

PACIFIC SOUTHWEST Forest and Range Experiment Station

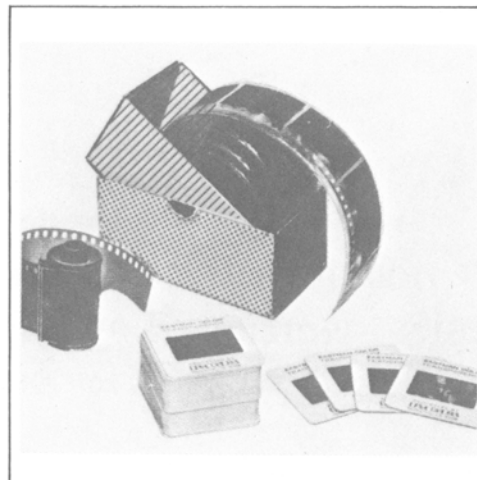
FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

TEAM TEACHING FIRE PREVENTION PROGRAM: evaluation of an education technique

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Members of the San Bernardino Ranger Unit and administrators, teachers, and students of the San Bernardino County schools submitted graciously to the extra demands made upon them by the study.

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Pacific Southwest Forest and
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P.O. Box 245, Berkeley, California 94701

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IN BRIEF...

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Team Teaching is an important part of a coordinated program developed by the California Department of Forestry to meet the challenge of children-caused forest fires. Teams of from four to eight members conduct the program in individual classrooms. Each session is made up of three segments of about 10 minutes in length: (1) small group work; (2) slide presentation; (3) visit by Smokey Bear. The program has been in operation over much of the State for several years, and although informal feedback continued favorable, the Department felt the need for a more objective appraisal of its effectiveness.

In 1974, a State-wide survey was made involving school teachers and principals who had experienced the program in their classrooms, and Department personnel who had conducted the program. The response to the survey was quite uniformly favorable to the program. The intimate, small group discussion

method, which is central to the program, was strongly praised, as was the competence of the team members making the presentations.

This endorsement by those familiar with the program was encouraging, but the Department felt the need for an assessment that more directly examined the effect of the program on the students, themselves. In 1976, a study was conducted in San Bernardino County, California, in which children were tested before and after exposure to the program, and their responses compared with those from children who had not received the program. Students exposed to the program scored higher in tests of their understanding of fire prevention principles than did those who had not been exposed. Grade level and socio-economic status affected test performance. No differences, however, were observed in terms of attitude scores.

The decades following World War II were marked by rapid and drastic changes in the numbers, distribution, and living patterns of people residing in California. One aspect of these changes of particular concern to the California Department of Forestry was the significant, and growing, proportion of wildfires attributed to children. The Department's concern extended beyond the immediate problem of children-caused fires to what it portended for the future when this generation of children became careless adults.

In an effort to meet the challenge of this problem, the California Department of Forestry has developed a Five-Point Conservation and Fire Prevention Education Program for children in the early elementary grade levels. Included are classroom and individualized teaching materials, a series of short films, and a teacher training course. One important part of this Five-Point Program is its Team Teaching effort. Since 1967, the Department has introduced thousands of children in grades kindergarten through second to various themes of fire prevention through this program. The last several years have seen a drop in the proportion of "children-with-matches" fires reported in the State's fire statistics after about 20 years of increases.

The Team Teaching Fire Prevention Program is a labor-intensive, and therefore expensive, activity.

Consequently, although the informal feedback was highly complimentary, the Department of Forestry was interested in having the program evaluated. In 1974, a survey was made of teachers and school principals who had experienced the program in their classrooms and of Department personnel who had been involved in actually conducting the program. The purpose of the survey was to determine their opinions of the effectiveness of the program.

Then in 1976, a study was conducted with students who had been exposed to the program to determine if it was effective, both in terms of students' understanding of fire prevention practices and in their attitudes toward various fire-related phenomena.

The two studies were made as part of an ongoing program of research on the problem of man-caused forest fires. The research is supported jointly by the Pacific Southwest Forest and Range Experiment Station and by the California Department of Forestry.

This paper summarizes results of the two studies¹ designed to measure the effectiveness of the Team Teaching Fire Prevention Program in California by surveying program participants. Other aspects of the program that might be evaluated in future studies are also summarized.

TEAM TEACHING FIRE PREVENTION PROGRAM

The original concept for the Team Teaching Program was developed by Richard K. Goings, then head of the Project Butte Fire Prevention Education Program, in cooperation with Dr. James F. Lindsey, who was principal of the laboratory school at California State University, Chico. Their work was part of an intensive fire prevention experiment in Butte County, California.²

In contrast to the traditional lecture method or the showing of a film to an auditorium full of children, the Team Teaching Program is conducted in three segments within individual classrooms:

1. Small group work (four to seven pupils in a group).
2. Slide or film presentation.
3. Visits by Smokey Bear, and reinforcement of principles learned.

Each segment lasts 10 minutes or less. The instruc-

tor is expected to stop before the collective attention span has lapsed.

The fire prevention teaching team is composed of about five to eight trained fire specialists from the local Ranger Unit of the California Department of Forestry. One member serves as team leader. After a brief introduction, the team arbitrarily divides the class into small groups. Members of each group, in close eye-to-eye contact with a team member, discuss their responses to "Smokey's rules" for fire prevention and fire safety:

1. Do not play with matches.
2. If you find matches at home give them to a teacher or another adult.
3. If you find matches on the way to school, give them to the bus driver, teacher, principal, or another adult.
4. If you see someone else playing with matches, take the matches away and give them to an adult, if the

² Folkman, William S. 1973. *Fire prevention in Butte County . . . evaluation of an experimental program*. USDA Forest Serv. Res. Paper PS W-98, 23 p., Pacific Southwest Forest and Range Exp. Stn., Berkeley, Calif.

¹ *The evaluation of Team Teaching program of the California Division of Forestry, 1968-1974*, by Frank H. Gladen, and *Effectiveness of the Team Teaching Fire Prevention Program*, by Frank L. Ryan. (Unpublished reports on file at the Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.)

person is younger than you, or tell an adult.

5. If you see a fire burning out of control, don't try to put it out yourself, tell an adult.

These five rules serve as the instructional core that repetitively surfaces during each segment of the program. Following the small-group discussion, all students in the classroom are gathered together for a slide presentation conducted by the team leader. The slides depict forest wildlife, fire hazardous situations, and other forest fire-related subjects. The culminating experience is a visit by Smokey Bear (played by a team

member). Smokey reviews with the children the rules of fire they have learned.

The program was started with 11 kindergarten classes in the Oroville, Butte County area. It has since been extended to most of California, and agencies in other parts of the country have adopted the program. The original team was used as a cadre in training other teams. Later this training became a part of the Department of Forestry's Fire Academy curriculum at Lone, California. A training film has been developed to aid in the training of teams of teachers.³

RESULTS

Public School Personnel Questionnaire

Two hundred forty-three questionnaires were mailed to principals and teachers who participated in the program. A 65 percent return of useable responses was obtained.

Approximately 95 percent of the respondents considered the teaching approach used in the program to be a highly satisfactory method of presenting the fire prevention message. Because the team teachers are only in a classroom for a short period of time, the regular classroom teacher is encouraged to reinforce the program with some type of follow-up activity. The questionnaire response indicated that 63 percent of the teachers frequently did so. The others were reported to sometimes reinforce the instruction. Thirty-five percent of the teachers said that the messages of the program had become a part of their curriculum through an increased general awareness.

When asked to rate the Team Teaching Program in comparison with other outside programs presented in their school in the previous three years, 85 percent of the respondents rated it better than most, 10 percent considered it about average; and the others did not answer.

The Department of Forestry team members were unanimously reported to be reliable in their arrangements with the school as to date, time, and place. The Department prefers to give the program in the spring because of its nearness to the fire season. The schools likewise felt that this was the logical time for the program.

The program has usually been presented to kindergarten and first grade students. Eighty-nine percent of the school respondents felt that it would be appropriate to extend it to grades two and three.

Ranger Unit Personnel Questionnaire

The Butte County Ranger Unit began using the program in 1967. In 1970 another Ranger Unit became involved; in 1971, two more; in 1972, six; and in 1973 four additional Units began using the program.

Questionnaires were sent to all Ranger Units throughout California, except for those where it was definitely known that they had not participated in the program. Of the 18 Ranger Units contacted, five reported that they were not currently participating in the program although one had done so previously.

The Team Teaching Program was reported to be in operation usually November through May. The bulk of its activity was concentrated in March, April, and May.

Numbers of people making up the teams ranged from four to eight, with seven being the typical number.

The amount of effort expended and the coverage obtained by the units engaged in the program were:

<i>Years:</i>	<i>Man-hours expended</i>	<i>Schools visited</i>	<i>Children contacted</i>
1971	2,110	84	4,188
1972	4,382	231	23,899
1973	5,924	287	28,022

This represents an expenditure of approximately 0.2 man-hours per child instructed. Most respondents mentioned manpower limitations as the principal problem they experienced in conducting the program. The responses to the questionnaire reflected a high degree

³ Film is available for review from the California Department of Forestry, 1416 Ninth Street, Sacramento, California 95814.

of enthusiasm for the program and a feeling that it was very worthwhile. Fifty-seven percent of the units reported a decrease in the incidence of children-caused fires as a result of their team teaching activity. The other units reported that they had not yet detected any change. None reported any increase.

Only two respondents offered suggestions about how the benefits of the Team Teaching Program could be achieved at lower cost. One suggested making better transportation arrangements. Another proposed that summer fire fighters be hired early and used in teaching under supervision.

In summary, a poll of Team Teaching members and their clients showed a high level of satisfaction with the program. Although this result may represent an accurate assessment of the effectiveness of the program, it remained essentially a subjective impression, however widely shared. The ultimate test remains—what effect does exposure to the program have on the children? Regardless of how good everyone feels about the experience, the program fails to meet its objectives if the pupils do not learn fire-safe behavior. Consequently, it was deemed necessary to conduct a study to directly evaluate the effect of the program on students experiencing it.

Evaluation of Effects on Students

The main purpose of this study was to determine if the program was effective, both in terms of students understanding fire prevention practices and of their attitudes toward various fire-related phenomena. This focus was in contrast to the earlier study's concentration on the receptivity to the program by teachers and school administrators.

Key personnel from throughout California who were identified as policy makers, planners, or instructional leaders for the program were contacted to determine the current objectives of the program. It became clear that a continuing primary objective of the program's instruction was to have the students be able to recognize and recall the five rules of fire prevention. Other objectives were that the children develop a cautious respect for fire and matches and a positive attitude toward rangers.

On the basis of data collected concerning the specific objectives of the program, we developed and tested some measures of achievement and attitudes.⁴

⁴ Detailed explanation of these measures is available upon request to the Wildfire Prevention Research Unit, Pacific Southwest Forest and Range Experiment Station, P. O. Box 245, Berkeley, California 94701.

San Bernardino County was selected as the site for the study. This decision was based on several factors, including the accessibility of the county to the evaluators from the University of California, Riverside; the diversity of the population; a history of an early entrance and active participation of the San Bernardino Ranger Unit in the program; and, very importantly, the willingness of the San Bernardino Ranger Unit staff to cooperate in such an evaluative undertaking.

With the assistance of county and district school officials, all schools in San Bernardino County that had not participated in the Team Teaching Fire Prevention Program since 1973 were classified as being low, middle, or high socio-economic status (SES), and either urban or rural. Using the resultant classifications and based on proportional data available for the State of California as to the stratification factors of SES level and geographic region (U.S. Department of Commerce 1976), we selected a random sample of schools for the study. All kindergarten through second grade classrooms within each school selected (with the exception of special classes, such as the trainable mentally retarded), were included in the study. Twelve schools with an enrollment of 2451 kindergarten, first-, and second-grade students were randomly selected for further evaluation.

Although all kindergarten, first- and second-grade students in those schools randomly selected were provided the procedures of the study, final statistical analysis was confined to those students in a final randomized selection. The number selected was based on the percentage distribution of California families among the SES levels, in both urban and rural areas. We concluded that the application of the stratified technique provided for an adequate simulation of the State of California—at least with respect to SES and geographical area.

Classes within each of the study schools were randomly designated as either experimental or control classes. On any particular day of the team teaching, experimental classes first received instruction, followed by administration of the attitudinal and achievement tests. Control classes were first tested and then received the fire prevention instruction. For the purposes of the evaluation, it was not necessary for the control classes to receive the instruction, but it served to preserve student morale. Furthermore, it served to conceal the experimental and control class designations from all but the members of the evaluation staff.

Differences between experimental and control scores on the achievement tests were marked, indicating that students did attain specific understandings as a

Table 1— Achievement test means and standard deviations for experimental and control groups, by grade and socio-economic level

Socio-economic status level and test ¹	Kindergarten				First grade				Second grade			
	Experimental		Control		Experimental		Control		Experimental		Control	
Low	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
1	4.33	1.23	2.30	1.99	6.73	2.31	3.49	1.97	7.48	1.87	4.72	2.34
2	5.41	1.90	1.51	1.27	6.19	2.39	2.93	2.28	7.96	2.24	3.37	1.99
3	9.40	2.32	4.98	2.72	10.28	2.91	5.78	3.03	13.01	3.41	7.01	3.56
Medium												
1	5.01	2.17	1.97	1.20	6.62	2.26	2.91	1.66	8.61	2.29	2.98	2.12
2	4.11	1.87	2.36	2.20	6.91	2.11	3.23	2.24	9.14	2.33	4.27	2.13
3	10.01	2.47	5.07	2.84	10.23	3.27	6.30	3.20	12.95	2.99	7.73	3.73
High												
1	6.82	1.24	3.27	2.21	8.15	2.13	4.12	2.34	9.35	2.42	5.43	2.00
2	6.92	1.90	3.53	1.88	7.78	1.99	4.75	2.42	8.90	2.33	5.20	2.26
3	11.65	2.06	6.99	3.02	14.21	3.81	7.29	3.14	15.90	3.08	8.39	3.11

¹1 = Measure of recall of fire rules.
²2 = Measure of applied knowledge.
³3 = Composite factor.

result of their participation in the program (table 1). The achievement tests measure three different elements: (1) recall of the five rules of fire prevention emphasized in Team Teaching; (2) the transfer or application of knowledge learned; and, (3) a measure derived by factor analysis containing test items from the first two elements and, therefore, labeled the Composite Factor. (Significance of differences noted were determined by multi- and uni-variate analysis of variance.)

Analysis of the achievement test data gave these results:

1. The experimental group performed better than the control group on each of the three achievement measures.
2. The performance was significantly better whether measured by an over-all or average of the three dependent variable scores or by each separate dependent variable score.
3. The second graders performed better than the first-graders or kindergartners.
4. First-grade students performed better than those in kindergarten.
5. Students of high socio-economic status performed better than those of middle or low status.
6. Students in the middle and low socio-economic status did not differ in scores.
7. No interactive effects between the variables were found.

Although the response scales for the attitude tests had been written for three constructs (fires, matches, rangers), factor analysis show student responses clustering about just two factors, with rangers dominating

one factor and matches the other. The construct, fires, was a subordinate element in each factor.

Scores for all grade levels for both experimental and control groups show little variation (table 2). All tend to cluster in the lower quartile for the test in which possible scores range from 10 to 30. Analysis of these data showed:

1. No differences on any variable were observed in terms of attitude scores.
2. No interactive effects were apparent.
3. No differences on each separate dependent variable due to attitude were evident.

In one of the schools included in the study, the program was implemented by using a woman volunteer team and a regular fire personnel team. The classes were randomly assigned to the two teams. In terms of student achievement, both women volunteers and regular personnel were effective, the regular personnel more so than the volunteers. There was no evidence that either team produced any attitude change on the part of students (table 3).

In summary, the evaluation of the effects of the program on students suggests that students acquired understandings as measured by recall of the five rules and as measured by the applied-knowledge test. Such increased understanding occurred at each of the grade levels studied, with second graders outperforming first graders and kindergartners, and first graders achieving more than kindergartners. Students in each of the three socio-economic status levels also showed improvement, but with those in the high SES outperforming students from middle and low SES. Both women volunteers and regular fire personnel proved effective

instructors, but regular personnel produced more student achievement than did the volunteers. There was

no evidence that student attitudes changed as a result of the program's instruction.

Table 2 — Attitudinal means and standard deviations for experimental and control groups, by grade and socio-economic status (SES) level

Socio-economic status level and score ¹	Kindergarten				First grade				Second grade			
	Experimental		Control		Experimental		Control		Experimental		Control	
Low	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
1	13.28	2.97	14.34	3.31	14.15	3.06	12.99	2.96	13.80	4.02	14.28	4.71
2	14.01	3.52	14.22	2.72	13.82	3.71	13.66	3.42	14.29	5.71	14.23	3.56
Medium												
1	14.20	3.26	12.99	3.91	13.63	2.41	14.12	3.36	13.71	4.37	13.55	4.33
2	13.72	2.90	13.12	3.76	13.39	3.69	13.72	3.29	13.77	6.05	14.09	3.12
High												
1	14.31	2.91	13.43	2.75	13.04	3.72	14.01	4.75	14.61	4.13	14.37	3.17
2	13.92	3.55	14.61	3.83	13.95	3.21	13.39	3.20	14.27	5.73	13.82	3.92

¹1 = FIRES-matches factor

2 = RANGERS-matches factor

Table 3 — Achievement test means and standard deviations according to grade level, hr type of instructors

Instructors and tests ¹	Kindergarten				First grade				Second grade			
	Experimental		Control		Experimental		Control		Experimental		Control	
Regular fire personnel:	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
1	5.35	2.20	2.03	1.51	7.21	2.20	3.95	2.12	8.96	1.82	5.00	1.72
2	4.72	1.85	2.20	2.20	7.06	2.18	3.26	1.68	9.09	2.14	6.01	2.91
3	9.47	1.64	6.33	2.15	11.72	2.43	7.14	1.75	13.17	2.35	9.42	1.70
Women volunteers:												
1	3.21	2.43	2.03	1.51	5.26	1.49	3.95	2.12	7.79	1.68	5.00	1.72
2	3.12	1.85	2.20	2.20	4.39	1.62	3.26	1.68	8.40	1.99	6.01	2.91
3	7.89	1.97	6.33	2.15	9.21	1.71	7.14	1.75	11.15	1.74	9.42	1.70

¹1 = Measure of recall of fire rules

2 = Measure of applied knowledge

3 = Composite factor

DISCUSSION

The feedback from teachers and school administrators and the results of the student evaluation all testify to the effectiveness of the Team Teaching program. Students are certainly learning from the program. It is particularly impressive that such learning occurs within a brief 25- to 30-minute instructional period.

Some of the strengths of the program may be gleaned from the reports of teachers who had observed it in operation in their classrooms. Teachers frequently, and approvingly, mentioned how the small-group discussion method encouraged each child to

participate. They noted the ability of the rangers to deal with the children on a friendly, personal basis. The fast moving pace of the program, efficient, professional organization, and the enthusiastic involvement of the rangers were also approved.

In the main, negative criticism centered around what were apparently deviations from the established format of the program. One team requested that the children be brought to them in a vacant room rather than presenting the program in the classroom as previously arranged. From another teacher's comments it appears

that a team discontinued the small-group discussion that is central to the program and that the teacher had found so effective the previous year. In another instance, an attempt to conduct the program with too few trained members resulted in reduced individual interaction in the consequent larger groups of children. Several teachers suggested that a bilingual team member would be effective in working in schools with a number of Spanish-speaking students. There were some criticisms of the slide portion of the program—a need for a better selection of slides and a slower tempo in narration were mentioned.

Teachers were sensitive to the way some teams left them without a role in the program (some teachers apparently were even asked to leave the room during the presentation). Limiting the teachers' observation of the students' experiences left them at a disadvantage in implementing valid followups to the program.

The study of the children's responses to the program pointed out several other possibilities for amending, buttressing, or embellishing it.

Consideration should be given to the expansion of the program objectives to include not only the immediate recallable (i.e., the five rules) but also more involved forms of understanding. Thus in the slide presentation, for example, with some modification in the questions posed, students could be provided a greater opportunity to interpret and apply what they

have learned to a broader range of fire-related activities and phenomena. No additional time would be required for implementing this suggestion.

Although the study showed that regular fire personnel were more effective than volunteers in increasing student understanding, this difference should not be considered immutable. We found nothing that would suggest that volunteers could not become equally effective teachers within the program, given comparable in-service training.

By the way they conducted the discussion or phrased the questions, some instructors would provide increased opportunities for more student involvement. Others, by asking a preponderance of questions requiring a mere "yes" or "no" answer or by intonation, left little doubt as to the answer they expected. As a result, some students may have felt that they contributed little to the discussion.

Although attitude toward the program appeared to be mostly positive and the students seemed genuinely interested in seeing and listening to rangers, no attitudinal changes were detected in terms of the two constructs (Rangers—fire, Matches—fire) measured. Whether or not these results are to be interpreted as acceptable is best left to the officials of the program. As a minimal response, those with policy responsibilities might delineate more specifically the desired attitudinal objectives for the program.

FURTHER EVALUATION NEEDS

In the studies summarized here, assessments of the program were obtained from school teachers and administrators and from agency personnel involved in the program. In addition, comparisons were made between experimental and control groups and between women volunteers and regular fire personnel teachers. No study provides answers to all questions. One of the more significant functions of any research study is in posing additional significant questions. Further evaluative studies of the Team Teaching program could include answers to such questions as:

1. What are the effects, if any, of repeated student exposure to the program?
2. What are the effects of time on retention and attitude change (which often follows cognitive change) as revealed by followup testing?
3. In what ways, if any, does the incidence of fire starting change after students within an area have been

exposed to the program?

4. In what way, if any, is the program effective in terms of such behavior as getting students to turn matches in to the proper people?

5. What are ways to decrease the dependence on regular fire personnel participation without decreasing the program's effectiveness? (e.g., increase the use of trained volunteers? greater involvement of the regular classroom teachers? increase the size of the "small" groups?)

6. What are other instructional options, both in terms of materials and consequences of activities, that are as effective, or even more effective, than the present program?

As with any action program, periodic assessment should be made to assure that the integrity of the Team Teaching program is maintained and that its full potential be developed.

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The California Department of Forestry's Team Teaching Fire Prevention Program consists of small-group discussions, slides or films, and a visit by Smokey Bear to school classrooms. In a survey, teachers and principals who had experienced the program responded favorably to it. The conduct by team members also received approval. The limited criticisms of the Program centered around apparent deviations from the established format. In a separate study, students exposed to the Program scored higher in tests of their understanding of fire prevention principles than did those who had not been exposed. Grade level and socio-economic status affected test performance. No differences, however, were observed in terms of attitude scores.

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1978. **Team Teaching Fire Prevention Program: evaluation of an education technique.** Res. Paper PSW-129,6 p. Pacific Southwest Forest and Range Exp. Stn., Forest Serv., U.S. Dep. Agric., Berkeley, Calif.

The California Department of Forestry's Team Teaching Fire Prevention Program consists of small-group discussions, slides or films, and a visit by Smokey Bear to school classrooms. In a survey, teachers and principals who had experienced the program responded favorably to it. The conduct by team members also received approval. The limited criticisms of the Program centered around apparent deviations from the established format. In a separate study, students exposed to the Program scored higher in tests of their understanding of fire prevention principles than did those who had not been exposed. Grade level and socio-economic status affected test performance. No differences, however, were observed in terms of attitude scores.

Oxford: 432(794): 945.32.

Retrieval Terms: Fire prevention; education; children; program evaluation; California Division of Forestry.