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August 3, 1973

PLAQUE CONTROL AS A METHOD FOR  
IMPROVING DENTAL HEALTH INSTRUCTION

by

ROBERT BRADLEY MORRIS

A professional paper submitted to the Graduate Faculty  
in partial fulfillment of the requirements for the degree

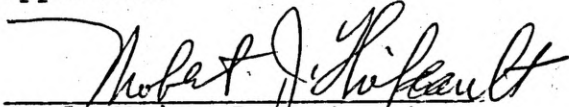
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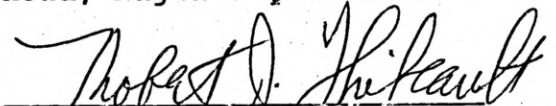
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## ABSTRACT

This study was conducted to investigate plaque control as a method for improving school dental health instruction. An effort was made to determine the influence of a recently initiated dental health education program on the elementary school students of Helena School District No. 1. The relationship between the understanding of dental disease and the actual dental health care habits of the students was the focus of this study.

To conduct this research 650 elementary students were selected to represent the population. The population defined for the investigation included all students in grades one through six attending school in Helena School District No. 1, Helena, Montana. Each student in the sample was given a knowledge and attitude inventory and a questionnaire concerning personal dental health practices. A parental questionnaire was then sent home with each of the students sampled to obtain information from the student's parents regarding the influence of the plaque control program as perceived by the student's parents.

Some of the important conclusions of this study were as follows: (a) dental health instruction emphasizing plaque control increases student knowledge, understanding, and awareness of the nature of dental disease and its cause and effects; (b) regular brushing and flossing of teeth practiced at school and reinforced at home improves student's personal dental health care habits; (c) there appears to be a relationship between the level of understanding of the nature of dental disease and regular dental health habits and practices of the students; (d) most of the students exhibit a favorable attitude toward the plaque control program and the activities associated with the instruction; (e) parents support the program which is necessary if home reinforcement of the school program is to be expected. Of the parents surveyed, 83.1 percent indicated that they were very pleased with the new program and recommended that it be continued.

Recommendations based on this investigation include: (a) continued research to demonstrate actual improvement in dental health as a result of the program; (b) studying the effect of the dental program on the teacher's classroom routine; (c) continuation of the program with increased emphasis on periodontal disease and dental flossing; (d) regular dissemination of information to parents; and (e) provision for administrative assistance and professional consultation by dentists for the teachers.

## CHAPTER I

### INTRODUCTION

It has long been recognized that children need good health to learn effectively; therefore, in the final analysis health is a basic goal of all education. Children respond better to health education than do adults and it is far easier to change behavior patterns of children than adults. According to Masters (8:257) one of the major health problems of the world today is dental disease; schools should be in a position to alter the course of dental health through effective dental health instruction.

Prevention of health problems is primarily educational in nature. Since schools directly influence all individuals in a community the school dental health program should have a definite advantage over mass-media educational attempts relied upon by community agencies.

The first step in establishing dental health instruction in any school is to secure central administration support for the program. The commitment obtained from the administrative staff is necessary to secure instructional leadership that is vital to the successful implementation of any school program. Once the need for dental health instruction is recognized the process of curriculum

development, teacher training, and program implementation can begin.

In September, 1973, a comprehensive health education curriculum was implemented in Helena School District No. 1. The new health program was designed to cover all major health topics in a sequential manner from grades one through twelve.

The need for a sound dental health instruction program was recognized by members of the health education advisory committee; primary emphasis for dental health portion of the curriculum was placed on the teeth and their supporting structures. Plaque control was selected as the basic concept for the dental instruction unit. Plaque is a sticky substance which adheres to the surface of the teeth and gums and is the agent which is indirectly responsible for dental disease. Plaque harbors bacteria which produce harmful toxins that cause dental caries and periodontal disease. An educational program that teaches students how to effectively control the plaque formation which occurs in their mouths should be successful in preventing the incidence of dental disease.

The purpose of this study was to determine the effects of the newly initiated dental health program on skill and habit development of students using plaque control measures.

### Statement of the Problem

The problem of this study was to investigate the influence of the school plaque control program on the personal dental health skills and habits of the students of Helena School District No. 1. Individual brushing and flossing practices were examined and compared to the level of understanding of the nature of dental disease and its cause and effects.

### Need for the Study

School administrators who are committed to health education can use observed changes in behavioral patterns as one indication of the effectiveness of the health program. The ultimate goal of dental health education is to reduce the incidence of dental disease; passive informational approaches which do not secure behavioral practices that are concomitant with the level of knowledge about oral health cannot achieve that goal. Instruction which leads to the development of personal health skills and habits is needed to reduce tooth decay and periodontal disease. Pelton and Wisan state that "knowledge about dental health without concomitant behavior is wasteful" (3:228).

Inclusion of an extensive plaque control program as part of the health curriculum requires allocation of highly

valued resources - time and money. Competition for instructional time is keen and each curricular innovation is carefully studied. The expansion of school programs, at a time when financial support from federal sources has been greatly reduced, accentuates accountability for all educational endeavors - especially those requiring additional money for operational expenses.

The school administrator is faced with difficult decisions which determine the school curriculum. This study was needed to provide information relative to the most important aspect of the dental health program; the influence of dental instruction on the habits and skills necessary to prevent dental disease. The results were necessary for the superintendent and principals to justify the continuation of the plaque control program.

#### General Questions to be Answered

1. Does the student's level of understanding of the nature of dental disease and its cause and effect correspond to personal habits of dental health care?
2. Has the school dental health instruction program influenced the students' skill development of tooth-brushing and dental flossing?

3. Does reinforcement of learning by daily classroom supervision by the teachers produce behavioral patterns necessary for prevention of dental disease?

4. Do parents reinforce what students learn from plaque control instruction?

5. Should the plaque control program be continued as a method for meeting administrative responsibility for dental health education?

#### General Procedures

The following general procedures were used to answer questions raised by the problem: (1) a historical background was presented to acquaint the reader with conditions which led to the study; (2) terms relative to dental disease, plaque control, and dental health education have been defined to create a better understanding on the part of those interested in the study; (3) a review of literature was conducted to gain relative facts, data, and provide background information; (4) 650 students and their parents (20% of the population) were questioned to collect data necessary to answer questions posed by the problem; (5) data was analyzed to determine the effect of the dental health instruction program on skill and habit development in relation to personal oral health. The results of this investigation

were then used in making the administrative decision which determined the extent to which the program will be continued in the future.

### Limitations

This investigation was limited to the plaque control portion of the dental health education curriculum. The study also was limited to those students who have been participating in the plaque control program during the last semester of the present school term. The number of students involved in this study was three thousand two hundred and fifty. (N=3250).

### Definition of Terms

The following technical terms have been used throughout this paper and have been defined to reduce the possibility of misunderstanding between the investigator and reader:

1. Plaque, for the purpose of this study, is defined as a sticky, germ-filled, hard to see film that collects on the teeth and gums.

2. Plaque control is the process of reducing or eliminating the plaque formation using succular brushing and flossing at the gum line.

3. Succular brushing is a toothbrushing technique in which soft bristles of the toothbrush are pointed toward the gum line and the brush is rocked back and forth on each surface of the tooth.

4. Dental disease, referred to in the study, is limited to dental caries and periodontal diseases. Periodontal disease is defined as disease of the gums and other supporting structures of the tooth.

#### Summary

Health education is a vital component of a school's general educational curriculum. The magnitude of dental disease requires that personal dental health care becomes a significant priority in the structural design of the health education curriculum. The school administrators are the most important people in the development of the school health program. They have the responsibility and the authority to see that all parts of the health curriculum are functioning at optimum levels of performance.

If the purpose of dental health instruction is to have students accept responsibility for their own personal oral health, the cognitive aspect of the dental health curriculum must be matched with behavioral patterns which reduce the causes of dental disease. The comparison between knowledge

and behavioral patterns can be used by the school administrator to measure program effectiveness; thus, justifying the allocation of school resource devoted to the project. This investigation was done to provide data upon which administrators could make sound decisions and judgments concerning plaque control as an effective method of dental health education.

## CHAPTER II

### REVIEW OF LITERATURE

#### Introduction

Health is the most important asset that an individual can possess; personal health of the school age child is an integral part of education as well as life itself. Health education curricula, when designed to meet the needs of the student, place schools in a position of influencing health behavior.

The success of the school health curriculum rests with the school administrator. Oliver E. Byrd, Professor of Health Education at Stanford University states that:

The school administrator is the most important person in the development of the school health program. He is more important than the physician, the public health officer, the nurse, or any other professionally qualified person in the field of health (1:3).

The reason for this preeminence is because the administrator represents the power of the board of trustees and provides the instructional leadership for the health program.

Dental health education is usually found in most elementary schools. A survey of elementary public and parochial schools in the United States was conducted by Dollar and Sandell and they concluded that

75 percent of the schools have some kind of dental service program; teaching of some dental health is almost universal and is accomplished by the classroom teacher in elementary schools (9:14).

Despite the fact that dental health education is usually included as part of the school curriculum the actual dental health of the students remains remarkably low. Dental disease begins in childhood and eventually effects more than 95 percent of the population ranking it as the number one chronic disease nationally (8:257). Since dental disease effects so many people, the administrator who is designing a health education curriculum based on the needs of students must rank dental health as a top priority in the health program. Byrd suggests that primary emphasis of a sound dental program should be placed upon the education of the pupil in the care of his own teeth and supporting structures (1:359).

#### Traditional Dental Health Curricula

Whether or not the individual suffers from periodontal disease, according to Cohen and Lucye, "is, in most cases, dependent on 'his' keeping 'his' teeth and gingiva free of dental plaque and calculus (4:361).

The disparity between the frequency of dental health education and the incidence of dental disease among students suggests that many dental health education programs are ineffective if the objective of such programs is to reduce the morbidity of dental diseases. School administrators and curriculum directors charged with the responsibility of providing dental health education must examine their approach to this subject area and make the necessary revisions in content and methodology if they expect to improve the health habits of the children.

The basic reason for unsuccessful dental programs seems to lie in the fact that students are not putting into practice what they have learned. The recent, "School Health Education Study" revealed that only one in five of the sixth grade students sampled brushed his teeth and nearly one-half of the ninth grade students questioned did not know how to brush their teeth properly (5:272). In Lubbock, Texas, fourth grade children were found to have a good knowledge of dental hygiene; they failed, however, to put it into practice (6:25). Increasing knowledge was found to have little or no effect on dental habits of

first year high school students studied in Western Tennessee (7:128).

A review of the previous studies cited, which were conducted to determine the effectiveness of dental health education programs, indicated that information, fact oriented, lecture approaches are relatively ineffective and unsuccessful. The dental health curriculum must be changed to include methods and techniques for changing student behavior as well as providing the information and knowledge necessary to motivate the student to put the knowledge gained into productive use.

#### An Alternative Model for Dental Health Instruction

One method for accomplishing desired behavioral change in the dental program was suggested by Steuart in a paper prepared for the International Seminar on Health Education (8:72). Figure 1, page 13, shows a few examples of classroom activities designed to be used with Steuart's model.

Figure 1. Classroom Illustrations of Knowledge and Behavioral Models (8:72)

| Don't<br>Traditional Knowledge<br>Model                      | Do<br>Alternative Behavior<br>Model                                                                   |
|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Lecture by dentist on decay process                          | = Group discussions on what methods they should use to prevent decay in own teeth                     |
| Dental hygienist illustrating toothbrushing on plastic model | = Students and teacher together removing plaque daily in classroom brushing of own teeth              |
| Teacher telling child to go to a dentist                     | = Group discussion on dental facilities available to them and arranging use for own needs             |
| Presentation of scientific facts on water fluoridation       | = Role playing the fluoridation controversy- i.e. mayor, city councilman, proponents, opponents, etc. |

This model emphasizes student activity and involvement and de-emphasizes teacher directed activity. This alternative model as opposed to the traditional model suggests that a cooperative relationship between the students and teacher should be advocated as a realistic means of eliciting changed behavior.

The American Dental Association's Council on Dental Health supports this model and suggests that the success of

the school dental program is dependent on the instructional unit. The school program, according to the Council, "must be planned on a progressive basis so the needs of the children can be met at every level" (11:6). Other successful models for dental health programs stress the concept of action as being central to the successful results of dental health instruction. Eiseman, who is a Doctor of Public Health, favors the conceptual approach to dental instruction. In Eiseman's opinion:

A curriculum design for dental health instruction which is concept-oriented and behaviorally directed might provide the needed impetus for motivating students to make the kind of decisions necessary for sound dental health (12:466).

#### Teacher Preparation and Professional Consultation

In addition to revising the methodology and the technical approach to the dental program other factors which influence the desired outcomes should be considered. The teacher is the key figure of any school curriculum at the implementation level; therefore, the background, training and experience of the teaching staff will play an important role in the dental health program. Teachers, especially in self-contained classroom situations, frequently lack preparation in health related instructional

areas. According to Haro, "many programs conducted in schools are often taught with no prior training or education in dental health" (10:42).

One method of training teachers to become effective dental health educators is to combine the technical dental expertise of local dentists with the educational expertise of the teaching staff to accomplish the task of improving teacher training. This method of improving the quality of teacher's preparation was mentioned by Schreier, a New York dentist:

What we need is active supervising dentists and dedicated school dental health teachers. The dentist and dental hygienist must unite in their attack of the problem of dental disease. This direct relationship must be preserved for an effective dental health effort. . . (12:559).

The two year pilot study (8:260) of dental disease prevention conducted in San Antonio, Texas has established the feasibility of the classroom teacher becoming an effective dental health educator.

#### Summary

Prevention remains the key to reducing the incidence of dental disease and the school is in a position to alter the course of dental health problems. Cohn and Lucye state that:

The school setting, therefore, provides great potential for securing dental health practices which will result in better dental health for the children of today, and the adults of tomorrow. The clue to knowing whether boys and girls have learned hygiene in school is not to evaluate what they know about health but what they habitually do about what they know (4:365).

It has been pointed out that the success or failure of the school dental health program rests with the school administrator and the instructional leadership which he provides in his school setting. Most schools provide some type of dental health instruction but the high incidence of dental disease which remains serves as an indicator that many educational approaches now being used are unsuccessful.

Dental health instruction which relies heavily on didactics and mere presentations of factual information are largely ineffective. Instructional models which are centered around action concepts and student involvement are most likely to succeed in changing the personal dental health behavioral patterns of the students.

In addition to examining the instructional methods used in the school, the administrator in charge of the health program must see that adequate training for the teaching staff is provided. A cooperative relationship established between members of the teaching staff and

local dentists and dental hygienists appears to be one of the more successful approaches to improving the quality of the school dental health education program.

## CHAPTER III

### PROCEDURES

#### Introduction

Dental health instruction in the Helena Schools was recently revised to include a daily brushing and flossing technique; the teaching and development of personal dental health skills was included to combat dental disease and prevent recurrence. The plaque control program was conducted for sixteen weeks with regular supervision and reinforcement by teachers and dentists.

Teachers were given four hours of instruction; tooth-brushing and dental flossing techniques were demonstrated by dentists. The nature of dental disease and its cause and effects were discussed. Audio-visual aids and materials required for a daily tooth and gum cleaning program in the classroom were distributed to each of the one hundred and forty elementary teachers. Information about the program was disseminated to parents and their cooperation was solicited to reinforce classroom instruction at home.

The purpose of this study was to investigate the levels of student understanding of the cause and effect of dental disease and determine the influence of the

school program on skill development and habit formation of personal dental health care practices. Analysis of the results of this study will provide information upon which to make revisions for increased program effectiveness and justify continued allocation of resources for its continuation.

#### Population Description and Sampling Procedure

The population selected for this study was all students enrolled in grades one through six in Helena School District No. 1, Helena, Montana. The total population number was 3,250 as of June 1, 1973. Students from eleven elementary schools were included in the population. All socio-economic, academic levels, and cultural groups were included in the group.

Individual classes at each grade level in each elementary school were assigned a number. A sample of 650 students (20 percent of the population) was selected using a table of random numbers and a numerical list of the classes to represent the total population. The representatives of the population were categorized by grade level for grades one through six.

### Method of Collecting Data

Two instruments were used to collect data for this study. A student knowledge and attitude inventory was administered by the teachers of selected classes. Each representative of the population was given a parent questionnaire to be taken home, completed by the parent, and returned to the student's teacher. A cover letter was attached to the parent questionnaire to identify the investigation, explain the purpose of the study, and give instructions for completion and disposition of the form. In order to obtain the most accurate opinions possible no student or parent names were solicited.

A multiple choice response mode, using four choices per item, was used on both student inventories and parent questionnaires. Space was provided for general comments regarding the program.

The Student Knowledge and Attitude Inventory was designed to provide information concerning:

1. The level of understanding of the nature of dental disease and its cause and effects.
2. Frequency of toothbrushing and dental flossing as part of personal dental health habits of students.

3. Level of skill development in using dental floss.

4. Influence of dental health instruction on personal health habits.

5. Student attitude toward the plaque control program.

The parent questionnaire was used to collect data about:

1. The influence of the school dental program on their child's understanding and awareness of dental disease.

2. The effect of the program on the development of toothbrushing and flossing skills.

3. Frequency of toothbrushing and flossing as part of their child's dental health habits.

4. Level of skill development achieved in the use of dental floss.

5. Parent attitudes and parent perceptions of their child's attitude toward the plaque control program.

6. Influence of the dental instruction on parents and other members of the family not directly involved at school.

7. Direct effect of the plaque control program on the condition of the student's teeth and gums.

An analysis of the information obtained was used to answer the following administrative questions:

1. Has the plaque control program increased the level of student understanding and awareness of dental disease?

2. Does the dental health program aid students in the development of skills and habits necessary to reduce the incidence of dental disease?

3. Is school instruction reinforced at home by parents?

4. Do students and parents demonstrate a favorable attitude toward the school plaque control program?

5. Should the plaque control program be continued in future years, if so, are modifications necessary to increase effectiveness?

#### Analysis of Data

All responses received have been reported on a percentage basis. Responses have been categorized by grade level and totaled for the six grades. An item analysis was done for each of the ten test questions and the final test scores were reported.

#### Summary

The effectiveness of the dental health instruction program was evaluated, in part, by determining the levels of

understanding of dental disease, skill development and habits of personal dental health practices and attitudes of students and parents toward the school program.

A random sample of the 3,250 students enrolled in grades one through six was selected to represent the population. A student Knowledge and Attitude Inventory and a Parent Questionnaire were used to collect the data. The results of the data collected have been reported on a percentage basis for the entire sample group and for each grade level represented.

## CHAPTER IV

### ANALYSIS OF RESEARCH FINDINGS

#### Introduction

Chapter three is divided into three parts. The first, Analysis of Student Knowledge Inventory, discusses the results of the data collected regarding student understanding of the nature of dental disease. Personal dental health practices and attitudes toward the program are presented in part two, Analysis of Personal Dental Health Practices and Attitudes as Reported by Students.

The final section of the chapter, Analysis of Parental Responses, reviews parents' perceptions of their child's dental health skills, habits and attitudes. Parent attitudes and the effect of the program on other members of the family is also found in part three.

#### Analysis of Student Knowledge Inventory

The total population defined for the study was 3,250 students enrolled in grades one through six in Helena School District No. 1. A random sample selected to represent the population included 650 students; the sample equaled 20 percent of the elementary students enrolled as of June 1, 1973. Student Knowledge Inventories were

provided for each student sampled; a total of 603 student inventories (92.8 percent of the sample) were returned for analysis.

The level of understanding of the nature of dental disease and its cause and effects was measured by the Student Knowledge Inventory (See Appendix C, page 47). A score of 70 or above was predetermined to be the minimum score to represent a satisfactory knowledge of tooth and gum disease and methods for preventing dental health problems. Test scores and an item analysis for each of the ten questions were presented by grade level in Table I, page 26.

An analysis of the test scores showed that 74.1 percent of students tested scored 70 or above. Less than 15 percent of the scores fall below 50. Table I showed that most students scored 80 or above; the mean score for the total sample was 77.25, well above the minimum satisfactory score. Most of the scores below 50 were from students in grades one, two or three. It is noted that reported scores for grade one may not be valid as teachers in four of the five first grades sampled assisted students with the test; no adult assistance was provided for students in the other grades.

TABLE I

Knowledge and Item Analysis of Student Inventory  
Cause and Effects of Dental Disease

| Results of Knowledge Inventory |             |           |            |           |            |            |       |
|--------------------------------|-------------|-----------|------------|-----------|------------|------------|-------|
| Score                          | Grade Level |           |            |           |            |            | Total |
|                                | 1<br>N=99   | 2<br>N=79 | 3<br>N=123 | 4<br>N=63 | 5<br>N=104 | 6<br>N=135 |       |
| 0                              | 1.0         |           |            |           |            |            | .17   |
| 10                             |             | 1.3       | .8         |           | .9         |            | .50   |
| 20                             | 2.1         | 1.3       | .8         |           |            | .7         | .83   |
| 30                             | 2.1         | 3.8       | 3.3        | 1.6       | 1.9        |            | 2.0   |
| 40                             | 2.1         | 6.3       | 5.7        | 1.6       | 2.9        |            | 3.0   |
| 50                             | 4.0         | 15.1      | 13.0       | 7.9       | 10.6       | .7         | 8.1   |
| 60                             | 9.0         | 14.0      | 18.7       | 9.5       | 12.6       | 4.4        | 11.3  |
| 70                             | 8.0         | 16.5      | 7.3        | 9.5       | 20.2       | 9.7        | 11.6  |
| 80                             | 15.1        | 15.1      | 26.8       | 31.8      | 18.2       | 19.3       | 20.7  |
| 90                             | 10.1        | 16.5      | 17.9       | 25.4      | 27.0       | 27.4       | 20.9  |
| 100                            | 46.5        | 10.1      | 5.7        | 12.7      | 5.7        | 37.8       | 20.9  |

| Item | Item Analysis - Percent of Correct Responses* |      |      |      |      |      |      |
|------|-----------------------------------------------|------|------|------|------|------|------|
| 1    | 73.7                                          | 57.0 | 74.0 | 77.8 | 81.8 | 92.7 | 77.6 |
| 2    | 75.8                                          | 62.1 | 74.8 | 80.9 | 85.6 | 96.3 | 80.6 |
| 3    | 92.0                                          | 78.5 | 70.0 | 74.7 | 74.1 | 83.8 | 78.9 |
| 4    | 89.9                                          | 54.5 | 73.2 | 84.2 | 83.7 | 90.3 | 80.1 |
| 5    | 71.8                                          | 51.9 | 63.5 | 66.7 | 70.2 | 83.0 | 69.1 |
| 6    | 88.9                                          | 82.3 | 73.2 | 88.9 | 74.1 | 94.9 | 83.6 |
| 7    | 88.9                                          | 77.3 | 77.3 | 88.9 | 72.2 | 93.4 | 83.1 |
| 8    | 88.9                                          | 70.9 | 75.6 | 80.9 | 78.9 | 94.1 | 81.9 |
| 9    | 84.9                                          | 93.7 | 83.8 | 93.7 | 85.6 | 95.6 | 89.2 |
| 10   | 88.9                                          | 34.2 | 17.1 | 42.9 | 27.9 | 66.7 | 46.8 |

Note - All figures are expressed as percentages

\*See Appendix B

The item analysis revealed that students have a satisfactory knowledge of the cause and effects of dental disease with the exception of periodontal disease. Scores reported for questions five and ten fall below the minimum satisfactory score of 70. Both items were included to measure understanding of the cause and effect of gum disease. Bleeding gums after eating or brushing was recognized as a symptom of gum disease by only 46.8 percent of the students.

Personal Dental Health Habits, Practices,  
and Attitudes Reported by Students

The frequency of toothbrushing and flossing as a part of regular health care habits was reported by grade level in Table 2. Student responses itemized in Table II, page 28, indicated that 43.3 percent of the students sampled brush two or three times each day, but the use of dental floss is less frequent; 74.2 percent reported using floss once or twice a day. The regular use of dental floss as part of regular dental care was reported by 95.4 percent of the students. The use of dental floss in the classroom as part of the instructional program partially explained the high percentage reported.

The ability to floss effectively varies among students at various grade levels; however, 74.2 percent of the

TABLE II

Personal Dental Health Practices of Students:  
Frequency of Toothbrushing and Use of Dental Floss

| Frequency of Toothbrushing    |           |           |            |           |            |            |                |
|-------------------------------|-----------|-----------|------------|-----------|------------|------------|----------------|
| Fre-<br>quency<br>per<br>Week | 1<br>N=99 | 2<br>N=79 | 3<br>N=123 | 4<br>N=63 | 5<br>N=104 | 6<br>N=135 | Total<br>N=603 |
| 3-4                           | 11.1      | 11.4      | 10.5       | 7.9       | 13.4       | 9.7        | 10.8           |
| 5-7                           | 25.2      | 21.5      | 17.9       | 12.7      | 18.2       | 31.1       | 22.1           |
| 7-14                          | 19.2      | 18.9      | 17.0       | 31.8      | 24.0       | 24.4       | 22.1           |
| 14-21                         | 42.4      | 44.3      | 52.8       | 47.6      | 40.3       | 34.8       | 43.3           |
| *                             | 2.1       | 3.9       | 1.8        | 0         | 4.1        | 0          | 1.7            |
| Frequency of Dental Flossing  |           |           |            |           |            |            |                |
| 2-3                           | 8.0       | 3.8       | 5.7        | 3.2       | .9         | 3.7        | 4.3            |
| 4-6                           | 11.1      | 17.7      | 13.0       | 22.2      | 21.1       | 18.5       | 16.9           |
| 7-14                          | 73.7      | 75.9      | 71.6       | 73.0      | 73.0       | 70.3       | 74.2           |
| 0                             | 4.0       | 1.3       | .8         | 0         | 3.8        | 1.4        | 2.0            |
| *                             | 2.1       | 1.3       | .9         | 1.6       | 1.2        | 6.1        | 2.6            |

\*Not Responding

students stated that they could floss between all teeth effectively and an additional 16.9 percent said that they could floss between most, but not all, of their teeth. Only 6.3 percent stated that they did not use dental floss at home or could floss between just a few of the teeth.

A comparison of toothbrushing habits as reported by the students corresponded very closely to the students' brushing habits as reported by the parents. A difference is noted between student and parent responses concerning the frequency of flossing. Again, the fact that students use floss as part of the school program may account for the discrepancy. Parental responses will be discussed further at the end of this chapter.

Student attitudes toward the school dental education program were presented in Table III, page 30. Positive attitudes were expressed by 81.2 percent of the students responding. It can be seen in Table III that primary pupils (grades 1-3) have a more positive attitude toward the program than the students in grades 4-6. The greatest number of negative attitudes, 17 percent, were expressed by class members of grade six. The total percent of negative responses for all students were only 8.1 percent which is very minimal from a health program of this type. The level of student

understanding corresponds very closely with the concomitant behavioral practices reported by the students.

TABLE III

## Student's Attitudes Toward Dental Program

| Attitude       | Grade Level |           |            |           |            |            | Total |
|----------------|-------------|-----------|------------|-----------|------------|------------|-------|
|                | 1<br>N=99   | 2<br>N=79 | 3<br>N=123 | 4<br>N=63 | 5<br>N=104 | 6<br>N=135 |       |
| Excited        | 80.9        | 73.3      | 65.8       | 68.2      | 65.4       | 30.3       | 61.5  |
| Favor-<br>able | 10.1        | 16.5      | 22.7       | 19.1      | 16.3       | 28.8       | 19.7  |
| Neutral        | 2.1         | 5.1       | 3.3        | 7.9       | 13.4       | 20.0       | 9.3   |
| Negative       | 5.0         | 5.1       | 7.3        | 4.8       | 4.9        | 17.0       | 8.1   |
| *              | 2.1         | 0         | .9         | 0         | 0          | 3.9        | 1.4   |

\*Not Responding

Analysis of Parental Responses

Parent questionnaires were given to each student in the population sample. The forms were taken home by the student, completed by the parent, and returned to school with the student. A total of 71 percent of the Parent Questionnaires were returned for analysis. Parental opinions regarding the influence of the plaque control program on their child's understanding of dental disease and the development of skills and habit formation of personal health care were reported by grade level in Table IV, page 31.

Both increased understanding of the nature of dental disease and improved dental health habits of students were

TABLE IV

Parent Opinions: Influence of Dental Health  
Instruction on Understanding of Dental  
Disease, Development of Skills  
Necessary to Control Plaque  
Formation, Personal Health  
Habit Formation

| Influence of Program on Understanding of Dental<br>Disease and Personal Dental Health Habits                                |             |           |            |           |           |            |                |
|-----------------------------------------------------------------------------------------------------------------------------|-------------|-----------|------------|-----------|-----------|------------|----------------|
| Opinion                                                                                                                     | Grade Level |           |            |           |           |            | Total<br>N=461 |
|                                                                                                                             | 1<br>N=38   | 2<br>N=52 | 3<br>N=104 | 4<br>N=55 | 5<br>N=87 | 6<br>N=125 |                |
| * A                                                                                                                         | 15.8        | 23.1      | 25.0       | 21.8      | 27.6      | 23.2       | 23.6           |
| B                                                                                                                           | 18.4        | 17.3      | 25.0       | 21.8      | 21.8      | 23.2       | 22.1           |
| C                                                                                                                           | 60.5        | 53.8      | 34.6       | 38.2      | 36.0      | 41.6       | 41.9           |
| D                                                                                                                           | 0           | 1.9       | 6.7        | 7.3       | 8.0       | 7.2        | 6.1            |
| E                                                                                                                           | 5.3         | 3.9       | 8.7        | 10.9      | 4.6       | 4.8        | 6.3            |
| * A Increased Understanding      D Neither A nor B<br>B Improved Habits                  E Not Responding<br>C Both A and B |             |           |            |           |           |            |                |
| Effect of Program on Development of Toothbrushing<br>and Dental Flossing Skills                                             |             |           |            |           |           |            |                |
| * A                                                                                                                         | 31.6        | 25.0      | 43.3       | 47.3      | 29.9      | 36.0       | 36.2           |
| B                                                                                                                           | 2.6         | 5.8       | 6.7        | 10.9      | 9.1       | 8.0        | 7.6            |
| C                                                                                                                           | 60.5        | 51.9      | 35.6       | 25.4      | 47.1      | 36.8       | 40.8           |
| D                                                                                                                           | 2.6         | 9.6       | 11.5       | 5.4       | 8.0       | 9.6        | 8.7            |
| E                                                                                                                           | 2.7         | 7.7       | 2.9        | 11.0      | 5.9       | 9.6        | 6.7            |
| * A Improved Brushing Skills      D Neither A nor B<br>B Improved Flossing Skills        E Not Responding<br>C Both A and B |             |           |            |           |           |            |                |

Note - All figures are expressed as percentages

reported by 41.9 percent of the parents that responded. The greatest gain in awareness and habit formation is noted for students in grades one and two. Table IV also showed that 40.8 percent of the parents surveyed felt that the plaque control program improved both dental flossing and toothbrushing skills. The largest percentages of improved habits were exhibited by students in grades one, two, and five.

Parents' statements as to the frequency of toothbrushing and the use of floss by their child were compiled in Table V, page 33. Regular brushing habits, one or more times each day, was reported by 73.5 percent of the parents that responded.

Table V showed that 44.4 percent of the parents report that their child used dental floss only occasionally, one to five times per week. It is also noted that 33.5 percent of the parents did not respond to this question, which suggests that many students did not use floss at home.

A comparison of parental attitude toward the school dental program and parents perceptions of their child's attitude toward the same showed that the parents are very pleased with the program and they feel that the students were also in favor of the instruction. See Table VI, page 34. Positive attitudes expressed by parents were obtained

TABLE V

## Parent's Description of Student's

| Frequency of Toothbrushing |           |           |            |           |           |            |                |
|----------------------------|-----------|-----------|------------|-----------|-----------|------------|----------------|
| Times<br>per<br>Week       | 1<br>N=38 | 2<br>N=52 | 3<br>N=104 | 4<br>N=55 | 5<br>N=87 | 6<br>N=125 | Total<br>N=461 |
| 1-5                        | 10.6      | 11.6      | 17.3       | 9.0       | 14.9      | 15.2       | 14.1           |
| 3-7                        | 21.0      | 15.4      | 12.5       | 7.3       | 10.3      | 11.2       | 12.1           |
| 7-13                       | 42.1      | 44.2      | 43.3       | 36.4      | 38.0      | 39.2       | 40.3           |
| 14-21                      | 26.3      | 28.8      | 26.9       | 47.3      | 35.6      | 34.4       | 33.2           |
| *                          | 0         | 0         | 0          | 0         | 1.2       | 0          | .3             |

| Frequency of Dental Flossing |      |      |      |      |      |      |      |
|------------------------------|------|------|------|------|------|------|------|
| 1-5                          | 57.9 | 48.1 | 43.3 | 38.2 | 48.3 | 40.8 | 44.4 |
| 3-7                          | 18.4 | 13.5 | 14.4 | 10.9 | 12.6 | 12.8 | 13.4 |
| 7-13                         | 2.6  | 7.7  | 7.7  | 7.3  | 8.0  | 7.2  | 7.2  |
| 14-21                        | 0    | 3.8  | 0    | 0    | 2.3  | 2.4  | 1.5  |
| *                            | 21.1 | 26.9 | 34.6 | 43.6 | 28.8 | 36.8 | 33.5 |

\*Not Responding

TABLE VI

## Attitudes Toward Plaque Control Program

| Student Attitudes as Perceived by the Parent |             |           |            |           |           |            |       |
|----------------------------------------------|-------------|-----------|------------|-----------|-----------|------------|-------|
| Attitude                                     | Grade Level |           |            |           |           |            | Total |
|                                              | 1<br>N=38   | 2<br>N=52 | 3<br>N=104 | 4<br>N=55 | 5<br>N=87 | 6<br>N=125 |       |
| * A                                          | 44.7        | 32.7      | 18.3       | 12.7      | 18.4      | 20.8       | 22.0  |
| B                                            | 42.1        | 50.0      | 51.0       | 43.6      | 50.6      | 46.4       | 47.6  |
| C                                            | 7.9         | 9.6       | 25.0       | 29.1      | 25.3      | 25.6       | 22.6  |
| D                                            | 0           | 3.3       | 0          | 3.6       | 3.4       | 2.4        | 2.4   |
| E                                            | 5.3         | 3.9       | 5.7        | 11.0      | 2.3       | 4.8        | 5.4   |

## Parents Attitudes Toward Program

|                |      |      |      |      |      |      |      |
|----------------|------|------|------|------|------|------|------|
| Very Pleased   | 65.8 | 61.5 | 49.0 | 41.8 | 52.9 | 45.6 | 50.8 |
| Favorable      | 28.9 | 23.1 | 31.7 | 29.1 | 36.8 | 36.0 | 32.3 |
| Neutral        | 2.6  | 7.7  | 15.4 | 14.5 | 6.9  | 14.4 | 11.5 |
| Opposed        | 0    | 0    | 0    | 3.6  | 1.1  | .8   | 1.1  |
| Not Responding | 2.7  | 7.7  | 3.9  | 11.0 | 2.3  | 3.2  | 4.3  |

- \* A Excited - child discusses program activities frequently  
 B Favorable - indicates that he is pleased with program  
 C Neutral - doesn't mention feelings toward program  
 D Negative - complains frequently and criticizes instruction  
 E Not responding

from 83.1 percent of the parents that responded; 69.6 percent of the parents stated that their children responded positively when discussing program activities.

Parents and other members of the students' family have also benefited from the plaque control program. Parent responses given in Table VII, page 36, show that 51.4 percent of the parents surveyed benefited from the program. Only 42.7 percent stated that the dental instruction program had little or no effect on the understanding of dental disease or on the dental health practices of the family.

An attempt was made to gain information concerning the effect of the plaque control program on the condition of students' teeth and gums. Table VIII, page 36, showed that 6.5 percent of the parents have received statements from family dentists that the condition of the child's mouth had shown improvement. Parent observation of improvement and student comments concerning the condition of their mouth was reported by 39.5 percent of the parents.

### Summary

The analysis of data collected demonstrated that the plaque control program has had an effect on the students'

TABLE VII

Effect of Plaque Control Program on Members  
of Students' Families - N=461

| Parent Response                        | Percentage |
|----------------------------------------|------------|
| A. Parents Benefited                   | 12.6       |
| B. Other Children in Family Benefited  | 15.2       |
| C. Both Parents and Children Benefited | 23.6       |
| D. Little or No Effect                 | 42.7       |
| E. Percent Not Responding              | 5.9        |

TABLE VIII

Effect of Plaque Control Program on Condition  
of Teeth and Gum Tissues - N=461

| Parent Response                                               | Percentage |
|---------------------------------------------------------------|------------|
| A. Family Dentist Stated That Condition of Mouth was Improved | 6.5        |
| B. Parents Noting Improvement Through Observation             | 29.5       |
| C. Students Commenting That Their Mouth Feels Better          | 10.0       |
| D. No Information Upon Which to Base Response                 | 43.2       |
| E. Percent Not Responding                                     | 10.7       |

understanding of dental disease and on their personal dental health practices.

The findings of this study showed that 74.1 percent of the students had satisfactory knowledge of tooth decay and periodontal disease which is necessary in establishing personal health care habits and skills which are needed to reduce dental health problems.

Parental responses confirmed the findings based on student responses. Both student and parental attitudes toward the program were positive.

Other findings showed that families of students directly involved in the school plaque control program have benefited. In addition to increased knowledge and behavioral patterns influenced by the program, actual condition of the mouth has been improved for some students.

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

This investigation was concerned with the effectiveness of a new dental health instruction program recently implemented in Helena School District No. 1. The writer conducted the study to provide information upon which to base administrative decisions concerning the future of the plaque control program. An attempt was made to determine the effectiveness of the school dental health program on students' understanding of dental disease, its cause and effects, and influence of the instruction on the habits and skills of personal dental health care practices.

Data collected from students and their parents has been presented. The investigator's conclusions and recommendations were based on the information collected and information obtained from the students and their parents.

#### Conclusions

On the basis of the investigation regarding the effectiveness of plaque control as a method for improving dental health instruction, the following conclusions can be made:

1. Dental health instruction emphasizing plaque control increases student knowledge, understanding, and awareness of the nature of dental disease and its cause and effects.

2. A regular brushing and flossing technique taught and practiced at school and reinforced at home improves students' personal dental health care habits, skills and practices.

3. There appears to be a relationship between the level of understanding of the nature of dental disease and regular dental health habits and practices of the students.

4. Most students like the plaque control program and enjoy the instructional activities. A positive attitude toward the dental program should make the teaching-learning of specific health habits easier.

5. Parents support the instructional program and most recommend continuation. Parental support is necessary if reinforcement of school objectives is to be expected.

6. Apparently, many families of students directly involved benefit from the school dental health program. This desired quality of the school program should increase

the impact of dental instruction on the primary objective of reducing the incidence of dental disease.

7. Empirical data supplied by parents and students, suggests that many students participating in the plaque control program experience improvement in the condition of their teeth and gums.

### Recommendations

The following recommendations are made as a result of this study:

1. Research efforts should be continued to measure the actual improvement in the dental health of students as a result of the plaque control program.

2. A study of the effect of the dental program on the teachers' classroom routine should be made to identify classroom conditions that would add to the effectiveness of the instructional program.

3. The plaque control program should be continued in grades one through six in all schools; more emphasis should be placed on the cause of periodontal disease and the development of dental flossing skills. Regular supervision and reinforcement by teachers, dentists, principals and parents should be encouraged throughout the program.

4. Regular dissemination of information about the school dental health program to the parents must be continued if their cooperation and support is to be expected.

5. Administrative assistance and professional consultation by dentists is needed for all teachers.

## APPENDICES

## Appendix A

RE: Dental Health Education

Dear Parents:

United States Public Health Service studies show that 98% of more than 200 million persons in the United States have tooth or gum disease. Dental disease is the nation's number one chronic disease; dental problems start with the young, and, if unchecked, continue throughout the individual's life - or until he loses his teeth.

An in-depth dental health education program was launched in Helena's elementary schools last February. We are presently in the process of evaluating the effectiveness of the program in preventing and reducing the incidence of dental disease among the children of our community.

In order to complete the evaluation and determine program effectiveness, we need to know what influence the school program has had on personal dental health habits and practices of the students.

We hope you will assist us in our efforts by completing the attached questionnaire and returning it to school with your child.

Sincerely

Robert B. Morris  
Director of Health Education  
Helena School District No. 1

## Appendix B

## PLAQUE CONTROL - PARENT QUESTIONNAIRE

Please complete the following information:

Student information: Boy \_\_\_\_\_  
Girl \_\_\_\_\_  
School Attended \_\_\_\_\_  
Grade \_\_\_\_\_

Person completing this form: Mother \_\_\_\_\_  
Father \_\_\_\_\_  
Both \_\_\_\_\_

Directions: Please circle the letter of the response which you feel best completes the statement.

1. What influence has the school dental program had on your child?
  - a. increased awareness or understanding of the nature of dental disease and its cause and effects
  - b. improvement of personal dental health habits
  - c. both a and b
  - d. neither a or b
2. Has the dental instruction program had any effect on the development of toothbrushing and dental flossing skills?
  - a. yes - it has improved toothbrushing skills
  - b. yes - it has improved dental flossing skills
  - c. both a and b
  - d. neither a or b
3. Which statement best describes your child's toothbrushing habits?
  - a. brushes teeth occasionally - 1-5 times per week
  - b. usually brushes every day - 3-7 times per week
  - c. brushes at least once each day
  - d. brushes two or three times every day

4. Which statement best describes the use of dental floss by your child?
  - a. flosses between each tooth effectively
  - b. is able to floss between a few of his teeth
  - c. attempts flossing but has a great deal of difficulty in cleaning between the teeth
  - d. does not use or attempt the use of floss
5. How frequently does your child use dental floss as a part of his personal dental care practice?
  - a. flosses occasionally - 1-5 times each week
  - b. uses dental floss frequently - 3-7 times each week
  - c. flosses teeth at least once each day
  - d. uses dental floss two or three times a day
6. Which statement best describes your child's attitude toward the dental health program?
  - a. excited - discusses program activities frequently
  - b. favorable - indicates that he is pleased with the program
  - c. neutral - doesn't mention likes or dislikes
  - d. negative - complains or criticizes the instruction
7. How do you, as a parent, feel about the plaque control program?
  - a. very pleased and recommend continuation
  - b. favorable - seems to be helpful
  - c. neutral or uncertain at this time
  - d. opposed to such an in-depth dental program
8. Has the school dental program had any effect on family members other than students directly involved in the program?
  - a. yes - we, as parents, have been helped by the school program
  - b. yes - other children, not in the program, have benefited from information related to them
  - c. yes - both adults and children in the family have benefited
  - d. the school program has had little or no influence on other members of our family

9. Do you feel that the plaque control program has had a direct effect on the condition of your child's teeth or gums?
  - a. definitely - our dentist has remarked about the improved condition of the mouth
  - b. yes - I think there is an observable difference
  - c. yes - because our child comments that his mouth feels better
  - d. I have no information upon which to provide an answer
10. Please make any comments or suggestions which you have about the dental program on the bottom of this page.

Thank you for your cooperation and assistance in providing this information.

## Appendix C

## PLAQUE CONTROL - STUDENT KNOWLEDGE AND ATTITUDE INVENTORY

The purpose of this questionnaire is to measure the level of your understanding of the cause of dental disease and its effect.

Please circle the answer which best answers the question.

1. Tooth decay attacks the:  
a. tooth      b. gums      c. plaque      d. bone
2. Gum disease attacks the:  
a. bone      b. gums      c. tooth      d. enamel
3. The main cause of tooth decay is:  
a. soft teeth      b. germs      c. lack of vitamins  
d. heredity
4. Tooth decay is most active among the following age group:  
a. 3-18      b. 19-30      c. 31-50      d. 51-80
5. Gum disease usually starts at the following age:  
a. 6-18      b. 19-30      c. 31-50      d. 51-80
6. The most important one thing you can do to keep your mouth free of dental disease is:  
a. see your dentist twice a year  
b. eat a balanced diet every day  
c. clean your teeth thoroughly every day  
d. have your teeth straightened
7. Failure to take proper care of your teeth may cause:  
a. pain      b. bleeding gums      c. loss of teeth  
d. all of these
8. The two most important aids which should be used daily in personal dental care are:  
a. tooth paste-toothbrush      b. toothbrush-dental floss  
c. toothbrush-toothpicks      d. toothbrush-water spray

9. When you clean your teeth you are trying to remove:  
a. sugar    b. tarter    c. germ plaque    d. enamel
10. When your gums bleed after eating or brushing, it is probably due to:  
a. gum disease                      b. tooth decay  
c. brushing too hard                d. using the wrong kind of brush
11. How often do you brush your teeth at home?  
a. three or four times a week  
b. once or twice every day  
c. usually once a day  
d. two or three times every day
12. When I use dental floss I:  
a. floss between just a few teeth  
b. floss between most of my teeth  
c. floss between all of my teeth
13. How often do you use dental floss at home?  
a. two or three times a week  
b. usually once a day  
c. once or twice every day  
d. I don't use floss at home
14. How do your present personal dental habits compare to the way you took care of your teeth before learning about plaque control in school?  
a. much better now than before  
b. better now than before  
c. about the same now as before  
d. not as good now as before
15. Place an "X" over the face which best shows your feelings about brushing, flossing and learning about dental disease in school.

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