

AN ABSTRACT OF THE THESIS OF

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Title AN ANALYSIS OF THE EFFECTIVENESS OF TEAM TEACH-  
ING COMPARED TO TRADITIONAL TEACHING OF HEALTH  
TO HIGH SCHOOL SOPHOMORE STUDENTS

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Purpose of the Study

The purpose of this study was to compare the effectiveness of teaching high school health by team teaching and traditional teaching methods. For this study 114 second-semester sophomore health students from Centennial High School in Gresham, Oregon were used, distributed in three health classes as a control group, utilizing traditional teaching, and three classes of an experimental group, using team teaching.

All students participating in this study were given the Shaw Health Knowledge Test as a pretest and as a final test. The Henmon-Nelson Test of Mental Abilities was given to insure that each group was comparable in mental ability. Chronological ages of the students were equated.

## Conclusions

Although the team teaching method made the greatest increase in health knowledge, the analysis of variance results indicated a lack of evidence to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing health knowledge of sophomore high school students taking a semester health course, therefore hypothesis number one is accepted.

There is not sufficient evidence to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing the health knowledge of sophomore high school girls taking a semester health course.

While boys in team teaching made a greater increase in health knowledge than the boys in traditional teaching, this increase was not statistically significant to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in health knowledge of sophomore high school boys taking a semester health course.

Team teaching students with superior mental ability had a statistically significant increase in health knowledge over the traditional teaching students with superior mental ability.

As the team teaching group and the traditional teaching group had about the same increase in health knowledge, the evidence

revealed was insufficient to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing the health knowledge of students with average mental ability.

According to the results of the analysis of variance, a lack of evidence indicates a rejection of the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing the health knowledge of below average mental ability.

### Recommendations

1. Additional health team teaching studies utilizing statistical treatment should be conducted on the elementary school, junior high school, secondary school and college levels.
2. Scientific team teaching studies should be encouraged in other secondary school subject areas to determine the effectiveness of this method in each subject area.
3. Because team teaching is as effective as traditional teaching in health education for girls, boys, average mental ability students and below average mental ability students, it is recommended that each school choose the method deemed most effective for the school.

4. Institutions involved in training prospective health teachers should integrate team teaching into their methods courses.

AN ANALYSIS OF THE EFFECTIVENESS OF TEAM TEACHING  
COMPARED TO TRADITIONAL TEACHING OF HEALTH  
TO HIGH SCHOOL SOPHOMORE STUDENTS

by

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# AN ANALYSIS OF THE EFFECTIVENESS OF TEAM TEACHING COMPARED TO TRADITIONAL TEACHING OF HEALTH TO HIGH SCHOOL SOPHOMORE STUDENTS

## CHAPTER I

### INTRODUCTION

There are a number of practices now being followed in our secondary schools which represent efforts to initiate new teaching ideas in secondary education. Several of these ideas have resulted in significant changes in staff utilization and the organization of instruction. The most extensive development, and undoubtedly one of the most promising, is team teaching. Trump (85, p. 327) defines team teaching as, "an arrangement whereby two or more teachers and their aids, in order to take advantage of their respective competencies, plan, instruct, and evaluate, in one or more subject areas, a group of elementary or secondary students equivalent in size to two or more conventional classes, making use of a variety of technical aids to teaching and learning in large group instruction, small group instruction, and independent study." While this generally describes team teaching, there are numerous variations because of differences in teachers, facilities, equipment, and other factors.

Teaching teams have attracted widespread interest and attention since they emerged in schools about nine or ten years ago.

In the past five years, a surprising number of secondary schools have introduced this new pattern of school teaching organization. This arises from the need of the secondary school of today to use all available resources to improve the curriculum and facilitate superior instruction.

This study will be concerned primarily with team teaching in health education. Anderson (3, p. 36) defines health education as "...the growth within a child of his ability to understand health knowledge and to utilize and apply meaning to it. Health education implies the growth of a child's ability to discriminate, appraise, and evaluate health knowledge and experience." Health education programs in the secondary public schools of the United States have been extremely varied. These variations are due to the employment of several methods of teaching health.

### Statement of the Problem

The purpose of this study is to investigate the relative effectiveness of team teaching and traditional teaching in improving the health knowledge of high school sophomore students. More particularly, the study will seek to determine whether team teaching is as effective as traditional teaching by proposing the following hypotheses:

1. Team teaching is as effective as traditional teaching in increasing health knowledge of sophomore high school students taking a semester health course. The Shaw Health Knowledge Test will be used in this study to measure the widely accepted 11 areas of health knowledge.
2. Team teaching is as effective as traditional teaching in increasing health knowledge of sophomore high school girls taking a semester health course.
3. Team teaching is as effective as traditional teaching in increasing health knowledge of sophomore high school boys taking a semester health course.
4. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with superior mental ability.
5. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with average mental ability.
6. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with below average mental ability.



### Significance of the Problem

The significance of health knowledge in secondary education has long been recognized. Horace Mann and Herbert Spencer in the nineteenth century stressed the need of hygiene in the schools. The Cardinal Principles of Secondary Education in 1918 included health as the first of the seven desired outcomes of education. One of the recommendations of the 1963 National Education Association Project on Instruction was to include health instruction among priorities for the school. Today the need for certain basic knowledge about health is essential if each individual is to take prompt advantage of the advances of medical science, protect himself against the hazards of medical quackery, and achieve for himself, his family, and his community an optimal level of health. A sound program in health instruction in the nation's schools is essential to acquiring correct health information and to the development of proper health attitudes and practices.

It is difficult to assess the exact value of health education in the school and community. Yet, discussants at the plenary session of the Twelfth World Health Assembly (95, p. 360) stated, "Health education is the key to the solution of many health problems involved in the humanitarian task of the World Health Organization." They also insisted that health education is the most powerful weapon we have in the field of health. Dr. M. G. Candau, Director

General of the World Health Organization (95, p. 360) recently said, "It is fully recognized today that no lasting progress in health work can be achieved without simultaneously undertaking to educate the population on health matters."

A functional approach to health education utilizes the school environment for teaching purposes and considers school health services as pupil-learning experiences. It reaches out into the home and community for situations which have health significance. Modern school health education is functional and dynamic, it has breadth and depth, and it is based on the needs and interests of boys and girls. Wilson (95, p. 413) states, "Modern health education helps children and youth gain understandings and develop attitudes that enable them to maintain and improve their own health and that of their families and communities. Health education contributes to the attainment of the purposes of education. It is a basic component of the school curriculum."

If the goal of health knowledge is to be achieved, then the most effective methods of instruction should be developed and utilized. Many studies support the idea that the best way to teach health is through the direct method. Direct health teaching refers to a separate health class that has the teaching of health concepts as its primary purpose, meets regularly, and for which the student generally receives credit.

According to Veekner (88, p. 187) "Numerous studies reflect the evolutionary development of health education as a discipline separate from physical education. Health instruction in the form of a hygiene course as a part of physical education has not been deemed the most desirable way of offering a broad, comprehensive area of study."

Some schools have attempted to teach health by correlating it with other subjects. Correlation in health usually refers to the inclusion of health information in a host subject, such as social studies or biology, by pointing out and relating health concepts to primary course content where natural relationships exist. Whaley and Southworth (92, p. 36) found that there is no "best" curriculum organization for health education. They recommended that additional studies be conducted in this area. Bechtel (9, p. 154) and Meier (56, p. 438) found evidence that health problems could not be solved effectively by the correlation method.

Hein (39, p. 70) illustrates the inadequacy of the correlation method in the following statement, "We should remind the well-meaning people who think that correlation and integration are enough that English is also being taught in many other areas of the curriculum. Supposedly it is also being correlated and integrated throughout the school program. But who has heard of doing away with English courses because English is being taught elsewhere on

a concomitant basis? As is true in English, there has to be a special place, a special time, where health and safety is given first place, where learning from other areas is tied together, where gaps are filled, where relationships are defined. More important, there needs to be a special time and place where a properly prepared person, whose first concern is health and safety, can communicate his knowledge, attitudes, and example to students."

Gmur (88, p. 154) investigated the effectiveness of different curricular patterns, including instruction through correlation, a core course, and direct teaching in a separate course. Results of this investigation provide evidence that supports the conclusion that the most favorable results of health instruction can be achieved by direct teaching.

The findings from these studies generally indicate that the direct health instruction method is the most desirable. The next problem is to determine which direct method is the most effective. Veenker (88, p. 153) reported that Carlos "compared the three-two plan with the direct course in Washington, D. C. high schools. The three-two plan that was being utilized was presenting some problems such as difficulty in maintaining interest in health material, in handling discipline, and in giving a single grade for the two areas. The Washington schools experimented with a one-semester

course at the tenth grade level. By measuring the students' health knowledge and application in both pretest and post test, Carlos made some conclusions concerning the two approaches. He found that the problems encountered under the three-two plan disappeared under the semester course system. More importantly, he found that the semester course provided students with better knowledge and application. "

In another study, Anderson (88, p. 153) reported a 1960 survey of college freshmen who had taken high school health work. The survey revealed that those who had been on a three-two schedule scored lowest as a group on standard health knowledge tests. He reported that those students who had taken a three-two program indicated the least liking for health education as a high school subject.

Available research reports suggest that the direct method of health instruction for at least one semester is recommended. Many schools offer separate classes of health instruction for boys and girls. Various reasons are given in way of explanation for these programs. It is felt by many health educators that health should be taught on a co-educational basis like other subjects. Evidence from a recent national health study seems to endorse co-educational health classes. Sliepcevich (75, p. 23) states, "Indications are that scheduling of health classes at the secondary

level is dictated by the practice that exists of separating boys and girls for physical education. Grouping boys and girls separately for health instruction for this reason only cannot be viewed as an acceptable practice any more than it could be for any other subject in the curriculum."

After reviewing some of the literature related to the significance of the problem of health education, it appears that the next logical step would be to conduct research to determine which type of direct instruction is the most effective in increasing health knowledge.

#### Purpose of the Study

For many years the investigator has been interested in the effectiveness of team teaching compared to traditional teaching. After several years of employing both methods in teaching health, the author became curious to find out if the team teaching method is as effective as the traditional teaching method in increasing health knowledge.

The purpose of this study is to conduct urgently needed research in the effectiveness of health teaching methods. More specifically, this study is designed to determine whether team teaching is as effective as traditional teaching in increasing health knowledge of secondary school students.

Several national investigations indicate that more research should be applied to improve health instruction. In a national survey, Sliepcevich (73, p. 53) listed some recommendations for health study. Three of these recommendations pertain to this author's study:

1. Individual states or local school systems should carry out studies of their health instruction programs to determine strengths and weaknesses.
2. Critical appraisal should be made of such facts as professional preparation and teacher effectiveness of health instruction staff, opportunities for in-service education for staff members, scheduling practices and time allotment for health instruction, repetition of learning experiences and omission of health content areas, policies related to the teaching of subject matter considered to be controversial, placement and sequential development of health concepts by grade levels, methodology and teaching approaches, scientific accuracy and grade level appropriateness of instructional materials, interpretation to the school staff and the community of the need for health education and its objectives, parent education programs in health education to assure reinforcement of what is learned in schools, and evaluation procedures.

3. Needs for research, experimentation, and evaluation should be considered by school systems, graduate departments in colleges, public agencies, private organizations, and others interested in research activities.

Recommendations such as these reveal the importance and the purpose of doing research in the health team teaching area.

The National Education Association, in 1964, made several recommendations for schools to work on during the next five years. Three of these recommendations seem very appropriate for this study:

1. Recommendation 6, (59, p. 41), Money, Time and Personnel - School systems should allocate an appropriate proportion of their annual operating budgets--not less than one per cent--for the support of research, experimentation, and innovation. Adequate time should be provided for each staff member to participate in curriculum planning, research, evaluation, and other activities designed to improve the instructional program of the public schools.
2. Recommendation 7, (59, p. 41), Curriculum and Instruction Centers - Adequately staffed and supported regional curriculum centers should be encouraged. These centers, located mainly in universities, should work in partnership



with local schools to initiate innovation and conduct experimentation and research to improve the instructional program of the public schools.

3. Recommendation 25, (59, p. 50), Team Teaching - The horizontal organization of the school should permit flexibility in assigning pupils to instructional groups that may range in size from one pupil to as many as a hundred or more. Well-planned, cooperative efforts among teachers--efforts such as team teaching--should be encouraged and tested.

These recommendations stress the importance of conducting team teaching research in the area of health education. Brownell and Taylor (16, p. 156) have stressed that experiments with teaching teams need to be expanded. They recommend closer analysis of assumptions, more explicit models, better research design, and more penetrating evaluation of results of team experimentation so that schoolmen will be able to make sound judgments about teaching teams.

Drummond (28, p. 8) indicates "Interest in team teaching has grown rapidly in the past few years. At the moment it appears that the instructional staffs in hundreds of secondary schools and many elementary schools are doing something they call team teaching." In 1962 a recent article by Pitruzzelo (66, p. 333)

reveals that team teaching research should be especially important to people in health education. "Physical education and health is the area with the highest incidence of team teaching."

### Definitions

For the purpose of this study, the terms of this investigation will be defined to mean the following:

1. Health: A state of complete physical, mental, emotional, and social well-being and not merely the absence of disease and infirmity. (97, p. 16)
2. Health Education: The process of providing or utilizing experiences for favorably influencing understanding, attitudes and practices relating to individual, family and community health. (38, p. 121)
3. Semester Health Course: A course which meets five days a week, for 55 minutes each day, and extends over a period of one-half school year or about 18 weeks in length, for the purpose of covering the 11 health areas in the Oregon Health Scope and Sequence Chart.
4. Traditional Teaching: Teaching in a self-contained classroom which meets five days a week for 55 minutes each day, with instruction being given by the same teacher in the same room.

5. Team Teaching: An arrangement whereby class instruction is offered by two or more teachers cooperatively through the use of large group, medium group or regular class size, small group and individual study in order to take advantage of teacher specialties.
6. Large Group: Consists of activities designed for groups of 60 to 100 students. This group meets about four times every two weeks.
7. Medium Group: This is the same as the conventional or regular class size which has about 20 to 30 students. It meets about four times every two weeks.
8. Small Group: There are 12 to 15 students in each class. The group meets two times during each two-week period.
9. Individual Study: These 15 students go to the library or resource center for independent study one to three times during each unit.
10. Control Group: The group that is taught by the traditional method.
11. Experimental Group: The group that is taught by the team teaching method.
12. Superior: Those students scoring 111 and above on the Henmon-Nelson Test of Mental Ability.
13. Average: Those students scoring between 90 and 110 on the Henmon-Nelson Test of Mental Ability.
14. Below Average: Those students scoring 89 and below on the Henmon-Nelson Test on Mental Ability.

### Fundamental Assumptions

1. The same course content was covered by both methods of instruction.
2. The socio-economic differences were reduced by using students from the same school to participate in this study.
3. The teacher variable was minimized by having the same instructors teach the traditional teaching classes and the team teaching classes.
4. The Shaw Health Knowledge Test is a valid and reliable measure of health knowledge.
5. The Henmon-Nelson Test of Mental Ability is a valid and reliable measure of intelligence.

### Limitations of this Study

1. The problem was limited to students from Centennial High School, Gresham, Oregon.
2. The study was further limited to a sample of 114 sophomore boy and girl high school students.
3. An additional limitation was the matching of the control group with the experimental group by age, sex, intelligence and health achievement.
4. The study was limited to two methods of instruction, traditional teaching and team teaching.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

A review of literature related to team teaching is essential as a base of operations. Such a review properly can begin with literature relating to general secondary school studies on team teaching and then proceed to specific secondary school subject studies. A third aspect is a review of the results of elementary school and junior high school studies on team teaching. A fourth section presents the findings of college and university work in the area of team teaching, and a final section presents summaries and conclusions resulting from team teaching studies.

Relatively few scientific studies have been attempted to evaluate the effectiveness of the team teaching method compared to the traditional method of teaching in increasing student achievement. In the area of health education, the author could not find a single scientific study on team teaching. However, a review of the literature has unearthed a variety of findings in other subject areas.

#### General Findings of Secondary Team Teaching Studies

Although the number of team teaching studies which have utilized statistical treatment has been limited, several investigators have employed at least some statistical techniques in analyzing their data.

Bloomenshine and Brown (14, p. 147) conducted a two-year experiment with team teaching in San Diego. The study included boy's physical education, United States history, English, biology, mathematics, science, world geography and typewriting. Unfortunately, no attempt was made to equate groups and make other analyses. From the results of the achievement tests, the following inference was made. (14, p. 166). "The achievement of pupils appears to be equal to or greater than that of pupils of comparable ability in regular classes."

In 1958 the Ford Foundation granted approximately five hundred thousand dollars to Claremont Graduate School, Claremont, California, to conduct research in team teaching. The project had in operation at the secondary level two teaching teams in Azusa High School, and one in Palm Springs. Taylor (79, p. 277) reported:

The results from the Azusa High School Teaching Team Program for the 1958-1959 school year reveal that the teacher morale stayed at a very high level, that very few pupils asked to be excused from the program, that discipline cases diminished, and that there was an increased amount of learning which took place.

Another statistically significant team teaching study at Johnson High School in St. Paul, Minnesota, was reported by Varner. (87, p. 161)

For the past two years an experiment in team teaching has been conducted at St. Paul's Johnson High School. Motivated by the need to find new methods of handling increased enrollments with existing facilities and staff, the St. Paul Public

School Administration requested and received support of the Louis W. and Maud Hill Family Foundation in financing the teaching project. In 1959-60 two experimental classes were organized. One, a class in American history, had 80 grade eleven students; the other, a senior social problems class, numbers 105 students. A study in depth of the outcome of the first year's experimentation with team teaching methods included a statistical analysis of test results and evaluations by students, teachers, and a three-man team of professional reviewers. The conclusions were favorable on the basis of student achievement and teacher utilization.

The number of studies receiving favorable team teaching achievement results has been limited. Therefore, statistically significant achievement results, such as those found in the Johnson High School study, are encouraging to advocates of team teaching.

McCollum (55, p. 263) found conflicting results in the Snyder, Texas team teaching experiment. In 1961 he reported:

The Snyder project was an experimental study of the relative effectiveness on learning in selected high school subjects of the conventional method versus a composite of procedures involving modern education media in addition to classes of varying sizes, team teaching, and teacher aids. Biology, general science and language arts were the subjects used in this study. The findings from the statistical treatment of data indicate that each class did achieve significant difference in subject matter; that, there was a significant difference between the two methods of instruction in biology and general science, but not in language arts. The difference was in favor of the control class treatment in biology, but it was in favor of the experimental method in general science.

McCollum felt that the apparent contradiction that appeared when the two methods of instruction were pitted against each other may have been accounted for by the failure of one teaching method to make full use of all opportunities for improving instruction offered

by the uniqueness of the teacher-learning situation in the experimental classes.

An extensive study of team teaching by Johnson (44, p. 79) revealed, "Jefferson County, Colorado, School District R-1 had taken the position that experimental research must be conducted if improvements are to be made." The Jefferson County study was conducted in 1958-1959 in the subject areas of English III, plane geometry, American history, and biology in eight high schools in Jefferson County. A total of 1,075 pupils in tenth and eleventh grades were included. All of the F-ratios showed differences which were not significant, except English III, which did significantly better. Other tests were to be conducted during the 1959-1960 school year.

The results of the 1959-1960, Jefferson County, Colorado, School District R-1 were found in a three-year study reported by Johnson and Lobb (45, p. 78). "Included in this approach were approximately 1,500 students and 18 teachers in the subject areas of social studies, English and mathematics. The results were that teacher teams produced just as good results in educational development of pupils as teachers working individually with regular classes. The team teachers claimed that the advantages of team teaching outweigh the disadvantages. Evaluations indicated that considerable progress was made in the effective utilization of professional time,



use of material and personnel resources, the development of appropriate teaching procedures, promotion of good attitudes and morale in teachers and students and provision of adequate facilities and equipment." The findings of the Jefferson County, Colorado, study indicated that team teaching is as effective as traditional teaching. This study did not reveal that team teaching had any advantages over traditional teaching in improving student achievement.

The following studies point toward a subjective evaluation of team teaching. These evaluations were favorable toward team teaching, but most of them lacked statistical treatment and careful design. Some of these observations were so favorable that some secondary schools structured their entire curriculum and designed their new school buildings for team teaching.

After experiencing team teaching, Crava (25, p. 76) stated:

The evaluations of teachers involved have been very favorable. We feel that our teaching has been enriched in that we have had an opportunity to see our strengths and weaknesses in planning and in teaching the material, getting new ideas, and new methods of presenting this material. In team teaching, the teachers are under some pressure to do a better job than usual as an individual teacher. When one is alone in a classroom, he can commit many sins, both omission and commission, without being aware of it. When someone else is there working with him, he feels under distinct pressure--a good pressure--to perform at a higher level. Our team teachers feel that there is a greater communication among classes for each class wants to see what the others have done. This is incentive and heightened interest--a friendly rivalry.

After four years of team teaching at Fremont High School in Sunnyvale, California, Haan and Adam (34, p. 279) in 1962 reported, "We believe that our present program is the beginning of a new design at Fremont in curriculum and organization of instruction." One statistical analysis of a team teaching experiment in the district has shown increased learning as a result of the team approach.

Although the research evidence favoring team teaching is very limited, a number of high schools throughout the United States have designed buildings specifically for this method. In 1962 Tracy and Peterson (84, p. 145) reported, "With the opening of the new 1,800 pupil Easton Area High School this September, the Easton Team Teaching Program in Pennsylvania has entered its fourth year of operation. The coming together of these two separate entities--a curricular program which had undergone three years of evolution, evaluation, and constant improvement, with a brand new three-year senior high school specifically built to house such an educational program has made the opening of this school year a pleasant one for our school system's secondary administration and teachers."

In 1965 Collins (23, p. 62) reported, "For two years prior to the opening of Cordova High School in 1963, extensive studies in new developments in teaching methods and curriculums were indicated at Folsom High School to assist in developing educational specifications for the Cordova High School." The four-year high

school has an almost completely team teaching curriculum. This also reveals that schools are being constructed and designed for team teaching with very little evidence to endorse such revolutionary practices.

Some investigators have reported the need for research concerning ability grouping of students. The possibility of ability grouping in health classes by the team teaching method needs to be explored. The need for special attention to various ability groups was reported in 1963 by Burgess (18, p. 395). "Highly specialized programs for the gifted in science, mathematics, reading, art, music, physical education, and other areas of the curriculum have been developed and put into action during the last decade, but there have been meager efforts made to utilize the capacities of these gifted children in health. Limited attention has been focused on controversial questions concerning health for the gifted."

In 1964 Taylor and Olsen (80, p. 309) reported the following results with trainable, mentally-retarded children at Slover Special School in Fontana, California, "The staff seems agreed after three years of involving use of the team teaching method at Slover that this method gives greater flexibility in the 'human dimension' to everyone involved--students, teaching staff, administrators, parents, and community members. The concensus was judged in part by a staff questionnaire on which answers indicated unanimous

interest in continuing the team teaching method and by opinions expressed on the questionnaire and in staff discussions."

The author feels that a study should include investigation of the effectiveness of team teaching in increasing knowledge of all ability groups. This would reveal whether the team teaching method or the traditional teaching method is more effective in increasing knowledge of students of various mental abilities.

#### The Results of Team Teaching Studies in Specific Secondary School Subject Areas

The number of controlled studies on the effectiveness of team teaching in improving student achievement in specific subject areas is limited. The investigator has not been able to find a single scientific study relating to the effectiveness of team teaching instruction in the health education field. This is especially disturbing in view of the fact that numerous health and physical education team teaching programs are in practice. Actually, very few statistically valid team teaching studies have been conducted in any of the secondary school subject areas. This is rather alarming when one considers the number of existing team teaching programs in practice and the increasing number of school buildings being designed to use this method. Many accounts of subject area team teaching experiences have been reported. However, a review of these

studies revealed that they are based on subjective evaluation through mere observation.

Anderson and Winkleman (5, p. 601) conducted a biology summer school experiment at Skokie, Illinois. In 1962 they reported, "We feel that our experiment was beneficial and that in many ways, and in a proper situation, team teaching may be a step forward in the teaching of biology." Although this study lacked statistical treatment, there was a favorable attitude toward team teaching on the part of the instructors.

Another biology study conducted by White (93, p. 37) in 1964, offered similar results:

The most important results to be reported is that team teaching compared favorably with the nonteam teaching approaches in the learning of the subject matter of biology. Students seemed to like and express enthusiasm for various approaches and frequent exchange of teachers responsible for learning. The enthusiasm and professional attitudes displayed by the biology teachers of Wausau were witnessed by observers such as the author, but, of course, this did not appear in the results of statistical analysis.

Mason (54, p. 365) reported the results of a 1964 biology team teaching experiment as follows: "In a performance on a national achievement test given at the end of last year's team project, the students performed two percentile points over the orthodox control group. It should be noted here that each instructor was assigned a control group of approximately equal numbers and ability." Statistical treatment was not mentioned in this study, however, an effort

had been made to make a comparison between a control group and an experimental group.

The business education field has had some successful results with team teaching. In 1962, Tedesco (81, p. 11) found some convincing results on the effectiveness of team teaching in typing.

These results were based on statistical evidence:

Our team teaching program at Cupertino High School in California, has equalled, if not exceeded, the results of the standard teaching practice. The rate of speed in the experimental classes closely related to that of the control group. However, the knowledge usage, procedures, and techniques in typing I under a team teaching program showed a decided benefit to students. The results of this experiment are interpreted as showing that team teaching has advantages over regular classroom organization.

Unfortunately, there have not been enough research studies completed in this objective manner.

A 1962 study by Thomas and Rubenow (82, p. 19) was conducted on how team teaching works in notehand at Rich High School in Park Forest, Illinois. The results indicated that a full-year course in notehand given to 100 prospective college students achieved good results. This conclusion was based on subjective judgment.

In the chemistry subject field, Watson (90, p. 556) claimed that in 1958, the chemistry classes using the team teaching method at North Central High School in Indianapolis, Indiana was very worthwhile and beneficial. Watson based his statement on

personal experience. This experience was not tested by statistical techniques.

The results of at least four team teaching studies in English education have been published. Although some improvement was noted by the team teaching method, there was not enough improvement to be statistically significant. Hawthorne High School of the Centinela Valley Union High School District in California conducted a team teaching experiment. Centinela Valley compared team teaching with traditional teaching in English. In 1964, Georgiades and Bjelke (13, p. 137) reported that, "A face-value analysis of the data would indicate that the control group averaged exactly one year's growth in English, while the experimental group did one-sixth better than the traditional teaching group. However, a statistical analysis, 't' ratio, showed that the difference in performance of these two matched groups was not significant at the .05 level of confidence."

Clawson (22, p. 98) found that Matoon High School in Matoon, Illinois, experienced relative success in English team teaching.

Matoon Senior High School conducted an experimental group of tenth-grade English classes during the year 1958-1959, under the direction of a team of three teachers. The program was so well accepted and successfully conducted that in 1959-1960, the team taught three groups of tenth grade English. Also taught in quite similar fashion were groups in American history, senior economics, and girl's physical education.

The results of this study were based upon various teaching team reports, scores from tests, observations by professional persons on teaching teams and others, and student ratings. The conclusion established was that the team teaching approach in secondary school education has inherent merit. This study revealed greater gains by the team teaching approach from pretest to final test scores than did the traditional groups. However, there was an inadequacy of standardized tests to bear out the hypothesis.

After team teaching in English for a number of years, Lindahl (52, p. 56) reported an interesting observation in regard to honors students.

To change the complete English program into team teaching organization would be a very difficult task from the standpoint of the administration and the English Department. Also, it is granted that the class under the traditional plan and an excellent teacher can be a very successful one. However, every student in Honors English classes should be given the opportunity of having the enrichment and pleasure of being in one or two team teaching classes in his high school career. Members of regular English classes would benefit from the experience also. All students who have been in a team teaching class will enter college with more knowledge, more respect for their high school English courses, and the ability to adjust to a variety of situations.

Although this study was not based on scientific investigation, it pointed out the fact that some investigation in team teaching and mental ability grouping may prove worthwhile.

A Montana High School team teaching study in English and social studies by Watkins (89, p. 15) revealed:



In an over-all evaluation of the course, it is impossible at this time to draw a complete conclusion as to the success or shortcomings of this experimental program. At this time, however, both Mr. Maier and Mrs. Myhre feel that the students have benefited greatly in both subject areas and have been able to see the relationships of these areas far better. Both teachers feel that the program will work not only for a superior group, but again care must be taken in the grouping process.

This study also lacked statistical treatment, but it re-emphasized the need for a team teaching study to determine how effective this method may be for students with varying mental abilities.

The social science field has conducted a few interesting studies on team teaching. Bruntz (17, p. 374) stated that team teaching in social sciences is still in its embryonic state. He said:

Team teaching will spread. It has its appeal and certainly its advantages. However, we must recognize its limitations and its weaknesses. We must not stop our search for new techniques that will enable the social science teacher to fulfill her obligation to train young people for good citizenship to our democracy. It would be just as much a mistake to accept blindly the team teaching approach as it would be to continue undisturbed in our present system.

Bruntz appears to offer some logical advice. He emphasizes the need to make further studies, rather than blindly accepting the team teaching approach.

In 1962, a social science study, Bodine (15, p. 117) reported on a team teaching senior American problems course at Corvallis High School in Corvallis, Oregon.

From our experience we sincerely believe that this type of team teaching can be of basic importance in improving

teaching in the secondary school. Team teaching with well-prepared teachers who can coordinate their fields and efforts is different from team teaching as a teacher-training device.

This course was incorporated into the Corvallis High School curriculum on the basis of experience. No attempt was made to apply statistical treatment to this study.

In another social science study, namely a history honors team teaching study at Kenmore East High in New York, Szabo (77, p. 27) reported, "The teachers involved are impressed with potentialities of team teaching. It is their belief that the students have experienced certain intangible results, critical judgment, and lasting interest in the study of history." This study was also based on experience and lacked statistical treatment. It pointed out the possibility of using team teaching with a high mental ability group.

Belford (12, p. 366), a foreign language teacher at Ridgewood High School in Illinois, stated, "Any single thing which can make teaching foreign languages more meaningful, more immediate, and more enjoyable is worth developing. Consequently, when one is assured of gaining several, even many, advantages from trying something new or something not commonly practiced, teachers vie with one another to take the first steps toward gaining these advantages. Team work is not the only answer, but it is one. Those who have tried it have found it pleasant, worthwhile, and a richly rewarding experience." This foreign language study stresses the

practical staff benefits from teaching, but it failed to mention the student achievement findings.

After team teaching in health education for a year and a half, Elliot and Gamble (30, p. 28) stated, "The possibilities for team teaching are far reaching. There are limitations, but team teaching is a good approach when teachers, classroom space, and time are limited." The author (70, p. 91) experienced similar results after three years of health team teaching at Centennial High School, Gresham, Oregon.

Smith, at Ritenour Senior High School in Illinois, believed there was increased interest in geometry among the students as a result of team teaching. He felt this was because students were exposed to three different viewpoints rather than just one. The team felt that each student becomes more self-reliant, takes the initiative and, therefore develops qualities of leadership. Although comparison studies have not been conducted at Ritenour Senior High School, the team notices certain advantages by the team teaching approach.

Paullin (64, p. 137) reported a team teaching study in music education conducted in San Diego, California. "Team teaching in general music can and does work. More students can be taught by one teacher. The varied backgrounds of three people plus, consistent, careful planning cannot help but produce a richer, more

rewarding classroom experience. Any disadvantages are far outweighed by the advantages."

This completes the senior high school subject area reports on team teaching to be included in this study. The findings have generally favored the team teaching approach. However, a lack of careful experimental design and statistical treatment limits the conclusions which can be made.

#### A Review of Team Teaching Studies in Elementary Schools and Junior High Schools

The current team teaching trend has also reached the elementary schools and junior high schools. Several studies have been conducted in these schools. However, very few of them have used scientific research procedures in evaluating their findings.

In 1965 Lambert (48, p. 217) reported that, "There has been a serious lack of controlled studies in the elementary school area." He claimed that most sources have reported no marked differences in achievement between team and self-contained organizations. However, Lambert found that a few authors reported significantly better achievement on the part of the team organization.

Anderson (6, p. 28) reported the following about team teaching in the elementary schools in 1959: "More time is needed to assess the efficiency, the cost, and the feasibility of team teaching before

any broad-scale application is made in America. Optimism is the prevailing mood, however, and it seems likely, as the popular song goes, *There Will Be Some Changes Made*.<sup>11</sup> Anderson reveals that a strong emphasis is being made toward team teaching in the elementary schools.

In 1965 Darling (27, p. 25), University of Wisconsin Assistant Professor of Curriculum and Instruction stated, "In the Wisconsin Improvement Program, which involves a number of school districts in the state, we have looked upon team teaching in terms of what we now know about society and the way young children learn. We believe that team teaching, provided it meets certain criteria, offers greater opportunity for achieving the objectives of elementary school education in a modern, complex, and interdependent society than any other organizational plan that we know of." Darling seems convinced that the team teaching method is the most desirable method of instruction. In this particular article, he did not offer any evidence to support his conviction.

In a 1964 analysis of team teaching and a self-contained home-room experiment in grades five and six, Jackson (42, p. 327) found, "Teachers of English, social studies, mathematics and science evaluated the experiences of students with team and with control background through the academic average, social adjustment, self-motivation and security under the departmental plan of grade seven.

Two statistically significant results were found for the experimental groups through academic average attained and the self-motivation expressed. Differences also favored the experimental group significantly in success with the elective subjects which ratings were made by teachers of French, art, instrumental music and vocal music."

The results reported by Jackson seem to indicate that team teaching is superior to traditional teaching in certain areas of the elementary school curriculum.

According to a 1965 report by Reasoner and Wall (68, p. 84) the Mt. Diablo team teaching study is another example of successful elementary school team teaching. "A recent study in California's Mt. Diablo Unified School District clearly demonstrated a positive relationship between the important dimensions of teacher effectiveness of team teaching as an organized technique." Research with results of this nature are very encouraging for team teaching advocates.

A few interesting team teaching studies have been conducted at the junior high school level. The results of these studies have been similar to those at the elementary schools. The work of Zwiebelson (98, p. 32) in junior high school is included in the following statement:

It was found that the achievement test results of the team-taught and the control group did not differ, but that significant changes in attitudes were obtained. The team-taught group

had better post demonstration attitudes regarding the school, teachers, and social studies than the control group. The teachers felt that there was remarkable improvement in group discipline and student motivation, especially noticeable for lower quarter students. In addition, the lower quarter students participate more in classroom discussions in the demonstration than in the traditional classroom. The planned team teaching approach provided effective ways to deal with class size, instructional task and activity variations. The heterogenous grouping of youngsters for team purpose was felt to be more productive of democratic living than homogenous grouping.

In 1963 Cuony (26, p. 70) conducted an experiment in science team teaching at Geneva Junior High School in Geneva, New York. He found, "The master schedule was so arranged that two seventh grade science classes of comparable ability met at the same time during the second semester when all seventh-grade pupils take twenty weeks of science instruction. These two classes were combined to make one group of fifty-six pupils whose mean IQ was within the normal range." No evaluation of this study was attempted. However, the team plans further experimentation.

Noall (62, p. 121) reported the results of a 1960 study at Walhquist Junior High School in Weber county, Utah. He concluded that test results in subject areas indicated that team teaching did as well as traditional teaching. However, no attempt was made to establish a research design for the study.

In a 1962 junior high study, Noall (61, p. 234), drew the following conclusions:

The second year of experimental experience with team teaching at the Roosevelt Junior High School in Duchesne County, Utah, has strengthened the convictions of the teachers and administrators to the merits of the new procedures. On the basis of assembled data, the staff has concluded that the educational achievement of the pupils taught by the team working with combined experimental groups have advanced more than the educational achievements of the pupils taught by the traditional method.

The extensiveness of team teaching research reported on the elementary and junior high school level has been less than that found in the secondary schools. The results of the elementary school and junior high school studies has generally been favorable, but they have been based primarily on subjective evaluation and they lack statistical treatment.

#### College and University Team Teaching Studies

Team teaching studies have not been limited to the lower educational levels. Significant results have been found in college and university instruction. For example, the team teaching system has been used at the College of Basic Studies at Boston University for nine years. In 1964 Glance (32, p. 387) reported some interesting findings about the Boston University study. He explained that the Graduate Record Examination was used to test students taking social science, humanities, and natural science. The results of this study revealed that the College of Basic Science growth scores are from one and one-half to two times as great as those found



with 996 college students studied by Lannholm and Pitcher (49, p. 386) who reported that the scholastic achievement from the College of Basic Studies of Boston University during their two-year course was similar to that of the typical four-year college. It should be emphasized that Boston University considers these data as evidence for, not proof of, the value of the team system in a college setting.

After observing Boston University's team teaching program, La Fauci (47, p. 158) commented, "Team teaching is not a panacea for all ills. Rather it is a system of instruction, tested and found successful, that provides an educational environment in which a student can develop his total potential. It is a means of meeting the educational needs of an expanding student body without sacrificing the ideals of academic excellence or personal contact between teacher and student. While not quite Mark Hopkins and the proverbial log, the team system is able to bring faculty members and relatively small groups of students into a continuing, intimate, and productive relationship." More team teaching studies should be conducted on the college level to determine how effective this method is in improving student achievement.

Another college study was conducted in 1961 by three professors of secondary education at Los Angeles State College. Hahn (35, p. 510) reported:

In summary, since the strengths appeared to outweigh the weaknesses--and many of the weaknesses might possibly be conceived as strengths--the experimenters felt that the experiment was sufficiently successful to continue. The major strength of the experiment, as determined by an analysis of the results of the use of the evaluative instruments, appeared to be the interaction among the professors and between students and professors. This area of interaction is one which authors will explore in depth in the future. It should be kept in mind that those involved in any experimental project tend to produce at a higher level, however, should encourage further experimentation in teacher education.

In 1963 Nelson and Robinson (60, p. 102) concluded that colleges and universities should start using the interdisciplinary team teaching approach. "In summary, teacher preparation is an interdisciplinary task in higher education and each facet of a program must be cognizant of new trends in the approach to classroom work. Team teaching is gaining popularity at the secondary school level, and programs of teacher education should provide experiences for prospective team members. Colleges and universities which train teachers can provide leadership in this training by adapting the team approach to college course work. The potential public school teacher is then able to use the interrelation among the knowledges as well as the mechanics for team teaching presentation." Nelson and Robinson felt that team teaching should be developed more on the college and university level because of facilities and staff to conduct the research.

Wetzler (91, p. 40) believes that an increasing number of college faculty members may be encouraged to explore the

possibilities of team teaching. "Those persons who will experiment with team teaching may find it to be a most interesting experience for strengthening a college classroom."

College and university studies also tend to favor team teaching over traditional teaching as a more effective way to increase student knowledge. The number of studies on this level has been extremely limited, however, the studies completed appear to have had improved experimental designs and superior statistical treatment.

#### Appraisal of Team Teaching Research and Growth by Various Investigators

There have been several team teaching studies conducted on the various educational levels. The types of studies, experimental designs, research findings and statistical treatments have varied greatly.

Polos (67, p. 456) recently reported some interesting comments on the past, present and future of team teaching.

Since 1957 America has witnessed a kind of team teaching explosion. Hundreds of schools have been experimenting with variations of team teaching, but regardless of the variations, it is still essentially a way of organizing the staff, the instructional program, and the school area and equipment--in short, a way of reorganization, or portion of it. Examples of this are to be found in the team teaching programs conducted in Jefferson County, Colorado, School District R-1, The Franklin Elementary School in Lexington, Massachusetts, and Azusa High School in Azusa, California, the experiments

conducted in Mt. Diablo Unified School District in Concord, California, the Mattoon (Illinois) Senior High School experiment, and the Greenwich, Connecticut, experiment to mention only a few. The team teaching programs and projects conducted under the auspices of the Claremont University College, Claremont, California, and Harvard Graduate School of Education (called SUPRAD) are excellent, and offer experimental guidelines to schools which are considering the team teaching experiment.

Several investigators point out problems on which current team teaching research must be done. In 1965 Wigderson (94, p. 324) reported, "Research on team teaching has revealed only one fundamental fact: the team teaching approach is no less satisfactory than conventional methods." In reviewing the literature one will find that investigators have made varied comments in their appraisal of team teaching research.

After reviewing the team teaching literature through 1964, Beggs (11, p. 105) stated, "In professional literature there is little evidence on the subject, either pro or con, that can be substantiated by carefully controlled research results. Instead, the literature is replete with articles written by opponents who, equally subjectively, expose the weakness of the device. Such hearsay makes provocative reading but offers little hope of an ultimate solution, for the authors of these articles ignore the basic questions that must be answered before any meaningful consideration is possible--Team teaching compared to what? Team teaching compared to instruction

which originally existed in our schools? Team teaching compared to some foreign educational system?"

Another similar comment was made by Thomson (83, p. 424), "Most articles presently available on team teaching omit statistical results and merely mention that research data appear inconclusive as to student achievement. Evidently some experimental classes achieve better than control groups and others do not." Thomson believed that there now exists a great need for more experiments performed with the specific purpose of finding out whether certain implications from learning theory lead to improvement of learning in a school setting.

After careful observation of the team teaching movement, in 1965 Carlin (20, p. 353) reported:

Experimentally team teaching has gone under the glass in a number of studies, most of which have adopted testing criteria based on pupil achievement and most of which have found no statistically significant difference in this area. More is being done, and it is too early to say definitely that there can be no improvement in pupil achievements.

Not enough has been done, however, in the study of certain aspects of teaching and learning that require less well-established instruments than standardized achievement tests. Such areas as teacher job satisfaction, teacher education, in-service effectiveness, and pupil attitudes seem to be considerably enhanced. Much of what is casually observable as fact may prove to be erroneously so in the light of scientific investigation. Suffice is to say that we must consider and welcome more research into these areas of team teaching.

An interesting comment appraising team teaching was offered by Clark (21, p. 444), "One measure of the effectiveness of any program is its facility for utilizing to the minimum those teaching techniques which do not result in the greatest learning." Clark does not feel that team teaching is an end in itself. He believes that it has definite qualities which seem to indicate that it can be a successful teaching device.

In 1962 King (46, p. 367) stated, "Although the team teaching experimental units in the Claremont program have shown considerable potential, it would appear to be far too early to freeze our designs. Each hypothetical structure carries within itself the characteristics which may lead to its own destruction. Experience in the field over a period of years will be necessary to decide whether or not team teaching is a part of the new education." He feels that the degree to which teachers, students, administrators, and parents find an understandable and profitable relationship to team teaching will have much to do with whatever success it may achieve.

Several comments have been made on the growth of team teaching in the United States. A review of several of these can be of value. In 1965 Peterson (65, p. 24) reported, "Many persons believe that team teaching has reached a leveling stage. While there will undoubtedly be as many schools initiating team teaching

programs in the next five years as in the past ten, there will be less indiscriminate experimentation. The next several years should see the publication of a number of excellent texts which will stress factual material known to work, rather than the pure theory which has characterized much of the writing to date." Peterson believes that while team teaching is still in its infancy, continued improvement in various team teaching techniques is the order of the day.

In 1963 Michael (58, p. 40) listed 34 reports of team teaching growth by several investigators in the United States. A few of these reports have been listed to emphasize the voluminous development of team teaching.

Clark and Faleyll (58, p. 40) reported on the growth of the East Side Union High School District, San Jose, California. "Four years ago, three pairs of teachers launched the district's team teaching program. Today, 38 teachers have teamed in 26 different courses covering the social sciences, business, mathematics, English, science, and industrial arts. The courses cover every grade level from nine through twelve." This was done after some indication in both standardized test results and student opinion that instruction is improved and increased learning takes place with the use of team teaching.

Another team teaching study was reported by Kleman (58, p. 43), "Because of the apparent success of this program during

1961-1962, we increased our teams for 1962-1963 to include 180 Core nine students, 95 Core seven students, and 95 mathematics and science seven students. Approximately 450 of our 1,025 students are involved in some type of team program in which instruction becomes individualized, professional growth occurs, and teacher competencies are highlighted."

A team teaching growth study by Neel (58, p. 44) revealed, "The Claremont Teaching Team Program reached its greatest size in 1962-1963. Twelve elementary teams operate in four schools with all students organized into teams; the secondary teams function with at least one team operating in grades six through twelve." This type of growth appears to be national and not limited to any one region of the country.

Clapp (58, p. 45) reported the team teaching growth in Jefferson, Colorado, as follows: "Jefferson County, Colorado, was one of the systems to become involved in a study of staff utilization, special scheduling, and variable class size through a grant from the Ford Foundation. Experimentation was successfully carried on at the high-school level for two years. Now in its sixth year, there are about 900,000 students in secondary schools in the team teaching program. It would be premature at this time to attempt a conclusive assessment of team teaching at the junior high school level



in Jefferson County. We do feel that we have made definite strides toward reaching the goals which were originally established."

A 1961 California study by Stone and Ramstad (77, p. 275) emphasizes the growing interest in team teaching in that state. "The results of the California survey show clearly that there is considerable interest and activity in staff utilization. More than fifty per cent of the schools returning the survey reported programs underway, and many more indicated plans for launching an increased number of activities during the coming year."

Ivins (41, p. 28) in a 1964 study of Southwestern Secondary Schools, including schools of more than 150 students in the states of Arizona, Colorado, and New Mexico found the following results: "At least one-fourth of all public secondary schools of 150 or more students in the study area are, or have been, engaged in some form of a teaching procedure which their principals recognize as team teaching."

Numerous comments have been given about the growth of team teaching in the schools throughout the United States. These comments clearly demonstrate the enormous growth of team teaching and emphasize the need for quality research. It is imperative that as much information on team teaching as possible be made available to school teachers and administrators.

A comprehensive review of the related literature revealed that team teaching research findings have been extremely varied. The reported team teaching studies were based primarily on subjective evaluations, lacked controls, and statistical treatment has been deficient. Research directly related to the specific area of teaching methods in health education has not been extensive. The paucity of such studies is reflected in a 1963 survey by Humphrey and Slusher (40, p. 108) of twenty universities which offer graduate study in health education leading to a master's or doctor's degree. "This small sampling yielded only one such study--and this at the college level--which could be classified specifically as experimental research in health teaching methods." It should be obvious that the health education research to date has not provided conclusive evidence as to the advantages or superiority of teaching methods of various kinds.

Brownell and Taylor (16, p. 156) offer an appropriate conclusion for this chapter. "We recommend a closer analysis of assumptions, more explicit models, better research design, and more penetrating evaluation of results of team experimentation so that schoolmen will be able to make sound judgments about teaching teams." Team teaching promises much in theory, but team teaching for tomorrow needs a firm foundation of sound research upon which to stand.

This study will attempt to answer the question of whether team teaching is as effective as traditional teaching in the area of secondary school health. The investigator's main concern is the preservation and advancement of educational qualities in health instruction. By exploring new paths through the team teaching concept, it is hoped that further experimentation will be made, and improved ways of communicating the results of such programs will be developed by the profession.

Perhaps the most unfortunate aspect of team teaching studies has been the oversight of not establishing a control group with which comparisons can be made. Schools rationalize that the other departments and the classes therein act as control groups. However, this is far from the case. Students in other areas are working with different curricular materials, are involved with different teachers, may be grouped differently and so on. Even the sophisticated research person can recognize the inherent evaluative difficulties in this type of arrangement.

According to Beggs (11, p. 108), "Far too few of the many high schools incorporating team teaching have attempted the practical evaluation of their programs, though at least five schools give some indication of systematic appraisal. The public schools in Jefferson County, Colorado have conducted the most systematic appraisal of their team teaching innovations and other imaginative

approaches. Three Illinois high schools--Ridgewood High School in Norridge, Lakeview High School in Decatur and Evanston Township School in Evanston--have empirically tested hypotheses which they have established."

One of the reasons schools have a difficult time evaluating the effectiveness of their team teaching practices is that schools are not certain what kinds of comparisons they are attempting to make. Assuming schools know what they are evaluating, there are other restrictions which have prevented scientific investigation. Some administrators do not know how to set up controlled studies, and, more unfortunate, they do not know where to go to receive the necessary help for setting up studies. Colleges and universities throughout the country should be providing assistance to the schools, assistance which would help the schools determine the variables which must be controlled, explored and interpreted. Another restriction is failure of the administrators to budget for evaluation of educational programs. It is true that the controls necessary in most research designs are difficult to manage within the practical setting of the school.

Unfortunately, the evidence which has been gathered since 1957 provides little in the way of interpretive analysis. The data seldom answer the questions related to the hypotheses. According to Beggs (11, p. 113), "The January issues of the Bulletin of the

National Association of Secondary School Principals contain as many as thirty articles which explain various staff utilization projects. A large number of articles refer specifically to team teaching and its advantages. It is not surprising to note that most of the articles find reasons to praise team teaching; most of the studies deal with administration rather than achievement level.<sup>11</sup> Some schools have attempted to determine what effect team teaching has on their students' achievement, but the studies are so poorly designed that conclusions with any degree of validity are difficult to find.

No matter what the singular or combined values of administration efficiency or attitudes may be, most evaluations insist that achievement in the experimental group must be equal to or greater than achievement in the control group before any additional factors are considered. If achievement were delegated the position of prime importance, achievement would be considered before all other factors. Only after the category of achievement has been analyzed carefully would other considerations relating to attitudes and administration efficiency be made.

The evaluation facet of the total picture of team teaching is as important as the implementation of the program itself. As an integral part of the program, evaluation needs to be given careful consideration.

## CHAPTER III

## DESIGN OF THE STUDY

Procedures Used

In this study the investigator has attempted to overcome the difficulties which have plagued many of the earlier team teaching studies. School studies sometimes offer special problems of investigation. Barnes (7, p. 21) points out some of these special school problems in his statement, "To a significant degree, researchers in education are limited in the extent to which they can experiment with the organization of grade groups, with instructional requirements and the allocation of content. Because of the very nature of the school as an institution, researchers cannot select different groups out of a gross, chance population and begin afresh to organize an imaginative educational system composed of chance students." To avoid this problem in this study, the team teaching and traditional teaching groups were equated as carefully as possible in regard to present health knowledge, mental ability and chronological age.

After surveying 26 high schools from various school districts in Oregon, the investigator was able to find only one school that was able to meet the requirements of this study. For purposes of this

study 114 second-semester sophomore students in health classes from Centennial High School in Gresham, Oregon were used. This school offered a one-semester, coeducational health course at the sophomore level. The health teachers at this school had teaching experience with both traditional teaching and team teaching. In addition to the teaching experience with both methods, this school had received the Oregon Association of Health, Physical Education and Recreation Distinguished Service Award in Health Education. This indicates a high standard health education program. The health educators participating in this study are recognized as being well qualified.

In 1966 spring semester health schedule at Centennial High School was organized as follows:

1. First period - three health classes taught by three health instructors.
2. Second period - two health classes taught by two health instructors.
3. Third period - three health classes taught by three health instructors.

The school principal consented to let the investigator use the three health classes during the first period as a control group, utilizing traditional teaching, and the three health classes during the third period as the experimental group, using team teaching. The two

health classes during the second period were eliminated because only two of the three teachers would be available. The following final organization was used during this study:

<u>Control Group</u> (Traditional teaching)			<u>Experimental Group</u> (Team teaching)		
<u>Instructor</u>	<u>Period</u>	<u>Number of Students</u>	<u>Instructor</u>	<u>Period</u>	<u>Number of Students</u>
A	1	19	A	3	19
B	1	19	B	3	19
C	1	<u>19</u>	C	3	<u>19</u>
		57			57

Students were assigned to these periods prior to this study. The method of student placement used by the counselors was to place half the students into physical education and half of the students in health on the basis of alphabetical order. Because both courses were required during the sophomore year, the counselors started with the letter A and placed students in health and physical education alternately until the classes were equally filled. This put an equal number of sophomore students in health and physical education classes during the semester. On the basis of this selection it was felt that classes of similar abilities would be found in the experimental and the control groups.



### Description of Experimental Conditions

Centennial High School made available 114 second-semester sophomore boys and girls for this study. All of these students were enrolled in health classes. The groups were equated as follows:

1. All students participating in this study were given the Shaw Health Knowledge Test as a pretest and as a final test. The pretest was given to insure that the control group did not possess more health knowledge than the experimental group, or vice versa.
2. The Henmon-Nelson Test of Mental Abilities was given to determine whether each group was comparable in mental ability. This test also served as a device for classifying students of superior mental ability, average mental ability, and below average mental ability. These classifications were used to determine the relative effectiveness of traditional teaching and team teaching for various mental ability groups.
3. Chronological ages of the students were listed to eliminate the possibility of the control group having an age advantage over the experimental group, or vice versa. The Shaw Health Knowledge Test, given as a pretest, was used to determine the two groups existing health

knowledge at the beginning of the study. However, the investigator felt that the use of chronological ages would serve as an additional experimental device to determine whether the groups were equated.

4. To fulfill the requirements of hypotheses two and three, the student's scores on the Shaw Health Knowledge Test were separated into male and female groups. This was for the purpose of determining whether team teaching is as effective as traditional teaching in increasing the health knowledge of sophomore girls, as a group, and sophomore boys, as a group.
5. A unique feature of this study was that of having the same three health teachers instruct the traditional teaching classes and the team teaching classes. This was done to minimize the teacher variable that has plagued so many team teaching studies.
6. The control and experimental classes received an equal amount of time and the same course content. Each class met for 45 minutes each day, five days a week.
7. All classes used the same state adopted textbook, *Your Health and Safety*: Clemensen, J., Lawrence, T., Hoyman, H. and W. LaPorte, Harcourt, Brace and Company, Inc. New York, 1957.

### The Shaw Health Knowledge Test as a Method of Comparing Results.

If a teaching method deserves to be called effective, it must produce a significant change in the student. In this case, the change should take the form of an increase in health knowledge. For this research project, the Shaw Health Knowledge Test was given as a pretest and a final test to measure the increase in student achievement. All testing was done under rigidly controlled conditions.

The purpose of the Shaw Health Knowledge Test was to provide an extremely valid, reliable and comprehensive measure of health knowledge. This will be explained in greater detail later in the chapter. An additional benefit derived from this test was the fact that the test was constructed in Oregon and designed chiefly for high school students and college freshmen. The test consists of 100 multiple-choice questions covering the 11 traditionally accepted health areas. Because this test was developed in Oregon, it was concerned with meeting the requirements of the Oregon Health Scope and Sequence Chart. The chart (63) includes the 11 health areas found in the Shaw Health Knowledge Test and are listed as follows:

1. Personal Hygiene: Individual self-appraisal. Future health planning (Introduction to family living).
2. Nutrition: Review nutrients. Food and dietary fads. Effects on personal appearance. Hygiene and digestion.

3. Wholesome Activity and Rest: Effects of exercise.  
Sound principles of body conditioning, emphasizing muscular activity to accomplish the desired purposes of the individual. Need for rest, sleep, relaxation, and recreation.
4. Choice and Use of Health Services and Health Practices:  
Food and drug advertising. Health appraisal. Consumer selection. Pure food, drug and cosmetic laws. Health accident and hospital insurance plans. Health vocations.
5. Prevention and Control of Disease: Communicable and noncommunicable diseases. Factors in prevention and control. Modern medical care.
6. Community Health Services and Agencies: Health agencies and organizations. (Taught with choice and use of health services and health practices)
7. Personality and Character Development, Individual Adjustments to Society, and Family Living: Physical basis of behavior. Heredity and environment in determining behavior. Desirable attitudes toward mental and nervous illness. Good mental health practices and attitudes relating personal and social maturity. The family as a basic social unit. Preparation for marriage. Adjustments for the unmarried. Later life adjustments.

8. Alcohol, Other Narcotics and Tobacco: Mental and emotional aspects of the use of alcohol, tobacco, other narcotics and drugs.
9. Home Safety: Safety in school and home.
10. School Safety: Covered with home safety.
11. Community Safety: Occupational safety. Recreational safety. Traffic safety. Red Cross Standard First-Aid course. Disaster and civil defense.

The Shaw Health Knowledge Test is based on statements of organizations and authorities, an analysis of textbooks and an analysis of tests. Evidence of the validity and reliability of this test will be presented later in this chapter.

#### Statements of Organizations and Authorities

Several national authorities and organizations have endorsed as comprehensive and definitive the eleven health areas found in the Shaw Health Knowledge Test. Some of these have made statements which lend support to this test.

The American Council on Education (1, p. 20-21) health objectives can be summarized in the following ten statements.

1. Normal body functions
2. Major health hazards
3. Sources and evaluation of health information

4. Planning sound time schedules for food, work, recreation, rest and sleep.
5. Maintenance of good nutrition
6. Maintenance of good emotional adjustment
7. Healthful exercise and recreation
8. Avoidance of disease
9. Intelligent utilization of medical and dental services
10. Community health problems and protection

Practically every authoritative statement of educational goals since Horace Mann, has listed health as a principal goal. In 1961 the Educational Policies Commission (29, p. 5) stated:

The central purpose of education is to develop rational powers of the individual or his capacities to think and reason. Basic to this development is physical health since disease, defects, or disability may interfere with learning. Mental health is also of profound importance. With it the pupil may have the desire and respect for learning that promote optimum mental performance, without it the likelihood of such development is drastically reduced if not rendered impossible. Health depends upon a reasoned awareness of the value of physical and mental fitness and the means by which these may be maintained.

Since 1946 an extensive list of objectives of individual health instruction has been advanced by Rugen and Nyswander (69, p. 213-216).

1. Individual and group responsibility for health
2. Interdependence of physical, mental, and emotional health

3. Organization of time for the balanced daily living
4. Fatigue and the need for, and conditions of, adequate rest and sleep
5. Suitable play and exercise
6. Getting along with others
7. Importance and maintenance of good posture and body mechanics
8. Provisions of proper food and nutrition
9. Cleanliness
10. Need for, and essentials of, periodic health examination
11. Medical attention
12. Individual procedures in personal and group problems
13. Immunization as protection against diseases
14. Causes and prevention of communicable diseases
15. Hazards of self-diagnosis and self-medication
16. First aid and prevention of accidents
17. Effects on health of wholesome and unwholesome practices of daily living
18. Adjustment to health handicaps
19. Structure, function and care of special organs, including eyes, ears, nose, throat, mouth and teeth

20. . The role of heredity in health; structure and function of the sex organs, and the nature of wholesome relationships with the opposite sex.
21. Effects of alcohol and tobacco, and the need for temperance in all things

An extensive study of health needs in 91 towns and cities from coast to coast was conducted by the Cooperative Committee on School Health Education (24, p. 1-81) in 1955. The data were summarized from the responses of 34 authorities and of teachers and administrators in the participating areas. The health needs, described as problems, were reported in the following order of frequency: healthful living, nutrition, emotional health, disease prevention and control, rest and recreation, cleanliness, dental health, and vision and hearing. Although these health needs represent the total school health program, several of them could be applied in planning health instruction.

The United States Public Health Service (86, p. 10) made a National Health Survey report which provided information to show that health needs of students were evident in respect to acute conditions including respiratory, infectious diseases; to digestive disorders; to injuries in general and those occurring at home, in motor vehicles, and at work; and to impairments including those of visual, auditory, or orthopedic nature.



One of the primary hazards to school-age children is accidents. Evidence of needs relative to accidental injury and death can be found in the publication Accident Facts and also Safety Education, both published by the National Safety Council.

A review of several of the statements of recognized organizations and authorities regarding health information the students should acquire, indicates that there is general agreement of the importance of the 11 areas. The Shaw Health Knowledge Test (71) grouped these objectives and subject-matter areas of health instruction to include:

1. Introduction--The Student and His Health
2. Heredity
3. Personal Health
4. Nutrition
5. Exercise, Rest and Fatigue
6. Safety
7. Substances Harmful to Health
8. Normal Mental, Emotional and Social Health
9. Preparation for Family Living
10. Prevention of Disease and Disorders
11. Consumer Health

In addition to the general agreement with statements of recognized organizations and authorities, the Shaw Health Knowledge Test areas parallel the Oregon Health Education Scope and Sequence Chart.

### Analysis of Textbooks

A State of Oregon Health Textbook Committee selected the text, Your Health and Safety, on the basis of the Oregon Scope and Sequence Chart (63). The statements of organizations and authorities and the analysis of textbooks by the state Health Textbook Committee indicate that the Shaw Health Knowledge Test covers the state requirements for secondary school health.

### Analysis of the Shaw Health Knowledge Test

Writers in the field of educational measurement are in general agreement that the multiple-choice type of question is the most valuable and most generally applicable of the various test forms.

Baron (8, p. 209) stated "...the multiple-choice item possesses several advantages. The number of alternative responses reduces the chances of guessing more than is the case with the true-false or matching type of question; the listing of plausible answers stimulate thinking; the limitation of possible answers eliminates ambiguity in scoring; and the technique of scoring is not complicated."

Hawkes (36, p. 138) found that "multiple-choice questions can be made particularly effective in requiring inferential reasoning. Reasoned understanding, or sound judgment and discrimination on the part of the pupil, it is definitely superior to other types for these purposes."

Considerable evidence is available showing that carefully constructed multiple-choice tests can adequately measure the understanding of complex principles, the ability to draw conclusions, and the ability to make inferences from one set of facts to another.

The Shaw test uses 100 multiple-choice questions. This test was derived from 390 multiple-choice type items relating to the 11 topic areas in general hygiene.

Shaw (71, p. 46) used the following procedures to develop a valid test:

1. Mimeograph test items and submit them to the subject-matter experts for criticisms of the test.
2. Revise test items on the basis of criticisms received from the experts.
3. Prepare three balanced trial forms, and apply each to over a thousand freshmen college students at the close of their hygiene course taking into consideration any ambiguities or other difficulties brought to light by the student taking the test.
4. Analyze the trial results with complete item and distractor analysis, to determine the power of discrimination and the difficulty of each item.
5. Construct the final test with 100 items carefully selected from the best of those proved by the trials listed above.

6. Apply this test to more than 1,000 college freshmen at the close of their hygiene course to establish correlations for validity and reliability.

To gain varied opinions, Shaw used a jury representing geographical areas and health departments throughout the nation to review and criticize the preliminary forms of this test. After passing the standards of critical analysis, he put the test to use. Shaw used item analysis to re-examine statistically each item of the test to determine its strengths and flaws. Furst (31, p. 314) states, "Item analysis contributes to the improvement of a test by providing data on effectiveness of individual items. These data help to identify items that should be revised or eliminated entirely from the test."

The degree of difficulty was designed so the test could discriminate effectively between students at the various levels of achievement in any group. Some items are so difficult as to be missed by all students of low and moderate achievement. These difficult items are necessary to discriminate between those students of good and high achievement. Similarly, some items should be so easy that only the most inferior student will miss them. These are of little value for ranking the good students, but are necessary for discriminating between the poor students.

The procedure proposed by Hawkes (36, p. 32) was chosen as a design for determining difficulty.

"... so that the highest score made will be near but not at the highest possible score, and that the lowest possible scores will be near but not at zero. The full range of possible scores should be actually utilized if the test is to have the maximum discriminatory value."

### Determination of Validity and Reliability

The concept of validity refers to the extent to which a test measures what it is supposed to measure with respect to the group for which it is intended. The validity of the Shaw Health Knowledge Test was provided in three ways:

1. By the manner in which the test was initially set up
2. By the development of test items of demonstrated worth
3. By comparison with an outside criterion

### Curricular Validity

This type of validity refers to the extent to which the content of the test is representative of the content of the course or subject. Shaw achieved this by (a) a study of the statements of nationally recognized organizations and authorities; (b) detailed analysis of current textbooks in the subject area; (c) analysis of published tests; and (d) applying the pooled judgment of a group of college health educators and specialists related to educational measurement.

### Item Validity

The validity of each item selected was required to (a) pass the scrutiny of a "jury" of health educators and subject-matter specialists, (b) survive trial and revision, (c) demonstrate suitable difficulty and discrimination value.

### Statistical Validity of Whole Test

A correlation of .80 was found to exist between test scores and final grades in the course.

### Reliability of the Test

The coefficient of correlation for reliability of the whole test was .89. This is significantly higher than the reports of the reliability of most other published health knowledge tests.

Henmon-Nelson Tests of Mental Abilities. The Henmon-Nelson tests of Mental Abilities were used in this study to determine if the control group and the experimental group were of comparable mental ability. Another purpose of the test was to enable the investigator to group students according to mental abilities to meet the requirements of purpose number four. Purpose number four conjectured on the relative effectiveness of traditional teaching and team teaching with students having superior mental ability, 111 and above, average mental ability, 90 to 110, and below average, 89 and below. Although these three mental ability levels were

arbitrarily chosen, they are comparable to other intelligence test standards.

D. Welty Lefever (19, p. 342) in his review in Buro's Fifth Mental Measurement Yearbook states, "The revised edition of the Henmon-Nelson Tests of Mental Ability represents a distinct improvement over the earlier edition. It is greatly improved in format, in the usefulness of the examiners' manuals in the evidence for validity, and especially in the care with which the standardization was conducted. For many purposes a relatively short intelligence test yielding a single score will be satisfactory. As the basis for predicting success in academic subjects, the Henmon-Nelson offers reliable help."

#### Purpose of the Test

The Henmon-Nelson Tests of Mental Ability (49, p. 2) was designed to measure those aspects of mental ability which are important for success in academic work and in similar endeavors outside the classroom. The more common uses of this test are:

1. Classification of children into groups either by classes or within classes
2. Grading and promotion information
3. Better understanding and handling of pupils when you understand their mental abilities

4. Supplements teacher's evaluation of children
5. Vocational and educational guidance
6. Entrance examination in independent schools, colleges, and professional schools when admittance is held to a limited number of students
7. Evaluate teaching procedures

The authors recommended that students with IQ's below 80 and above 130 should be given individual intelligence tests administered by a psychometrist.

#### Validity

1. Evidence from the plan for the test--Originally 297 items were constructed and submitted to experienced teachers for their criticism. From this number 250 items were then selected and administered in two forms. The pupils to whom these forms were administered were divided into three groups of inferior ability, average ability, and superior ability as indicated by the composite score on three well-known group tests of mental ability. Any item was discarded that did not show a significantly larger number of correct response in passing from the inferior to the average and then to the superior group. The items that remained were incorporated into a second experimental test, each form containing 101 items. On the



basis of trials with these forms, 90 items for each form of the test were chosen which were most discriminating and which insured, insofar as possible, identical difficulty in two forms. In 1953 the authors started work to revise the tests. Tests were taken by students in 77 communities in 24 states representing a cross section of various sizes of schools and geographic regions of the United States to strengthen the discriminating power of each item in each form. Items were selected with care to avoid using those that might appeal more to one sex than to the other. A random sample of 200 boys and 200 girls was obtained from the entire population and neither the mean nor the standard deviation of the test scores were significantly different at the 5 per cent level.

2. Evidence from the test blank itself--The test is relatively simple consisting of only one task. The difficulty of items is arranged to form a rectangular distribution so that a rank-ordering of persons would be obtained with approximately equal precision over all parts of the range. The test seems to be well constructed, free from ambiguity, easily read, and has a complete and helpful manual. Particularly commendable are the methods of selecting

items from the earlier edition and matching them so that the different forms would be truly equal.

3. Evidence from the results of the tests--The authors (49, p. 2) have made several studies to find the congruent validity of this test. They found that it had a correlation coefficient of .50 to .84 with the California Test of Mental Maturity. This correlation was found with four groups of ninth and tenth graders (475 students). To check for concurrent validity, the authors compared results with achievement tests, teacher grades, and other Intelligent Quotient tests. The correlation varied from .64 to .85. These correlations were made with quite a large number of students. To find the predictive validity the authors correlated the test with school grades. The correlations ranged from .516 to .738, but the authors admit that this was not a good comparison since they had data for only a short period of time. They expect it will be as valid as any commonly used measurement of intelligence to predict grades over a number of years. Since this is a single-score test it comes under careful study, especially by those favoring the multiple-factor analysis. The authors felt the factor analysis has not been proven and the evidence does not indicate the factor scores are needed by

the classroom teachers and administrators for whom this type of test was designed. In results of studies made to compare factor-analysis tests and single-score tests, the single-score tests have proven to be as closely correlated to grades as the more complicated and long, factor-analysis tests.

4. Evidence for Outside Authority--Most reviewers and critics seem to feel that this test has a noteworthy validity, but with certain limitations. (49, p. 2)

Cronbach: The 1957 revision is well designed as a short measure of scholastic ability having reliability over .90 but considerable overlap with reading ability and no diagnostic features.

Lefever (Buros): For many purposes a relatively short intelligence test yielding a single score will be satisfactory. As a basis for predicting success in academic subjects, the Henmon-Nelson offers reliable help.

Shaffer (Buros): In all, the revised Henmon-Nelson impresses the reviewers as a scholarly example of the best in test construction, and as a remarkably efficient instrument for its length.

Traxler: One of the older and more dependable group test of mental abilities of the single-score type.

Tyler (Buros): The reader cannot fail to be impressed with the care that was taken in (a) selecting items and matching them so that the different forms and levels will

be truly equivalent, (b) sampling the total school population in a way that would insure that the norms would be truly representative of this population, and (c) collecting and reporting evidence of several different kinds with regard to reliability and validity. Scores can be expressed as mental ages, as percentiles, or as deviations IQ's equated to those of the Stanford Binet. Any teacher should be able to administer and score the tests. Any educator with a moderately complete background in measurement and statistics should be able to interpret scores correctly.

### Reliability

Reliability has been shown to be over .90 for this test. It was computed by both the odd-even method and the alternate-form method. Odd-even reliability coefficients range from .904 to .948 using the Spearman-Brown formula; while the alternate forms of reliability coefficients range from .895 to .938. These reliability coefficients were computed from wide samplings of students in grades nine through twelve. The authors have three charts in the manual to show not only these reliability coefficients but also the mean and standard deviations.

### Administration, Factors in Scoring and Interpretation

The directions for the administration of this test are simple and adequate in the test manual. It provides tables for Mental Age,

Percentile Rank, Grade Equivalent, and IQ. The test takes about 30 minutes to administer.

Scoring is simple and quick. The pupil's responses are transferred by means of carbon paper to columns on the scoring pages inside the test booklet. The total number correct is the score. This number is placed on the front of the booklet.

Norms for scores of IQ, Mental Age, Percentile Rank, and Grade Equivalent are found in the manual. The use of these charts seem to be complete for all normal purposes and are fairly easy to interpret. The norms are based upon a population of children in grades three through twelve in regular attendance in public schools throughout the United States. The norms were made through a listing of all public school districts by courtesy of the United States Bureau of Census. Schools were drawn at random throughout the 48 states. The authors of the test include in their manual a complete report of the 242 schools in 45 states used for determining the norms.

This appears to be an adequate test to use for finding general mental abilities. Its short length and ease of administration and scoring make it extremely practical. The Henmon-Nelson tests of Mental Abilities give a single score, which according to some

literature, will predict scholastic success as well as, or even better than, a long series of factor-analysis batteries. The well-established reliability and validity and the norms seem to be better founded than any comparable mental abilities test.

## CHAPTER IV

### PRESENTATION AND ANALYSIS OF DATA

A brief restatement of purpose seems appropriate before describing the procedures used in this study. The study was conducted to compare the effectiveness of teaching high school health by team teaching and traditional teaching methods. The Shaw Health Knowledge Test was used to give a valid and objective assessment to health knowledge. This test made it possible to measure any increase in the level of health knowledge by the Centennial High School sophomore health students.

The following hypotheses were formulated.

1. Team teaching is as effective as traditional teaching in increasing the health knowledge of sophomore high school students taking a semester health course.
2. Team teaching is as effective as traditional teaching in increasing health knowledge of sophomore high school girls taking a semester health course.
3. Team teaching is as effective as traditional teaching in increasing health knowledge of sophomore high school boys taking a semester health course.

4. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with superior mental ability.
5. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with average mental ability.
6. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with below average mental ability.

A description of experimental conditions of this study was listed in Chapter III.

#### Analysis Procedure

The statistical procedures followed in this study were recommended and approved by the Department of Statistics at Oregon State University. Analyses made in this chapter are based on (a) pretest and final test scores obtained by administering the Shaw Health Knowledge Test to the Centennial High School sophomore students taking a semester health course, (b) scores obtained from the Centennial High School Counseling Department on the Henmon-Nelson Tests of Mental Abilities, and (c) a list of the chronological ages of all students participating in this study.



It was recognized that one of the variables to be considered for control purposes was individual intelligence. The Henmon-Nelson Test of Mental Abilities was selected to compare mental abilities of the team teaching and the traditional teaching groups. The Henmon-Nelson test was administered by the Centennial High School Counseling Department and appeared to be adequate for purposes of this study.

The analysis of variance was the statistical method used in this study. This method was suggested by the Oregon State University Statistics Department and can be found in Li (51, p. 179). According to Siegel (73, p. 184), "Sample values almost invariably differ somewhat, and the question is whether the differences among samples signify genuine population differences or whether they represent merely chance variations such as are to be expected among several random samples from the same population."

Chronological ages were used in this study as an additional control in order to determine whether the students were close enough in age that one group would not have an age advantage over the other group.

After administering the Shaw Health Knowledge Test as a pre-test and final test to 114 Centennial High School second-semester sophomore health students, the hypotheses of this study were

applied. The six hypotheses offer a variety of ways to interpret the differences between team teaching and traditional teaching methods.

Hypothesis number one: Team teaching is as effective as traditional teaching in increasing the health knowledge of sophomore high school students taking a semester health course. Table 1 of this chapter provides information about hypothesis number one which indicates that the intelligence and the chronological age variations were slight. The team teaching group mean was 102.9 and the traditional group mean was 102.8. Chronological age variation was also small with the team teaching age mean of 15.775 and the traditional teaching age mean of 15.765. According to data in Table 1, the team teaching method had a greater increase in health knowledge. However, the analysis of variance in Table 2 revealed that this difference was not statistically significant. These results do not reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing health knowledge of sophomore high school students taking a semester health course. This led to the conclusion that hypothesis number one was accepted.

Hypothesis number two: Team teaching is an effective as traditional teaching in increasing health knowledge of sophomore high school girls taking a semester health course. Table 3 provides information about hypothesis number two which shows that

Table 1. Means of Team Teaching and Traditional Teaching Groups.

Number	Intelligence Quotient	Chronological Age	Pretest Score	Final Test Score	Difference
Team Teaching					
57	102.9	15.775	30.7	46.7	15.8
Traditional Teaching					
57	102.8	15.765	31.4	45.3	13.9

Table 2. Difference Between Team Teaching and Traditional Teaching Groups.

Analysis of Variance				
Source of Variation	D. F.	Sum of Squares	Mean Square	F
Between Groups	1	104.2193	104.2193	1.70*
Within Groups	112	6883.6140	61.4608	
Total	113	6987.8333		

\* Not significant at .05 level

Table 3. Means of Girls' Team Teaching and Traditional Teaching Groups.

Number	Intelligence Quotient	Chronological Age	Pretest Score	Final Test Score	Difference
Team Teaching					
26	101.5	15.702	30.7	47.2	16.5
Traditional Teaching					
26	100.7	15.695	30.1	45.7	15.6

Table 4. Difference Between Girls' Team Teaching and Girls' Traditional Teaching Groups.

Analysis of Variance				
Source of Variation	D. F.	Sum of Squares	Mean Square	F
Between Groups	1	11.0769	11.0769	.2357*
Within Groups	50	2348.8462	469.7692	
Total	51	2359.9231		

\* Not significant at .05 level

the intelligence and chronological age variations for girls were slight. The team teaching intelligence quotient mean score for girls was 101.5 as compared to 100.7 for the girls in the traditional teaching group. Chronological age variation was also small with an age mean of 15.702 for the girls in the team teaching group and 15.695 for the girls in the traditional teaching group. The girls taught by the team teaching method appeared to have made the greatest increase in health knowledge. However, the analysis of variance results on Table 4 shows a lack of evidence to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing health knowledge of sophomore high school girls taking a semester health course. On the basis of these findings, hypothesis number two was accepted.

Hypothesis number three: Team teaching is as effective as traditional teaching in increasing health knowledge of sophomore high school boys taking a semester health course. Table 5 reveals the differences between the boys in the team teaching group and the boys in the traditional teaching group. The intelligence and chronological age variations were small. For boys in the team teaching group the intelligence quotient mean score for boys was 104.2 and for boys in the traditional teaching group the intelligence quotient mean score was 104.5. Team teaching group had a chronological

Table 5. Means of Boys' Team Teaching and Traditional Teaching Groups.

Number	Intelligence Quotient	Chronological Age	Pretest Score	Final Test Score	Difference
Team Teaching					
31	104.2	15.836	30.7	46.3	15.2
Traditional Teaching					
31	104.5	15.832	32.6	45.0	12.5

Table 6. Difference Between Boys' Team Teaching and Traditional Teaching Groups.

Analysis of Variance				
Source of Variation	D. F.	Sum of Squares	Mean Square	F
Between Groups	1	116.5322	116.5322	.1599*
Within Groups	60	4372.5162	728.7527	
Total	61	4489.0484		

\* Not significant at .05 level

age mean of 15.836 compared to 15.832 for the traditional teaching group. The boys in the team teaching group had a better increase in health knowledge than the boys in the traditional teaching group. However, the analysis of variance on Table 6 shows no evidence to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing health knowledge of sophomore high school boys taking a semester health course. Hypothesis number three was therefore accepted.

Hypothesis number four: Team teaching is as effective as traditional teaching in increasing the health knowledge of students with superior mental ability. Table 7 reveals the differences between the team teaching and traditional teaching superior mental ability groups. The team teaching superior mental ability group had an intelligence quotient mean of 116.92 as compared with 116.38 for the traditional superior mental ability group. The team teaching superior mental ability group had a chronological age mean of 15.836 and the traditional teaching superior mental ability group chronological age mean was 15.832. The team teaching superior mental ability group had the greatest gain in health knowledge. The analysis of variance data on Table 8 indicated that superior students respond better to team teaching than to traditional teaching. This rejected the null hypothesis that there was no significant difference

Table 7. Means of Team Teaching and Traditional Teaching in Superior Mental Ability Groups.

Number	Intelligence Quotient	Chronological Age	Pretest Score	Final Test Score	Difference
Team Teaching					
13	116.92	15.66	35.5	56.3	20.7
Traditional Teaching					
13	116.38	15.57	41.3	55.0	13.6

Table 8. Difference Between Superior Mental Ability Team Teaching and Superior Mental Ability Traditional Teaching Groups.

Analysis of Variance

Source of Variation	D. F.	Sum of Squares	Mean Squares	F
Between Groups	1	332.6538	332.6538	6.2088**
Within Groups	24	1285.8501	53.5770	
Total	25	1618.5039		

\*\* Significant at .05 level



in the effectiveness of team teaching and traditional teaching in increasing health knowledge of students of superior mental ability. Team teaching students of superior mental ability show a statistically significant increase in health knowledge over the traditional superior mental ability students. Team teaching is more effective than traditional teaching in increasing health knowledge of students with superior mental ability which means that hypothesis number four is rejected.

Hypothesis number five: Team teaching is as effective as traditional teaching in increasing the health knowledge of students with average mental ability. Table 9 shows the difference between these groups in regard to intelligence, chronological age, pretest, final test and difference. The team teaching intelligent quotient mean scores for the average mental ability students was 101.0 compared to 100.1 for the average mental ability traditional teaching students. Chronological age means were 15.76 for both groups. According to Table 9 the team teaching group and the traditional teaching group had about the same increase in health knowledge. The analysis of variance listed in Table 10 reveals no evidence to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing the health knowledge of students with average mental ability. This substantiated the fifth hypothesis.

Table 9. Means of Team Teaching and Traditional Teaching in Average Mental Ability Groups.

Number	Intelligence Quotient	Chronological Age	Pretest Score	Final Test Score	Difference
Team Teaching					
37	101.0	15.76	31.0	46.4	15.05
Traditional Teaching					
37	101.1	15.76	29.8	44.8	15.02

Table 10. Difference Between Average Mental Ability Team Teaching and Average Mental Ability Traditional Teaching Groups.

Analysis of Variance

Source of Variation	D. F.	Sum of Squares	Mean Square	F
Between Groups	1	.0140	.014	.0002*
Within Groups	72	3852.8650	53.51	
Total	73	3852.8790		

\* Not significant at .05 level

Table 11. Means of Team Teaching and Traditional Teaching in Below Average Mental Ability Groups.

Number	Intelligence Quotient	Chronological Age	Pretest Score	Final Test Score	Difference
Team Teaching					
7	87.0	16.1	19.7	30.1	10.4
Traditional Teaching					
7	86.0	16.1	21.4	29.7	8.2

Table 12. Difference Between Below Average Mental Ability Team Teaching and Below Average Traditional Teaching Groups.

Analysis of Variance

Source of Variation	D. F.	Sum of Squares	Mean Square	F
Between Groups	1	16.0635	16.0635	.21*
Within Groups	12	933.1508	77.7625	
Total	13	949.2143		

\* Not significant at .05 level

Hypothesis number six: Team teaching is as effective as traditional teaching in increasing the health knowledge of students with below average mental ability. Table 11 shows the differences between the team teaching group and the traditional teaching group in regard to intelligence, chronological age, pretest, final test and differences between tests. The team teaching intelligence quotient mean score for the below average team teaching group was 87.0 compared with 86.0 for the below average traditional teaching group. Chronological ages were 16.1 for both groups. According to Table 11 team teaching appears to show a greater increase in health knowledge. However, the analysis of variance listed in Table 12 shows no evidence to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing the health knowledge of students of below average mental ability. This substantiated the sixth hypothesis.

Before concluding Chapter IV, it is interesting to note the closeness of the means of the test scores of the Centennial High School sophomores after completion of the semester health course with those means of the entering freshmen taking General Hygiene at Oregon State University.

The average on the Shaw Health Knowledge Test by the Centennial High School sophomores at the conclusion of the health course

was 45.3 for the traditional group and 46.7 for the team group.

These scores compare favorably with the mean score of 50 attained by the entering freshmen at Oregon State University, especially considering that all mental ability groups were represented in the Centennial study. A mean score of 48.2 was obtained by combining the average mental ability and superior mental ability high school students, which would be a more realistic comparison.

## CHAPTER V

## SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The widespread interest and attraction of teaching teams since they emerged in schools about nine or ten years ago has greatly stimulated research in this area. Several of the team teaching programs have originated with the idea of maximum staff and facility utilization in order to improve education. The purpose of this study was to compare the effectiveness of teaching health in high school by team teaching and traditional teaching methods.

The following six hypotheses were formulated:

1. Team teaching is as effective as traditional teaching in increasing the health knowledge of sophomore high school students taking a semester health course.
2. Team teaching is as effective as traditional teaching in increasing the health knowledge of sophomore girls taking a semester health course.
3. Team teaching is as effective as traditional teaching in increasing the health knowledge of sophomore boys taking a semester health course.

4. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with superior mental ability.
5. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with average mental ability.
6. Team teaching is as effective as traditional teaching in increasing the health knowledge of students with below average mental ability.

The Shaw Health Knowledge Test was used in this study to measure the 11 widely accepted areas in health education.

The significance of health knowledge in secondary education has long been recognized. In the nineteenth century, the need for hygiene in the schools was stressed by Horace Mann and Herbert Spencer, and in 1918 health was included in the Cardinal Principles of Secondary Education. A recommendation of the National Education Association in 1963 was to include health instruction among priorities for the school. The Twelfth World Health Assembly described health education as the most powerful weapon in the field of health and the key to the solution of many unsolved health problems.

Health education contributes to the attainment of the purposes of education. If the goal of health education is to be achieved, then the most effective methods of instruction should be developed and

utilized. Studies have been conducted which recommend that health be taught by the direct method, separated from other subjects, for at least one semester on a co-educational basis. After reviewing some of the literature related to the problem of health education, it appeared that the next logical step was to decide which type of direct instruction is the most effective in increasing health knowledge.

The purpose of this study, therefore, was to conduct urgently needed research to determine the effectiveness of team teaching compared to traditional teaching in health education. Several national investigations, including a survey by Sliepcovich, indicated that more research should be done in this area.

A review of the related literature in health education fails to reveal a single scientifically controlled study in the area of team teaching. This is particularly disturbing when Pitruzzello reported that physical education and health have the highest incidence of team teaching.

The review of related literature has been divided into five sections. The first section includes general findings of secondary team teaching studies. The number of team teaching studies which have utilized statistical treatment has been limited. Scientific team teaching studies have been conducted in practically all secondary curriculum areas except health. A great number of studies,



however, used a subjective evaluation of team teaching. Although the research evidence favoring team teaching is meager, a great number of high schools throughout the United States have designed buildings especially for team teaching.

The second section consisted of a review of the results of team teaching studies in specific secondary school subject areas including business education, chemistry, English, social studies, history, foreign languages, geometry, art, physical education and other areas. Some of these studies grouped students by superior mental ability, average mental ability and below average mental ability. Results indicated that the teachers and students react favorably to team teaching. However, only a limited number of attempts have been made to apply statistical treatment to these courses to verify the subjective evaluations.

Team teaching has been gaining in popularity throughout the nation in the elementary schools and junior high schools. The third section of the related literature discloses the serious lack of controlled studies in the elementary areas. Many educators believe that team teaching, provided it meets certain criteria, offers a greater opportunity for achieving the objectives of the elementary school educators than do traditional teaching methods. Most junior high school research studies show that students do as well instructed by the team teaching method as by the traditional teaching method.

Research on the elementary and junior high school levels have been less extensive than that found in the secondary schools.

The fourth section of related literature dealt with team teaching on the college and university level. College and university research studies tend to favor team teaching over traditional teaching as a more effective way to increase student knowledge. The number of studies on this level have been extremely limited. However, the studies completed appear to have improved experimental design and superior statistical treatment over the other levels.

The fifth section of the review includes an appraisal of the growth and research of team teaching by various investigators. Most research reveals that team teaching is no less satisfactory than conventional methods. A great number of articles presently available on team teaching omit statistical analysis. Writers tend to agree that the next several years should see the publication of a number of excellent texts which will stress factual material known to work in team teaching rather than the pure theory which has characterized much of the writing to date.

A comprehensive review of the related literature reveals that team teaching research findings have been extremely varied. The reported team teaching studies were based primarily on subjective evaluations which lacked controls and statistical treatment.

Perhaps the most unfortunate aspect of team teaching studies has been the oversight of not establishing a control group with which comparisons can be made. Schools rationalize that other departments and classes therein act as controls. Some schools have attempted to determine what effect team teaching has on their students' achievement, but these studies were so poorly designed that conclusions, with any degree of validity, are difficult to find.

In the design of this study the author tried to overcome some of the difficulties which have plagued many of the earlier team teaching studies. Because of the very nature of the school as an institution, researchers cannot select definite groups out of a gross chance population. To avoid the problem in this study, the team teaching and traditional teaching groups were equated as much as possible.

After surveying 26 high schools from various school districts in Oregon, the investigator was able to find only one school that was able to meet the requirements of this study. For purposes of this study 114 second-semester sophomore health students from Centennial High School in Gresham, Oregon were used. The school principal consented to let the investigator use three health classes as a control group, utilizing traditional teaching, and three classes as an experimental group, using team teaching. The school counselors selected the students on an alternate alphabetical basis, placing half of the students in physical education and the other half in health.

The groups were equated as follows:

1. All students participating in this study were given the Shaw Health Knowledge Test as a pretest and as a final test. The pretest was given to insure that the control group did not possess more health knowledge than the experimental group, or vice versa.
2. The Henmon-Nelson Test of Mental Abilities was given to insure that each group was comparable in mental ability. This test also served as a device for classifying students of superior mental ability, average mental ability and below average mental ability.
3. Chronological ages of the students were listed to eliminate the possibility of the control group having an age advantage over the experimental group, or vice versa.
4. To fulfill the requirements of hypotheses two and three, the student's scores on the Shaw Health Knowledge Test were separated into male and female groups. This was for the purpose of determining whether team teaching was as effective as traditional teaching in increasing the health knowledge of sophomore girls, as a group, and sophomore boys, as a group.
5. A unique feature of this study was that of having the same three teachers instruct the traditional teaching classes

and the team teaching classes. This was done to minimize the teacher variable that has plagued so many team teaching studies.

6. The control and experimental classes received an equal amount of time and the same course content.
7. All classes used the same state adopted textbook, Your Health and Safety.

The Shaw Health Knowledge Test was used to provide an extremely valid, reliable and comprehensive measure of health knowledge. This test was constructed in Oregon and designed especially for high school students and college freshmen. Because this test was developed in Oregon, it was concerned with meeting the 11 accepted health areas:

1. Personal Hygiene
2. Nutrition
3. Wholesome Activity and Rest
4. Choice and Use of Health Services and Health Practices
5. Prevention and Control of Disease
6. Community Health Services and Agencies
7. Personality and Character Development, Individual Adjustments to Society, and Family Living
8. Alcohol, Other Narcotics and Tobacco

9. Home Safety
10. School Safety
11. Community Safety

Several national authorities have endorsed these 11 health areas. The Shaw test uses 100 multiple-choice questions. The degree of difficulty was designed so the test could discriminate effectively between students at the various levels of achievement. Some items are so difficult as to be missed by all students of low and moderate achievement. The statistical validity of the whole test revealed a correlation of .80 between test scores and final grades in the course. The coefficient of correlation for reliability of the whole test was .89.

The Henmon-Nelson Test of Mental Abilities was used to determine if the control group and the experimental group were comparable. Another purpose of the test was to enable the investigator to group students according to mental abilities to meet the requirements of hypotheses number four, five and six. The test was designed to measure those aspects of mental ability which are important for success in academic work and similar endeavors outside the classroom. The validity ranges from .50 to .84 with the California Test of Mental Maturity. Reliability has been shown to go over .90 for the Henmon-Nelson test.

The directions for the test are simple, it provides tables for mental age, percentile rank, grade equivalent and IQ. It only takes about 30 minutes to administer. This appears to be an adequate test to use for finding general mental abilities.

### Conclusions

The statistical procedures were based on the Shaw Health Knowledge Test, the Henmon-Nelson Test and the chronological ages. An analysis of variance, at the .05 level, was the statistical method used to determine whether team teaching was as effective as traditional teaching in the six formulated hypotheses.

Hypothesis number one: Although the team teaching method produced the greater increase in health knowledge, the analysis of variance results indicated a lack of evidence to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing health knowledge of sophomore high school students taking a semester health course. Therefore, hypothesis number one is accepted.

Hypothesis number two: Because there is not sufficient evidence to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing the health knowledge of sophomore high school girls taking a semester health course, hypothesis number two is accepted.

Hypothesis number three: While the boys in the team teaching group made a greater increase in health knowledge than the boys in the traditional teaching group, this increase was not statistically significant to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in health knowledge of sophomore high school boys taking a semester health course. Because of these findings hypothesis number three is accepted.

Hypothesis number four: Team teaching students with superior mental ability had a statistically significant increase in health knowledge over the traditional teaching students with superior mental ability. This rejected the null hypothesis that there was no significant difference in the effectiveness of team teaching and traditional teaching in increasing health knowledge which meant that hypothesis number four is rejected.

Hypothesis number five: As the team teaching group and the traditional teaching group had about the same increase in health knowledge, the evidence revealed was insufficient to reject the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing the health knowledge of students with average mental ability. Therefore, hypothesis number five is accepted.



Hypothesis number six: According to the results of the analysis of variance, a lack of evidence indicates a rejection of the null hypothesis that there is no significant difference in the effectiveness of team teaching and traditional teaching in increasing the health knowledge of below average mental ability. Consequently, hypothesis number six is accepted.

### Recommendations

In view of the findings of this study the investigator offers the following recommendations to the colleges and universities training health educators and to public schools organizing and administering health education programs. Recommendations for further study are as follows:

1. Additional team teaching studies in health utilizing statistical treatment should be conducted on the elementary school, junior high school, secondary school and college levels.
2. Scientific team teaching studies should be encouraged in other secondary school subject areas to determine the effectiveness of this method in each subject area.
3. Because team teaching is as effective as traditional teaching in health education for girls and boys, average mental

ability students and below average mental ability students, it is recommended that each school choose the method deemed most effective for the school.

4. Institutions involved in training prospective health teachers be advised to integrate team teaching into their methods courses.

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## APPENDICES

APPENDIX A

Appendix Tables 13-20

Table 13. Intelligence Quotients, Chronological Ages, Pretest Scores, Final Test Scores and Differences of the Team Teaching Group.

Team Teaching					
Number	Intelligence Quotient	Chronological Ages	Pretest Score	Final Test Score	Difference
Boys					
1	128	15.33	24	58	34
2	121	15.42	35	53	18
3	119	15.75	30	50	20
4	117	16.00	36	58	22
5	115	16.25	44	54	10
6	114	15.17	40	51	11
7	113	15.75	31	44	13
8	113	15.33	30	50	20
9	112	15.50	41	75	34
10	110	15.50	36	57	21
11	108	15.58	49	58	9
12	107	15.33	28	41	13
13	107	16.08	53	62	9
14	106	16.08	41	50	9
15	104	15.50	22	38	16
16	103	15.67	31	57	26
17	103	16.42	29	36	7
18	103	15.83	21	38	17
19	102	15.42	25	41	16
20	102	15.33	35	55	20
21	101	15.83	33	57	14
22	99	16.25	25	35	10
23	99	15.25	30	43	13
24	96	16.50	33	40	7
25	94	16.17	18	48	30
26	93	15.83	18	32	14
27	93	15.67	26	30	4
28	89	16.92	18	36	18
29	88	16.75	25	24	- 1
30	86	16.08	22	31	9
31	84	16.42	24	32	8
31	104.2	15.836	30.7	46.3	15.2

(Continued)

Table 13. (Continued)

Team Teaching					
Number	Intelligence Quotient	Chronological Ages	Pretest Score	Final Test Score	Difference
Girls					
1	121	15.83	40	58	18
2	118	16.08	53	69	16
3	115	15.50	21	54	33
4	114	15.67	37	58	21
5	110	15.75	49	65	14
6	109	15.58	44	57	13
7	107	16.00	37	62	25
8	107	15.58	31	55	24
9	107	15.25	37	56	19
10	106	15.83	32	45	13
11	104	15.92	37	52	15
12	102	16.08	36	53	17
13	101	15.25	34	53	19
14	100	15.83	36	58	22
15	100	15.25	23	36	13
16	98	15.75	29	52	23
17	97	15.50	20	36	16
18	97	15.75	19	31	12
19	96	15.75	27	41	14
20	92	15.67	19	27	8
21	92	15.92	29	45	16
22	92	15.50	22	36	14
23	91	15.92	36	41	5
24	89	16.50	11	21	10
25	88	15.25	13	29	16
26	85	15.33	25	38	13
26	101.5	15.702	30.7	47.2	16.5
Team mean					
57	102.9	15.775	30.7	46.7	15.8

Table 14. Intelligence Quotients, Chronological Ages, Pretest Scores, Final Test Scores and Differences of the Traditional Teaching Group.

Traditional Teaching					
Number	Intelligence Quotient	Chronological Ages	Pretest Score	Final Test Score	Difference
Boys					
1	130	15.33	44	55	11
2	123	15.83	43	56	13
3	123	15.17	39	55	16
4	119	16.50	36	43	7
5	115	15.25	43	52	9
6	114	15.83	50	60	10
7	112	15.83	53	67	14
8	112	15.50	36	46	10
9	112	15.17	40	58	18
10	112	15.17	39	58	19
11	110	15.33	28	55	27
12	109	15.50	27	39	12
13	107	15.67	25	20	- 5
14	107	15.33	33	50	17
15	106	15.92	35	35	0
16	105	15.58	37	49	12
17	104	15.58	37	60	23
18	103	15.42	47	56	9
19	103	16.08	30	51	21
20	98	15.42	16	37	21
21	98	16.50	34	32	- 2
22	98	16.75	31	45	14
23	96	15.75	22	52	30
24	94	16.08	27	36	9
25	94	16.42	32	45	13
26	93	15.25	13	34	21
27	90	16.25	16	31	15
28	90	16.75	26	29	3
29	89	16.75	23	41	18
30	88	17.08	36	26	-10
31	87	15.50	12	23	11
31	104.5	15.832	32.6	45.0	12.5

(Continued)

Table 14. (Continued)

Traditional Teaching					
Number	Intelligence Quotient	Chronological Ages	Pretest Score	Final Test Score	Difference
Girls					
1	117	15.92	36	62	26
2	112	15.42	60	63	3
3	112	15.58	19	40	21
4	110	15.33	28	45	17
5	109	16.08	46	63	17
6	109	15.75	30	52	22
7	108	15.25	32	49	17
8	106	15.33	31	63	32
9	106	15.25	40	52	12
10	105	15.33	31	55	24
11	105	15.42	21	45	24
12	104	16.08	27	39	12
13	103	15.58	39	47	8
14	101	15.25	22	34	12
15	101	15.92	32	44	12
16	100	16.08	24	36	12
17	99	15.83	37	52	15
18	98	15.92	22	47	25
19	97	15.33	28	50	22
20	96	16.25	33	49	16
21	91	15.67	37	44	7
22	90	16.00	28	38	10
23	89	16.25	18	38	20
24	87	15.25	14	29	15
25	85	16.00	24	25	1
26	77	16.00	23	26	3
26	100.7	15.695	30.1	45.7	15.6
Traditional Mean					
57	102.8	15.765	31.4	45.3	13.9



Table 15. Superior Mental Ability Comparisons Between the Team Teaching and Traditional Teaching Groups (Intelligence Quotient Score Range of 111 and above).

Team Teaching Group					
Number	Intelligence Quotient	Chronological Ages	Pretest Score	Final Test Score	Difference
Boys					
1	128	15.33	24	58	34
2	121	15.42	35	53	18
3	119	15.75	30	50	20
4	117	16.00	36	58	22
5	115	16.25	44	54	10
6	114	15.17	40	51	11
7	113	15.75	31	44	13
8	113	15.33	30	50	20
9	112	15.50	41	75	34
Girls					
1	121	15.83	40	58	18
2	118	16.08	53	69	16
3	115	15.50	21	54	33
4	114	15.67	37	58	21
13	Means	116.92	35.53	56.3	20.76
Traditional Teaching Group					
Boys					
1	130	15.33	44	55	11
2	123	15.83	43	56	13
3	123	15.17	39	55	16
4	119	16.50	36	43	7
5	115	15.25	43	52	9
6	114	15.83	50	60	10
7	112	15.83	53	67	14
8	112	15.50	36	46	10
9	112	15.17	40	58	18
10	112	15.17	39	58	19
Girls					
1	117	15.92	36	62	26
2	112	15.42	60	63	3
3	112	15.58	19	40	21
13	Means	116.38	41.3	55.0	13.61

Table 16. Average Mental Ability of the Team Teaching Group (Intelligence Quotient Score Range from 90 through 110).

Team Teaching						
Number	Intelligence Quotient	Chronological Ages	Pretest Score	Final Test Score	Difference	
Boys						
10	110	15.50	36	57	21	
11	108	15.58	49	58	9	
12	107	15.33	28	41	13	
13	107	16.08	53	62	9	
14	106	16.08	41	50	9	
15	104	15.50	22	38	16	
16	103	15.67	31	57	26	
17	103	16.42	29	36	7	
18	103	15.83	21	38	17	
19	102	15.42	25	41	16	
20	102	15.33	35	55	20	
21	101	15.83	33	57	14	
22	99	16.25	25	35	10	
23	99	15.25	30	43	13	
24	96	16.50	33	40	7	
25	94	16.17	18	48	30	
26	93	15.83	18	32	14	
27	93	15.67	26	30	4	
Girls						
5	110	15.75	49	65	14	
6	109	15.58	44	57	13	
7	107	16.00	37	62	25	
8	107	15.58	31	55	24	
9	107	15.25	37	56	19	
10	106	15.83	32	45	13	
11	104	15.92	37	52	15	
12	102	16.08	36	53	17	
13	101	15.25	34	53	19	
14	100	15.83	36	58	22	
15	100	15.25	23	36	13	
16	98	15.75	29	52	23	
17	97	15.50	20	36	16	
18	97	15.75	19	31	12	
19	96	15.75	27	41	14	
20	92	15.67	19	27	8	
21	92	15.92	29	45	16	
22	92	15.50	22	36	14	
23	91	15.92	36	41	5	
37	Means	101.02	15.76	31.08	46.45	15.05

Table 17. Average Mental Ability of the Traditional Teaching Group (Intelligence Quotient Score Range from 90 through 110).

Traditional Teaching					
Number	Intelligence Quotient	Chronological Ages	Pretest Score	Final Test Score	Difference
Boys					
11	110	15.33	28	55	27
12	109	15.50	27	39	12
13	107	15.67	25	20	- 5
14	107	15.33	33	50	17
15	106	15.92	35	35	0
16	105	15.58	37	49	12
17	104	15.58	37	60	23
18	103	15.42	47	56	9
19	103	16.08	30	51	21
20	98	15.42	16	37	21
21	98	16.50	34	32	- 2
22	98	16.75	31	45	14
23	96	15.75	22	52	30
24	94	16.08	27	36	9
25	94	16.42	32	45	13
26	93	15.25	13	34	21
27	90	16.25	16	31	15
28	90	16.75	26	29	3
Girls					
4	110	15.33	28	45	17
5	109	16.08	46	63	17
6	109	15.75	30	52	22
7	108	15.25	32	49	17
8	106	15.33	31	63	32
9	106	15.25	40	52	12
10	105	15.33	31	55	24
11	105	15.42	21	45	24
12	104	16.08	27	39	12
13	103	15.58	39	47	8
14	101	15.25	22	34	12
15	101	15.92	32	44	12
16	100	16.08	24	36	12
17	99	15.83	37	52	15
18	98	15.92	22	47	25
19	97	15.33	28	50	22
20	96	16.25	33	49	16
21	91	15.67	37	44	7
22	90	16.00	28	38	10
37	Means	101.11	29.83	44.86	15.02

Table 18. Below Average Mental Ability Comparison Between Team Teaching and Traditional Teaching Groups (Intelligence Quotient Score Range of 89 and Below).

Team Teaching Group						
Number	Intelligence Quotient	Chronological Ages	Pretest Score	Final Test Score	Difference	
Boys						
28	89	16.92	18	36	18	
29	88	16.75	25	24	- 1	
30	86	16.08	22	31	9	
31	84	16.42	24	32	8	
Girls						
24	89	16.50	11	21	10	
25	88	15.25	13	29	16	
26	85	15.33	25	38	13	
7	Means	87.0	16.17	19.7	30.1	10.4
Traditional Teaching Group						
Boys						
29	89	16.75	23	41	18	
30	88	17.08	36	26	-10	
31	87	15.50	12	23	11	
Girls						
23	89	16.25	18	38	20	
24	87	15.25	14	29	15	
25	85	16.00	24	25	1	
26	77	16.00	23	26	3	
7	Means	86.0	16.11	21.4	29.7	8.2

Table 19. Summary of Means Tables of the Traditional Teaching and Team Teaching Groups.

	Intelligence Quotient	Chronological Age	Pretest	Final	Difference
Trad. Gp. Boys	104.5	15.832	32.6	45.0	12.5
Trad. Gp. Girls	100.7	15.695	30.1	45.7	15.6
Trad. Mean	102.8	15.765	31.4	45.3	13.9
Team Gp. Boys	104.2	15.836	30.7	46.3	15.2
Team Gp. Girls	101.5	15.702	30.7	47.2	16.5
Team Mean	102.9	15.775	30.7	46.7	15.8
Boys Mean	104.4	15.829	31.7	45.6	13.8
Girls Mean	101.1	15.698	30.4	46.4	16.0
Intelligence					
Superior Mean	116.7				
Average Mean	101.1				
Below Average Mean	86.5				



Table 20. (Continued)

		Intelli- gence Quotient	Mean	Chrono- logical Age	Mean	Pretest	Mean	Final	Mean	Differ- ence	Mean
	n										
Superior	26	3033	116.7	406.08	15.618	1000	38.5	1447	55.7	447	17.2
Average	74	7481	101.1	1165.58	15.751	2254	30.5	3379	45.7	1113	15.0
Below											
Average	14	1211	86.5	226.08	16.149	288	20.6	419	29.9	131	9.4
Boys	62	6470	104.4	984.42	15.829	1963	31.7	2830	45.6	857	13.8
Girls	52	5255	101.1	816.31	15.698	1579	30.4	2415	46.4	834	16.0
Grand Total		11725		1797.74		3542		5245		1691	

APPENDIX B

The Shaw Health Knowledge Test



## THE SHAW HEALTH KNOWLEDGE TEST

DO NOT WRITE OR MARK ON THIS TEST. Please read all instructions carefully before beginning.

FOLLOW THE INSTRUCTIONS IN THE ORDER IN WHICH THEY ARE GIVEN.

1. On the answer sheet, write your name, sex, class (i. e. freshman, sophomore, etc.) your instructor and your age in year and months.
2. This test is composed of 100 MULTIPLE-CHOICE items. You have a selection of one correct answer from five choices. Read each question carefully, SELECT THE ANSWER that appears best (correct or most nearly correct) to you, and then mark the response you chose in the appropriate space on your answer sheet.
3. Mark only on the answer sheet. Be sure that your marks are heavy and black. Erase completely any answer you wish to change. Complete as many statements as you can, but leave blank rather than make a wild guess.
4. Upon completion of the test, you must: return the original test, the answer sheet, and the marking pencil to your instructor.
5. If you have any general questions, ask them now, do not start until the examiner tells you to do so.

1. The efficiency of which of the following systems is most important in extending the prime of life?
 

A. Musculature	D. Digestion
*B. Circulatory	E. Reproduction
C. Endocrine	
2. The most important meal of the day for high school students is:
 

*A. breakfast	D. snacks
B. lunch	E. brunch
C. dinner	
3. The basic responsibility for a person's health rests with the:
 

A. health department	D. family of the individual
B. medical profession	*E. individual himself
C. community	
4. The problem of self medication is that:
 

A. it is expensive	D. the medicine taken is valueless
B. it masks serious symptoms	E. drugs cause other complications
*C. proper treatment delayed causes death or permanent damage	

5. Ovulation in the female normally occurs:
- A. at the beginning of the menstrual cycle
  - \*B. at the mid-point of the menstrual cycle
  - C. at the end of the menstrual cycle
  - D. several times during the menstrual cycle
  - E. just before the menstrual cycle begins
6. High tensions and frustrations in normal youth:
- \*A. increase the intensity of the sex drive
  - B. diminish the intensity of the sex drive
  - C. have no effect on the sex drive
  - D. account for the increased birth rate
  - E. can produce sterility
7. During menstruation the female should:
- A. not go swimming
  - \*B. go about normal activities
  - C. not take a bath
  - D. stay in bed
  - E. reduce activities
8. The leading causes of death today in the United States can be classified as:
- A. communicable diseases
  - \*B. degenerative diseases
  - C. deficiency diseases
  - D. contagious diseases
  - F. functional diseases
9. An ovum on its way to the exterior of the body follows which one of the following courses?
- A. Uterus, oviduct, vagina, ovary
  - B. Oviduct, uterus, ovary, vagina
  - C. Ovary, uterus, vagina, oviduct
  - D. Oviduct, ovary, uterus, vagina
  - \*E. Ovary, oviduct, uterus, vagina
10. The most important factor in successful social adjustment is:
- A. flattery
  - B. aggressiveness
  - \*C. interest in other people
  - D. egocentricity
  - E. timidity
11. The greatest health value of exercise has its effect upon:
- A. respiration
  - B. strength
  - C. endurance
  - \*D. circulation
  - E. flexibility of joints
12. Which of the following is regarded by health scientists as the most serious problem in the United States?
- \*A. alcohol addiction
  - B. nicotine addiction
  - C. morphine addiction
  - D. barbiturate addiction
  - E. marihuana addiction
13. Metabolism is:
- A. building up of cells
  - B. tearing down of cells
  - \*C. building up and tearing down in cells
  - D. creation of energy
  - E. rapid change in the cell

14. The greatest danger in traffic is the driver who is:
- A. color blind
  - B. a woman
  - C. deaf
  - \*D. antisocial
  - E. cautious
15. A person's behavior is the result of:
- A. hereditary tendencies
  - B. environmental influences
  - \*C. both heredity and environment
  - D. social influences
  - E. mental tendencies
16. Frequent sore throat in youth predisposes to:
- \*A. rheumatic fever
  - B. heart disease
  - C. arthritis
  - D. tuberculosis
  - E. cancer
17. The delay of sexual relations after biological maturity:
- A. prevents complete physical development
  - B. increases probability of having children after marriage
  - C. constitutes harmful repression of a natural instinct
  - \*D. causes no physical or mental ill effects
  - E. reduces fertility after marriage
18. Which of the following is classified as an organic disease?
- \*A. Diabetes mellitus
  - B. Septic sore throat
  - C. Smallpox
  - D. Appendicitis
  - E. Sinusitis
19. Every normal person:
- A. has no feeling of inferiority
  - B. has no fear or apprehension of failure
  - C. can reach perfection in mental health
  - \*D. becomes emotionally disturbed
  - E. can avoid all frustrations
20. Which of the following is NOT a body defense against infection?
- \*A. alkalinity of the skin
  - B. hydrochloric acid of the stomach
  - C. salinity of tears
  - D. fever
  - E. mucous secretions
21. Sex and reproduction differ in that:
- A. they are directly opposed to each other
  - B. neither is biological
  - C. one is natural, the other unnatural
  - \*D. one is primarily emotional, the other biological
  - E. sex occurs only in the male, and reproduction only in the female
22. Which of the following is correct?
- A. All social drinkers become alcoholics
  - \*B. All alcoholics once were social drinkers
  - C. In the United States more women than men are alcoholics
  - D. Most alcoholics are social drinkers
  - E. Most alcoholics could quit drinking if they wished

23. In which way are carbohydrates utilized by the body?
- A. To supply energy and build new tissues
  - B. To regulate body processes
  - \*C. To supply heat and energy
  - D. To build and renew tissues
  - E. To provide roughage
24. A recorded basal metabolic rate would be inaccurate if the patient was:
- \*A. digesting and absorbing food
  - B. lying down
  - C. of normal body temperature
  - D. well rested
  - E. free from illness
25. Life expectancy at birth in the United States is:
- A. greater than that of any other country in the world
  - B. lowest in the world
  - C. greater than that of all European countries
  - \*D. less than that of the Scandinavian countries
  - E. below the average for the world
26. Vitamins:
- \*A. act as regulators
  - B. provide heat energy
  - C. provide cell building material
  - D. are basic foods for nerves
  - E. do all of the above
27. Of the following the least important factor to mental health is:
- A. good physical health
  - B. good social health
  - \*C. exceptional intellectual capacity
  - D. material security
  - E. popularity with the opposite sex
28. A husband and wife are both heterozygous for a trait which neither they nor their two children exhibit. Therefore, the trait:
- A. is transmitted as a dominant
  - B. is an example of incomplete dominance
  - C. would have to be sex-linked
  - \*D. is inherited as a recessive
  - E. is certain to appear if a third child is born to this husband and wife
29. Medical authorities unanimously condemn coffee drinking by children because:
- A. caffeine tends to retard normal growth
  - \*B. coffee in the diet would replace milk and fruit juices
  - C. caffeine is an irritant to the delicate lining of the esophagus
  - D. susceptibility to respiratory infections is increased by caffeine
  - E. it is an unnecessary part of the diet
30. A person of normal health:
- A. never gets ill
  - B. never gets tired
  - \*C. shows variations in his physical condition
  - D. never gets emotionally upset
  - E. is always the same
31. Activity should be determined by:
- A. a person's physiological capacity
  - B. his general health condition
  - C. physiological fitness
  - D. his interests
  - \*E. all of the above

32. Puberty is a condition which normally occurs at the beginning of:
- A. menopause
  - B. early adult life
  - C. pregnancy
  - D. middle age
  - \*E. adolescence
33. The most important factor in the length of a person's life is:
- A. regular rest and plenty of exercise
  - B. the careful choice of foods and the avoidance of undue strains of any sort
  - \*C. one's inherited constitution
  - D. the avoidance of excessive use of stimulants and alcohol
  - E. the education and intelligence of the individual
34. A person of normal mental health never:
- A. gets angry
  - B. becomes upset
  - \*C. reaches his potential level
  - D. encounters frustration
  - E. acts in his own self-interest
35. Which of the following is NOT correct?
- A. A person always rests during sleep
  - B. A person rests only when he sleeps
  - C. People who move during sleep do not rest
  - D. A person who is really tired will go right to sleep
  - \*E. All of the above four
36. Studies show that people with high serum cholesterol levels have:
- A. a low incidence of atherosclerosis
  - B. few heart attacks
  - C. a diet low in fat
  - D. robust health
  - \*E. a higher incidence of atherosclerosis
37. Excessive thyroxin output results in a (an):
- A. carotene deficiency
  - \*B. underweight condition
  - C. overweight condition
  - D. water imbalance
  - E. basal metabolism rate of less than minus 10
38. For the individual of normal mental health, disintegration of the personality:
- A. never occurs
  - B. is highly frequent
  - C. is of long duration
  - \*D. is of short duration
  - E. is of a major type
39. In America, sexual morality:
- A. is consistent among all of its people
  - \*B. varies with different social groups
  - C. is indicative of sexual precocity
  - D. is a relatively simple matter
  - E. does not matter
40. A poison which stops breathing is:
- A. carbon monoxide
  - \*B. a neurotoxin
  - C. a carcinogen
  - D. nicotine
  - E. a ptomaine

41. Dental caries are:
- A. the same as dental cavities
  - B. caused by drinking fluoridated water
  - \*C. a process of dissolving of tooth enamel
  - D. prevented entirely by the use of toothpaste
  - E. the result of dental cavities
42. The most egocentric period in life is between:
- \*A. birth and 5 years of age
  - B. 6 and 9 years of age
  - C. 10 and 14 years of age
  - D. 15 and 20 years of age
  - E. 31 and 35 years of age
43. An individual's degree of biological masculinity or femininity is:
- \*A. primarily glandular
  - B. primarily social conditioning
  - C. due to dietary conditions
  - D. due to physical size
  - E. due to order of birth
44. The normal functioning of the thyroid gland is dependent upon adequate dietary amounts of:
- A. chlorine
  - B. cobalt
  - C. fluorine
  - \*D. iodine
  - E. potassium
45. In the light of present knowledge, the best way to keep one's self free from colds is to:
- A. take a laxative
  - B. take vitamin A in cod liver oil
  - C. gets lots of rest and eat at regular times
  - D. use one of the various vapor treatments
  - \*E. avoid close contact with persons who have colds
46. An example of a positive emotion is:
- A. fear
  - B. anger
  - \*C. love
  - D. fright
  - E. remorse
47. The reason for NOT using patent medicines is:
- A. they cost too much for the good derived from them
  - \*B. they delay an individual from seeing a physician
  - C. they cause addiction
  - D. testimonials in favor of them are slanted
  - E. they perform to the extent of their advertisement
48. Which of the following is NOT true in sleep?
- A. Temperature of the body is lowered
  - \*B. Circulation rate is increased in order to remove wastes
  - C. Oxygen content of the brain area is reduced
  - D. The nervous system continues to work
  - E. The digestive system may continue actively

49. A course in general health places its major emphasis upon:
- A. symptoms of the various diseases
  - B. how to correct physical defects
  - C. memorization of specific statistics
  - \*D. understanding of health principles
  - E. anatomy and bacteriology
50. Continnence or restraint in sexual responsiveness before marriage is:
- A. injurious to physical health
  - B. helpful to physical health
  - C. injurious to mental health
  - D. beneficial to mental health
  - \*E. in accordance with acceptable American social standards
51. In a certain marriage, neither parent has a certain disorder which is known to be inherited. The couple have two daughters who have the disorder. Therefore:
- A. the disorder is inherited as a dominant characteristic
  - \*B. the disorder is inherited as a recessive characteristic
  - C. the disorder is inherited as a sex-linked trait
  - D. no inheritance factor can be involved here
  - E. the disorder is developmental
52. Education of drivers is effective in reducing accidents when significant improvement is made in their:
- A. knowledge
  - B. skills
  - C. hand-eye-foot coordination
  - \*D. attitudes
  - E. strength
53. Conception begins:
- A. during sexual intercourse
  - B. during ovulation
  - \*C. when the sperm unites with the ovum
  - D. when the fertilized ovum reaches the uterus
  - E. when the ovum enters the oviduct
54. Pasteurization:
- A. reduces the nutritive value of milk
  - B. preserves vitamins
  - C. kills all bacteria
  - \*D. kills disease producing organisms
  - E. increases digestibility
55. The type of disorder which occurs when an inadequate release of emotional tension creates functional bodily disorders, such as headaches and high blood pressure, is known as:
- \*A. psychosomatic condition
  - B. insanity
  - C. neurosis
  - D. psychosis
  - E. phobia
56. In the United States, accidents as a cause of death are:
- \*A. of importance for all age groups
  - B. declining in importance
  - C. increasing in rate
  - D. of significance only for ages 1 to 29
  - E. first as a cause of death for all ages

57. It is humanly possible to:
- A. eliminate all hazards
  - B. make a completely safe world
  - \*C. markedly reduce unnecessary risks
  - D. prevent all accidental deaths
  - E. make all people adequately safety conscious
58. Chronic diseases are characterized by:
- \*A. slowly progressing symptoms
  - B. the patient being beyond the prime of life
  - C. recurring frequently
  - D. being caused by microorganisms
  - E. their rapidity in causing death
59. Emotions:
- A. should never be suppressed
  - B. should be given free expression
  - C. are properly used as a means of binding others to one's will
  - \*D. serve as powerful forces for creative work
  - E. are unrelated to physical well-being
60. Which of the following is least indicative of mental health?
- A. Objectivity
  - B. Orderliness
  - \*C. Sensitivity
  - D. Interest in other people
  - E. Life goal of service
61. In terms of health, which of the following outcomes of exercise is of least importance?
- A. mental health
  - \*B. powerful muscles
  - C. physiological fitness
  - D. extension of the prime of life
  - E. improved efficiency of circulation
62. Amino acids are found in:
- A. carbohydrates
  - \*B. proteins
  - C. vitamins
  - D. minerals
  - E. fats
63. The normal heart:
- A. is often damaged by strenuous exercise
  - B. maintains a constant rate of contraction
  - \*C. changes output with varying body needs
  - D. contains three chambers
  - E. has valves which permit blood to flow in two directions alternately
64. Carbon monoxide poisoning:
- A. is due to the narcotic effect of the gas
  - \*B. is caused by carbon monoxide displacing oxygen
  - C. is due to the strangling effect of the gas
  - D. occurs abruptly
  - E. is always fatal



65. To gain weight, the least effective food is:
- \*A. proteins
  - B. carbohydrates
  - C. fats
  - D. starches
  - E. sugars
66. Sexual adjustment in marriage:
- A. must be 100 percent perfect to be acceptable
  - B. is never acceptable
  - C. is not a necessary aspect of successful marriage adjustment
  - D. is always satisfactory
  - \*E. can be satisfactory without being perfect
67. Health scientists would regard which of the following to be the most important contribution of exercise to health?
- A. Improvement of posture
  - B. Extension of the span of life
  - C. Coordination values
  - \*D. Mental health values
  - E. Muscular strength
68. Unsafe conditions:
- A. usually are due to unstable physical factors
  - B. are more difficult to correct than unsafe acts
  - \*C. are easier to correct than unsafe acts
  - D. cause more accidents than unsafe acts
  - E. are really not significant in the safety program
69. When botulism occurs, it is found to be due to:
- A. eating uncooked commercially canned foods
  - \*B. eating home canned foods not sufficiently heated before serving
  - C. eating commercially canned foods not sufficiently heated before serving
  - D. drinking bad liquor
  - E. drinking raw milk
70. Vitamin B helps produce healthy skin by:
- A. affecting the blood vessels in the skin
  - \*B. affecting the nerves of the skin
  - C. producing oil
  - D. preserving the elasticity of the skin
  - E. keeping the epithelial cells healthy
71. Fluorine is added to the drinking water in some areas to:
- A. kill bacteria
  - B. soften water
  - C. prevent disease
  - \*D. reduce dental decay
  - E. prevent goiter
72. Ethyl alcohol is classified as a (an):
- A. enzyme
  - B. antibiotic
  - C. antigen
  - \*D. narcotic
  - E. stimulant

73. Hypertension, as a disorder, is characterized by the:
- A. stomach producing excess acid
  - B. liver producing excess bile
  - C. nervous system being overly sensitive
  - \*D. blood pressure being above normal
  - E. endocrine glands responding too freely to stimulation
74. Which of the following indicates the student does NOT possess normal health?
- A. Steady weight
  - B. Efficient and enjoyable living
  - \*C. Constant awareness of his body
  - D. Fatigue
  - E. Emotional stability
75. Weight can be controlled safely by:
- A. reducing with special foods
  - B. increasing and decreasing exercise
  - \*C. balancing energy expended and calorie intake
  - D. increasing and decreasing excretion
  - E. stopping caloric intake completely
76. The first child of a couple had erythroblastosis, but the second child born a year later did not have erythroblastosis because the:
- A. child was Rh positive
  - \*B. child was Rh negative
  - C. mother was Rh positive
  - D. father was Rh negative
  - E. child was a female
77. Night-blindness is associated with the lack of:
- \*A. vitamin A
  - B. vitamin B
  - C. vitamin B<sub>2</sub>
  - D. vitamin C
  - E. vitamin D
78. Protection against communicable disease primarily depends on:
- A. heredity
  - B. a nutritious diet
  - C. antigens
  - \*D. antibodies
  - E. plenty of sleep
79. Marriage is:
- A. a fifty-fifty proposition
  - B. wrecked when the wife works
  - C. less demanding than the single status
  - D. guaranteed to succeed when there are children
  - \*E. jeopardized when one partner loses status
80. Chronic nephritis is a general term referring to diseases of the:
- A. spleen
  - B. pancreas
  - \*C. kidneys
  - D. intestines
  - E. nerves
81. The daily caloric need of the average college girl is about:
- A. 500 calories
  - B. 1000 calories
  - C. 1500 calories
  - D. 2000 calories
  - \*E. 2500 calories

82. Present levels of radioactive materials in the atmosphere:
- A. effect everyone alike
  - \*B. are not a known hazard to human life
  - C. come from atom bomb testing
  - D. are serious because of their effect on the skin
  - E. are from ultraviolet radiation
83. The group of conditions below which includes only degenerative diseases is:
- A. cancer, high blood pressure, syphilis, diabetes
  - B. measles, apoplexy, arteriosclerosis
  - C. appendicitis, stomach ulcers, cancer, heart failure
  - D. whooping cough, pernicious anemia, rickets, delirium tremens
  - \*E. arteriosclerosis, diabetes, apoplexy, atherosclerosis
84. Which of the following is NOT an attribute of a normal college student?
- A. Inferiority feeling
  - B. Apprehension about a new experience
  - C. Fear of the unfamiliar
  - \*D. Total lack of self interest
  - E. Some feeling of social inadequacy
85. A complete professional examination of the eyes is best made by a (an):
- A. obstetrician
  - B. optician
  - C. optometrist
  - \*D. ophthalmologist
  - E. family physician
86. Which of the following does NOT involve a pathogenic organism?
- A. Wart
  - B. Cold sore
  - C. Acne
  - \*D. Eczema
  - E. Boils
87. The necessary vitamins would best be obtained from:
- A. fish liver oils
  - B. vitamin concentrate
  - C. sunshine
  - \*D. natural foods
  - E. "health" foods supplements
88. Warts are caused by:
- A. an animal parasite
  - \*B. a virus
  - C. an abnormal condition of small surface blood vessels
  - D. an overgrowth of one of the deeper pigmented layers of skin
  - E. protein hypersensitivity
89. The principle use which the body makes of proteins is:
- A. for quick energy
  - B. to aid digestion
  - \*C. for the growth and replacement of tissues
  - D. to add bulk to the diet and thus prevent constipation
  - E. to stimulate the flow of bile

90. Sexual arousal of the female is:
- A. nonexistent
  - \*B. less sensitive than in the male
  - C. more sensitive than in the male
  - D. somewhat neutral
  - E. entirely genital
91. A toxin is a:
- A. drug
  - B. bacterium
  - C. virus
  - D. protozoan
  - \*E. poison
92. Excessive pressure produced by fluid in the eye is the cause of:
- A. myopia
  - B. hyperopia
  - C. astigmatism
  - D. cataract
  - \*E. glaucoma
93. For high school women the most likely cause of death during the next four years is:
- A. pneumonia
  - B. mononucleosis
  - C. poliomyelitis
  - D. tuberculosis
  - \*E. accidents
94. 'Hypoglycemia' means:
- A. too much blood sugar
  - B. sugar administration by hypodermic needle
  - C. blood sugar mixed with water
  - D. glycerin
  - \*E. too little blood sugar
95. All "catching" diseases have in common the following characteristic, they:
- A. are transmitted from person to person by nose and mouth discharge
  - B. have a high mortality
  - C. tend to come to a "crisis"
  - \*D. are caused by some organism
  - E. are more severe in tropical countries
96. The most important factor in assuring success in marriage is:
- A. physical maturity
  - \*B. emotional maturity
  - C. social maturity
  - D. moral maturity
  - E. vocational maturity
97. Which of the following has no scientific support?
- A. smoking by the expectant mother effects the fetus adversely
  - B. nicotine can diffuse from the mother's blood to the blood of the fetus
  - \*C. children of smoking mothers will not live as long as children of non-smoking mothers
  - D. smoking can increase the heart rate
  - E. smoking can increase the blood pressure

98. In a sex-linked characteristic the:
- A. same condition cannot occur in females
  - B. genetic factor is present in the female
  - \*C. effective gene is part of a sex chromosome
  - D. condition is congenital
  - E. gene operates as a dominant
99. Degenerative diseases are best postponed by:
- A. increased consumption of vitamins
  - \*B. use of available scientific knowledge of health
  - C. a diet high in vegetables
  - D. glandular transplants
  - E. use of tranquilizing drugs
100. Which of the following is NOT correct?
- A. All female germ cells contain an X chromosome
  - B. One-half of all male germ cells contain an X chromosome
  - C. One-half of all male germ cells contain Y chromosomes
  - \*D. All male germ cells contain a Y chromosome
  - E. All germ cells contain one sex chromosome

\*Correct answer