After the judges had independently recorded their observations, they compared their separate sets of observation data. The films were then viewed again, observations discussed, and discrepancies resolved.

Table 2 illustrates the design used.

Table 2. Design for behavioral observations.

	Experimental School	Control School
Before curriculum	Bicyclist & pedestrian behavior filmed	Bicyclist & pedestrian behavior filmed
Treatment	Exposure to curriculum	No exposure to curriculum
After curriculum	Bicyclist & pedestrian behavior filmed	Bicyclist & pedestrian behavior filmed

For the third part of the evaluative study, questionnaires were developed for grade levels K-3, 4-6, 7,8, and 9 to determine: (1) how useful the materials were; (2) how much they were actually used; (3) which parts were not used and why; and (4) what changes the teachers would recommend.

The questionnaire was reviewed by the University of North Carolina Institute for Research in Social Science and revised on the basis of their valuable suggestions.

The fourteen experimental school principals provided a listing of all the teachers in their schools involved in the K-9 traffic safety program. Each of these teachers was mailed a questionnaire. Two weeks and again three weeks later follow-up letters were sent to those teachers who had not yet responded. All questionnaire responses were recorded.

III. RESULTS

Knowledge Acquired

For the first part of the evaluation, tests were developed based on curriculum content for the third grade, sixth grade, and ninth grade levels to determine the amount of knowledge students gained as a result of the traffic safety program. Forty test items were composed for each grade level designated, and twenty from each group of forty were randomly selected within topics to insure that the set of 20 items covered essentially the same material as the complete set of 40 items. The 20 item sets were used as pre-tests and were administered in September before the program had been initiated. In February, after the experimental school children had been exposed to the curriculum, post-tests were administered which included all forty items. The reason for including 20 additional test items in the post-test was to reduce the learning effect from taking the pre-test.

Tables 3, 4, and 5 present the pre-test and post-test scores categorized for the experimental and control children by grade level. The F statistic presented is based on the individual before/after scores rather than on the grouped data. The assumpation is made that the effects of the curriculum are independent of the starting point (which corresponds to a usual additive model). This removes the problem of different distributions for the pre-test scores of experimental and control schools. The third and sixth grade children in the experimental schools demonstrated a significantly greater increase in amount of traffic safety knowledge than the third and sixth grade children in comparable control schools. The difference in knowledge for the ninth grade level, on the other hand, was not significant.

Behavior Observed

The knowledge tests measured the extent to which the students had acquired the information taught in the curriculum. The results indicated that at the third and sixth grade levels significant amounts of learning occurred. However, a major question is whether the children used this information to modify their pedestrian and bicycling behavior. To answer this question, filmed observations were made of the pedestrian and bicyclist behavior of elementary school children in an experimental and in a control school.

Table 3. Test scores before and after curriculum for the third grade, experimental and control school.

AFTER

Experimental School Test Scores

BEFORE Experimental School Test Scores	Below 55	55-59	60-64	65-69	70-74	75-79	80 Plus	Total
Below 55	2	4	4	5	3	7	2	27
55-59		2	4	5	2	3		16
60-64		1	3	6	3	4	5	22
65-69		1	2	5	5	3	4	20
70-74	1			2	2	3		8
75-79				1	1		2	4
80 Plus					3		1	4
Total	3	8	13	24	19	20	14	101

AFTER

Control School Test Scores

BEFORE Control School Test Scores	Below 55	55-59	60-64	65-69	70-74	75-79	80 Plus	Total
Below 55	2	4	6	6	6	2	1	27
55-59	4		3	5	5			17
60-64	3	2	3	5	4	1	2	20
65-69	3	1	2	5	2	2		15
70-74	1	2	4	1	2	1	3	14
75-79			1	2	1	1	4	19
80 Plus							1	1
Total	13	9	19	24	20	7	11	103

$F_{1,202} = 7.35$, $p < .01$

Note: F is based on individual before - after test scores for every student.

Table 4. Test scores before and after curriculum for the sixth grade, experimental and control school.

AFTER

Experimental School Test Scores

BEFORE Experimental School Test Scores	Below 55	55-59	60-64	65-69	70-74	75-80	80 Plus	Total
Below 55	1	6	5	4	8	4	1	29
55-59	1	1	3	3	1	2	1	12
60-64	2	2	5	2	2	6	2	21
65-69	1	1	2	3	5	5	2	19
70-74		2	2	5	7	1	1	18
75-79		1		3	1	1	1	7
80 Plus						2	2	4
Total	5	13	17	20	24	21	10	110

AFTER

Control School Test Scores

BEFORE Control School Test Scores	Below 55	55-59	60-64	65-69	70-74	75-79	80 Plus	Total
Below 55	2	1	1		2	1		7
55-59	1	1	3	3	3	2	1	14
60-64	1	4	4	4	6	2	1	22
65-69	1	1	3	7	9	6	7	34
70-74	1	1	1	8	9	3	11	34
75-79			1	1	6	8	8	24
80 Plus		1	1	1	5	8	13	29
Total	6	9	14	24	40	30	41	164

$F_{1,272} = 9.87$, $p < .005$

Note: F is based on individual before - after test scores for every student.

Table 5. Test score before and after curriculum for ninth grade, experimental and control.

AFTER

Experimental School Test Scores

BEFORE Experimental School Test Scores	Below 55	55-59	60-64	65-69	70-74	75-79	80 Plus	Total
Below 55		2	1	1		2		6
55-59	1		1	2	2			6
60-64	1	2		3	1			7
65-69	1	2	3	5	4		2	17
70-74			4	3	5	5		17
75-79			3		6	1	1	11
80 Plus			1	4	3	6		14
Total	3	6	13	18	21	14	3	78

AFTER

Control School Test Scores

BEFORE Control School Test Scores	Below 55	55-59	60-64	65-69	70-74	75-79	80 Plus	Total
Below 55	1	1	1					3
55-59		1	2	3		1		7
60-64			3	3	1	1	1	9
65-69	1	1	2	3	1		1	9
70-74	2	1	3	2	4	1	7	20
75-79			2	2	2	4	3	13
80 Plus		1	2		7	3	9	22
Total	4	5	15	13	15	10	21	83

$F_{1,159} = .123$, $p > .7$

Note: F is based on individual before - after scores for every student.

To obtain the observations, children were filmed leaving school. Films were made at an experimental and at a control school both before and after the curriculum was taught (in September and again in February). At the experimental school the crossing area was a T intersection. Since at this intersection the children did not have the option of going straight, when judging the film, markings were made where the children could step out of the crosswalk to go left or right and still be counted as remaining within the crosswalk. In the case of the control school, the distance of the marked intersection was considerably longer, and therefore afforded greater opportunity for the children to step outside the boundaries. Figure 1 illustrates the crosswalks and the direction the children were crossing.

When the films, taken in September and February, were first viewed independently by the three judges, the data indicated high inter-judge reliability, with values above .90 for every behavioral film viewed (see Appendix A).

After recording their independent observations, the judges discussed their different sets of data, viewed the films again, and resolved the discrepancies in observation. The consensus findings were presented in Table 6. Because of the small frequencies in some of the categories, there were no statistical analyses performed.

For both the experimental and control schools, a greater proportion of the children were running, and a smaller proportion of the children were crossing outside the marked crosswalks in the post-films as compared to the pre-films. In addition, in all the films a large proportion, 88.9 percent or greater, remained on the curb until the patrol indicated the right-of-way. No comparisons can be made relevant to the bicyclist behavior because of the small frequency of bicyclists in the experimental films. It should be noted that the patrol had many opportunities to correct the student behavior, but this was not usually done.

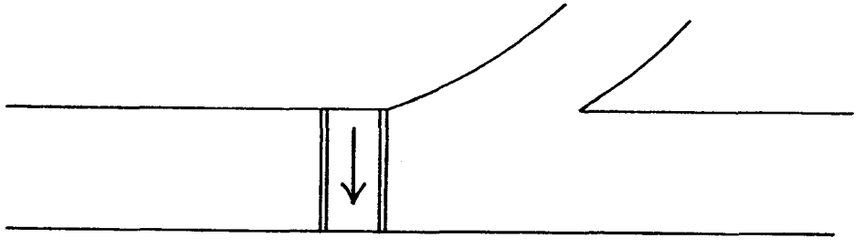
The number of behavioral observations was not great enough to have guaranteed detecting a difference between experimental and control schools unless the difference had been of considerable magnitude. For example, for the first pair of behaviors in Table 6, Runs across street and Walks across street, both experimental and control schools showed a deterioration in performance, that is, after the curriculum had been taught, the proportion of children running across the street was higher than had been the case earlier in the year. If the experimental school children had shown no deterioration in performance whatsoever and had been compared with the control school's performance (with the given sample sizes and given results for the control), there would have been

Table 6. Concensus judgements of pedestrian and bicyclist behavior at an experimental and control school before and after the curriculum was taught. Frequency (percentage).

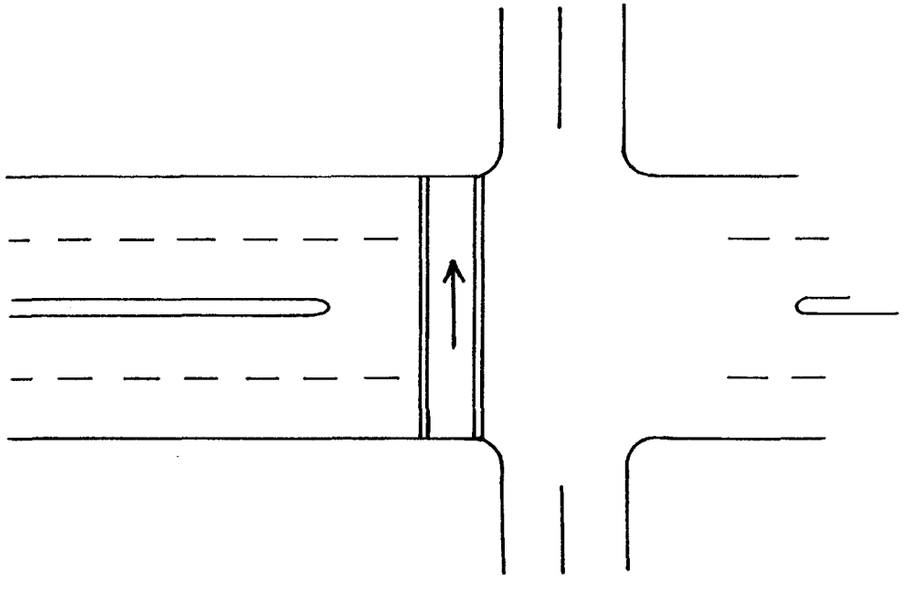
	Behavior	Experimental		Control	
		Before	After	Before	After
I.	Runs across street	13 (25.5)	25 (53.2)	3 (25.0)	9 (50.0)
	Walks across street	38 (74.5)	22 (46.8)	9 (75.0)	9 (50.0)
	Total	51 (100.0)	47 (100.0)	12 (100.0)	18 (100.0)
II.	Rides bike across intersection	1 (100.0)	2 (100.0)	15 (100.0)	26 (100.0)
	Walks bike across intersection	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Total	1 (100.0)	2 (100.0)	15 (100.0)	26 (100.0)
III.	Does not remain on curb until patrol indicates right of way (pedestrians)	4 (7.8)	4 (8.5)	0 (0.0)	2 (11.1)
	Remains on curb until patrol indicates right of way (pedestrians)	47 (92.2)	43 (91.5)	12 (100.0)	16 (88.9)
	Total	51 (100.0)	47 (100.0)	12 (100.0)	18 (100.0)
IV.	Does not remain behind curb line until patrol indicates right of way (bikes)	0 (0.0)	0 (0.0)	2 (13.3)	3 (11.5)
	Remains behind curb line until patrol indicates right of way (bikes)	1 (100.0)	2 (100.0)	13 (86.7)	23 (88.5)
	Total	1 (100.0)	2 (100.0)	15 (100.0)	26 (100.0)
V.	Crosses outside the marked crosswalk (pedestrians)	26 (51.0)	19 (40.4)	1 (8.3)	1 (5.6)
	Crosses within the marked crosswalk (pedestrians)	25 (49.0)	28 (59.6)	11 (91.7)	17 (94.4)
	Total	51 (100.0)	47 (100.0)	12 (100.0)	18 (100.0)
VI.	Crosses outside the marked crosswalk (bikes)	0 (0.0)	2 (100.0)	11 (73.4)	17 (65.4)
	Crosses within the marked crosswalk (bikes)	1 (100.0)	0 (0.0)	4 (26.6)	9 (34.6)
	Total	1 (100.0)	2 (100.0)	15 (100.0)	26 (100.0)

Figure 1. Drawings of the intersections where the experimental and control school children were filmed.

Experimental School



Control School



only a 70 percent chance of detecting such a difference (α = .20). In addition, the behaviors observed represented only some of the behaviors considered in the curriculum. For example, at the elementary school level, the curriculum also covers the areas of schol bus safety, passenger safety for grades K-6, and minicycle safety and farm machinery safety for grades 4-6, which this study did not attempt to evaluate on a behavioral level.

Teacher Responses

For the last part of the evaluation, questionnaires were developed to determine basically how useful the materials were considered, how much they were actually used, which parts were not used and why, and what changes were recommended.

All of the teachers (N=147) who were using the curriculum in the 14 experimental schools were mailed a questionnaire. Of these teachers, 133 or 90.5 percent completed and returned the questionnaire. The following findings are based on the data provided in the returned questionnaires.

Participation in the K-9 Traffic Safety Curriculum Workshops

As indicated earlier, from the beginning there was teacher input to the development of the curriculum. This teacher input was provided through workshops. However, since ultimately the curriculum is to be used by teachers in general, there were both workshop participants and other teachers included in the pilot effort.

Of the 133 teachers who returned the questionnaire, over one-half from each of the grade categories K-1, 2-3, 4-6, and 7-9 had not participated in the K-9 traffic safety workshops (see Table 7). Because it might be expected that the workshop teachers would differ from the non-workshop teachers in their use of the curriculum, the responses of these two gropus were presented independently for each of the questionnaire items.

Curriculum Appraisal

Teachers were asked to indicate their overall appraisal of the curriculum. A majority of the workshop and nonworkshop teachers at

almost every grade level category indicated that the curriculum was good. Exceptions were noted for the 4-6 workshop teachers where 58.8 percent reported it excellent, and for the 709 nonworkshop teachers, one-half of whom reported it fair or poor. These data are shown in Table 8.

Extent of Curriculum Use

Table 9 shows the extent of the curriculum use by the teachers by grade level. At all grade level categories, a sizable majority (at least 80 percent) of both the workshop and nonworkshop teachers indicated they had used the curriculum materials either "somewhat" or "considerably." Of interest was the fact that the greatest extent of use was among the 2-3 and 4-6 workshop teachers.

Context of Curriculum Use

The majority of the teachers, both workshop and nonworkshop, on the levels K-6 reported using the materials "both" as a separate unit and integrated into the existing curriculum. The majority of the teachers, workshop and nonworkshop, from levels 7-9 reported using the curriculum "solely" as a separate unit. These data are presented in Table 10.

Ease of Use of Curriculum Materials

Teachers were asked if they found using the materials to be "difficult," "reasonable," or "easy." Over four-fifths of both groups of teachers from all grade level categories reported the using of the materials to be either "reasonable" or "easy." A small proportion of teachers indicated that the materials were "difficult" to use (see Table 11).

Materials Reported Most and Least Helpful

Questions were asked concerning which materials were most and least helpful. Data were sparse for these questions because many teachers did not indicate an opinion. Overall, however, suggested activities were reported most helpful, and films were reported least helpful (see Tables 12 and 13).

Reported Teaching and Non-Teaching of Specific Curriculum Areas by Grade Level

K-1

The K-1 questionnaire included questions regarding the teaching or nonteaching of pedestrian, bicycle, passenger, and school bus safety. The majority of all the teachers, workshop and nonworkshop, reported teaching all of these areas with the exception of school bus safety, which only 41.7 percent of the nonworkshop participants reported teaching (see Table 14).

The questionnaire also included questions regarding the reasons for not teaching the specific areas. For all areas the major reason given for not teaching the materials was "not enough time."

2-3

The traffic safety materials which were given to 2-3 grade teachers covered the same areas as those for K-1 teachers, e.g., pedestrian, bicycle, school bus, and passenger safety. The majority of both groups of teachers, workshop and nonworkshop, taught all these areas (see Table 15). Again, time was indicated as the major reason for not teaching an area.

4-6

A sizable majority of both groups of teachers taught the areas of pedestrian, bicycle, school bus, and passenger safety. A large proportion, 58 percent and greater, of both groups of teachers, however, did not teach the areas of farm machinery and minicycle safety. These data may be seen in Table 16.

For all areas, the major reason for not teaching the materials was insufficient time. For the areas of farm machinery and minicycle safety, the nonapplicability to local traffic environment, the inappropriateness to grade level, and difficulty integrating the materials into the existing curriculum were also frequently given as reasons for nonuse.

7

The materials that the seventh grade teachers were given focused on the areas of pedestrian, bicycle, school bus, motorcycle, and tractor safety. Sixty percent or more of the workshop teachers taught all the

areas except tractor safety, which only 40 percent taught. With reference to the nonworkshop participants, all taught pedestrian and bicycle safety; less than half taught motorcycle safety; and none taught tractor safety (see Table 17).

Again, the major reason given for not teaching an area was insufficient time. With reference to the tractor safety materials (an optional area) one-third of the respondents indicated that the materials were not applicable to their local traffic environment.

8

Among the workshop respondents, all taught passenger safety, emergency procedures, traffic signs and markings; three-fourths taught the future traffic environment; one-half taught roadway types and highway designs; and only one-fourth taught auto trip planning. None of the nonworkshop teachers at grade 8 responded to the questionnaire. These data are presented in Table 18.

Not enough time was the reason most frequently provided for not teaching an area. Of interest, one teacher reported that the ninth grade teachers in her school requested that the eighth grade teachers not utilize the traffic environment materials.

9

Among the workshop teachers, at least 75 percent taught all five areas of the ninth grade curriculum. In contrast, two-thirds of the nonworkshop teachers taught the highway transportation system, driving task, and entry into the highway system; one-half taught self evaluation of driving attitudes; and only one-third taught the highway user materials (see Table 19). Again, time was the major reason provided for not teaching an area.

Comments

Of the 133 questionnaires returned, 103 voluntarily provided recommendations for changes (including additions and deletions) in the curriculum, and special comments concerning the K-9 traffic safety program. These recommendations and comments were listed by grade level and frequency of teachers (see Tables 20 and 21).

Teachers from every grade level, K-9, requested additional and more available audio-visual materials. Films, filmstrips, records, tapes, maps, pictures, masters, and signs were specifically mentioned.

Concerning the masters, several teachers recommended that they be ready made, consist of larger and less crowded type, and include answer keys. Moreover, many of the teachers suggested that the student materials needed to be simplified. Again, masters, suggested activities, and experiments were specifically mentioned. Of importance, several teachers on the elementary school level felt that the curriculum should be taught the entire year. Lastly, a large number of teachers expressed general satisfaction with the curriculum on the K-7 levels.

Table 7. Teacher participation in the K-9 traffic safety curriculum workshops by grade level.

Teacher Participation	Grade Level K-1	2-3	4-6	7-9
Yes	47.8%	30.3%	34.0%	48.1%
No	52.2%	69.7%	66.0%	51.9%
Total	100.0%	100.0%	100.0%	100.0%
N	23	33	50	27

Note: Total (N) may be different from table to table due to teachers' non-response to certain questionnaire items.

Note: Total (%) may not equal 100.0 due to rounding.

Table 8. Overall appraisal of the K-9 traffic safety curriculum by workshop and nonworkshop teachers by grade level.

Appraisal	Grade Level K-1 Workshop	K-1 Nonworkshop	2-3 Workshop	2-3 Nonworkshop	4-6 Workshop	4-6 Nonworkshop	7-9 Workshop	7-9 Nonworkshop
Excellent	18.2%	36.4%	30.0%	26.1%	58.8%	33.3%	16.7%	14.3%
Good	81.2%	54.5%	70.0%	69.6%	35.3%	63.6%	66.6%	35.7%
Fair	0.0%	9.1%	0.0%	0.0%	0.0%	3.0%	16.7%	42.9%
Poor	0.0%	0.0%	0.0%	4.3%	5.9%	0.0%	0.0%	7.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	99.9	100.0%	100.0%
N	11	11	10	23	17	33	12	14

Table 9. Extent of use of curriculum materials by workshop and nonworkshop teachers by grade level.

Extent of Use	Grade Level K-1 Workshop	K-1 Nonworkshop	2-3 Workshop	2-3 Nonworkshop	4-6 Workshop	4-6 Nonworkshop	7-9 Workshop	7-9 Nonworkshop
Not at all	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
A little	18.2%	8.3%	0.0%	4.3%	5.9%	15.1%	15.4%	14.2
Somewhat	36.4%	41.7%	20.0%	34.8%	11.8%	36.4%	30.8%	42.9%
Considerably	45.4%	50.0%	80.0%	60.9%	82.3%	48.5%	53.8%	42.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N	11	12	10	23	17	33	13	14

Table 10. Context in which curriculum materials were used by workshop and nonworkshop teachers by grade level.

Context	Grade Level K-1 Workshop	K-1 Nonworkshop	2-3 Workshop	2-3 Nonworkshop	4-6 Workshop	4-6 Nonworkshop	7-9 Workshop	7-9 Nonworkshop
As a separate unit	18.2%	33.3%	30.0%	34.8%	41.2%	33.3%	61.5%	53.8%
Integrated into existing curriculum	18.2%	8.3%	0.0%	0.0%	5.9%	15.2%	0.0%	23.1%
Both of the above	63.6%	58.3%	70.0%	65.2%	52.9%	51.5%	38.5%	23.1%
Total	100.0%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N	11	12	10	22	17	33	13	13

Table 11. Ease of use of curriculum materials by workshop and nonworkshop teachers by grade level.

Ease of Use	Grade Level K-1 Workshop	K-1 Nonworkshop	2-3 Workshop	2-3 Nonworkshop	4-6 Workshop	4-6 Nonworkshop	7-9 Workshop	7-9 Nonworkshop
Difficult	0.0%	8.3%	0.0%	0.0%	5.9%	0.0%	15.4%	14.3%
Reasonable	81.8%	33.3%	44.4%	82.6%	35.3%	87.9%	69.2%	64.3%
Easy	18.2%	58.3%	55.6%	17.4%	58.8%	12.1%	15.4%	21.4%
Total	100.0%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N	11	12	9	23	17	33	13	14

Table 12. Materials considered most helpful in curriculum by workshop and nonworkshop teachers by grade level.

Materials Considered Most Helpful	Grade Level K-1 Workshop	K-1 Nonworkshop	2-3 Workshop	2-3 Nonworkshop	4-6 Workshop	4-6 Nonworkshop	7-9 Workshop	7-9 Nonworkshop
Masters for reproduction	25.0%	0.0%	71.4%	25.0%	30.0%	25.0%	33.3%	36.4%
Suggested activities	75.0%	80.0%	14.3%	18.7%	50.0%	45.0%	22.2%	27.3%
Content for discussion	0.0%	20.0%	14.3%	37.5%	20.0%	20.0%	11.1%	18.2%
Films	0.0%	0.0%	0.0%	18.7%	0.0%	10.0%	33.3%	18.2%
Total	100.0%	100.0%	100.0%	99.9%	100.0%	100.0%	99.9%	100.0%
N	4	5	7	16	10	20	9	11

Table 13. Materials considered least helpful in curriculum by workshop and nonworkshop teachers by grade level.

Materials Considered Most Helpful	Grade Level K-1 Workshop	K-1 Nonworkshop	2-3 Workshop	2-3 Nonworkshop	4-6 Workshop	4-6 Nonworkshop	7-9 Workshop	7-9 Nonworkshop
Masters for reproduction	42.8%	20.0%	44.4%	18.7%	20.0%	11.5%	14.3%	30.8%
Suggested activities	14.3%	20.0%	22.2%	18.7%	13.3%	26.9%	42.8%	23.1%
Content for discussion	28.6%	20.0%	22.2%	18.7%	20.0%	42.3%	28.6%	7.7%
Films	14.3%	40.0%	11.1%	43.8%	46.7%	19.2%	14.3%	38.5%
Total	100.0%	100.0%	99.9%	99.9%	100.0%	99.9%	100.0%	100.0%
N	7	10	9	16	15	26	14	13

Table 14. Reported teaching and nonteaching of specific curriculum areas by workshop and nonworkshop teachers for level A (grades K-1).

	Curriculum Area: Pedestrian Safety		Bicycle Safety		Passenger Safety		School Bus Safety	
Taught	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop
Yes	90.9%	100.0%	81.8%	66.6%	72.7%	66.6%	90.9%	41.7%
No	9.1%	0.0%	18.2%	33.3%	27.3%	33.3%	9.1%	58.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N	11	12	11	12	11	12	11	12

Table 15. Reported teaching and nonteaching of specific curriculum areas by workshop and nonworkshop teachers for level B (grades 2-3).

	Curriculum Area							
	Pedestrian Safety		Bicycle Safety		Passenger Safety		School Bus Safety	
Taught	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop
Yes	100.0%	100.0%	80.0%	87.0%	70.0%	60.9%	80.0%	73.9%
No	0.0%	0.0%	20.0%	13.0%	30.0%	39.1%	20.0%	26.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N	10	23	10	23	10	23	10	23

Table 16. Reported teaching and nonteaching of specific curriculum areas by workshop and nonworkshop teachers for level C (grades 4-6).

	Curriculum Area											
	Pedestrian Safety		Bicycle Safety		School Bus Safety		Farm Machinery Safety		Mini-cycle Safety		Passenger Safety	
Taught	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop
Yes	94.1%	97.0%	100.0%	93.8%	76.5%	71.9%	11.8%	6.5%	41.2%	36.4%	82.4%	51.5%
No	5.9%	3.0%	0.0%	6.2%	23.5%	28.1%	88.2%	93.5%	58.8%	63.6%	17.6%	48.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N	17	33	17	32	17	32	17	31	17	33	17	33

Table 17. Reported teaching and nonteaching of specific curriculum areas by workshop and nonworkshop teachers for level D (grade 7).

	Curriculum Area									
	Pedestrian Safety		Bicycle Safety		School Bus Safety		Motorcycle Safety		Tractor Safety	
Taught	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop
Yes	80.0%	100.0%	100.0%	100.0%	60.0%	50.0%	60.0%	28.6%	40.0%	0.0%
No	20.0%	0.0%	0.0%	0.0%	40.0%	50.0%	40.0%	71.4%	60.0%	100.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N	5	8	5	8	5	8	5	7	5	8

Table 18. Reported teaching and nonteaching of specific curriculum areas by workshop and nonworkshop teachers for level D (grade 8).

	Curriculum Area											
	Passenger Safety		Traffic Environment, (Highway Design, etc.)		Traffic Signs and Markings		Auto Trip Planning		Emergency Procedures		Future Traffic Environment	
Taught	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop
Yes	100.0%	0.0%	50.0%	0.0%	100.0%	0.0%	25.0%	0.0%	100.0%	0.0%	75.0%	0.0%
No	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	75.0%	0.0%	0.0%	0.0%	25.0%	0.0%
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
N	4	0	4	0	4	0	4	0	4	0	4	0

Table 19. Reported teaching and nonteaching of specific curriculum areas by workshop and nonworkshop teachers for level D (grade 9).

Taught	Highway Transportation System		Driving Task		Curriculum Area Entry into Highway System		Highway User		Self Evaluation of Driving Attitudes	
	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop	Workshop	Nonworkshop
Yes	100.0%	66.7%	75.0%	66.7%	75.0%	66.7%	100.0%	33.3%	100.0%	50.0%
No	0.0%	33.3%	25.0%	33.3%	25.0%	33.3%	0.0%	66.7%	0.0%	50.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
N	4	6	4	6	4	6	4	6	4	6

Table 20. Frequency of teacher recommendations for changes in K-9 traffic safety curriculum, by grade level.

Changes (including additions and deletions)	Grade Level									
	K	1	2	3	4	5	6	7	8	9
1. Additional and/or more available films and filmstrips		3	7	4	2	4	2	5	1	5
2. Additional and/or more available tapes for songs	1	1					1			
3. Additional games and/or suggested activities		2	1			1	1	1		1
4. Additional bulletin board ideas						1				
5. Additional and/or more available visual material other than films, i.e., maps, charts, pictures, masters, and signs, etc.	1	2	3	2	1	3	3	1	3	
6. More directions for diagrams of turning maneuvers and intersections							1			
7. Need "more involvement from administration"									1	
8. Include self teaching-self correcting activities for learning centers						1				
9. Provide booklets for students on traffic safety			1							
10. Provide booklets for parents on traffic safety					1					
Additional discussion material					1					

(Continued)

Changes (including additions and deletions)	Grade Level									
	K	1	2	3	4	5	6	7	8	9
11. Provide student workbooks			1							1
12. Provide materials in text book form										1
13. Include a script with tape cassette series			1	1						
14. Include a "check up quiz" with answer sheet for concepts										1
15. Include picture form tests			1							
16. State behavioral objectives			1							
17. Provide tokens or rewards for achievements in safety				1						
18. Develop the environmental sections with films and filmstrips										1
19. Include more appropriate demonstrations and experiments for the classroom			1							
20. Include materials that are more concrete and applicable for the "EMR" level.										1
21. Provide instruction on teaching of curriculum			1					1		1
22. Condense the material for discussion								1		
23. Delete the "bicycle survey tabulation chart"			1							
24. Simplify student materials in general	1		1	1				1		3
25. Simplify suggested activities	1						1	1		
26. Simplify masters			1				1			
27. Provide ready made masters		1	3	1				1	1	1
28. Include answers to masters					1		1			
29. Provide precise directions for masters								2		

(Continued)

Changes (including additions and deletions)	Grade Level									
	K	1	2	3	4	5	6	7	8	9
30. Enlarge type on masters			2	1	1					
31. Correct mistakes in masters					1	2	1			
32. Correct mistakes in crossword puzzles						1				
33. Develop a more concise teacher's manual	1	1					1			
34. Place topics relevant to every area in opening section							1			
35. Need involved concerned helpers to provide students with real street experiences			1							
36. Shorten porgram	1				1					
37. Schedule more time to cover curriculum			2	2		2		3		2
38. Extend program to an entire year	1	3	2	1	1					
39. Implement curriculum at K-3 levels only							1			
40. Teach curriculum as a separate subject					1		1	1	1	
41. Assign only workshop or special teachers to teach curriculum								1		1
42. Assign only health or physical education teachers to teach curriculum								5		

Table 21. Frequency of teacher comments concerning the K-9 traffic safety curriculum other than changes, by grade level.

Comments	Grade Level									
	K	1	2	3	4	5	6	7	8	9
1. Films good for age group									2	
2. Activities relevant to student needs								2		
3. Materials quite flexible						1		1		
4. Pamphlets well received by students						1				
5. Teachers' manual good tool--information easily found, lessons quickly prepared, information complete			1							
6. Manual rules good							1			
7. Masters good			1						1	
8. Content for discussion appropriate for grade level				1						
9. Suggested activities appropriate for grade level		1								
10. Curriculum appropriate for traffic environmental in area						1				
11. Materials easy to use						1				
12. Children enthused by curriculum					1	1				
13. Students enjoyed "puzzles, games, movies, and signs								1		
14. A large quantity of materials helpful	1		1	1						
15. Materials are easy to integrate into regular subjects		2		1		2	1	1		
16. Materials are difficult to integrate into regular subjects								2		
17. Handicapped by scarce materials					1					
18. Films and material need to be more sophisticated for the ninth grade										1
19. Interest is low on passenger safety unit						1				

Frequency of teacher comments concerning the K-9 traffic safety curriculum other than changes, by grade level.

(Continued)

Comments	Grade Level									
	K	1	2	3	4	5	6	7	8	9
20. Should implement curriculum as a required course										1
21. Need fresh new material for each grade level										1
22. Need an organization system for films i.e., one should not show the same film to two different grade levels										1
23. "The section for learning to cross the street (gap time)" is too difficult to teach				2						
24. Difficult to cover all material		1		1	2		3	2		
25. Cannot spend but six to eight weeks a year on the curriculum because of other courses of study					1					
26. "Touch on all aspects each year, but concentrate on only one area"					1					
27. Curriculum was offered "as an elective to seventh and eighth graders as a mini course, and taught by an eighth grade teacher"								1		
28. Should utilize to the fullest extent films dealing with alcohol and drugs										1
29. Expressions of general satisfaction with curriculum i.e., curriculum well prepared impressed with curriculum, enjoying curriculum, etc.	5	9	4	7	5	3	4	5		

IV. DISCUSSION

The evaluation of the newly developed K-9 traffic safety curriculum consisted of three parts: (1) a measure of the teachers' acceptance and reaction to the curriculum materials, (2) a measure of the extent to which the materials covered in the curriculum were acquired by the students, and (3) the extent to which changes occurred in the pedestrian and bicyclist behavior of students. It could be argued that an evaluation of a traffic safety curriculum should focus solely on the behavioral observations of students, or, perhaps even more to the point, on the frequency of traffic accidents involving children in the areas in which the curriculum is taught. The latter approach was rejected because of the relatively small number of pupils involved and the relative infrequency (thankfully) of reportable traffic crashes. However, the evaluation included three facets so that it would be possible to determine to what extent the curriculum was effective and where any ineffectiveness might lie. For example, had the evaluation focused only on behavioral observations and no significant differences were found, we would be at a loss to ascertain whether the failure to observe a change in behavior was attributable to a failure on the part of student to use information acquired, a failure on the part of the student to acquire information in the first place, or a failure on the part of the teacher to teach the curriculum materials. The three-fold thrust that was employed enables us to say that the curriculum on the whole was well accepted by the teachers. Their high level of involvement in the program is reflected in the high proportion that returned the questionnaire, the high proportion of these that reported their use of and satisfaction with the materials, and the high proportion that provided voluntary comments, both positive and negative, about the curriculum materials. Thus, on the basis of the evidence, there is no reason to conclude that any failure to observe a behavioral change could be attributed to a failure on the part of the teachers to accept and use the curriculum materials.

Likewise, the measurement of knowledge acquisition on the part of the students indicates that in those schools where the curriculum was taught, the elementary level students, at least, showed significant increases in knowledge covered in the curriculum. While this increase was not observed at the ninth grade level, a number of possible contributing factors could be identified. These included, first, the higher attrition rate between pre-tests and post-tests at the ninth grade level. The analysis used included only those students for whom both a pre-test and a post-test were obtained. At grade 3 there was a 22.43 percent loss of students between pre-testing and post-testing, compared with a 13.84 percent loss at grade 6 and a 44.29 percent loss at grade 9. Second, there were relatively fewer traffic safety teachers for the ninth grade, thus necessitating larger classes and possibly making it more difficult to communicate the information. Third, the ninth grade students may have had more difficulty recalling information because the curriculum was presented for only three weeks in the ninth grade, while for the elementary grades it was spread over several months. From the data, there is no way of knowing how long the interval was between the completion of the ninth grade mini-course and the post-testing of the students. Since retention is likely to vary with the length of time since the curriculum was completed, this factor could have affected the findings. Fourth, information obtained from the teacher questionnaire indicated that the ninth grade teachers were less satisfied with the curriculum materials. Fifth, there appeared to be more confusion concerning the administration of the 7-9 traffic safety program in comparison to the other levels. To illustrate, an eight grade teacher reported that the ninth grade teachers in her school requested that the traffic environment materials (designed for grade eight) not be taught in the eighth grade. A ninth grade teacher reported teaching the unit "along with the driver education work." This same teacher reported teaching traffic safety from her workshop notes before receiving the curriculum and before the pre-tests. She was apparently instructed to follow this procedure. After she had received the curriculum, however, she taught the material from that. When the findings were examined for grade 9, with the test scores from this school omitted, there was still no indication of an increase in knowledge. In addition, one eighth grade teacher in an experimental school reported on the questionnaire that she was unaware of the existence of the traffic safety curriculum even though she was teaching in an experimental school. These problems could, to varying degrees, be alleviated in the expanded use of the traffic safety curriculum. Hopefully such efforts would lead to a greater impact of the curriculum at the ninth grade level.

However, it may be more efficient to consider whether the curriculum should be taught at these higher grade levels at all. The implementation of the curriculum did not appear to incur serious problems at the elementary school level, and it was at this level that significant increases in knowledge were observed. However, at level D, (grades 7 through 9) there appeared to be numerous problems associated with the curriculum implementation. In terms of the amount of benefit realized in relation to the amount of effort invested, it may be more worthwhile to discontinue the curriculum at level D and concentrate available resources at the elementary school level where the results appear more promising. The higher concentration of pedestrian fatalities at the lower age levels as indicated by accident statistics would support such a shift in emphasis.

The observations of students leaving school did not show the type of effects that would be hoped for. Although the number of observations was limited, it should also be noted that at both experimental and control schools there was ample room for improvement in the students' behavior both before and after the curriculum was taught.

It could be argued that the crosswalk outside the school may not be the most appropriate place to be filming observations, since students are more likely to be involved in traffic crashes several blocks away from the school rather than right next to it. However, filmed observations at locations more remote from the school grounds would yield relatively few observations at a corresponding increase in cost. Furthermore, if a traffic safety curriculum is to have any impact, it might be expected that the greatest effects would be apparent closest to the school. Consequently, in order to maximize the number of observations that could be obtained and in order to maximize the possibility of observing an effect of the traffic safety curriculum, the decision was made to film students at the crosswalks next to the schools. It is felt that this decision was vindicated when the precurriculum observations showed a sizeable proportion of students failing to observe basic traffic safety maxims. This means that there was room for the curriculum to result in measurably improved traffic safety behavior at the crosswalks. It is recognized that the number of behavioral observations was small. However, the purpose of this evaluation was to provide input for the revision of the curriculum that was being pilot tested, and the failure to observe the desired improvement in behavior suggests that the knowledge acquired by the students may not have been translated into overt pedestrian behavior. Therefore, it is recommended that consideration be given to placing greater emphasis on behavorial practice of the principles being taught in the curriculum.

Such a recommendation is more easily made than implemented. To provide behavioral practice in traffic safety principles may require facilities other than the traditional classroom. At the elementary level the physical education period may offer one opportunity, but this is a problem that will require cooperative effort on the part of teachers and school administrators.

Because the curriculum is just one approach to traffic safety and, like any other approach, has its limitations, it is also recommended that exploration be made of possibilities involving individuals other than classroom teachers in instruction in safe traffic behavior. For example, it was observed that the school patrol had many opportunities to instruct and correct the students in their pedestrian and bicyclist behavior. Perhaps the school patrol could be provided with training that would enable them to reinforce the instruction being given in the traffic safety curriculum. Likewise, school bus drivers could perhaps become involved as liason personnel in providing additional real-world instruction in safe passenger and pedestrian behavior. Other community members possibly could be involved as aides to teachers in providing students with on-the-scene instruction in traffic safety.

If the school system is serious about teaching traffic safety, then this aspect of the teaching cannot be overemphasized. If the school were seriously trying to teach students how to play tennis, one would wonder about the adequacy of a curriculum that consisted of 20 hours of classroom teaching and little or no time on the tennis courts. Yet we may be attempting something equally preposterous if we try to teach traffic safety only within the confines of the traditional classroom.

It should be noted that in developing the curriculum the intent was that a student would proceed from kindergarten through the ninth grade, sequentially receiving additional information as he progressed from one grade to the next. Thus, the curriculum could potentially have a cumulative effect that could not be assessed after a single year's exposure.

V. SUMMARY AND CONCLUSIONS

Under the auspices of the Research Triangle Institute a traffic safety curriculum was developed for use in kindergarten through ninth grades. This curriculum was pilot tested in schools in Buncombe County and Asheville; and Pitt County and Greenville. The purpose of this study was to evaluate the effectiveness of the curriculum to provide input for the revision of curriculum materials. The evaluation included three facets.

First, the amount of knowledge which students acquired about traffic safety was measured by tests administered before the curriculum was initiated and after the students had been exposed to the curriculum. Students in comparable schools, where the program was not implemented, were also tested to provide a control. The sample for the testing encompassed 12 third grade classes, 12 sixth grade classes, and 12 ninth grade classes. An equal proportion of these classes were experimental and control, and were located in the eastern and western areas of the state.

At the third and sixth grade levels the students exposed to the curriculum showed significant increases in knowledge compared to students in the control schools. However, no differences were found between the two groups on the ninth grade level. Possible reasons for this failure to observe an effect at the ninth grade level have been discussed previously.

The second phase of the evaluation focused on the pedestrian and bicyclist behavior of students leaving school. Students were filmed at an experimental school and at a control school before the program was implemented and again after the curriculum was taught. The total number of observations was limited and results should be interpreted with this in mind.

A panel of judges viewed the films and recorded their observations. The data failed to show any marked improvement in the behavior of students at the experimental school when compared with the control school. However, the behavioral observations were limited such that only a difference of considerable magnitude would have been detected.

For the third phase of the study, questionnaires were developed for teachers at grade levels K-1, 2-3, 4-6, 7,8, and 9 to determine how useful the materials were considered, how much they were actually used, which parts were not used and why, and what changes were desired. The

questionnaire was mailed to all the teachers using the curriculum. Of the teachers surveyed, 90.5 percent completed and returned the questionnaire.

Some of the teachers had participated in workshops where they had helped to develop the curriculum materials. For the most part, both workshop and nonworkshop teachers at all grade levels rated the curriculum "good," used it "considerably" or "somewhat," found using the materials to be "reasonable," and considered the suggested activities "most helpful" and the films "least helpful." In general, workshop and nonworkshop teachers used the curriculum "both" as a separate unit and as an integrated part of the existing curriculum for grade levels K-6, and "solely" as a separate unit for grade levels 7-9.

Of importance, overall a larger proportion of the workshop participants used the materials than the nonworkshop teachers. The materials that were reported unused by the majority of both groups of teachers, workshop and nonworkshop, focused on the areas of farm machinery and minicycle safety for grades 4-6, tractor safety for grade 7, and auto trip planning for grade 8. The major reason given for nonuse was insufficient time. Other reasons included lack of relevance for the particular students involved.

Seventy-seven percent of the teachers returning the questionnaire provided recommendations for changes and other comments about the curriculum. These comments alone are indicative of a high interest and concern among the teachers, and therefore should be given consideration when revisions are made. Among the recommendations from the teachers, those most frequently expressed included additional and more readily available audio-visual materials; ready-made masters with larger and less crowded type; simpler student activities in general; and more time to teach the curriculum.

The results indicate that a traffic safety curriculum was developed that was generally accepted and used by the teachers. Furthermore, at the elementary level it was associated with significant increases in traffic safety knowledge on the part of the students. However, the limited measures that were made of the actual student pedestrian and bicyclist behavior failed to show an effect of the curriculum. This failure to observe significant differences could in part be related to the limited observations.

On the basis of this pilot project, the following recommendations are offered:

1. Curriculum revisions should include some focus on behavorial practice of the traffic safety principles being taught.

2. Possibilities should be explored for involving additional personnel who can reinforce the traffic safety behaviors taught by the classroom teacher. Such auxiliary personnel might include crosswalk guards, school bus drivers, and parents.

3. Because the implementation of the curriculum was relatively smooth at the elementary level, because it was at this level that the results looked most promising, and because there appear to be considerable problems in the administration of the curriculum at the junior high level, serious consideration should be given to focusing available resources on the elementary level and omitting the junior high program.

4. Because the evidence indicates that the teachers accepted and used the curriculum and students at the elementary level showed significant increases in knowledge, evaluation of any expanded program should focus more heavily on behavioral measures of effectiveness.

APPENDIX A

Independent Judgments of Pedestrian and Bicyclist Behavior

Table A-1. Independent judgments of pedestrian and bicyclist behavior at an experimental school before the curriculum was taught. Frequency (percentage).

	Behavior	Judge A	Judge B	Judge C
I.	Runs across street	10 (19.2)	12 (25.5)	12 (26.1)
	Walks across street	42 (80.8)	35 (74.5)	34 (73.9)
	Total	52 (100.0)	47 (100.0)	46 (100.0)
II.	Rides bike across intersection	1 (100.0)	1 (100.0)	1 (100.0)
	Walks bike across intersection	0 (0.0)	0 (0.0)	0 (0.0)
	Total	1 (100.0)	1 (100.0)	1 (100.0)
III.	Does not remain on curb until patrol indicates right of way (pedestrians)	3 (5.9)	4 (8.5)	3 (5.9)
	Remains on curb until patrol indicates right of way (pedestrians)	48 (94.1)	43 (91.5)	48 (94.1)
	Total	51 (100.0)	47 (100.0)	51 (100.0)
IV.	Does not remain behind curb line until patrol indicates right of way (bikes)	0 (0.0)	0 (0.0)	0 (0.0)
	Remains behind curb line until patrol indicates right of way (bikes)	1 (100.0)	1 (100.0)	1 (100.0)
	Total	1 (100.0)	1 (100.0)	1 (100.0)
V.	Crosses outside the marked crosswalk (pedestrians)	20 (39.2)	24 (46.2)	25 (45.5)
	Crosses within the marked crosswalk (pedestrians)	31 (60.8)	28 (53.8)	30 (54.5)
	Total	51 (100.0)	52 (100.0)	55 (100.0)
VI.	Crosses outside the marked crosswalk (bikes)	0 (0.0)	0 (0.0)	0 (0.0)
	Crosses within the marked crosswalk (bikes)	1 (100.0)	1 (100.0)	1 (100.0)
	Total	1 (100.0)	1 (100.0)	1 (100.0)

Reliability coefficient .9973

Table A-2. Independent judgments of pedestrian and bicyclist behavior at a control school before the curriculum was taught. Frequency (percentage).

	Behavior	Judge A	Judge B	Judge C
I.	Runs across street	1 (8.3)	1 (8.3)	1 (8.3)
	Walks across street	11 (91.7)	11 (91.7)	11 (91.7)
	Total	12 (100.0)	12 (100.0)	12 (100.0)
II.	Rides bike across intersection	14 (100.0)	15 (100.0)	14 (100.0)
	Walks bike across intersection	0 (0.0)	0 (0.0)	0 (0.0)
	Total	14 (100.0)	15 (100.0)	14 (100.0)
III.	Does not remain on curb until patrol indicates right of way (pedestrians)	0 (0.0)	4 (33.3)	4 (33.3)
	Remains on curb until patrol indicates right of way (pedestrians)	12 (100.0)	8 (66.6)	8 (66.6)
	Total	12 (100.0)	12 (99.9)	12 (99.9)
IV.	Does not remain behind curb line until patrol indicates right of way (bikes)	9 (64.3)	7 (46.7)	2 (13.3)
	Remains behind curb line until patrol indicates right of way (bikes)	5 (35.7)	8 (53.3)	13 (86.7)
	Total	14 (100.0)	15 (100.0)	15 (100.0)
V.	Crosses outside the marked crosswalk (pedestrians)	0 (0.0)	1 (8.3)	1 (8.3)
	Crosses within the marked crosswalk (pedestrians)	12 (100.0)	11 (91.7)	11 (91.7)
	Total	12 (100.0)	12 (100.0)	12 (100.0)
VI.	Crosses outside the marked crosswalk (bikes)	9 (64.3)	9 (60.0)	10 (71.4)
	Crosses within the marked crosswalk (bikes)	5 (35.7)	6 (40.0)	4 (28.6)
	Total	14 (100.0)	15 (100.0)	14 (100.0)

Reliability coefficient .9023

Table A-3. Independent judgments of pedestrian and bicyclist behavior at an experimental school after the curriculum was taught. Frequency (percentage).

Behavior	Judge A	Judge B	Judge C
I. Runs across street	23 (46.9)	24 (52.2)	22 (46.8)
Walks across street	26 (53.1)	22 (47.8)	25 (53.2)
Total	49 (100.0)	46 (100.0)	47 (100.0)
II. Rides bike across intersection	2 (100.0)	2 (100.0)	2 (100.0)
Walks bike across intersection	0 (0.0)	0 (0.0)	0 (0.0)
Total	2 (100.0)	2 (100.0)	2 (100.0)
III. Does not remain on curb until patrol indicates right of way (pedestrians)	4 (7.8)	1 (2.4)	4 (8.3)
Remains on curb until patrol indicates right of way (pedestrians)	47 (92.2)	40 (97.6)	44 (91.7)
Total	51 (100.0)	41 (100.0)	48 (100.0)
IV. Does not remain behind curb line until patrol indicates right of way (bikes)	0 (0.0)	0 (0.0)	0 (0.0)
Remains behind curb line until patrol indicates right of way (bikes)	2 (100.0)	2 (100.0)	2 (100.0)
Total	2 (100.0)	2 (100.0)	2 (100.0)
V. Crosses outside the marked crosswalk (pedestrians)	24 (53.3)	15 (32.6)	18 (40.9)
Crosses within the marked crosswalk (pedestrians)	21 (46.7)	31 (67.4)	26 (59.1)
Total	45 (100.0)	46 (100.0)	44 (100.0)
VI. Crosses outside the marked crosswalk (bikes)	2 (100.0)	2 (100.0)	2 (100.0)
Crosses within the marked crosswalk (bikes)	0 (0.0)	0 (0.0)	0 (0.0)
Total	2 (100.0)	2 (100.0)	2 (100.0)

Reliability coefficient .992

Table A-4. Independent judgments of pedestrian and bicyclist behavior at a control school after the curriculum was taught. Frequency (percentage).

Behavior	Judge A	Judge B	Judge C
I. Runs across street	8 (44.4)	8 (44.4)	6 (33.3)
Walks across street	10 (55.6)	10 (55.6)	12 (66.6)
Total	18 (100.0)	18 (100.0)	18 (100.0)
II. Rides bike across intersection	26 (100.0)	26 (100.0)	27 (100.0)
Walks bike across intersection	0 (0.0)	0 (0.0)	0 (0.0)
Total	26 (100.0)	26 (100.0)	27 (100.0)
III. Does not remain on curb until patrol indicates right of way (pedestrians)	2 (11.1)	0 (0.0)	2 (11.1)
Remains on curb until patrol indicates right of way (pedestrians)	16 (88.9)	18 (100.0)	16 (88.9)
Total	18 (100.0)	18 (100.0)	18 (100.0)
IV. Does not remain behind curb line until patrol indicates right of way (bikes)	3 (11.5)	2 (7.7)	3 (11.5)
Remains behind curb line until patrol indicates right of way (bikes)	23 (88.5)	24 (92.3)	23 (88.5)
Total	26 (100.0)	26 (100.0)	26 (100.0)
V. Crosses outside the marked crosswalk (pedestrians)	1 (5.6)	1 (5.6)	0 (0.0)
Crosses within the marked crosswalk (pedestrians)	17 (94.4)	17 (94.4)	17 (100.0)
Total	18 (100.0)	18 (100.0)	17 (100.0)
VI. Crosses outside the marked crosswalk (bikes)	19 (73.1)	17 (65.4)	22 (84.6)
Crosses within the marked crosswalk (bikes)	7 (26.9)	9 (34.6)	4 (15.4)
Total	26 (100.0)	26 (100.0)	26 (100.0)

Reliability coefficient .9845

APPENDIX B

Questionnaires

(For teachers of K-1st, and 2nd-3rd)

QUESTIONNAIRE TO TEACHERS

CONCERNING

THE K-9 TRAFFIC SAFETY CURRICULUM

(for research only)

PLEASE PRINT

1. LAST NAME _____

2. FIRST NAME _____

3. SCHOOL _____

4. Circle the grade or grades that you are presently teaching.

   k 1 2 3 4 5 6 7 8 9

5. Were you involved in the K-9 traffic safety curriculum workshops?

   (1) ☐ yes

   (2) ☐ no

6. Considering everything, check your overall appraisal of the K-9 traffic safety curriculum for your grade level.

   (1) ☐ excellent

   (2) ☐ good

   (3) ☐ fair

   (4) ☐ poor

7. To what extent did you use the K-9 traffic safety curriculum materials?

   (1) ☐ not at all

   (2) ☐ a little

   (3) ☐ somewhat

   (4) ☐ considerably

8. In what context were the materials used?

   (1) ☐ as a separate unit

   (2) ☐ integrated into existing curriculum

   (3) ☐ both of the above

9. Did you find using the materials to be:

   (1) ☐ difficult

   (2) ☐ reasonable

   (3) ☐ easy

10. What was the most helpful in materials used?

   (1) ☐ masters for reproduction

   (2) ☐ suggested activities

   (3) ☐ content for discussion

   (4) ☐ films

11. What was the least helpful in materials used?

   (1) ☐ masters for reproduction

   (2) ☐ suggested activities

   (3) ☐ content for discussion

   (4) ☐ films

12. Did you teach in the area of pedestrian safety this semester?

   (1) ☐ no

   (2) ☐ yes

   If no, why were the pedestrian safety materials not utilized?

   Please check as many as apply:

   (1) ☐ were not appropriate for grade level i.e. too difficult or too easy

   (2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

   (3) ☐ information was not applicable to traffic environment in your area

   (4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

   (5) ☐ felt students already knew material

   (6) ☐ did not have enough time to teach

   (7) ☐ other (please explain): _____

   _____

13. Did you teach the area of bicycle safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the bicycle safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

14. Did you teach the area of school bus safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the school bus safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

15. Did you teach the area of passenger safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the passenger safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

16. What changes do you feel would be desirable in the materials, including additions and deletions.

Please write your comments here:

(For teachers of 4-6th grades)

QUESTIONNAIRE TO TEACHERS

CONCERNING

THE K-9 TRAFFIC SAFETY CURRICULUM

(for research only)

PLEASE PRINT

1. LAST NAME _____

2. FIRST NAME _____

3. SCHOOL _____

4. Circle the grade or grades that you are presently teaching.

   k 1 2 3 4 5 6 7 8 9

5. Were you involved in the K-9 traffic safety curriculum workshops?

   (1) ☐ yes

   (2) ☐ no

6. Considering everything, check your overall appraisal of the K-9 traffic safety curriculum for your grade level.

   (1) ☐ excellent

   (2) ☐ good

   (3) ☐ fair

   (4) ☐ poor

7. To what extent did you use the K-9 traffic safety curriculum materials?

   (1) ☐ not at all

   (2) ☐ a little

   (3) ☐ somewhat

   (4) ☐ considerably

8. In what context were the materials used?

   (1) ☐ as a separate unit

   (2) ☐ integrated into existing curriculum

   (3) ☐ both of the above

9. Did you find using the materials to be:

   (1) ☐ difficult

   (2) ☐ reasonable

   (3) ☐ easy

10. What was the most helpful in materials used?

   (1) ☐ masters for reproduction

   (2) ☐ suggested activities

   (3) ☐ content for discussion

   (4) ☐ films

11. What was the least helpful in materials used?

   (1) ☐ masters for reproduction

   (2) ☐ suggested activities

   (3) ☐ content for discussion

   (4) ☐ films

12. Did you teach in the area of pedestrian safety this semester?

   (1) ☐ no

   (2) ☐ yes

   If no, why were the pedestrian safety materials not utilized?

   Please check as many as apply:

   (1) ☐ were not appropriate for grade level i.e. too difficult or too easy

   (2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

   (3) ☐ information was not applicable to traffic environment in your area

   (4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

   (5) ☐ felt students already knew material

   (6) ☐ did not have enough time to teach

   (7) ☐ other (please explain): _____

   _____

13. Did you teach the area of bicycle safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the bicycle safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

14. Did you teach the area of school bus safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the school bus safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enought time to teach

(7) ☐ other (please explain): _____

_____

15. Did you teach in the area of farm machinery safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the farm machinery safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

16. Did you teach the area of mini-cycle safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the mini-cycle safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, ☐ projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

17. Did you teach the area of passenger safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the passenger safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

18. What changes do you feel would be desirable in the materials, including additions and deletions.

Please write your comments here:

(For teachers of 7th grade)

QUESTIONNAIRE TO TEACHERS

CONCERNING

THE K-9 TRAFFIC SAFETY CURRICULUM

(for research only)

PLEASE PRINT

1. LAST NAME _____

2. FIRST NAME _____

3. SCHOOL _____

4. Circle the grade or grades that you are presently teaching.

k 1 2 3 4 5 6 7 8 9

5. Were you involved in the K-9 traffic safety curriculum workshops?

(1) ☐ yes

(2) ☐ no

6. Considering everything, check your overall appraisal of the K-9 traffic safety curriculum for your grade level.

(1) ☐ excellent

(2) ☐ good

(3) ☐ fair

(4) ☐ poor

7. To what extent did you use the K-9 traffic safety curriculum materials?

(1) ☐ not at all

(2) ☐ a little

(3) ☐ somewhat

(4) ☐ considerably

8. In what context were the materials used?

(1) ☐ as a separate unit

(2) ☐ integrated into existing curriculum

(3) ☐ both of the above

9. Did you find using the materials to be:

(1) ☐ difficult

(2) ☐ reasonable

(3) ☐ easy

10. What was the most helpful in materials used?

(1) ☐ masters for reproduction

(2) ☐ suggested activities

(3) ☐ content for discussion

(4) ☐ films

11. What was the least helpful in materials used?

(1) ☐ masters for reproduction

(2) ☐ suggested activities

(3) ☐ content for discussion

(4) ☐ films

12. Did you teach in the area of pedestrian safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the pedestrian safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

13. Did you teach the area of bicycle safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the bicycle safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

14. Did you teach the area of school bus safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the school bus safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

15. Did you teach the area of motorcycle safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the motorcycle safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

16. Did you teach the area of tractor safety this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the tractor safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

17. What changes do you feel would be desirable in the materials, including additions and deletions.

Please write your comments here:

(For teachers of 8th grade)

QUESTIONNAIRE TO TEACHERS

CONCERNING

THE K-9 TRAFFIC SAFETY CURRICULUM

(for research only)

PLEASE PRINT

1. LAST NAME _____

2. FIRST NAME _____

3. SCHOOL _____

4. Circle the grade or grades that you are presently teaching.

   k 1 2 3 4 5 6 7 8 9

5. Were you involved in the K-9 traffic safety curriculum workshops?

   (1) ☐ yes

   (2) ☐ no

6. Considering everything, check your overall appraisal of the K-9 traffic safety curriculum for your grade level.

   (1) ☐ excellent

   (2) ☐ good

   (3) ☐ fair

   (4) ☐ poor

7. To what extent did you use the K-9 traffic safety curriculum materials?

   (1) ☐ not at all

   (2) ☐ a little

   (3) ☐ somewhat

   (4) ☐ considerably

8. In what context were the materials used?

   (1) ☐ as a separate unit

   (2) ☐ integrated into existing curriculum

   (3) ☐ both of the above

9. Did you find using the materials to be:

   (1) ☐ difficult

   (2) ☐ reasonable

   (3) ☐ easy

10. What was the most helpful in materials used?

   (1) ☐ masters for reproduction

   (2) ☐ suggested activities

   (3) ☐ content for discussion

   (4) ☐ films

11. What was the least helpful in materials used?

   (1) ☐ masters for reproduction

   (2) ☐ suggested activities

   (3) ☐ content for discussion

   (4) ☐ films

12. Did you teach the area of passenger safety this semester?

   (1) ☐ no

   (2) ☐ yes

   If no, why were the passenger safety materials not utilized?

   Please check as many as apply:

   (1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

   (2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

   (3) ☐ information was not applicable to traffic environment in your area

   (4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

   (5) ☐ felt students already knew material

   (6) ☐ did not have enough time to teach

   (7) ☐ other (please explain): _____

13. Did you teach the area of roadway types and traffic environments, components of the highway design and management system this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the roadway types and traffic environments, components of the highway design and management system materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

14. Did you teach the area of traffic signs and markings this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the traffic signs and markings materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

15. Did you teach the area of auto trip planning this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the auto trip planning materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

16. Did you teach in the area of emergency procedures this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the emergency procedures materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

17. Did you teach in the area of the future of the traffic environment this semester?

(1) ☐ no
(2) ☐ yes

If no, why were the future of the traffic environment materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy
(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught
(3) ☐ information was not applicable to traffic environment in your area
(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.
(5) ☐ felt students already knew material
(6) ☐ did not have enough time to teach
(7) ☐ other (please explain): _____

_____

18. What changes do you feel would be desirable in the materials, including additions and deletions.

Please write your comments here:

(For teachers of 9th grades)

QUESTIONNAIRE TO TEACHERS

CONCERNING

THE K-9 TRAFFIC SAFETY CURRICULUM

(for research only)

PLEASE PRINT

1. LAST NAME _____
2. FIRST NAME _____
3. SCHOOL _____
4. Circle the grade or grades that you are presently teaching.

   k 1 2 3 4 5 6 7 8 9

5. Were you involved in the K-9 traffic safety curriculum workshops?

   (1) ☐ yes
   (2) ☐ no

6. Considering everything, check your overall appraisal of the K-9 traffic safety curriculum for your grade level.

   (1) ☐ excellent
   (2) ☐ good
   (3) ☐ fair
   (4) ☐ poor

7. To what extent did you use the K-9 traffic safety curriculum materials?

   (1) ☐ not at all
   (2) ☐ a little
   (3) ☐ somewhat
   (4) ☐ considerably

8. In what context were the materials used?

   (1) ☐ as a separate unit
   (2) ☐ integrated into existing curriculum
   (3) ☐ both of the above

9. Did you find using the materials to be:

(1) ☐ difficult

(2) ☐ reasonable

(3) ☐ easy

10. What was the most helpful in materials used?

(1) ☐ masters for reproduction

(2) ☐ suggested activities

(3) ☐ content for discussion

(4) ☐ films

11. What was the least helpful in materials used?

(1) ☐ masters for reproduction

(2) ☐ suggested activities

(3) ☐ content for discussion

(4) ☐ films

12. Did you teach in the area of the highway transportation system this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the highway transportation system materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

13. Did you teach in the area of the driving task this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the driving task materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

14. Did you teach in the area of entry into the highway system this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the materials on entry into the highway system not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

15. Did you teach in the area of the highway user this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the pedestrian safety materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

16. Did you teach in the area of self-evaluation of driving attitudes this semester?

(1) ☐ no

(2) ☐ yes

If no, why were the self evaluation of driver attitudes materials not utilized?

Please check as many as apply:

(1) ☐ were not appropriate for grade level, i.e. too difficult or too easy

(2) ☐ could not be easily integrated into the existing curriculum, i.e. subjects regularly taught

(3) ☐ information was not applicable to traffic environment in your area

(4) ☐ did not have convenient access to necessary equipment, i.e. films, projectors, etc.

(5) ☐ felt students already knew material

(6) ☐ did not have enough time to teach

(7) ☐ other (please explain): _____

_____

17. What changes do you feel would be desirable in the materials, including additions and deletions.

Please write your comments here:

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Highway Safety Research Center

university of north carolina

chapel hill, n.c.

THE EVALUATION OF THE NORTH CAROLINA K-9 TRAFFIC SAFETY CURRICULUM: METHODOLOGY, FINDINGS, AND RECOMMENDATIONS

Susan S. Padgett

September, 1975

The Evaluation of the North Carolina K-9 Traffic Safety Curriculum: Methodology, Findings, and Recommendations

Susan S. Padgett

University of North Carolina
Highway Safety Research Center

Under the direction of Research Triangle Institute, traffic safety curriculum was developed for use in kindergarten through ninth grades. Through workshops, teachers were involved in the curriculum development from the beginning. This curriculum was pilot tested in fourteen public schools in the eastern and western areas of North Carolina, and was taught by both workshop and nonworkshop participants. The purpose of the evaluative research described below was to determine the effectiveness of the curriculum to provide input for the revision of curriculum materials.

METHODOLOGY

The evaluation of the kindergarten through ninth grade traffic safety curriculum was conducted in three parts. The first concerned the extent to which the students acquired the information included in the curriculum; that is, how much did they learn. The second concerned the extent to which the students showed a change in their actual pedestrian and bicyclist behavior. The third part of the evaluation concerned the extent to which teachers actually made use of the curriculum materials and what changes they would recommend.

To determine the extent of knowledge increase, tests were developed for the third, sixth, and ninth grade levels based on the curriculum content. Forty items were developed at each designated grade level. The schools in which the curriculum was being taught were designated experimental schools. Control schools were selected from within the same school systems and on the basis of input from the local teachers and administrators as to which schools could be considered comparable. Within each grade level, four schools were used, two designated as experimental and two as control. To insure better geographic coverage of the state, for each grade level, experimental and control schools were equally distributed between the eastern and the western areas. Three classes were tested within each school, resulting in a total of twelve classes tested for each grade level. Twenty test items at each grade level were randomly chosen for pretests which were administered at both experimental and control schools early in the semester. After the curriculum had been taught in the experimental

schools, post-tests including all forty items at each grade level were administered to the same students previously tested.

The analysis of these data was designed to answer a basic question: How much knowledge did the student acquire as a result of the program? A statistical test (2-tailed t test for paired data) was chosen to indicate whether the change in amount of knowledge was great enough to be significant.

Table 1 illustrates the evaluation design used.

Table 1. Design for knowledge testing.

	Experimental Schools	Control Schools
Before curriculum	Pre-test	Pre-test
Treatment	Exposure to curriculum	No exposure to curriculum
After curriculum	Post-test	Post-test

In the second part of the evaluation, a filming system was developed and utilized for recording the pedestrian and bicyclist behavior in the school area, again before and after the curriculum was used. Observations were filmed at two elementary schools, one control and one experimental school in the same school district. Schools were selected to be filmed on the basis of their covering the same grade levels, and having children walking and riding bicycles home from school. Again input from the local teachers and administrators was used in the selection of these schools.

A super 8 movie camera on a tripod was used. It was placed at an obscure, elevated location near the schools' crosswalks. The camera was turned on and off with a ten-foot cable release.. Thus, the children were unaware that they were being filmed. The total filming time was approximately four minutes; however, this represents about 15 minutes of behavior since the camera was operated only when the children were actually crossing the street.

It could be argued that the crosswalk outside the school may not be the most appropriate place to be filming observations, since students are more likely to be involved in traffic crashes several blocks away from the school rather than right next to it. However, filmed observations at locations more remote from the school ground would yield relatively few observations at a corresponding increase in cost. Furthermore, if a traffic safety curriculum is to have any impact it might be expected that the greatest effects would be apparent closest to the school. Consequently in order to maximize the possibility of observing an effect of the traffic safety curriculum, the decision was made to film students at the crosswalks next to the schools.

Films were made in September and again in February. It was anticipated that there might be seasonal variations in students' behavior at the crosswalks, that is, in the springtime the students might be more active than earlier in the year. A control school was included in the design to take into account any such seasonal effects. In addition, at both schools both before and after the curriculum was taught, the films were made in bright clear weather.

A coding sheet was developed for recording observations of the filmed pedestrian and bicyclist behavior. The sheet provided space for tallies of the following:

(1) students walking across the street
(2) students running across the street
(3) students walking bikes across street
(4) students riding bikes across street
(5) students remaining on curb until patrol indicated right-of-way
(6) students failing to remain on curb until patrol indicated right-of-way
(7) students crossing within the marked crosswalks
(8) students crossing outside the marked crosswalks

The behaviors numbered 1, 3, 5, and 7 were drawn directly from the curriculum materials and were among those behaviors the curriculum was attempting to foster.

If a student engaged in unsafe behavior at any point while crossing the intersection (see numbers 2, 4, 6, and 8), only his unsafe behavior was recorded. For example, if in crossing, a student walked three quarters of the way, and ran the last quarter, he was counted as running.

To increase the reliability of the observations made, a panel of three judges was selected to view the films. The judges were not told which school was experimental and which was control. First, the films were viewed and the observations recorded by each judge independently. A measure of the inter-judge reliability (the ratio of within variation to total variation) indicated high agreement.

After the judges had independently recorded their observations, they compared their separate sets of observation data. The films were then viewed again, observations discussed, and discrepancies resolved.

Table 2 illustrates the design used.

Table 2. Design for behavioral observations.

	Experimental School	Control School
Before curriculum	Bicyclist & pedestrian behavior filmed	Bicyclist & pedestrian behavior filmed
Treatment	Exposure to curriculum	No exposure to curriculum
After curriculum	Bicyclist & pedestrian behavior filmed	Bicyclist & pedestrian behavior filmed

For the third part of the evaluative study, questionnaires were developed for grade levels K-3, 4-6, 7, 8, and 9 to determine: (1) how useful the materials were; (2) how much they were actually used; (3) which parts were not used and why; and (4) what changes the teachers would recommend.

The fourteen experimental school principals provided a listing of all the teachers in their schools involved in the K-9 traffic safety program. Each of these teachers was mailed a questionnaire. All questionnaire responses were recorded.

FINDINGS

Knowledge Acquired

The students exposed to the curriculum at the third and sixth grade levels showed significant increases in knowledge compared to students in control schools. However, no significant differences were found between the two groups on the ninth grade level.

There are a number of possible contributing factors which may account for the failure to observe an increase in knowledge at the ninth grade level. These included, first, the higher attrition rate between pre-tests and post-tests at the ninth grade level. The analysis used included only those students for whom both a pre-test and a post-test were obtained. At grade 3 there was a 22 percent loss of students between pre-testing and post-testing compared with a 14 percent loss at grade 6 and a 44 percent loss at grade 9. Second, there were relatively fewer traffic safety teachers for the ninth grade, thus necessitating larger classes and possibly making it more difficult to communicate the information. Third, the ninth grade students may have had more difficulty recalling information because the curriculum was presented for only three weeks in the ninth grade, while for the elementary grades it was spread over several months. From the data, there is no way of knowing how long the interval was between the completion of the ninth grade mini-course and the post-testing of the students. Since retention is likely to vary with the length of time since the

curriculum was completed, this factor could have affected the findings. Fourth, information obtained from the teacher questionnaire indicated that the ninth grade teachers were less satisfied with the curriculum materials. Fifth, there appeared to be more confusion concerning the administration of the 7-9 traffic safety program in comparison to the other levels. To illustrate, an eighth grade teacher reported that the ninth grade teachers in her school requested that the traffic environment materials (designed for grade eight) not be taught in the eighth grade. A ninth grade teacher reported teaching the unit "along with the driver education work," when the unit was designed as a pre-driver education mini-course. This same teacher reported teaching traffic safety from her workshop notes before receiving the curriculum and before the pre-tests. She was apparently instructed to follow this procedure. After she had received the curriculum, however, she taught the material from that. However, when the findings were examined for grade 9, with the test scores from this school omitted, there was still no indication of an increase in knowledge. In addition, one eighth grade teacher in an experimental school reported on the questionnaire that she was unaware of the existence of the traffic safety curriculum even though she was teaching in an experimental school. These problems could, to varying degrees, be alleviated in the expanded use of the traffic safety curriculum. Hopefully such efforts would lead to a greater impact of the curriculum at the ninth grade level.

Behavior Observed

The limited observations which we did obtain of students leaving school did not show the type of effects that would be hoped for.

For both experimental and control schools, a greater proportion of the children were running, and a smaller proportion of the children were crossing outside the marked crosswalks in the post-curriculum films as compared to the pre-curriculum films. In addition, a large proportion, 89 percent or greater, remained on the curb until the patrol indicated the right-of-way in all the films--experimental and control schools, before and after the curriculum. No comparisons can be made relevant to the bicycle behavior, however, because of the very small frequency of bicyclists in the experimental films.

These results must be interpreted with caution, however, because the number of observations were not sufficient to draw firm conclusions. There were only 14 pilot schools from which to sample, and eight of those schools were in the mountains of North Carolina where students are bused. Of the six remaining schools, all in the east, only two were strictly elementary (grades 1-6). Therefore, the behavioral facet of the evaluation is presented primarily for its methodological interest.

Teacher Responses

The questionnaire was mailed to all the teachers using the curriculum. Of the teachers contacted, 90.5 percent completed and returned the questionnaire.

For the most part, the workshop and nonworkshop teachers on all grade levels rated the curriculum "good," used it "considerably" or "somewhat," found using the materials to be "reasonable," and considered the suggested activities "most helpful" and the curriculum films "least helpful." In general, both workshop and nonworkshop teachers used the curriculum "both" as a separate unit and integrated into the existing curriculum, on grade levels K-6; and "solely" as a separate unit at grade levels 7-9.

Of importance, overall a larger proportion of the workshop participants used the materials than the nonworkshop teachers. The materials that were reported unused by the majority of both groups of teachers, workshop and nonworkshop, focused on the areas of farm machinery and minicycle safety for grades 4-6, tractor safety for grade seven, and auto trip planning for grade 8. The major reason given for non use was inadequate time. Other reasons included lack of relevance for the particular students involved.

Seventy-seven percent of the teachers returning the questionnaire provided recommendations for changes as well as comments about the curriculum. These comments alone were indicative of a high interest and concern among the teachers. Among the recommendations from the teachers, those most frequently expressed included the desire for additional and more readily available audio-visual materials; ready-made masters for reproduction with larger and less crowded type; simpler student activities in general.

In summary, the results indicate that a traffic safety curriculum was developed that was generally accepted and used by the teachers. Furthermore, at the elementary level it was associated with significant increases in traffic safety knowledge on the part of the students. However, the limited measures that were made of the actual student pedestrian and bicyclist behavior failed to show an effect of the curriculum. Because of the limited behavioral observations that were obtained, it would be premature to arrive at any firm conclusions concerning the impact of the curriculum on behavior. The size of the sample observed was such that only a fairly marked change in behavior would have been detected. Therefore the behavioral observations should be considered primarily in terms of whatever interest they may have from a methodological standpoint.

The traffic safety curriculum was conducted as a pilot project initially because it was generally agreed that we did not know at this time the best possible way to teach such a curriculum. The evaluation of this pilot effort was conducted with the purpose of providing information on which to base recommendations and changes in the curriculum. While recognizing that no evaluation is conclusive, the following recommendations were offered for consideration in the expansion and revision of the traffic safety curriculum.

1. Curriculum revisions should include greater focus on behavioral practice of the traffic safety principles being taught. This recommendation is more easily made than implemented. To provide behavioral practice in traffic safety principles may require facilities other than the

traditional classroom. At the elementary level the physical education period could offer one opportunity.

2. Because the curriculum is just one approach to traffic safety and like any other approach has its limitations, it was also recommended that exploration be made of possibilities involving individuals other than classroom teachers in instruction in safe traffic behavior. Perhaps the school patrol could be provided with training that would enable them to reinforce the instruction being given in the traffic safety curriculum. Likewise, school bus drivers could perhaps become involved as liason personnel in providing additional real world instruction in safe passenger and pedestrian behavior. Other community members possibly could be involved as aides to teachers in providing students with on-the-scene instruction in traffic safety.

3. Because the implementation of the curriculum was relatively smooth at the elementary school level, because the results looked most promising at this level, and because there appear to be considerable problems in the administration of the curriculum at the junior high level, serious consideration should be given to focusing available resources on the elementary school level and omitting the junior high program. The statistics concerning the age of pedestrian injuries and deaths would support such a focus.