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A Comparison of the Level of Health Knowledge Between Two Groups of Freshmen Students Attending Cathedral High School, St. Cloud, Minnesota

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A COMPARISON OF THE LEVEL OF HEALTH KNOWLEDGE BETWEEN TWO GROUPS OF FRESHMEN STUDENTS ATTENDING CATHEDRAL HIGH SCHOOL, ST. CLOUD, MINNESOTA

by

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B.S., St. Cloud State University

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Chairperson

Dean
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PURPOSE:

The purpose of this study was to determine the level of health knowledge of freshmen students attending Cathedral High School, St. Cloud, Minnesota, and the factors which might have played a role in the level of health knowledge.

PROCEDURES:

The subjects in this study included 129 ninth grade students, 57 males, and 72 females. For comparative purposes the pre- and post-test format was used. The Kilander-Leach Health Knowledge Test was used to gather data on student's knowledge level. A personal data sheet was administered to the students to determine parental background and prior class enrollment. The test and personal data sheet were administered to ninth grade males and females attending Cathedral High School. Of the 129 subjects, 66 subjects (27 males, 39 females) were not enrolled in the school's health education class (control group) and 63 subjects (30 males, 33 females) comprised the experimental group, those students enrolled in the school's health education class. The pre-test was given September 15, 1980 and the post-test was given January 12, 1981, near the end of the first semester. The .05 level of significance was used for statistical analysis. Analysis of Variance, T-tests and Crosstabulations, Regression Analysis, and measurements of central tendency were all analyzed to concisely determine impact specific factors may have had.

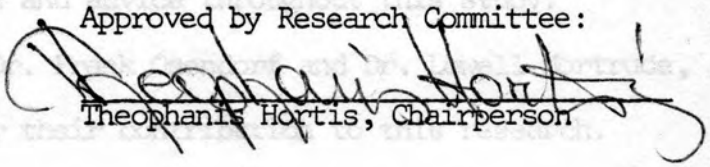
FINDINGS:

There was no significant difference between the sexes on either the pre-test or the post-test. Analysis of parental background indicated that, although no significant differences were found, parents with the most formalized education and occupations that demanded a high level of education or dealt in health related areas, had offspring that achieved the highest mean scores. Enrollment in the secondary classes anatomy, biology, drug education and physical science did show significance ($P = .033$) on the health knowledge test, irrespective of group.

The experimental group scored significantly higher on the post-test (P = .002) than did the control group. All factors considered, as indicated statistically, health education may be the major factor relative to increased post mean score on the health knowledge test.

November, 1981

Approved by Research Committee:



Theophanis Hortis, Chairperson

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D.L.M.

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INTRODUCTION

School health education is a course that has evolved with the current educational philosophy. Curricula now include many new courses which prepare the individual to develop to his or her maximum potential; and which offer broad experiences that increase his or her ability to live and function in a changing world. School health education is one of these courses.

Statement of the Problem

The purpose of the present study was to determine the level of health knowledge of two groups of freshmen students attending Cathedral High School, St. Cloud, Minnesota.

One group of students, the experimental group, was enrolled in the school health education course during the testing period. The other group, the control group, was not enrolled in a course in health education. Specifically, this study investigated the potential differences between the two groups, using pre- and post-test results on the Kilander-Leach Health Knowledge Test (Appendix A).

Hypotheses

The null hypotheses tested were:

1) There was no significant difference in health knowledge between the two groups, on the pre-test.

2) There was no significant difference in health knowledge between the two groups, on the post-test.
3) There was no significant difference between enrollment in any related subject area and score on the post-test.
4) There was no significant difference between parental background and student test scores.
5) There was no significant difference between male and female test scores.

Basic Assumptions

For a more accurate assessment of the problem certain assumptions had to be made. These were:

1) Each student's background was comparable in the area of health education.
2) The administrators of the test did not alter or in any way bias the results relative to the Kilander-Leach Health Knowledge Test.
3) Each student answered the questions to the best of his/her ability.
4) Post-test results reflect learning that took place through formalized high school instruction, i.e., the health education course taught at Cathedral High School.
5) Students not enrolled in the health course were equally motivated to do well as were students enrolled in health class.

Limitations

1) No attempt was made to determine long term health knowledge gain.
2) Outside sources of information, such as television, magazines, newspapers, and conversation were uncontrollable factors that may have caused data discrepancies.

Delimitations

This study was delimited to:

1) students attending Cathedral High School, St. Cloud, Minnesota.
2) one hundred and twenty-nine ninth grade students.
3) measure student knowledge as determined by the Kilander-Leach Health Knowledge Test.
4) the .05 level of determining significance.

Chapter II

REVIEW OF LITERATURE

Introduction

School health education is a term with many different meanings. To some, the term 'school health education' means simply a presentation of some elementary hygiene to a class of either boys or girls. To others, 'school health education' is much broader and more inclusive. Campbell and Early (5) thus, in their study comparing the level of health knowledge of young adults and their parents, state,

> The goal of all education is to develop self-motivated and self-directed citizens. Within this framework, an important concern of health education is that all individuals should be adequately informed on all of the various areas of health knowledge so that they are able to act wisely for their own personal needs.

Mathews (22) likewise states,

> The concept of health education should always be in broader terms than classroom instruction and formal health courses. A school health education program should permeate the whole curriculum and program and involve the people of the community.

Historical Overview

Prior to 1850, health education was practically non-existent in the American public school. In general, school health education in America was a mixture of fact, superstition and false hypotheses, that intended to make Americans health conscious. Physical education programs, sometimes considered health education programs, began in

the United States about 1835, beginning in Massachusetts. These early physical education classes consisted of calisthenics, with competitive games and sports appearing later. Very little health education was given. The decade between 1880 and 1890 marks the beginning of school health education in the United States. During these ten years, every state, beginning with Massachusetts, passed legislation requiring schools to provide instruction regarding the nature of alcohol and narcotics (16). The greatest advancements, however, in school health education occurred after WWI and were brought about by two important developments: compulsory physical examinations for military inductees, which revealed the poor physical condition of men between 18 and 30 years of age and, The Seven Cardinal Principles set forth by the National Education Association in 1918, according to which health was recognized as the first principle.

Subsequently, in 1921, Harvard University and the Massachusetts Institute of Technology jointly established the first formal curriculum in health education (16). It wasn't until 1940, however, that health education was recognized as a major and minor field of study in many of the teacher education institutions.

More recently, the passage of the Health Maintenance Organization Act (HMO) in 1972 pushed prevention and education to the forefront. HMO's proved to be another major development in health education, requiring preventive health education if federal funding was to be approved. In 1973, the first ever 'President's Committee on Health Education' was appointed while in 1974 the Bureau of Health, Education and Welfare was established. The enactment of Public Law

94-317 in 1976 and the subsequent establishment of the Office of Health Information and Health Promotion under the Assistant Secretary of Health in the Department of H.W.E. provided additional impetus for health education in the United States (20).

Despite all these gains, however, serious problems still exist. One of these deep-rooted problems of school health education in the United States is that most of the time it has been tied in with other curricula or courses and only rarely has been taught independently with its own curriculum. Most often, in fact, it is combined with physical education and although there may be no inherent evil in such an arrangement philosophically, in actual practice it has nonetheless led to serious problems as several studies indicate. A study, for instance, carried out in the Oregon Junior High School programs revealed that approximately 83% of the health instructors considered health to be of lesser importance, and that most often the instructor's education was limited to a minor in health education (4). Dvorak's study (11) on preparation of Minnesota health teachers, found that only 7% were health education majors. Most were physical education majors (65%) followed by social studies majors. Of the 360 health teachers querried, twenty-five teachers (7%) were not certified to teach health in the secondary school and only three were considered 'full-time' health teachers, while the greatest percentage (50.5%) taught two, three or four health classes a week in addition to their major assignment. A California study by Drury (10), undertaken in order to find out how much health education is being taught and by whom, reported similar results. Of the 419 schools that responded

to the questionnaire, 36 schools had a 'health teacher', 129 schools had a 'health coordinator', 276 schools required a health education course to graduate, 150 schools had one period of health per week and 314 schools incorporated health into the physical education curriculum.

Health education is considered by some the 'Neglected Child of the Schools' (1). A comprehensive study by Aubrey (1) of the possible reasons for such low regard for health education found that the major reasons are inadequate training of teachers during college preparation, lack of enforcement of mandatory state regulations, teacher apathy and resistance, indifference and low priority of health among school administrators, difficulties in building student interest and involvement, and parental resistance and indifference. His findings were indicative of the historical problems of health education in the United States.

Health Instruction and Knowledge

In light of the controversy surrounding the historical development of health education the next question is: What should a comprehensive school health education program include and what should it provide for the students?

Many believe that primary emphasis should be placed on education for prevention rather than for therapy. Dr. Ronald Vincent explains,

> For our cigarette users, we build heart, cancer and respiratory disease institutes. For our alcoholics, addicts, and venereal disease sufferers, we build diagnostic and rehabilitation centers, with mental hospitals and correctional institutes held in reserve. All of these with so

> little thought of research given to support the thesis that if our youths were given relevant information, systematically and professionally at a time in their lives when it could be of some value, they might very well solve the majority of these problems themselves with that selfsame concern and common sense that we do not give them credit for having. I propose to you that if a solution to these medical problems does not come by the positive decisions of an enlightened youth, the solution is not likely to come at all.. . . Health Education has the potential to be one of the most vital, practical, and rewarding courses among those that are taught. It's substance dwells close to the purpose of life itself and the very core of human relationship (37).

Others have said "health education is education". A great deal of time and effort have been expended in seeking to determine the place of health education in the curriculum. Dr. Charles Wood, in 1930 stated, "health should be, in practice as well as theory, in accomplishment as well as in promise, the first objective in education" (43).

When health knowledge is understood and applied in decisions of daily living, it is truly learned. Stang's (39) six steps in learning healthful living perhaps best describe the role of health education:

1) Know what is the healthful thing to do.

2) Know why it is important to do it.

3) Want to do it.

4) Know just how to do it.

5) Do it.

6) Get satisfaction from it.

In their attempt to make school health education more beneficial, many states have adopted guidelines and regulations for schools to follow. The Minnesota State Board of Education stipulates that "A

minimum of 60 clock hours are required for senior high school students, grades 10-12" (26). The Board feels that a school health education program should:

> First, enable individuals to know themselves and to be able to shape their life to maximize their personal options for living fully; second, enable individuals to utilize health resources and services and environmental support, with optimal efficiency and economy; and third, enable individuals to be able to participate constructively in community health and environmental planning in priority setting, and in decision making.

Conley and Jackson (8) studied the question of whether a mandated comprehensive health education program would guarantee successful health education. Using 12th grade students from seven public high schools, they found that while the students health knowledge was generally weak, moderate strength was indicated in the area of chronic disease. There was no significant difference between male and female but there was a significant difference ($P < .05$) among the seven schools tested. Their findings were inconclusive as to the benefits of a mandated health program.

Other studies have discovered different findings. The School Health Education Study (SHES)(38), perhaps the most comprehensive in this area, sought to discover the impact variables such as sex, socioeconomic level and school size may have upon the health knowledge of the study participants. It was discovered that females scored significantly higher ($P < .01$) than males, and large school districts and higher socioeconomic levels produced scores significantly higher ($P < .01$) than small districts and low socioeconomic level. These findings are contrary to the previous cited study and thus inconclusive as to the benefits of a mandated school health program.

Factors Relating to Health Knowledge

Much has been done to determine health knowledge and the benefits of a health education class. However, the greatest shortcoming in the testing of knowledge of health is the failure to determine what a student or class knows about a topic at the beginning of a study. Shaw (35) feels it is impossible to determine real progress without pre-testing. Many studies have been done using pre- and post-tests, with and without health education, the basic assumption being that health education classes should improve a student's level of health knowledge. Musser (37), in his study, analyzed achievement of college students with and without high school health instruction. More specifically, he compared scores of those who had had high school health classes with those who had not; which topic areas within the test received the most correct responses; and what were the differences between scores based on sophomore-freshman or pre- and post-instructions. The results indicated that there was a significant difference ($P < .05$) between individual pre-test and post-test scores. However, there was no significant difference between group pre-test and post-test scores. Marvin Kinnett (18) did a similar study comparing students in a school where a health course was not required with students from a school that required health instruction for graduation. Three groups were tested: the academically talented (honor group), the group that received instruction (group 1), and the group receiving no instruction (group 2). The honor group scores on the health knowledge test were consistently higher than either group 1 or group 2 scores. The results also indicated that there was no significant

difference between groups 1 and 2. He concluded that health education was not effective in improving scores or level of health knowledge.

Considering all the concerns of health education, the basic questions still remain: How well are students learning about health? What is their level of health knowledge? and ultimately, is school health education effectively contributing to a student's health knowledge?

Many studies have been done to answer just these questions. Perhaps the largest such study ever undertaken to ascertain health knowledge was done by Frederick Kilander (17). Well over 100,000 people have taken one form or another of the Kilander Health Knowledge Test. In 1936, Kilander tested 2,900 individuals. Included in this group were students in all four years of high school, college, and adults of a wide variety of occupations and ages. The health knowledge test was designed for all three groups. The one hundred questions of the test were selected from all major fields of health education. Kilander's findings were:

-- Individual scores varied a great deal within a given class.
-- Higher scores in a given class indicated a higher intelligence and a more favorable home environment.
-- A college education did not add to health knowledge of the students.
-- Health instruction did not necessarily improve the score of the individual who already had a high score, but such instruction did eliminate low scores by raising their grade to at least the average.

Kilander's general findings have been substantiated by many subsequent studies. In a study using 5,490 male college students at Pennsylvania State University, Gross and Davis (13) sought to determine the students' general level of health knowledge, and more specifically which their strongest and weakest areas of health knowledge were. The test used was the College Health Knowledge Test, designed by Dr. Terry Dearborn (9). It is a one-hundred question test used to measure both factual knowledge and currently accepted practices and attitudes. The results indicated a mean score of 55%, with hygiene of environment, and prevention and control of disease the strongest areas, and mental hygiene and integration, and medical care and advice the weakest.

Washnik (41), attempted a similar study using high school seniors as his subjects. His findings indicated that girls scored significantly better than boys on the health knowledge test. Safety and first aid, and nutrition ranked as the strongest topic areas with mental health and community health the weakest. The Shaw-Troyer Health Knowledge and Application Test which also indicates degree of application of health knowledge to practice was the instrument used in his study. He found very poor application of knowledge among his subjects.

Rich (31), in her study, attempted to determine what needs metropolitan high school students had in health education. Using the LeMaister Health Behavior Inventory and the Mooney Problem Check List as her instrument, she tested 959 10th and 12th grade students. She found that 12th graders scored significantly higher ($P < .05$) than

10th graders, girls scored significantly ($P < .05$) higher than boys, and that the areas of sleep, rest and relaxation, prevention and control of chronic and degenerative disease, safety, education, and consumer health, showed the greatest weakness.

Pigg (30), in a 1976 study, tested over 4,300 freshmen in 29 Georgia colleges using the Fast-Tyson Health Knowledge Test instrument. He found the areas of weakness to include alcohol, tobacco, and drugs, exercise, relaxation and sleep, disease, mental health, personal health, and human sexuality. His subjects achieved a mean score of 45.68, placing them in the 57th percentile for the Fast-Tyson test.

According to Sinacore (37), "bones and muscles" courses have proven very ineffective. He believes that, to provide the greatest knowledge, the health education curriculum should include the topic areas of mental health and health behavior, sex education, environmental health, communicable diseases, drug education, nutrition, family life education, chronic diseases, first aid, and consumer health.

A compilation of five studies done by Higgens and the West Virginia State Department of Education also came up with some very interesting observations (14). The study, which took over 16 months and sampled over 4,000 students grades 7-12, determined that course enrollment and offerings were minimal, knowledge levels were below national norms, and highest knowledge levels were observed in areas perceived by teachers and administrators to be most important.

Rooke (33) also constructed his own true/false health knowledge test to be given to college freshmen and sophomores. He, too, found no significant difference between students who had high school health education and those who did not. Many other studies indicate that health knowledge is not significantly changed by health education alone. There appears to be many contributing factors.

Otta (28) evaluated the effectiveness of a semester of health education in a public school as it relates to health knowledge and attitudes and practices of the student. Using the LeMaister-Pollack Health Behavior Inventory he tested 287 tenth graders both before and after health instruction. His results:

-- Total groups showed improvement in their mean score from 46.81% to 55.09%.

-- Health education significantly improved ($P < .01$) student performance.

-- Males showed greatest improvement from 44.79% to 54.52%, females from 49.21% to 55.76%.

-- Post-test scores were not significantly different between the sexes but pre-test scores were significantly different, favoring females.

-- Test scores increased in all ten health content areas.

-- The greatest knowledge gain was in safety education and first aid and nutrition.

Milne's (25) findings further support Otta's study. Milne attempted to determine the impact of health education on knowledge, attitude and behavior of teenage students. She found a high

correlation between knowledge level and enrollment in a health class, and that this correlation remained high for as long as 2-5 years after the class. No correlation was found between health education and behavior except during the freshman year, and no correlation at all existed between health education and attitudes.

Scahill (34) did an extensive study on the health knowledge of college freshmen and the effect that secondary school health instruction had on it. She also compared Washington freshmen to Iowa freshmen. Her results indicated that secondary health education did influence health knowledge and that Washington students scored better than Iowa students. These findings led to other studies to determine the many factors that may influence health knowledge in addition to health instruction.

In yet another study, Campbell and Early (5) found that home environment and health knowledge of the parents greatly influenced health knowledge of the students. They found a .83 correlation between high parent score on the test and high student score. They, too, found that girls had higher health knowledge test scores than boys, further supporting earlier studies. Coleman, Burkhardt, and Highfill (7) in comparing health knowledge of young adult underachievers and their parents, found that no apparent relationship existed between parent's knowledge of health and that of their offspring. They concluded that this lack of correlation was due primarily to low socioeconomic status situations. Campbell and Foster (6) in a later study seeking to determine if socioeconomic levels play a significant role in health knowledge, determined socioeconomic level by

estimating average income, occupation of parents, and value of residence. They used 503 subjects divided into two groups: high socioeconomic level and low socioeconomic level. Their findings indicated that high school students from a high socioeconomic level had greater knowledge and understanding of matters pertaining to health than did students from a low socioeconomic level. The magnitude of the difference between levels of knowledge, however, diminished with the maturity of the student. Female respondents attained a mean score higher than the male subjects, and scores by sex were independent of either grade level or socioeconomic level. Family living, safety education and mental health were the primary contributors to the separation of the groups.

A widely used study to determine the relationship that may exist between health knowledge and science background was done by Donald Merki in 1956 (24). Merki gave the Trusler Arnett Test to 277 boys attending St. George High School in Evanston, Illinois. His results indicated that, "science background did have a significant relationship with health knowledge, primarily a biology background". He also found that students with the highest I.Q. scored the best on the test. He concluded that students with high I.Q.'s have a tendency to be more curious and industrious both in and out of school. He further stated that those students tended to involve themselves more in the mathematics and basic science areas. Thus the explanation for their higher health test scores.

Worick (44) in his study attempted to determine specifically the contribution of biology instruction to health education. He felt

that health education had lacked identity and was attempting to measure the value of health knowledge relative to biology. He found a high correlation (.78) between enrollment in biology classes and test scores in his study. Patty (29), too, felt that health education needed an identity of its own. He stated, "Health Education should no longer be considered a mere sideshow in the educational circus. It must be a vital and integral part of any functional educational program". William and Brownell (42) stated that home economics, biology, social studies, and general science can contribute significantly to the health of the students they serve.

A most unique study was done by Janet Shirreffs (36). She surveyed college and university professors to determine their feelings relating health to other academic disciplines. Her results showed that:

-- Health educators believe that the boundaries of the discipline have widened considerably.
-- A large majority (87.5%) felt that health science can contribute to the growth of knowledge.
-- A majority indicated a change in emphasis from physiological to psycho-social aspects of health.
-- 76.5% felt health education is a unique subject matter and felt that it led to attitude and behavior changes.
-- 94% believed health science is beginning to be academically respectable.

In conclusion, Shirreffs felt that health educators believed that health education is unique in terms of its emphasis on attitude and behavior.

Despite great efforts by individuals such as Kilander, Trusler, Arnett, Fast, Tyson, LeMaistre and many others, actual gain and benefit from health education is very difficult to measure accurately. This frustration is summed up by Richard Means:

> The ultimate value of health education cannot be measured by ordinary standards or in ordinary periods of time. One bit of health information properly applied may save a life now or forty years from now. That single life may be so valuable to society that this health education learning may be of greater value than any other bit of learning that the individual may have experienced (23).

Thus, however difficult to measure health education or health knowledge may be, the importance of it cannot be understated.

Chapter III

METHODS AND MATERIALS

The present study was undertaken to determine the level of health knowledge of freshmen students attending Cathedral High School, St. Cloud, Minnesota. The study also sought to determine factors which might have played a role in the level of health knowledge. For comparative purposes the pre- and post-test format was used.

Pilot Study

A pilot study was done using 224 students in the junior and senior class at Cathedral High School. The pilot study was done to determine time constraints in the administration of the test, to determine if the instrument is clearly understood by 'typical' high school students, and to check the personal data sheet for clarity and accuracy in obtaining information.

The juniors in the pilot study comprised 53.1% of the subjects and the seniors 46.9%. There were 68 junior males, 53 senior males, (54% of subjects) and 50 junior females, 53 senior females (46% of subjects). The Kilander-Leach Health Knowledge Test (copyright 1973) was the instrument used. Each student was given 50 minutes to complete the test, the required time set for the test. Each of the 224 students finished the test well within the required time. The personal data sheet was completed by each student and upon review it was found to be too

general. Consequently, a different format of the personal data sheet was used for the main study (Appendix B).

Main Study

The subjects involved were 129 freshmen attending Cathedral High School, St. Cloud, Minnesota. There were 57 males (44.2%) and 72 females (55.8%). The mean age for the subjects at the time of the test was 14 years, 10 months. The test was given to 66 subjects (27 males, 39 females) not enrolled in the school's health education class (control group) during the first semester for the 1980-81 school year. Sixty-three subjects (30 males, 33 females) made up the experimental group, those taking health education class during the first semester, 1980-81. All students are required to take health education as freshmen at Cathedral High School. Scheduling and credit load are determining factors as to which semester a student is enrolled in.

The students at Cathedral High School come from socioeconomic backgrounds typical of Central Minnesota. All subjects of this study were native English speakers and of the Caucasian ethnic group.

Experimental Facility and Materials

All tests were given in two regular high school classrooms. The experimental group used their assigned health education classroom and the control group used their assigned English classroom. Each student was given a Kilander-Leach Health Knowledge Test standardized test booklet as well as an IBM computer answer sheet.

Procedure

Permission to administer the test during school hours was obtained by meeting with the Cathedral High School principal, Mr. Paul J. Wenner, in May 1980. Miss Nancy Hubbard approved use of her English calss and room for the control group testing.

The Kilander-Leach Health Knowledge Test was the instrument used to determine health knowledge of the student (17). The test was designed by Frederick Kilander first in 1936, with basically four objectives in mind:

1. To determine the relative scores of high school and college classes.
2. To determine in which fields of health education students were best and in which least informed.
3. To determine which factors contribute to greater health knowledge or lack of health knowledge.
4. To offer certain suggestions, for health education based upon his findings.

From his findings Kilander concluded that:

1. High scorers in a given class where variations in back-groung exist have had more training in specific health education and science courses; and
2. Health instruction may not necessarily improve the score of the individual who already has a high score, but such instruction does eliminate the low scores by raising the grade to at least the average.

These and subsequent findings led Kilander to continually update his test. Leach joined Kilander and in 1972 the most recent revision of the test was ready for use. It has a coefficient of reliability of .83 for high school seniors. These norms are based on over 100,000 individual scores. The test consists of 100 items from the areas of health knowledge; personal health, nutrition, community health, consumer health, chronic disease, communicable disease, safety and first aid, family living, mental health, and stimulants and depressants.

The test and personal data sheet were administered to ninth grade males and females attending Cathedral High School, located in St. Cloud, Minnesota during the 1980-81 school year. The subjects in this study included 129 ninth grade students, 57 males, and 72 females. The subjects were each given a pre-test and post-test and there answers were indicated on a standard IBM answer sheet.

The pre-test was given September 15, 1980 to both the experimental group and the control group. A 50 minute time limit, whether completed or not, was given to each student taking the Kilander-Leach Health Knowledge Test. The following day, September 16, the subjects were given 15 minutes, if needed, to complete the personal data sheet. All the IBM answer sheets and personal data sheets were collected, separated by group and stored in a file cabinet. The materials were not studied or reviewed in any way so as to avoid any bias that could occur.

The experimental group was then exposed to health education during the ensuing 12 weeks. Cathedral High School conducts classes

using a modular schedule. There are six days in each cycle. Health classes meet four times per cycle for 41 minutes per meeting. The experimental group was exposed to 42 class periods of health education.

The required health education class at Cathedral High School is one semester in duration. The primary topic areas studied are first aid and safety education, mental and emotional health education, drug education, and personal and community health education. Lecture and group discussions are the basic class format.

The control group was not exposed to any formalized health education at Cathedral High School during the first semester.

The post-test was administered to each group, in the same classroom, on January 12, 1981, near the end of the first semester. Again, the post-test data were collected and in addition to the pre-test data, were delivered to the St. Cloud State University's Academic Computer Services, for analysis.

The data were analyzed by the Academic Computer Services Center using the Statistical Package for the Social Sciences (SPSS) computer program.

Statistical Procedure

St. Cloud State University's Academic Computer Services analyzed all the tests, pre and post, as well as the personal data sheets of each subject.

Statistical emphasis was placed on measures of central tendency including mean and median. Measurements of variability were also determined which indicated standard deviation. Regression

analysis, using multiple variables, was done to help predict the factor or factors that would be present in an individual who scored well on the Kilander-Leach Health Knowledge Test. Other tests of significance, including t-tests and crosstabulations, were performed that help determine the variables of significance and the impact that each individual variable will have on test score. Frequencies and composite scores were other basic statistics that were obtained.

A .05 level of significance was used in the regression analysis. The dependent variable was total score and the independent variables were classes enrolled in and parental background, including occupation and education.

Purpose

The purpose of this study was to determine the level of health knowledge and the variables that may have contributed to this knowledge. The Kilander-Leach Health Knowledge Test was used to gather data on students' knowledge level. A personal data sheet, developed by the author, was administered to the students in an attempt to gain background information for themselves as well as their parents.

Chapter IV

RESULTS AND DISCUSSION

Introduction

The purpose of this study was to determine the level of health knowledge among freshmen students attending Cathedral High School, St. Cloud, Minnesota. Furthermore, using a pre- and post-test format and a control and experimental group, this study sought to determine the factors which may contribute to a student's health knowledge. The factors studied were:

1. Subjects' sex
2. Parents' educational level.
3. Parents' occupational level.
4. Prior education in the areas of anatomy, biology, drug education, nutrition education, safety education, physical science, and psychology, at both the elementary and secondary levels.
5. Sub-topical questions within the test.

Subjects Sex

Each student indicated his or her sex by placing a check in the proper space in the personal data sheet (Appendix B). Table 1 shows the number and percentage of male and female subjects, in the two groups.

Table 1

Number and Percentage of Subjects
by Group and Sex

	Control Group		Experimental Group		Total	
	Number	Percent	Number	Percent	Number	Percent
Male	27	40.9	30	47.6	57	44.2
Female	29	59.1	33	52.4	72	55.8
Total	66	100.0	63	100.0	129	100.0

Employing the Oneway Analysis of Variance (ANOVA), the mean scores and standard deviation were computed for both the pre-score and the post-score (Table 2).

Table 2

Pre- and Post-Test Mean Scores and
Standard Deviation by Sex

	Count	$\bar{M}$ Score	S.D.
Pre-Score:			
Male	57	41.53	12.16
Female	72	40.15	9.54
Post-Score:			
Male	57	40.95	14.98
Female	72	42.07	10.76

No significant differences (P = .0302) were observed between the pre-score and the post-score. Females, however, raised their mean score by 1.92 points (40.15 to 42.07) on the post-test while the males mean score decreased .58 points (41.52 to 40.94) on the post-test. Although not significant, this somewhat higher female mean score is in agreement with the findings reported by Washnik (31) and Rich (41). Their studies showed females scored significantly better than males on the tests used in the study.

Fathers' Education

Table 3 shows the fathers' level of education. The mean educational level of the students' fathers is the approximate category rank of 'one to three years post high school education'. To further delineate differences between the control and experimental groups, the computational procedures 'Crosstabulation' was used. Table 3 summarizes the educational background of the students' fathers by number, percentage and group.

The most common educational level of the students' fathers differs according to group. The mode education level of the control group fathers is 'high school graduate', whereas the mode level of the experimental group fathers is 'four years post high school or degree'. This slight difference between groups, however, is not significant.

To further delineate the effects of fathers' education on the health knowledge scores of the students tested, a Oneway Analysis of Variance (ANOVA) was used. Table 4, Pre- and Post-Test Mean Score and Standard Deviation by Father's Educational Level, indicates the

Table 3

Number and Percentage of Subjects' Fathers by Educational Level

Level of Education	Control Group Number	Control Group Percent	Experimental Group Number	Experimental Group Percent
Educational level unknown, deceased, did not respond	3	4.5	1	1.6
Up to Junior High School	7	10.6	5	7.9
High School Graduate	17	25.8	15	23.8
One to three years post high school	14	21.2	12	19.0
Four years post high school or degree	13	19.7	19	30.2
Professional Degree	12	18.2	11	17.5

differences, although not significant, between educational level and score on the health knowledge test.

It is to be noted that the higher mean score was achieved by students whose fathers had the highest educational level. The greatest gain from pre-score to post-score however, occurred among students whose fathers have the education level of 'four years post high school or degree'. It appears then that the higher the educational level of the father the higher the socioeconomic level. This is in accordance with the results reported by Campbell and Foster (6) in their study. Their findings indicated that high school students from high socioeconomic levels had greater knowledge and understanding of matters pertaining to health than did students from low socioeconomic levels. The

Table 4

Pre- and Post-Test Mean Score and Standard Deviations by Fathers' Educational Level

Educational Level	Count	$\bar{M}$ Score	S.D.
Pre-Score:			
Through Junior High School	12	42.50	13.49
High School Graduate	32	38.16	9.59
1-3 years Post High School	26	38.38	12.20
4 years Post High School or Degree	32	40.44	8.01
Professional Degree	23	44.74	10.21
Post-Score:			
Through Junior High School	12	43.50	18.24
High School Graduate	32	36.50	11.24
1-3 years Post High School	26	40.77	11.64
4 years Post High School or Degree	32	43.03	11.36
Professional Degree	23	43.96	12.60

relatively high mean score of the students whose fathers had the least educational background can perhaps be explained by the small number of students, 12, who indicated this educational level for their fathers. The risk of standard error is higher when using small samples, such as 12.

Fathers' Occupation

Occupation generally belies educational background. Educational and occupational background provide an insight into the home environment which has been found to be of significance, relative to health knowledge of students. Campbell and Early (5) found that home environment, occupation, and health knowledge of the parents greatly influences health knowledge of the students. One may assume therefore, that one particular type of occupation may contribute more to a students level of health knowledge than another. Table 5, Number and Percent of Subjects' Fathers by Occupation, indicates the various occupations of the fathers in the two groups as indicated by the

Table 5

Number and Percent of Subjects' Fathers by Occupation

Occupation	Control Group Number	Control Group Percent	Experimental Group Number	Experimental Group Percent
Other, i.e., Deceased, Retired, Unemployed	3	4.5	3	4.8
Farmer	4	6.1	2	3.2
Business	18	27.3	13	20.6
Skilled Labor	17	25.8	23	36.5
Common Labor	12	18.2	14	22.2
Teacher	3	4.5	1	1.6
Educational Administration	2	3.0	0	0.0
Medical Profession	7	10.6	7	11.1
Total	66	100.0	63	100.0

students. The most common occupation is skilled labor followed by business, common labor, medical profession, farming, and education.

Table 6, Pre- and Post-Score, Number and Percentage of Subjects, Mean Score, and Standard Deviation by Fathers' Occupation, provides more insight as to the impact of a specific occupation on the mean score, and standard deviation. Although there is no significant difference in terms of occupation, the students who indicated medical profession, as their fathers' occupation, scored the highest in the post-test. Once again, this is in agreement with the prior Campbell and Foster (6) study which found that parental occupation and student success on a health knowledge test were related. It would be reasonable to assume that the medical profession would be more educated in the area of health than would people in other occupations and that this knowledge is perhaps transmitted to their offspring. This, however, is in direct contrast to the Coleman et al. (7) study.

The Coleman study found no apparent relationship between parents' knowledge of health and that of their offspring. However, they concluded that the low socioeconomic status of the study participants may have contributed to the low correlation.

The occupation 'educational administration' due to the small count (2) provided information that may not agree with findings provided by a larger count.

The statistical tests done on fathers' educational and occupational background did not reveal any significant differences but they did indicate some trends. As may be expected, fathers with

Table 6

Pre- and Post-Score, Number and Percentage of Subjects, Mean Score, and Standard Deviation by Fathers' Occupation

Occupation	Number	Percentage	$\bar{M}$ Score	S.D.
Pre-Score:				
Farmer	6	4.7	35.17	9.90
Business	31	24.0	39.26	9.95
Skilled Labor	40	31.0	40.27	9.06
Common Labor	26	20.1	39.85	12.47
Teacher	4	3.1	48.75	8.65
Educational Administration	2	1.5	36.00	2.83
Medical Professions	14	10.8	48.57	12.67
Other, i.e., Deceased, Retired, Unemployed	6	4.7	36.21	9.90
Post-Score:				
Farmer	6	4.7	32.33	13.14
Business	31	24.0	41.64	10.78
Skilled Labor	40	31.0	42.60	10.78
Common Labor	26	20.1	40.23	13.71
Teacher	4	3.1	40.00	7.83
Educational Administration	2	1.5	31.00	7.07
Medical Profession	14	10.8	48.58	14.85
Other, i.e., Deceased, Retired, Unemployed	6	4.7	34.94	10.91

the most education, and occupations that require a high degree of formal education or that deal in health related areas, had offspring that achieved the highest mean scores.

Mothers' Education

As a group, the mean educational level of the students' mothers was within the educational category 'high school graduate'. Table 8 summarizes the results of crosstabulation analysis of the scores achieved by the two groups, control and experimental, on the basis of the mothers' level of education.

Table 7

Number and Percentage of Subjects (control and experimental) by Mothers' Educational Level

Educational Level	Control Group Number	Control Group Percent	Experimental Group Number	Experimental Group Percent
Educational Level Unknown, Deceased, Did Not Respond	3	4.5	0	0.0
Through Junior High School	3	4.5	3	4.8
High School Graduate	26	39.4	31	49.2
1-3 years Post High School	8	12.1	10	15.9
4 years Post High School or Degree	23	34.8	17	27.0
Professional Degree	3	4.5	2	3.2
TOTAL	66	100.0	63	100.0

On the basis of the educational level of the mothers, no significant difference was observed between the groups.

Table 8 indicates student test scores in relation to the educational level of the mothers.

Table 8

Pre- and Post-Test Mean Score and Standard Deviation by Mothers' Educational Level

Educational Level	Count	$\bar{M}$ Score	S.D.
Pre-Score:			
Through Junior High School	6	34.17	3.65
High School Graduate	57	40.19	10.80
1-3 years Post High School	18	40.61	9.26
4 years Post High School or Degree	40	40.65	10.84
Professional Degree	5	49.40	9.91
Post-Score:			
Through Junior High School	6	30.33	7.25
High School Graduate	57	41.09	12.91
1-3 years Post High School	18	41.55	12.85
4 years Post High School or Degree	40	41.72	11.97
Professional Degree	5	48.20	11.97

A definite pattern is obvious. Both in the pre-test and post-test, the higher the educational level of the mother, the higher the the mean score of the student. This further suggests that health

knowledge can be influenced by educational level of the mother. This agrees with the study done by Campbell and Early (5). Maternal education could be in an area other than health education, yet the student score remains higher than the norm. A high level of education could also imply a higher socioeconomic status. The mean scores listed on Table 8 agree with research done by Campbell and Foster (6) in their study to determine if socioeconomic levels play a significant role in health knowledge. They found that high school students from a high socioeconomic level had greater knowledge and understanding of matters pertaining to health than did students from a low socioeconomic level. The categories of 'junior high school education' and 'professional degree' exhibited the lowest and highest mean score respectively. The categories 'high school graduate', 'one to three years post high school' and 'four year post high school or degree', respectively, have a mean student score very close to one another. These scores also are similar in that they closely reflect the total mean score.

Mothers' Occupation

Occupation of the mother also figures into the health knowledge of the student. Table 9 lists the mothers' occupation and frequency distribution of each occupation. Although the difference is not significant between groups, control and experimental, the occupation 'housewife' has a significantly higher frequency in it than any other category.

Table 9

Number and Percentage of Subjects' Mothers by Occupation

Occupation	Control Group Number	Control Group Percent	Experimental Group Number	Experimental Group Percent
Other, i.e., Deceased, Retired, Unemployed	1	1.5	1	1.6
Housewife	42	63.6	39	61.9
Business	2	3.0	2	3.2
Skilled Labor	7	10.6	6	9.5
Common Labor	3	4.5	3	4.8
Teacher	5	7.6	2	3.2
Education Administration	0	0.0	0	0.0
Medical Profession	6	9.1	10	15.9

Analysis of variance again was computed to clearly indicate the impact occupation may have on test scores. Table 10 indicates statistics that agree with Table 6. Again, the medical profession as an occupation provide the highest mean student score on the health knowledge test.

The occupational and educational level of the mothers and the fathers very closely approximate one another.

Previous Courses

Previous studies (24, 29, 42, 44) have shown that certain classes influence health knowledge. The present study sought to

Table 10

Pre- and Post-Score, Number and Percentage of Subjects, Mean Score, and Standard Deviation by Mothers' Occupations

Occupation	Number	Percentage	$\bar{M}$ Score	S.D.
Pre-Score:				
Other, i.e., Deceased, Retired, Unemployed	2	1.6	34.50	8.44
Housewife	81	62.8	39.00	8.28
Business	4	3.1	37.50	11.39
Skilled Labor	13	10.1	40.08	9.99
Common Labor	6	4.6	35.17	7.19
Teacher	7	7.7	41.57	11.94
Medical Profession	16	12.4	51.94	12.44
TOTAL	129	100.0		
Post-Score:				
Other, i.e., Deceased, Retired, Unemployed	2	1.6	36.50	11.40
Housewife	81	62.8	40.22	12.22
Business	4	3.1	39.50	15.00
Skilled Labor	13	10.1	36.54	10.37
Common Labor	6	4.6	36.50	11.38
Teacher	7	7.7	46.71	15.17
Medical Profession	16	12.4	52.00	11.43
TOTAL	129	100.0		

determine not only the previous academic background of the students in other disciplines but also the contribution this previous education may have had on the level of health knowledge of the student.

Table 11

Number and Percentage of Control and Experimental Students who had Elementary Subject, by Subject

Subject	Control Group Number	Control Group Percent	Experimental Group Number	Experimental Group Percent
Anatomy	4	6.1	18	28.6
Biology	5	7.6	8	12.7
Drug Education	8	12.1	12	19.0
Nutrition Education	22	33.3	23	36.5
Physical Science	12	18.2	18	28.6
Psychology	4	6.1	3	4.8
Safety Education	30	45.5	41	65.1

Table 11 indicates that the vast majority of students have not had formal education during elementary years in the areas of anatomy, biology, drug education, physical science and psychology. A higher percentage of students, although not a majority, with the exception of safety education by the experimental group, did have instruction in the areas of nutrition education and safety education. In contrast, during the secondary years of education (Table 12) the percentages all more closely approximated 50%-50%. An interesting finding surfaced with the compilation of this statistic. The experimental group had

Table 12

Number and Percentage of Control and Experimental Students Who had Secondary Subject, by Subject

Subject	Control Group		Experimental Group	
	Number	Percent	Number	Percent
Anatomy	24	36.4	49	77.8
Biology	24	36.4	41	65.1
Drug Education	31	47.0	42	66.7
Nutrition Education	21	31.8	30	47.6
Physical Science	44	66.7	42	66.7
Psychology	11	16.7	18	28.6
Safety Education	20	30.3	27	42.9

a significantly higher percentage of people who had instruction in the areas of anatomy, biology, and drug education. This appears to be a major contributing factor for the higher mean score by the experimental group on the post-test.

Table 13 lists the mean score on the health knowledge for both groups, those not having previous education in a particular subject area and those having education in a particular area. Some interesting observations can be made in comparing the students who had the class and those who had not. Enrollment in elementary classes had no significant impact on mean score on the health knowledge test. This finding is in agreement with those of others particularly of the Milne (25) study, which found that enrollment in a particular class

Table 13

Pre- and Post-Mean Scores and F. Probabilities of Students that Had or Did Not Have a Particular Subject, by Subject and Level

Subject	Pre-Score Have	Pre-Score Have Not	Post-Score Have	Post-Score Have Not	Pre-Score F. Probability	Post-Score F. Probability
0 - Anatomy	39.50	41.01	43.77	41.14	.5484	.3767
1 - Anatomy	43.29	37.46	45.10	36.96	*.0020	*.0002
0 - Biology	41.00	40.73	37.61	42.01	.9327	.2395
1 - Biology	41.15	40.35	43.93	39.17	.6765	*.0335
0 - Drug Education	40.55	40.80	40.05	41.85	.9249	.5632
1 - Drug Education	41.05	40.37	43.73	38.75	.7234	*.0271
0 - Nutrition	39.20	41.59	41.93	41.38	.2293	.8157
1 - Nutrition	39.47	41.60	41.52	41.60	.2726	.9948
0 - Physical Science	38.63	41.40	40.40	41.92	.2177	.5671
1 - Physical Science	42.24	37.79	43.19	38.32	*.0260	*.0404
0 - Psychology	37.85	40.92	37.85	41.79	.4649	.4301
1 - Psychology	41.52	40.54	43.03	41.15	.6683	.4858
0 - Safety Education	40.42	41.17	41.59	41.55	.6952	.9861
1 - Safety Education	41.33	41.01	42.06	41.50	.9231	.7615

0 = Elementary
1 = Secondary
* = Significant at the .05 level

only had an impact on knowledge level for a period of 2-5 years after the class. However, enrollment in the secondary classes anatomy, biology, drug education, and physical science did significantly ($P = .033$) influence mean score on the health knowledge test, irrespective of control or experimental group. The present results agree with those of Milne's study that knowledge from previous courses will remain high and positively influence knowledge for as much as two to five years.

Students having had previous secondary education in the areas of anatomy, biology, drug education, physical science, psychology, and safety education, had higher mean scores than the group mean, for the health knowledge test.

No other significant differences were observed with respect to previous courses.

Pre-Test

The pre-test was given to determine the level of health knowledge in each of the groups, prior to the period of instruction for the experimental group. Much has been done to determine health knowledge and the benefits of a health education class. However, the greatest shortcoming in the testing of knowledge of health is the failure to determine what a student or class knows about a topic at the beginning of a study. Shaw (15) feels it is impossible to determine real progress without pre-testing.

The pre-test provided a very good point of reference while no significance existed. The pre-test mean score for the control group

was 40.39 while the experimental group mean score was 41.14. The pre-test mean score for males was 41.53 and for females 40.15, again no significance. The Kilander-Leach Health Knowledge Test includes sub-topic areas of health knowledge. Appendix C lists the seven sub-topics and the questions within each. Table 14 described the pre-test scores for each sub-topic area and T-test level of significance.

Table 14

Subject Pre-Score Mean and T-test of Significance by Subject and Group

Subject	Number of Questions	Group Control $\bar{M}$ Score	Group Experimental $\bar{M}$ Score	T-Score
Drug Education	8	3.22	3.15	.801
Safety Education	8	3.97	3.92	.838
Personal Health	19	8.38	8.15	.667
Mental Health	7	2.57	3.36	*.011
Nutrition Education	15	6.30	6.23	.889
Public Health	16	5.97	5.93	.923
Disease Education	27	9.97	10.36	.528

* = Significance at the .05 level

The only significant difference between the two groups was observed in the area of mental health (P = .011).

Four questions were answered significantly different between the groups on pre-test. Questions 21, 50, and 76 were answered significantly correct more often by the experimental group (P = .005, .003,

.004 respectively). Question 32 was answered significantly correct (P = .004) more often by the control group.

Multiple regression was used to determine the relative impact of each individual variable upon the dependent variable or pre-score.

Listed in Table 15 is the R square value that indicates the percentage of variation in pre-score based upon the linear dependance of each independent variable.

Table 15 summarizes the results of the multiple regression with pre-score as the dependent variable. According to this analysis the factor contributing the greatest influence on pre-score is 'Mothers' Occupation', which alone accounts for 9.34 percent of the observed variations in pre-score. All of the factors combined account for 26.48 percent of observed variation in pre-scores. This means that 73.52 percent of the variation in pre-scores is accounted either by mere chance or by other, unknown independent variables.

Post-Test

The post-test, without comparison between it and the pre-test, provides interesting statistics. The post-test mean score for the control group was 28.19 while the experimental mean score was 45.11. The post-test mean score for males was 40.95 and for females was 42.07. Table 16 describes the post-test scores for each group, and for each specific sub-topic area within the Kilander-Leach Health Knowledge Test. The mean score and the T-test of significance are also given.

Listed on Table 16 are the significant differences that exist between groups, all in favor of the experimental group in the sub-

Table 15

Multiple Regression with Independent Variables
by Dependent Variable Pre-Score

	R Square
Mothers' Occupation	.09342
Secondary Safety Education	.13858
Secondary Anatomy	.18247
Secondary Physical Science	.20265
Secondary Nutrition Education	.23634
Secondary Biology	.24253
Fathers' Occupation	.25286
Elementary Anatomy	.25578
Elementary Drug Education	.25795
Elementary Nutrition Education	.25953
Elementary Biology	.26097
Secondary Druf Education	.26317
Educational Level - Father	.26402
Elementary Physical Science	.26434
Sex	.26468
Educational Level - Mother	.26476

Table 16

Subject Post-Score Mean and T-test of Significance by Subject and Group

Subject	Number of Questions	$\bar{M}$ Score Control Group	$\bar{M}$ Score Experimental Group	T-Score
Drug Education	8	3.07	4.07	*.001
Safety Education	8	3.53	4.74	*.000
Personal Health	19	7.62	8.78	*.037
Mental Health	7	2.70	2.98	.277
Nutrition Education	15	5.77	6.89	*.017
Public Health	16	5.84	6.04	.610
Disease Education	27	9.65	11.59	*.007

* = Significance at the .05 level

topic areas of drug education (P = .001), safety education (P = .000), personal health (P = .037), nutrition (P = .017), and disease (P = .007). The only areas where no significant differences were observed were those of mental health (P = .277) and public health (P = .610). This, perhaps, could be best explained as being a result of very limited time being spent on public health in the school health education program and mental health being an abstract topic area with difficult to grasp concepts.

Appendix F gives the frequency distribution of post-scores by groups, control and experimental.

Perhaps the most revealing statistic is the multiple regression of independent variables and their effect on the dependent variable--post score. Looking at Table 17 it is noted that secondary anatomy education accounted for the greatest difference (10.10 percent by itself) on the post-score. The second greatest influence on score variance was, quite surprisingly, the group that the student was in. Secondary anatomy and group together contributed 18.14 percent of the variation in post-score. The post-score variation total, as shown by the R square value, was 31.75 percent. In other words 68.25 percent of the variation in post-scores occurred either by chance or as a result of unknown, independent variables.

Pre- and Post-Test Comparison and Discussion

The pre-test was given so that increased knowledge could be determined by administering a post-test. Table 18 compares sub-topic area pre-scores between groups and post-scores between groups. Table 18 also indicates the level of significance of each comparison.

It is interesting to note that only one significant difference existed in the pre sub-topic areas and that was the area of Mental Health (P = .011). In the post sub-topic areas, six areas showed significant differences and all in favor of the experimental group (total P = .002, drug education P = .001, safety education P = .000, personal health P = .037, nutrition P = .017, disease education P = .007). Perhaps the most important of these differences is post-score between groups. As Shaw (35) and others determined, health education class should improve a student's level of health knowledge. Yet

Table 17

Multiple Regression with Independent Variables by Dependent Variable Post-Score

	R Square
Secondary Anatomy	.10096
Group	.18141
Mothers' Occupation	.21693
Secondary Physical Science	.24624
Elementary Biology	.26325
Secondary Drug Education	.27552
Secondary Nutrition Education	.28517
Elementary Psychology	.29134
Secondary Psychology	.29759
Sex	.30302
Elementary Nutrition Education	.30740
Education Level - Father	.30942
Secondary Biology	.31349
Elementary Anatomy	.31669
Fathers' Occupation	.31730
Secondary Safety Education	.31756

Table 18

Pre-Score, Post-Score and T-test of Significant by Subject and Group

Subject	Number of Questions	$\bar{M}$ Pre-Score Control Group	$\bar{M}$ Pre-Score Experimental Group	T-test	$\bar{M}$ Post-Score Control Group	$\bar{M}$ Post-Score Experimental Group	T-test
Total	100	40.39	41.14 41.14	.695	38.19	45.11	*.002
Drug Education	8	3.22	3.15	.801	3.07	4.07	*.001
Safety Education	8	3.96	3.92	.838	3.53	4.74	*.000
Personal Health	19	8.37	8.15	.667	7.62	8.77	*.037
Mental Health	7	2.57	3.36	*.001	2.69	2.98	.277
Nutrition	15	6.30	6.23	.889	5.77	6.88	*.017
Public Health	16	5.96	5.93	.923	5.84	6.04	.610
Disease Education	27	9.96	10.36	.538	9.65	11.58	*.007

* = Significance at the .05 level.

other studies, including those of Musser (27) and Kinnett (18) reported contrary results. This study clearly indicates a significant difference between groups, not only on the post-score mean, but also on the sub-topic areas of drug education, safety education, personal health education, nutrition, and disease education.

Tables 19 and 20 indicates differences that may exist within groups between pre- and post-tests. Significant differences did exist within the control group (Table 19) but each significant difference resulted in a lowering of the post-mean score. This finding is peculiar in that it has not been reported in any of the studies

Table 19

Comparison of Pre- and Post-Score Means using the T-test of Significance by Control Group

	Number of Questions	Pre $\bar{M}$ Mean	Post $\bar{M}$ Mean	T-test
Total Score	100	40.29	38.20	.057
Drug Education	8	3.22	3.07	.470
Safety Education	8	3.97	3.53	*.012
Personal Health	19	8.38	7.62	*.038
Mental Health	7	2.57	2.70	.531
Nutrition Education	15	6.30	5.77	.090
Public Health	16	5.97	5.84	.690
Disease	27	9.97	9.65	*.040

* = Significance at the .05 level.

reviewed in the literature review in Chapter II, and the reasons for it can only be speculated upon. However, in studying Tables 19 and 20 it becomes apparent that the pre-test scores were high in the areas of significance, including safety education, personal health education, and disease education. Perhaps, therefore, it is not that the student's knowledge decreased so much in these areas on the post-test but rather it was artificially high during the pre-test. This artificially high pre-test score could be the result of many unknown independent variables.

The experimental group displayed significant gains in health knowledge, based on scores obtained during the post-test. This agrees with much of the literature review. Table 20 indicates that gains occurred in every area excluding the sub-topic areas of personal health education, public health education and a significant decrease in mental health education. It is important to determine why these gains occurred. As stated earlier, there are no apparent significant differences in parental background between the groups. However, the experimental group had more prior education in the areas of anatomy and biology. As reported earlier by Merki (24) and Worick (44) in their studies, a science background can significantly improve health knowledge, and this may be the major contributing factor. Again, referring to Table 17 on multiple regression, the most influential factor remains prior enrollment in a secondary anatomy class. This may also be the reason that the 'group' category ranks higher in the multiple regression, relative to influence on the post-score.

Table 20

Comparison of Pre- and Post-Score Means Using the T-test of Significance by Experimental Group

Group	Number of Questions	Pre- $\bar{M}$ Score	Post- $\bar{M}$ Score	T-test
Total Score	100	41.14	45.11	*.000
Drug Education	8	3.15	4.08	*.000
Safety Education	8	3.92	4.08	*.000
Personal Health	19	8.15	8.78	.073
Mental Health	7	3.36	2.99	*.049
Nutrition	15	6.23	6.89	*.032
Public Health	16	5.93	6.04	.665
Disease Education	27	10.36	11.59	*.007

* = Significance at the .05 level.

Yet much has to be said about enrollment in a health education class. Scahill (34) in her study on the effect of secondary school health instruction on health knowledge of college freshmen found that health education did influence health knowledge. Milne's (25) and Otta's (28) studies also found health education to exert a great influence on the level of health knowledge

Each experimental group student was exposed to health education for 12 weeks. The students had 42 class periods of health education, each period lasting 41 minutes. The primary topic areas covered included first aid and safety education, mental and emotional health

education, and drug education. Areas of nutrition and personal health were also reviewed briefly.

The topic areas covered in health education for the experimental group parallel very closely the sub-topic areas of significance on the post-test. This seems to indicate that students may indeed have learned more about health which in turn improved their score on the post health knowledge test. This finding agrees with previous reports (26, 27, 35) and is compatible with the basic assumption articulated by Shaw (35), that a health education class should improve a student's level of health knowledge.

Discussion Summary

There was no significant difference between the members comprising the groups. No significant difference existed between parental background of the two groups. Males achieved somewhat higher mean scores on the pre-test than females, although not significantly higher. Females scored somewhat higher mean scores on the post-test, although, again not significantly higher. This, is in agreement with research done by Campbell and Early (5) and Campbell and Foster (6), who found that females scored better than males on the health knowledge tests administered in their studies. Previous class enrollment in the secondary areas of anatomy, biology, drug education and physical science did show significance ($P = .033$) on the health knowledge test, irrespective of group. This, once more, is in agreement with Merki (24).

All factors considered, as indicated statistically, health education may be the major factor relative to increased post mean

score on the health knowledge test. There was a significant difference (P = .002) between the control group, those not exposed to health education, and the experimental group, those exposed to health education. As shown by this and previous studies, health education is responsible for most of the health knowledge gained in school and as such it is justifiably an important, worthwhile subject in a school's curriculum.

Chapter V

SUMMARY AND RECOMMENDATIONS

Summary

The purpose of the present study was to determine the level of health knowledge freshmen students at Cathedral High School, St. Cloud, Minnesota, possess. The study also attempted to estimate the value of school health education on the acquisition of health knowledge. This was accomplished by using a pre- and post-test format, as well as having a control group (not enrolled in health education) and an experimental group (enrolled in health education). Other factors were also studied to determine their value on the health knowledge of the students. These factors were: parental background (occupation and education), sex differences, and prior course enrollment.

To determine significance between groups, the groups were compared collectively, as well as individually for each subject. Several significant differences were found. The experimental group scored higher than the control group on the post-test (control P = 38.19 vs. experimental P = 45.11). Sub-topic areas within the total test also showed significant differences. The experimental group scored significantly higher on the sub-topics of drug education (P = .001), safety education (P = .000), nutrition education (P = .017), and disease education (P = .007), on the post test. The results suggested that school health education does significantly increase health

knowledge. They further suggest that prior education in related areas increases health knowledge.

Both similarities and differences were noted when results of the present study were compared to previous investigations. The resultant similarities or differences between the present study and previous studies appeared to depend on the author's variables used for comparison. However, studies which defined variables in a similar manner found similar results (15, 16).

Recommendations

Research yet to be accomplished include a statewide evaluation of the school health education program and its effect on health knowledge. Other variables such as socioeconomic level, school health education class content, and age of study participants may be of value in ascertaining health knowledge in the State of Minnesota and the reasons for it.

It is recommended that a health knowledge test be given statewide to determine effectiveness of school health education, areas of weakness, and future health education goals.

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APPENDIXES

APPENDIX A

KILANDER-LEACH HEALTH KNOWLEDGE TEST

No._____ Score_____

Date_____

KILANDER-LEACH HEALTH KNOWLEDGE TEST

Percentile_____

Group_____

Developed by
H. Frederick Kilander, Ph. D.
Dean of Graduate School
Wagner College

Revised by
Glenn C. Leach, Ed. D.
Coordinator of Health Education
Wagner College

Name_____ Date _____
Last name First Middle

School now attending_____ City_____ State_____

Date of Birth_____ Sex_____ Father's Occupation_____

Classification (Underline): High School College Freshman Sophomore Junior Senior

Indicate in the blanks below the number of semesters in high school that you have studied each of the following science and health subjects:

General Science	_____	Health Education	_____	Safety Education	_____
Biology	_____	Home Nursing	_____	Chemistry	_____
Home Economics	_____	First Aid	_____	Physics	_____

If you are in college, indicate the number of credits that you have earned in college science courses:

Biology	_____	First Aid	_____	Psychology	_____
Health, Hygiene	_____	Chemistry	_____	Sociology	_____
Physiology	_____	Physics	_____	_____	_____

_____

Directions: Carefully fill out the above information before turning to the questions. This test requires fifty minutes of working time. Each question gives a choice of several answers. In the blank following each statement place the number of that answer which you think is correct. Do not spend too much time on any one question.

Your cooperation is requested in making this a valid test. If you do not understand the question or know the answer, place a zero for your answer. Please do not guess.

IF YOU HAVE ANY GENERAL QUESTIONS, ASK THEM NOW
DO NOT OPEN THIS TEST UNTIL THE EXAMINER TELLS YOU TO DO SO

_____

Printed in U.S.A.
The Rocco Press, New Jersey

HEALTH KNOWLEDGE TEST

1. Many people lack emotional stability in adult life. This characteristic most probably is traceable to: 1. Early home life 2. Early school life 3. Bad companions 4. Heredity 1 _____

2. All except which one food can be used instead of meat as a source of protein?
1. Fish 2. Dried beans and peas 3. Macaroni 4. Poultry 2 _____

3. Which one is a voluntary health agency, as the term is commonly used? 1. Metropolitan Life Insurance Company 2. U. S. Public Health Service 3. National Tuberculosis Association 4. American Medical Association 3 _____

4. The blood test required in many states before a marriage license is issued is for the purpose of determining whether or not either party has: 1. Syphilis 2. Gonorrhea 3. Tuberculosis 4. Hemophilia 4 _____

5. What is missing in an otherwise well-balanced breakfast made up of a glass of strained orange juice, a cooked egg, 2 slices of enriched white bread, and a glass of whole milk?
1. Vitamins 2. Roughage 3. Protein 4. Minerals 5 _____

6. The best rule to follow to prevent constipation is to:
1. Take a laxative regularly once a week.
2. Avoid cheese since it is considered to be binding.
3. Eat plenty of food high in water content such as soups and beverages.
4. Eat regularly foods containing roughage such as vegetables, fruits and whole grain bread. 6 _____

7. The World Health Organization, known as WHO, is:
1. An agency of the old League of Nations.
2. An independent international agency working closely with the UN.
3. An agency of the United Nations.
4. A loose international federation which includes most countries but not Russia and its satellites. 7 _____

8. Which temperature of the bath water is most conducive to relaxation when one is nervous?
1. Hot 2. Warm 3. Cold 4. Hot followed by cold 8 _____

9. A physician who specializes in the health of children is called a: 1. Pediatrician 2. Orthopedist 3. Obstetrician 4. Otologist 9 _____

10. Fatigue due to sedentary or mental work is best relieved at the end of one's working hours by: 1. Coffee 2. Sleep 3. A shower 4. Recreational activity of a physical type 10 _____

11. Which statement about the inheritance of allergies is the most accurate?
1. Allergies are inherited.
2. Allergies are not inherited.
3. The tendency to develop allergies is inherited.
4. It is not known definitely whether there is an inherited factor. 11 _____

12. Comment on the statement: A fever can be "killed" by drinking whiskey.
1. This is true. 2. There is neither harm nor value in this method. 3. It frequently helps. 4. It is more dangerous than helpful. 12 _____

13. Which of the following statements is correct?
1. Excessive masturbation leads to insanity. 2. Excessive masturbation leads to sterility. 3. Masturbation is not physically harmful, and is usually outgrown. 13 _____
4. Masturbation is participated in by the male species only.

14. The process whereby a sperm and egg unite is known as fertilization. By which other name is it also called?
    1. Reproduction 2. Conception
    3. Implantation 4. Sterilization 14 ____

15. Which is the best way to arrange a chair and writing desk in a room with windows only on one side and for a right-handed person?
    1. Facing windows 2. With right side toward windows
    3. With back to windows 4. With left side toward windows 15 ____

16. The ultra-violet rays either from sunlight or artificial sun lamps are of value in preventing: 1. Rickets 2. Goiter 3. Cancer 4. Kidney trouble 16 ____

17. Of the various forms of insurance, the one that offers hospitalization benefits is known as: 1. American Hospital Plan 2. Blue Shield 3. Blue Cross 4. Major Medical 17 ____

18. A college degree is required in order to take up specialized study in three of these fields. For which one is a high school diploma sufficient?
    1. Medical social worker 2. Dentist
    3. Hospital administrator 4. Dental hygienist 18 ____

19. Can a prospective mother make her child more musical if she listens to good music?
    1. Yes, several prominent musicians can ascribe their musical ability to such a procedure. 2. It is doubtful that it would have such an effect. 3. Probably, if the mother does so during the entire prenatal period. 4. It is contrary to the facts of heredity to expect this. 19 ____

20. A person has cut an artery in the forearm. A tourniquet should be applied:
    1. On the side of the cut toward the wrist 2. Either at wrist or elbow
    3. On the side of the cut toward the elbow 4. Both at wrist and elbow 20 ____

21. The most serious type of fatigue is induced by:
    1. Physical work 2. Mental work 3. Emotional strain 4. Not known 21 ____

22. Having which one of these diseases is most likely to be fatal?
    1. Tetanus (lockjaw) 2. Mumps 3. Scurvy 4. Hookworm 22 ____

23. Which one statement concerning the heart and exercise is incorrect?
    1. If heart trouble is already present, excessive muscular activity may lead to trouble.
    2. Some heart patients benefit from medically prescribed exercise.
    3. Exercise causes "athlete's heart."
    4. The death rate from heart disease is lower for people who do heavy physical work as compared with those who do sedentary work. 23 ____

24. That field of medicine which deals with the aged is known as:
    1. Pediatrics 2. Geriatrics 3. Obstetrics 4. Orthopedics 24 ____

25. For people at sedentary work, 68 degrees is the ideal room temperature because:
    1. It keeps the humidity sufficiently low.
    2. We are accustomed to that temperature.
    3. It is the temperature at which our body makes heat at the same rate that it loses it without shivering or perspiring.
    4. It is the nearest temperature to that of summer. 25 ____

26. The best method today of lowering the death rate from cancer is by:
    1. Early diagnosis. 2. Repeated use of radium and X-ray.
    3. Improvement in one's general health. 4. Early operation. 26 ____

27. In fighting biological warfare, you as a citizen should:
    1. Identify germs, toxins or poisons before reporting them.
    2. Avoid washing or dry cleaning any contaminated clothing.
    3. Wear air-tight face mask and suit covering entire body.
    4. Report all unusual symptoms and illnesses to your local or civil defense authorities. 27 ____

28. The cooking of foods decreases particularly the value of:
1. Proteins 2. Fats 3. Vitamins 4. Calories 28 _____

29. Is the "taste" for alcohol inherited?
1. Yes 2. Yes, in some cases 3. Yes, in most cases 4. No 29 _____

30. When a strong acid has accidentally come in contact with the skin, one should immediately:
1. Wash it off with plenty of water, preferably alkaline.
2. Cover it with oil. 3. Apply an ointment dressing.
4. Wash it off with rubbing alcohol. 30 _____

31. Astigmatism is defined as: 1. An infection of the eye 2. Weak eyes
3. A type of nearsightedness 4. Imperfect curvature of the eye 31 _____

32. Gonorrhea may cause:
1. Stomach ulcers 2. Insanity 3. Baldness 4. Sterility 32 _____

33. The number of cases of organic diseases such as heart trouble and cancer compared with communicable diseases such as typhoid, tuberculosis, and diphtheria is:
1. Increasing 2. The same 3. Decreasing 4. Not known 33 _____

34. In which way is sugar used in the body? 1. To yield energy 2. To build tissue
3. To regulate the body processes 4. To yield energy and build tissue 34 _____

35. The souring of milk is hastened most quickly by: 1. Thunderstorms
2. Pasteurization 3. Leaving the bottle uncovered in the refrigerator
4. Poor refrigeration 35 _____

36. What is the relative professional competency of medical doctors in comparison with chiropractors in treating disease? 1. Equal to chiropractors
2. Inferior to chiropractors 3. Better than chiropractors 4. Debatable 36 _____

37. Which of the following statements about syphillis is the only correct one?
1. It is a hereditary disease. 2. Once a person has contracted it, he develops an immunity toward it. 3. The latent stage may cause heart defects or insanity. 4. It is often acquired from dirty toilet seats or towels. 37 _____

38. In attempting to reduce the rate of tuberculosis, this disease should be considered primarily: 1. An hereditary sickness 2. An infection 3. An emotional ailment
4. As caused by faulty nutrition 38 _____

39. What is meant by "tolerance" as used in speaking of drug addiction?
1. A sense of well-being and relaxation caused by the drug.
2. The need for larger doses of the drug with continued use.
3. Physical dependence on the drug.
4. Emotional dependence on the drug. 39 _____

40. Three of these countries have relatively low death rates; for which one is the death rate the highest? 1. United States 2. Australia 3. Mexico 4. Sweden 40 _____

41. Which disease is transmitted most readily and quickly by personal contact?
1. Cancer 2. Pellagra 3. Diphtheria 4. Anemia 41 _____

42. Milk, which is high in protein and vitamins, completely lacks which one of the following food essentials? 1. Roughage 2. Fats 3. Carbohydrates 4. Minerals 42 _____

43. Which one of these factors contributes most to mental health?
1. Daydreaming 2. Facing the realities of life 3. Seldom facing unpleasant situations 4. A great deal of introspection 43 _____

44. What is it in tobacco smoking which causes lung cancer? 1. Nicotine 2. Tobacco tars 3. Carbon monoxide in tobacco smoke 4. The heat of the smoke 44 _____

45. Which factor most frequently makes the air less healthful in heated homes or offices during the winter? 1. Room temperature kept too high 2. Dampness 3. Lack of sufficient oxygen 4. Too much carbon dioxide 45 _____

46. Soft drinks of the cola type contain sugar and a drug, caffeine, which acts as a:
1. Depressant 2. Stimulant 3. Narcotic 4. Vitamin 46 _____

47. For which communicable disease must you present a certificate of successful vaccination when you return to the U. S. from abroad? 1. Yellow fever
2. Chickenpox 3. Smallpox 4. Cholera 47 _____

48. Which one of these symptoms is NOT a symptom of shock?
1. Cold perspiration on forehead 2. Strong pulse
3. Shallow, irregular breathing 4. Dilated pupils of eyes 48 _____

49. Arthritis is a form of rheumatism in which there is inflammation of:
1. Muscles 2. Joints 3. Nerves 4. Bursae 49 _____

50. The type of illness that occurs when emotional tension creates functional bodily disorders, such as headaches and high blood pressure, is known as:
1. Psychosomatic condition 2. Neurosis 3. Psychosis 4. Insanity 50 _____

51. Having which disease does not make the person immune to a second attack of the disease? 1. Colds 2. Mumps 3. Scarlet fever 4. Typhoid fever 51 _____

52. The oxygen taken in by the lungs is carried to the body tissues by which one of the following substances? 1. White blood cells 2. Blood platelets
3. Red blood cells 4. Autocoids 52 _____

53. Where does heart disease rank as a cause of death in the United States today?
1. First 2. Second 3. Fifth 4. Among the second five causes 53 _____

54. The Federal Food, Drug and Cosmetic Act prohibits:
1. False advertising in newspapers
2. The sale of products in the same state in which they are made
3. False advertising on the package 4. Both sale and advertising of product 54 _____

55. A glass of drinking water contains approximately how many calories?
1. None 2. 10 3. 100 4. 200 55 _____

56. Which one of the following is favorable to the maintenance of a healthy mind?
1. Introspection 2. Monotonous living 3. Cultivation of hobbies
4. Emotionalizing over one's handicaps 56 _____

57. Three of the following four personality traits indicate emotional maturity in a person Which one does not? 1. Self-discipline 2. Self-satisfaction 3. Determination
4. Independence 57 _____

58. Which one of these chemical salts, when found in drinking water or applied to the teeth, helps to reduce tooth decay? 1. Chlorides 2. Fluorides 3. Sulphates 4. Carbonates 58 _____

59. When it is time for the baby to be born:
1. The navel gradually opens to let the baby out.
2. The muscles of the uterus contract to force out the baby.
3. The Fallopian tube expands to permit the baby to pass through. 59 _____
4. None of these three statements applies.

60. The main function in perspiring (sweating) is:
1. To eliminate body poisons 2. To regulate the temperature of the body
3. To get rid of excess water 4. To cleanse the surface of the body 60 _____

61. Various marks of disfiguration on a newborn child are due to the fright of the mother during pregnancy. 1. This has frequently happened. 2. It may happen when the fright occurs early in pregnancy. 3. It may happen when the fright occurs during last 3 or 4 months of pregnancy. 4. There is no biological basis for this statement. 61 _____

62. The "Pap" test is used in determining the presence of cancer in what part of the body? 1. Skin 2. Stomach 3. Breast 4. Uterus 62 _____

63. Human whole blood or some of its derivatives can be used in the treatment of all except which one? 1. Shock 2. Goiter 3. Anemia 4. Burns 63 _____

64. Which is the correct view in regard to "cousin marriage"?
1. Such a marriage almost always results in some inferior children.
2. It frequently results in mentally deficient children.
3. It is not likely to result in deficient children any more than any other marriage.
4. It is biologically undesirable if undesirable inheritable traits are known to be present in the family. 64 _____

65. Cigarette smoking produces all of the following effects except which one?
1. It causes shortness of breath. 2. It causes an increase in mental alertness.
3. It causes a measurable rise in blood pressure. 4. It makes the extremeties (feet and hands) cold. 65 _____

66. The dangerous gas contained in manufactured illuminating and cooking gas is:
1. Methane 2. Hydrogen 3. Carbon monoxide 4. Carbon dioxide 66 _____

67. Three of the following services are considered to be functions of the city and county health departments. Which function is NOT the health department's responsibility?
1. Compiling vital statistics
2. Providing for sanitation in the community
3. Providing for communicable disease control
4. Caring for the needy 67 _____

68. In order to recover from tuberculosis, which procedure is most important?
1. To rest a great deal 2. To move to a dry climate
3. To exercise by taking long walks 4. To take injections of tuberculin 68 _____

69. During which age period will the lack of proper food result in most harm?
1. From birth to 6 years 2. Childhood—6-12 years
3. Adolescence—12-18 years 4. Early maturity—18-24 years 69 _____

70. Is fish a brain food?
1. It is, because fish is rich in protein similar to that found in the brain.
2. It is of value because it contains quantities of the salts found in the brain.
3. It is doubtful whether enough fish can be eaten to make much difference.
4. No one type of food is used specifically for one organ or region such as the brain. 70 _____

71. Can communicable diseases be inherited? (Consider only biological inheritance.)
1. Many but not all communicable diseases can be inherited.
2. It is only occasionally that such diseases are inherited.
3. Tuberculosis is one of the two or three communicable diseases that may be inherited.
4. Communicable diseases cannot be inherited. 71 _____

72. Which one is the best reason why patent medicines should NOT be used?
1. They are too expensive for what a person gets from them.
2. They stimulate one too much by means of harmful drugs.
3. They may cause a person to become a drug addict.
4. They may contain substances that give temporary relief while the condition causing the trouble grows worse. 72 _____

73. Can rheumatism be cured by the application of rattlesnake (or other snake) oil?
1. This is an old, reliable remedy used in the west.
2. It is known to have helped in many instances.
3. There is no value in this remedy.
4. Snake oil will cure only when rubbed in thoroughly. 73 _____

74. Venereal diseases (syphilis and gonorrhea) are most frequently contracted in which age group? 1. 13-18 years 2. 19-24 years 3. 25-30 years 4. 31-36 years 74 _____

75. Most people who are overweight are so primarily because:
1. They exercise too little. 2. They have inherited the tendency. 3. They have an underactive thyroid gland. 4. They eat too much fattening food. 75 _____

76. "Handling toads or frogs is a cause of warts forming on the hands."
1. This statement is true. 2. It is true only for toads, not for frogs.
3. It is doubtful whether frogs or toads can cause warts.
4. Both animals can be handled without fear of getting warts from them. 76 _____

77. Anemia is a disease in which the individual may not have sufficient:
1. Gastric juices 2. Red corpuscles 3. Bile 4. Calcium 77 _____

78. Active acquired immunity develops when a person has a disease and then recovers from it. For which pair of diseases is this common?
1. Tuberculosis and malaria 2. Colds and pneumonia
3. Measles and mumps 4. Diabetes and anemia 78 _____

79. According to present scientific knowledge, which one is entirely attributed to heredity?
1. Cancer 2. Excessive weight 3. Color-blindness 4. Anemia 79 _____

80. The human embryo gets its food through: 1. The Fallopian tube
2. The placenta 3. Cell division 4. The abdominal cavity 80 _____

81. The main value in the use of a dentifrice (toothpaste or powder) is to:
1. Help scour and clean the teeth 2. Kill bacteria in the mouth
3. Neutralize bad mouth odors 4. It has no value 81 _____

82. It is through the Eustachian tube that infections in the nose frequently spread to:
1. Lungs 2. Ear 3. Tonsils 4. Adenoids 82 _____

83. Which statement is most often true about alcoholics?
1. They eventually become insane. 2. They show personality changes.
3. They suffer from infectious diseases. 4. They suffer from malnutrition 83 _____

84. Which is the incorrect statement?
1. Marijuana is a synthetic drug.
2. Marijuana may produce hallucinations.
3. Marijuana does not produce a physical dependency.
4. Marijuana may lead to the use of heroin.

84 _____

85. Can a swelling or a "black eye" due to a bruise be reduced by applying raw meat?
1. It works in many instances because raw meat is able to absorb the liquid which otherwise would cause the swelling to develop.
2. Statement (1) holds true only for certain kinds of meat such as beefsteak.
3. It works at times because of a special enzyme in meat. 85 _____
4. There is no special value in the use of raw meat in the treatment of bruises.

86. Tuberculosis in childhood is acquired most frequently by getting the germs:
1. Through inheritance 2. From street dust 3. From contact with adults who have the disease. 4. By drinking milk from infected cows 86 _____

87. Which statement is correct concerning lighting and television watching?
1. TV gives off certain harmful rays that may injure the eyes.
2. It is best to sit slightly to the side of the TV screen when viewing it.
3. Moderate indirect lighting for the room as a whole is recommended for minimum eye strain.
4. There should be sufficient contrast between the lighting in the room and that from the TV screen. 87 _____

88. Which vitamin should be included in children's diets in order to prevent rickets?
1. A 2. B 3. C 4. D 88 _____

89. In the event of a heart attack, which procedure is wrong?
1. Keep patient quiet.
2. If patient so desires, have him slowly walk around to stimulate his circulation.
3. Assist patient to a comfortable position.
4. Provide moderate warmth. 89 _____

90. Antibiotics refer to: 1. Drugs used in combating certain diseases 2. A special food for infants 3. A disinfectant for sterilizing utensils 4. A hormone for preventing certain diseases 90 _____

91. Four of the following represent types of neurosis; which one is a type of psychosis?
1. Hypochondriasis 2. Hysteria 3. Neurasthenia 4. Paresis 91 _____

92. Botulism refers to: 1. A type of food poisoning 2. One of the newer drugs
3. An enzyme 4. A tropical disease 92 _____

93. The periodic health examination is valuable in the detection and prevention of all except which one of these diseases? 1. Typhoid fever 2. Heart disease
3. Diabetes 4. Cancer 93 _____

94. Which department of the Federal Government is responsible for the control of narcotics and drug abuse?
1. Department of Justice. 2. Department of the Treasury. 3. Department of Health, Education and Welfare. 4. Department of Commerce. 94 _____

95. The physiological effect of alcohol upon the nervous system is:
1. As a stimulant 2. As a depressant 3. As both a stimulant and a depressant 4. Either, depending upon the person 95 _____

96. The average life span (expectation of life at birth) during the past century has been increased from about 30 years to about 70 years. This change has been accomplished mainly by: 1. Preventing infant deaths 2. Reducing diseases of old age
3. Equally by both (1) and (2) 4. It is not definitely known 96 _____

97. The best thing to do when fatigued from a strenuous day of muscular work is to:
1. Take a cold shower to "pep one up." 2. Massage the tired muscles.
3. Take further exercise to "work off" the fatigue toxins. 4. Sleep it off. 97 _____

98. What is the best thing for a person to do who feels that he is about to faint?
1. Move to fresh air. 2. Drink some cold water. 3. Lower the head between the knees.
4. Have someone rub his forehead with a rotary motion. 98 _____

99. Which one of these factors contributes most to automobile accidents?
1. Car design 2. Weather 3. Human element 4. Defects of car 99 _____

100. Which one of the following statements on teeth and their care is true?
1. Since wisdom teeth (third molars) are useless and decay early, the sooner they are extracted, the better.
2. "Pink toothbrush" can be cured by the right kind of toothpaste.
3. Eating soft, sugary foods and candies contributes to tooth decay.
4. One's physical condition has little effect on the health of the teeth. 100 _____

APPENDIX B

PERSONAL DATA SHEET

Dear Student:

The following questions are being used to aid in the analysis of a paper that I am currently writing. I am trying to determine the level of health knowledge among high school students and the factors that may have had a positive influence on this knowledge.

Please answer the questions honestly and accurately. Be assured that all responses will be held confidential.

Thank you for your cooperation,

Dennis L. Miller

Name: _____

Age: _____

Sex: Male _____, Female _____

Please indicate by placing a check mark in the appropriate space following each statement.

Educational Level of Father: (Check only the highest completed level)

Junior High School _____

High School Graduate _____

1 year Post-High School _____

2 years Post-High School _____

3 years Post High School _____

4 years Post-High School _____

College Graduate _____

Other _____

Educational Level of Mother: (Check only the highest completed level)

Junior High School _____

High School Graduate _____

1 year Post-High School _____

2 years Post-High School _____

3 years Post-High School _____

4 years Post-High School _____

College Graduate _____

Other _____

Father's Occupation: _____

Mother's Occupation: _____

Place a check in the space provided if you have had instruction in the topic area listed. Be sure to check the appropriate area, either Elementary and/or Junior High School.

	Elementary	Junior High School
Anatomy	_____	_____
Biology	_____	_____
Drug Education	_____	_____
Nutrition Education	_____	_____
Physical Science	_____	_____
Psychology	_____	_____
Safety Education	_____	_____

APPENDIX C

Sub-Topic: Question Breakdown

APPENDIX C

Sub-Topic: Question Breakdown

Questions	Drug Education	Safety Education	Personal Health Education	Mental Health Education	Nutrition Education	Public Health	Disease Education
Numbers below each sub-topic category represent questions which correspond to the sub-topic within the test.	29	20	9	13	2	3	4
	39	30	10	21	5	7	6
	44	48	13	43	23	9	11
	46	63	14	50	28	17	12
	65	66	15	56	34	18	16
	83	89	19	57	35	24	22
	84	98	58	91	42	25	26
	95	99	59		52	27	31
			60		55	36	32
			61		69	40	33
			64		70	45	37
			74		75	54	38
			76		77	67	41
			80		88	93	47
			81		92	94	49
			85			96	51
			87				53
			97				62
			100				68
							71
							72
							73
							78
							79
							82
							86
							90

APPENDIX D

CORRECT, INCORRECT RESPONSES BY QUESTION

APPENDIX D

Correct, Incorrect Responses by Question

Questions	Pre-Test Correct	Pre-Test Incorrect	Post-Test Correct	Post-Test Incorrect
1	47	82	28	101
2	76	53	82	47
3	119	10	110	19
4	109	20	117	12
5	90	39	80	49
6	41	88	57	72
7	78	51	91	38
8	52	77	39	90
9	28	101	21	108
10	72	57	78	51
11	82	47	73	56
12	59	70	59	70
13	65	64	58	71
14	93	36	81	48
15	72	57	82	47
16	99	30	106	23
17	100	29	98	31
18	103	26	99	30
19	97	32	92	37
20	60	69	45	89
21	55	74	60	69
22	92	37	70	59
23	80	49	83	46
24	80	49	71	58
25	39	90	37	92
26	60	69	38	91
27	57	72	63	66
28	92	37	82	47
29	60	69	57	72
30	19	110	15	114
31	84	45	78	51
32	87	42	82	47
33	72	57	21	48
34	90	39	91	38
35	31	98	36	93
36	84	45	92	37
37	99	30	103	26
38	88	41	84	45
39	87	42	58	71
40	62	67	62	67

APPENDIX D (continued)

Questions	Pre-Test Correct	Pre-Test Incorrect	Post-Test Correct	Post-Test Incorrect
41	91	38	84	45
42	69	60	59	70
43	87	42	98	31
44	103	26	105	24
45	95	34	105	24
46	58	71	37	92
47	86	43	76	53
48	81	48	55	74
49	42	87	52	87
50	82	47	86	43
51	49	80	58	71
52	75	54	71	58
53	111	18	85	44
54	63	66	56	73
55	24	105	26	103
56	58	71	69	60
57	82	47	80	49
58	20	109	28	101
59	58	71	50	79
60	46	83	51	78
61	56	73	67	62
62	98	31	100	29
63	115	14	118	11
64	106	23	107	22
65	65	64	74	55
66	74	55	94	35
67	76	53	70	59
68	92	37	96	33
69	66	63	53	76
70	82	47	89	40
71	101	28	100	29
72	78	51	83	46
73	73	56	67	62
74	89	40	94	35
75	83	46	91	38
76	49	80	57	72
77	87	42	98	31
78	62	67	56	73
79	75	54	77	52
80	98	31	98	31
81	77	52	76	53
82	88	41	92	37

APPENDIX D (continued)

Questions	Pre-Test Correct	Pre-Test Incorrect	Post-Test Correct	Post-Test Incorrect
83	51	78	57	72
84	91	38	88	41
85	82	47	88	41
86	98	31	105	24
87	91	38	95	34
88	105	24	114	15
89	41	88	48	81
90	56	73	47	82
91	110	19	116	13
92	76	53	65	64
93	85	44	91	38
94	113	16	119	10
95	105	24	96	33
96	114	15	112	17
97	109	20	104	25
98	71	58	64	65
99	62	67	61	68
100	52	77	50	79

APPENDIX E

FREQUENCY DISTRIBUTION BY PRE-SCORE BY GROUP

APPENDIX E

Frequency Distribution by Pre-Score by Group

Group	Control Count	Experimental Count	Group	Control Count	Experimental Count
Pre-Score			Pre-Score		
19	1	0	42	2	2
23	1	1	43	6	4
24	1	3	44	1	1
25	2	2	45	3	2
26	1	0	46	2	1
27	2	0	48	2	2
28	0	1	49	1	1
29	2	3	50	0	1
30	0	1	51	2	3
31	1	0	52	0	3
32	1	2	53	0	1
33	3	0	54	3	1
34	6	2	56	0	1
35	3	6	57	1	0
36	1	3	60	2	1
37	1	4	61	1	0
38	2	1	62	1	1
39	5	3	63	0	2
40	2	2	72	1	0
31	3	1	77	0	1

Total Pre-Score Mean = 40.76
Control Mean = 40.39
Experimental Mean = 41.14

APPENDIX F

FREQUENCY DISTRIBUTION BY POST-SCORE BY GROUP

APPENDIX F

Frequency Distribution by Post-Score by Group

Group	Control Count	Experimental Count	Group	Control Count	Experimental Count
Post-Score			Post-Group		
12	1	0	44	2	3
13	0	1	45	1	0
19	1	0	46	2	2
20	1	0	47	1	2
21	1	0	48	0	4
22	0	1	49	0	1
23	2	0	50	2	2
24	3	2	51	3	1
26	2	1	52	3	0
27	1	0	53	1	1
28	3	0	54	2	0
29	0	1	55	2	2
30	3	1	56	0	2
31	3	2	58	0	1
32	1	0	59	1	1
33	0	1	60	0	2
34	4	2	61	0	1
35	2	3	62	0	2
36	3	1	63	0	1
37	2	1	64	0	2
38	4	3	65	0	1
39	1	3	70	0	1
40	1	3	72	1	0
41	1	2	83	0	1
42	5	2			

Total Post-Score Mean = 41.57
Control Mean = 38.19
Experimental Mean = 45.11