

THE EFFECTS OF INQUIRY TEACHING PRACTICES
ON DENTAL HYGIENE STUDENTS

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CHAPTER I

INTRODUCTION

Graduation of a dental hygienist who is a knowledgeable and skilled professional is an objective of dental hygiene educational programs. The training of such an individual has been performed in the classroom, laboratory, and clinical settings by traditional teaching methodology. The teacher presides as the authoritative source of knowledge who makes assignments in the required texts, administers periodic examinations, and gives a course grade based on these evaluations. Audiovisuals, independent study assignments, and discussion interchanges may be included in the course outline, but for the most part, learning expectations are achieved by the student in a dependent and passive manner.

Students must meet the established dental hygiene selection criteria. The result is that the majority complete their coursework with passing grades. At the end of their training period most dental hygiene graduates passed their national and state board examinations and secured employment as a part of the dental health

team. Many dental hygiene educators believe that they are doing an effective job of teaching because the student attrition rate is low and the success rate on licensing examinations is high. Other educators, however, have expressed concern over the inability of their students to show evidence of self-direction and independence of thought while progressing through the curriculum. They believe that dental hygiene educators might become even more effective if they could utilize a teaching method which would promote such learning behaviors.

Many dental hygiene instructors have little, if any, formal training as educators. They are a product of a system where the teacher provides facts and the student is to listen, read, and memorize in order to recall knowledge on examination. Thus, this system of education has been perpetuated. Recognizing this shortcoming, the American Dental Hygienists' Association (ADHA) is currently sponsoring a series of workshops for dental hygiene educators. This series, funded by the Department of Health, Education, and Welfare (HEW), is titled "Curriculum Design: Making Education Make a Difference." Included in the course description is the

statement, "Of special concern is the problem of re-organizing educational activities to better promote thinking, problem solving health professionals." (Connell, 1979, p. 1).

The workshop participants were introduced to what is termed the inquiry process of teaching. Its foundations began with the experimentalism of John Dewey. He is considered one of the most influential philosophers of the twentieth century. Dewey published the first of his precepts, Democracy in Education, in 1916 and continued to be a prolific author during his lifetime. His philosophy of teaching is expressed in the following quotation:

. . . it is part of the educator's responsibility to see equally to two things: First that the problem grows out of the condition of experience being had in the present, and that it is within the range of the capacity of the students; and secondly, that it is such that it arouses in the learner an active quest for information and the production of new ideas. The new facts and ideas thus obtained become the ground for further experience in which new problems are presented. The process is a continuous spiral (Dewey, 1938, p. 79).

Dewey's pedagogy is denoted by various names, with "inquiry process" being the most current. Pragmatism, instrumentalism, experimentalism, teaching by discovery, positive relativism, and problem-solving

method are also used. Brown (1968) operationalized Dewey's concepts of teacher practices making the following comparisons of inquiry and dis-inquiry processes, the latter being referred to by Dewey as the "evils of Education" (Institute for Inquiry in Education 1975, pp.1-2).

Inquiry	Dis-inquiry
1. Situations of experience	1. Neglect of direct experience
2. The development of challenging problems	2. Reliance upon extrinsic motivation
3. The generation of ideas	3. Making learning a direct and conscious end in itself
4. The observation and collection of data	4. The mechanical following of an established method
5. The development of reasoned hypotheses	5. The imposition of a general method on all alike
6. Experimental application and testing	
7. Evaluation and judgment of results	

Dewey's philosophy of teaching, designed to produce students skilled in reflective thinking and problem solving abilities, has been applied and evaluated in elementary and secondary education for several decades. However, Dewey's philosophy of teaching has not been widely utilized in higher education at the undergraduate level. The ADHA workshops are thus introducing dental hygiene educators to an alternative to traditional teaching methods. The aim of inquiry teaching is the development of students who are more autonomous and active in

the learning process. The ultimate goal is the graduation of health professionals who have expertise and experience to apply in solving the problems of dental health.

Change in teaching style, however, is often difficult to accomplish. Recognizing this fact, the facilitator of the ADHA curriculum design workshops, Dr. Karen J. Connell, helps the participants to anticipate some common pitfalls to implementation of inquiry practices. One of these pitfalls is giving tests and grades. She contends that such practices lead to premature closure of reflective thinking in students. The explanation of the seventh feature of inquiry teaching processes, evaluation and judgment of results, is as follows:

In the "spirit of science" students are encouraged to view the results of their experience dispassionately, to accept failure as one of the calculated risks of trying. This requires a shift in emphasis in the evaluation climate of a classroom or program. Students need to be freed from constant external judgments by teachers and to be made responsible for making self-evaluations. They should participate in the evaluation of their own efforts and be given opportunity to make revisions and corrections in their work accordingly. Teachers should, in this view, encourage answers to be treated as intermediate in learning, not final (Institute for Inquiry in Education 1975, p. 1).

Connell proposes that teachers can facilitate students developing their own evaluation criteria for course work and then allowing them to engage in periodic

reflection on how well they believe they have met these criteria. This periodic qualitative data will be used by the students at the end of the semester to assign themselves a course grade according to how well they believe they met their criteria.

Making students accountable for their own educational competency, however, presents a dilemma for many health occupation educators. They believe that they are compelled to know that students are in possession of scientific skills and facts, yet their goal is producing graduates who are capable of the internal supervision necessary for problem solving and decision making relative to client care. The quandry exists of how to move from the external controls they believe they must exercise to show competency of students, to the internal controls needed by a graduate health professional. If, therefore, the adoption of inquiry teaching practices can be shown to effect a student who possesses greater problem solving and self-evaluation capabilities without a decrease in knowledge of content then it is a methodology of sound potential merit for dental hygiene education.

Purpose of the Study

The purpose of this quasi-experimental study was to determine if inquiry teaching practices, when utilized in a didactic dental hygiene course, result in the learning of content material that was equal to or greater than that achieved by students who were taught by traditional, expository teaching methods. An additional purpose of the study was to determine if inquiry teaching practices used in the same course results in a gain of reflective thinking, problem solving abilities, and increased self-evaluation skills (inquiry behavior) of students based on scores received on a test instrument titled, "Student Behavior Inventory" (SBI).

Research Hypotheses

The research hypotheses for this study were as follows:

1. There will be no statistically significant difference in the mean score of the Preventive Dentistry achievement (content) examinations for the 1978 comparison group as contrasted to the mean score of the Preventive Dentistry achievement (content) examinations for the 1980 comparison group

2. There will be no statistically significant difference in the inquiry behavior of the 1980 comparison group as measured by the SBI near the beginning and at the end of the semester during which the course is taught

Significance of the Study

A review of the literature shows that few studies of the inquiry method of teaching have been conducted at the post-secondary level of education, particularly in health occupations education. Only two studies are currently underway to evaluate the effectiveness of inquiry teaching practices in the area of clinical dental hygiene education. No studies have been reported to date on the effectiveness of such teaching practices when used in didactic courses of dental hygiene education. Getzel (1964) states:

While new curriculum-makers and methodologists are exhorting the experimental approach to knowledge, they are not to a great extent submitting their own exhortations to experiment (p. 258).

This teaching practice is being promoted by the ADHA, therefore, it is incumbent upon educators in dental hygiene to test the validity of such a method previous to adopting it on a widespread basis. Research can be used to determine if this innovation in dental hygiene education deserves to be considered an improvement.

If the merits of inquiry teaching are confirmed then it can be adopted as an accepted practice by the instructor of an individual course or more widely adopted as a philosophy of teaching for an entire curriculum. Broader application of research findings related to the inquiry methodology would be a reflection of this educational philosophy in the ADHA Curriculum Guidelines, the ADHA guidebook for the development of new dental hygiene educational programs and for those existing programs seeking to make curriculum improvements. Brown (1968) uses the adage: "By your deeds you shall be known" (p. 175), to emphasize that teachers who teach experimentally should also think and believe experimentally.

Definition of Terms

The following terms have restricted meaning and were thus defined for this study:

1. Content material was defined as the facts, concepts, theories, laws, and generalizations which comprise the body of knowledge for a course in Preventive Dentistry of the Texas Woman's University Dental Hygiene Program
2. Inquiry process, inquiry practice, and inquiry method were synonymous and interchangeable and were defined

as teaching practices which strive to maximize student involvement in their own learning experiences where the teacher acts in the role as a facilitator of learning and not as the expositor of content materials. See Appendix A for category descriptions of "Deweyan Inquiry" (Institute for Inquiry in Education, 1975)

3. Inquiry behaviors were defined as evidence of inquiry process skills such as autonomy in thinking, an experimental stance toward problem solving, and abilities to self-evaluate as evidenced by group data test scores on the SBI

Basic Assumption

It is assumed that the subjects responded honestly to the instruments used to measure teacher practices and the self assessment of their inquiry behaviors.

Limitations

The following factors were considered to be limitations of the study:

1. There was no available data on the reliability and validity of the test items of the Preventive

Dentistry achievement examination, Learning Style Inventory, and Learner Observation Form

2. Student Behavior Inventory (SBI) gain scores were available for only the 1980 comparison group in the study
3. The subjects of the study were convenience samples; groups of students contrasted over a three year period of time
4. The pretest (SBI) was administered one month after the beginning of the course

CHAPTER II

SELECTED REVIEW OF THE LITERATURE

The review of the literature could begin with John Dewey who started publishing his tenets on the inquiry method early in the twentieth century. But with respect to the evolution and refinement of Dewey's proposals this review shall be confined to selected publications which have been printed in the past twenty years.

A starting point is enumeration of some supportive comments relative to this teaching method. Advocates, such as Brown (1968) and Bigge (1971), propose that its use will result in a student who demonstrates greater abilities to use higher level cognitive thought processes, namely application, analysis, synthesis, and evaluation. Kagan (1966) believes that a major advantage of discovery learning is the arousal it generates in students resulting in maximal attention to learning, an increased value of the learning task, and greater self-confidence as an autonomous problem solver. To

quote Postman and Weingartner, (1969):

. . . change is the most striking characteristic of the world we live in. It is not beyond our ingenuity to design school environments which can help young people to master concepts necessary to survival in a rapidly changing world (pp. xiii-xiv).

No practice in education is without its critics and this is equally true of inquiry. Ausubel (1963) contends that it is not a cost-effective method of education. Society is able to pass on its culture because of its abilities to communicate to others without them having to rediscover it for themselves. He further states that variability in genic endowment is probably responsible for more of the measured variance in critical thinking than is variability in educational experiences. The dialectic presented by Wittrock (1966) is that there is no one universal method for teachers to use; that individual differences require several different approaches. He also proposes that the hypothesis of inquiry may confuse the means with the end. Namely, to produce the ability to discover (an end) may involve more than simple practice at discovery (a means). More practical "limitations" to inquiry teaching are stated by Marsh (1976) as lack of suitable evaluation instruments to measure inquiry behavior change and lack of availability of teacher training.

There are, however, several books on teacher methodology for inquiry teaching. It was Brown (1968) who operationalized Dewey's concepts and developed the first Teacher Practices Inventory which spells out categories whereby inquiry teaching practices are enumerated. Other authors, such as Gage (1972) and Bigge (1971), have written texts which can serve as guidelines for a teacher interested in pursuing this teaching practice. For example, Gage says that:

Indirectness--the teacher dimension that consists of the degree to which the teacher permits pupils to discover underlying concepts and generalizations for themselves, giving them less rather than direct guidance (1972, pp. 36-37),

is a significant way for teachers to improve learning. Bigge suggests such techniques to teachers utilizing inquiry as to have anticipated class outcomes on paper, or at least in mind, but not to structure specific objectives as these would tend to delimit learning.

Research findings on inquiry can be divided into specific journal articles or textbook chapters telling of studies in which inquiry was a variable and more general reviews compiling several years of research into one report which describe "trends" in education. An early study conducted by Suchman (1962) was based on the rationale that learning by inquiry is superior to

learning directed wholly by teacher or textbook. The subjects were fifth and sixth grade students divided into a control and experimental group both studying the same science concepts for a 24 week period. At the end of this study both groups were tested for (1) understanding of physics, (2) information, and (3) skill in inquiry process. The results showed no significant difference in understanding and information but there was a marked difference favoring the experimental group in inquiry skills as exhibited by autonomy in learning and questioning fluency.

Flanders (1960) reports on an extensive study supporting a significant process/product relationship. The sample consisted of 240 junior high school classrooms divided between the study of geometry and social studies. A trained observer coded teacher/student verbal interactions and classified the teacher as having direct influence, more autocratic control of the class, or indirect influence, more democratic control of the class. Students' opinions of their teacher were measured by an attitude scale and achievement tests, adjusted for initial ability, were administered for the content area of study. Findings showed that teachers who use more

indirect influence, defined by Flanders (1960) as, "increasing freedom of action of a student by reducing restraints or encouraging participation" (p. 12), resulted in an increase in student's scores on both attitude and achievement.

Guthrie (1969) conducted a study in which the hypothesis proposed that a method of instruction where rules are followed by examples would facilitate retention but not transfer of learning. That training with examples followed by rules and training with examples only (these later two methods being inquiry techniques) would result in transfer but not retention. The hypotheses were proved to be true. Subjects were 72 students enrolled in a college educational psychology course who were divided into a control group who learned some Russian vocabulary and three treatment groups taught to decipher cryptograms by various methods.

Mid-Continent Regional Education Laboratory, Kansas City, Missouri, has conducted an extensive study titled Inquiry Role Approach (IRA). The study was begun in 1968 and a field test report was filed by Seymour (1973). The population was composed of tenth grade biology students with the IRA treatment group being 15 teachers responsible for 1750 students in six different

states. The control group consisted of eight teachers responsible for 465 students in the same geographic area of the midwest. The domains of student performance which were measured were inquiry process skills, attitude, and subject matter comprehension. Results of the study showed the IRA subjects to be significantly better in inquiry skills and attitude but control subjects gained slightly over the IRA group in subject matter comprehension. However, the researcher points out that the non-IRA group also had higher verbal and numerical aptitude test scores than the IRA group for which no statistical allowance was made.

A long term study to examine differential effectiveness of programs based on divergent educational and developmental theories was reported by Stallings (1976). The program was funded by Congress in 1967 when it became apparent that a model was needed in the lower grades of public school to capitalize on the academic gains of children who completed Head Start Programs. There were seven treatment groups, two of which were highly structured classes using positive reinforcement and five groups (one of which was based on Dewey's concepts at the University of Arizona demonstration school) which were more open structured models. Results showed the highly

structured groups (drill, practice and praise) had higher reading and mathematics scores on the Metropolitan Achievement Test. The more open structured classes had higher scores on the nonverbal problem solving test, Raven's Coloured Progressive Matrices Test, and a lower absence rate based on school records. The conclusions drawn were that what occurs in the classroom does contribute to achievement, attendance, and desired child behaviors.

A study, more specific to the health education profession, has been conducted by Connell et al. (1977) concerning an educational inquiry approach to faculty development of health occupations educators. She states that the results have been encouraging in that data shows:

(1) that faculty development programs can be organized in a way that will cultivate an inquiry set in faculty and (2) that when faculty function with an inquiry set, student inquiry behavior, a widely acclaimed goal of both higher and professional education, increases significantly (p. 108).

Two studies to test the effect of inquiry teaching practices on the clinical abilities of dental hygiene students have been initiated, one at the University of Washington and the other at the University of Missouri at Kansas City (UMKC). To date results of neither study

have been published. A telephone interview with Ms. Marilyn Harrington (1979), Director of the UMKC program was made. She reports interim statistics show a gain in clinical competency. Data compiled for the junior class, who just completed the first full year using the new inquiry clinical curriculum indicates that productivity and quality of client care has increased approximately 200 percent. However, the study is designed to continue for another year before final results will be available.

One aspect of inquiry teaching process is freeing students from exclusively external judgments by teachers and creating in them increased responsibility for self-evaluation. At the end of the semester, Gaier (1961) asked 132 undergraduate students in the psychology course he was teaching, to give themselves a grade. He presented them with the following statement: "Write the grade you believe you deserve in this course and list the reasons you believe you should be assigned this grade" (p. 63). The student's responses were classified as high (H) based on the instructor's assigned grade of A or B, middle (M) based on an assigned grade of C, or low (L) based on an assigned grade of D or F. Pearson correlation coefficients between the instructor's assigned grades and student's expected grades yielded $H + 0.78$,

M + 0.44, and L + 0.65, all of which were significant beyond the 1 percent level of confidence. The student's reasons for the grade they felt they deserved were much more objective than subjective in nature. There was no significant difference found among the three groups in their use of objective criteria to support their choice of a grade.

Gilmore (1973), a college professor at a Canadian university, reports on a complicated system of student self-evaluation which he has used for several years in the classes he teaches. With his formula for determining student error rate in self-evaluation he has concluded that students can and do rate themselves accurately. He believes this control over their own course grade serves to encourage students to become more actively involved in their own learning process.

Dental school faculty (Jacobs et al., 1975) at the University of Iowa published results of a study in which instructors grading of final examinations, self-ratings, and peer evaluations of the same examinations were compared. All three groups ranked the subjects consistent with the GPA of their previous year in dental school. However, peer and instructor ratings were 6 percent lower than self-ratings.

In a new text dealing with clinical evaluation in the health professions Fuhrmann and Weissburg (1978) place a great deal of value on the necessity to develop highly reliable self-evaluation skills in health occupations students to enable them to transfer this ability to their role as graduate professionals. They favor self-evaluation in formative education but feel that the price of personal objectivity and honesty may be too high for summative grading situations.

More general reviews evaluate recent studies and report trends in education. McKeachie states, as summarized by Mizell and Bell (1977), that lecture methods are better for learning factual information and discussion methods lead to greater retention, motivation, improvement of attitude toward learning, and use of higher level cognitive thinking. He also states that we may not be able to hope for a number of clearly significant studies favoring one instructional strategy or another. As a result he will have to be content with spotting trends. The fact that a large number of studies found the same results, even though individual studies did not find the difference to be significant, may be sufficient. In another text McKeachie (1978) writes about an interesting observation on studies of lecture versus discussion where the measure of knowledge used is the final

examination. He questions the final examination as a valid criterion measure for research in that motivation for grades is so strong for many students that they are likely to compensate for any perceived deficiencies in teaching by extra study, thus negating the differential effects of teaching methods.

Cognitive style and locus of control are student variables which have been studied relative to teaching practices. Witkin et al. (1977), published a review in which they

described cognitive style and identified some areas where research evidence has accumulated to identify the potential benefits of cognitive style approach for problems of education (p.2).

Cognitive style was described as a characteristic perceptual and intellectual approach a person brings with him to a diverse range of situations. The two basic cognitive styles are field-dependence and field-independence. The former style is that of persons whose perceptions are strongly dominated by the prevailing field, who have a strong social sensitivity, who have a greater need for externally provided structure, and who favor a spectator over hypothesis testing approach. The field-independent person is contrasted as a person who experiences items as separate from the surrounding field, who are more

solitary in their work requirements, who are particularly analytical, and who learn more under conditions of intrinsic motivation. Studies have indicated that field-dependent teachers ranked discussion methods, where students were questioned to ascertain their grasp of content, high as a good teaching practice while field-independent teachers ranked lecture or discovery approaches higher. Research data has not shown a significant difference in student achievement as a result of exposure to field-dependent as opposed to a field-independent teacher. The combined effect of the cognitive styles of teachers and students show that there is greater interpersonal attraction in situations where teachers and students are matched in cognitive style. Rotter (1966) utilizes a locus of control concept to explain individual responses to learning situations. He developed an Internality-Externality Scale to measure the extent to which people credit success or failure to themselves (internality) or to the environment or teacher (externality). Rotter contends that students who score high in externality will be very challenging to motivate and that it will be difficult to instill them with a sense of personal responsibility for their own learning.

In concluding the selected review of the literature some remarks from health occupations educators concerning future directions are in order. Rosendahl (1974) comments that professional education should incorporate more andragogy (the art and science of helping adults to learn as coined by Knowles) than pedagogy. The nursing educator of adult students should be in the role of helper, facilitator, consultant, and resource person--not a transmitter of knowledge. She feels this will produce a practitioner more capable of upgrading the health care system. A dental educator, Lutz (1975), expresses similar sentiments about the need to make learning in dental schools more student-centered. He proposes that this can be accomplished if the teacher would assume responsibilities for being a professional role model, partner-in-learning, classroom facilitator and a coevaluator. Dental hygiene educators have also expressed their concerns for curriculum revisions that reflect an inquiry set. Ancell (1974) points out that professional attrition rate is quite high in dental hygiene with 42 percent of hygienists leaving practice one year postgraduation and 86 percent by five years postgraduation. She agrees that disillusionment with the profession may be a factor and suggests that increased student participation in the

learning process may help to prevent this from occurring. Another dental hygiene educator, Dunbar (1976) feels that students have been in a learning environment where they have been encouraged to "do as you're told" and "do it better than your classmate." As a consequence successful students learn to play roles rather than acquire and use knowledge. She too advocates teaching methods that actively involve the learner in order to produce more competent hygienists oriented toward lifetime learning.

Summary

Several educators believe that utilization of the inquiry method will result in students with increased abilities to use higher level cognitive thought processes. Critics of this method counter that it is not a cost-effective practice. It has also been pointed out that students vary in cognitive style (Witkin et al., 1977) enabling some students to profit from an inquiry approach more than others.

Results with regard to student achievement as a dependent variable in inquiry studies have been mixed. Suchman (1962) found no significant difference and the IRA study conducted by the Mid-Continent Regional Education Laboratory (Seymour, 1973) resulted in a slight decrease

in achievement. Flanders (1960), however, found a gain in achievement in the 240 classroom units in which inquiry teaching practices were utilized.

Studies conducted with college undergraduates as subjects are lacking, although some studies to determine the effect of inquiry methods in clinical dental hygiene courses are currently being conducted in university settings. Research findings have been published which show reliability of college student self-evaluation to be high; however, other inquiry teaching practices were not variables in these studies.

Many health occupations educators agree that a more student-centered curriculum is needed to produce practitioners with greater capacities to improve present health care delivery systems. Data, collected by Connell (1977), shows that when health occupations faculty function with an inquiry set there is a significant gain in student inquiry behavior.

CHAPTER III

METHODOLOGY

Permission was obtained from the program director of the Texas Woman's University (TWU) Dental Hygiene Program, Denton, Texas, to conduct a quasi-experimental research study utilizing students in one of the program's courses, Preventive Dentistry. The Preventive Dentistry Course is offered in the second semester of the TWU Dental Hygiene Program curriculum. The instructor of the course, who was also the director of the research study, is a dental hygiene educator with twenty years of teaching experience. The instructor has held responsibility for this course for the past eight years. She has recently completed the ADHA workshop and follow up workshop, "Curriculum Design: Making Education Make a Difference," in 1979, at which time dental hygiene educators were introduced to inquiry teaching practices.

The Population

The population was composed of TWU Dental Hygiene Program students. A maximum of 24 students are admitted to this program at the beginning of each fall semester.

Most of these students have completed approximately 60 semester hours of prerequisite college work. This is followed by 56 semester hours of study in the dental hygiene major and culminates with the student being awarded the Bachelor of Science in Dental Hygiene. The TWU program is what is commonly referred to in dental hygiene education as a two plus two degree program. Most students admitted to the program have met the minimum selection criteria as stated in the current Texas Woman's University General Catalogue. These criteria have remained essentially unchanged since the first students were admitted to the program in 1971.

Selection of the Sample

The subjects for the three comparison groups were naturally assembled collections: recent classes of the TWU Preventive Dentistry course. One comparison group consisted of 24 TWU dental hygiene students who completed the Preventive Dentistry course in the spring semester of 1978. This was the last semester the researcher/instructor taught the course in its entirety using the traditional expository teaching style characterized by lectures. This teaching style included instructor prepared behavioral objectives, a course outline with reading assignments,

some audiovisuals, and opportunities for students to ask questions. Evaluation was performed by the use of four achievement examinations, each of which counted as 25 percent of the course grade. These tests were administered approximately every four weeks throughout the 15 week semester (see appendix B).

The second comparison group was composed of 23 TWU dental hygiene students who completed the Preventive Dentistry course in the spring semester of 1979. The instructor changed from expository to some inquiry teaching practices in the middle of the semester after attending her first ADHA curriculum workshop. The SBI was administered to the students prior to the initiation of the inquiry method of teaching. This SBI score is presented as most similar to students who are regularly enrolled and who have not had the inquiry method of teaching. This contrast is made to establish that the 1978 comparison group would have had a similar pre inquiry score (SBI) had the instrument been administered to them. A t-test was performed comparing the pre inquiry scores for the 1979 and 1980 groups. The two-tail probability of the separate variance estimate was 0.211 which is not significant at the .05 level as shown in table 1.

TABLE 1
t-TEST COMPARISON OF PRE SBI INQUIRY SCORES

Year	Mean	Standard Deviation	t Value	2-Tail Probability
1979	58.83	11.50	-1.27	0.211
1980	64.33	17.70		

During the remainder of the semester data was collected on the 1979 group using the same test instruments to evaluate inquiry skills, teacher practices, and learning styles as was used in the 1980 comparison group.

The sample for the 1980 comparison group was 24 TWU dental hygiene students who enrolled in the Preventive Dentistry course offered in the spring semester of 1980. The instructor taught the course in its entirety utilizing the inquiry method thus allowing the subjects to have more autonomous control over their learning. The course grade was assigned on the basis of student self-evaluation. The subjects took the same four achievement examinations at times in the semester corresponding to the times the 1978 comparison group took the examinations. The subjects were told the examinations were to provide them feedback as formative evaluation and that the scores

would not be used to determine the course grade. The Student Behavior Inventory (SBI) was administered in February, March, and at the end of the semester to test for gain scores in inquiry abilities. The pre SBI was administered a month after the semester began, instead of on the first day the class met, due to a breakdown in communications. The researcher mistakenly understood that a fellow faculty person was administering the instrument for her. When the error was discovered the 1980 group had already been exposed to the treatment variable (inquiry teaching) for one month, thus, the pre SBI was administered in February. The students were asked to reflect back to their perceptions as of the beginning of the course.

The near equivalency of the comparison groups was demonstrated by comparing the five semester GPA mean for each group (the GPA of each group at the conclusion of the semester just prior to their enrollment in Preventive Dentistry) and by comparing mean Dental Hygiene Aptitude Test (DHAT) scores for each group. The DHAT is a standardized test administered by the American Dental Hygienist's Association to predict student ability and is used as a selection criteria for admission of students to dental hygiene educational programs. The data

used to determine equivalency of groups was obtained from historical files of the Dental Hygiene Program.

Analysis of variance (ANOVA) of the mean GPA of each group resulted in the significance of F being 0.691. This showed that no significant difference in mean GPAs existed in the three comparison groups at the .05 level of probability. ANOVA was also performed using mean DHAT scores for each of the three comparison groups. Class means in each of the four DHAT sections (Science, General, Numerical, and Reading) as well as the total DHAT score of the four sections, were compared. There was no significant difference in the three groups in any of the four sections of the DHAT examination or the total DHAT scores at the .05 level of probability. The significance of F of the total DHAT scores, as determined by ANOVA, was 0.618. Refer to table 2.

TABLE 2
COMPARATIVE STATISTICS WHICH DEMONSTRATE
EQUIVALENCY OF THE 3 COMPARISON GROUPS

Variable	1978 Mean	1979 Mean	1980 Mean	Significance of F
5 semester GPA	2.90	2.93	2.98	.691
DHAT Science	3.80	4.35	4.08	.565
DHAT General	2.96	3.49	3.25	.683
DHAT Numerical	3.29	3.44	3.67	.716
DHAT Reading	3.50	4.00	3.33	.442
DHAT Total	13.50	15.13	14.33	.618

The Research Design

The design for this quasi-experimental study was the nonequivalent control group design as discussed by Campbell and Stanley (1963, pp. 47-50). The subjects of the three comparison groups were as previously identified. The instructor and content material for all groups was the same. The research treatment, or independent variable, was the inquiry method of teaching. The dependent variables were the mean scores of the four achievement

tests and the gain scores of the Student Behavior Inventory (SBI). The class means for the 1978 control group's achievement tests were obtained from the course grade book recorded at that time. The class means on the achievement tests and scores of the Student Behavior Inventory (SBI) were obtained from instruments coded to assure strict confidence and administered to the 1980 comparison group. Internal validity was assessed by the administration of the Learning Styles Inventory, Teacher Practices Inventory-Student, and Learner Observation Form to the 1980 comparison group, all of which were coded and reported only as composite figures, plus Teacher Practices Inventory self assessment by the instructor (see appendix D). The following table (table 3) indicates the time frame in which the test instruments were administered to the treatment group.

TABLE 3
SCHEDULE OF EVALUATION OF 1980 GROUP

Observation	Time					Purpose
	Jan.	Feb.	Mar.	Apr.	May	
1. Student assessment of:						1.
a. Teaching Practices Inventory-Student (TPI-S)	X		X		X	a. Formative assessment--provides feedback on process
b. Own learning behaviors--Student Behavior Inventory (SBI)		pre X	inter- im X		post X	b. Principle measure of impact on students
c. Own learning style--Learning Style Inventory (LSI)				X		c. Serve as a possible explanation in extent of change among students
d. Of the course--Learner Observation Form (LOF)					X	d. Overall assessment of intentions/impact of course
2. Content tests (same as '78 group)		X	X	X	X	2. Scores compared with '78 group
3. Instructor self-assessment--Teacher Practices Inventory (TPI)		X	X			3. Formative assessment, corrective feedback

Instruments Used for Evaluation Purposes

The instrument used to measure inquiry and dis-inquiry behaviors of subjects is the Student Behavior Inventory (SBI). This is a self-evaluation instrument copyrighted by the Institute for Inquiry in Education, Incorporated, Chicago, Illinois. A copy of the SBI and the scoring sheet, used to arrive at the summary inquiry and dis-inquiry scores for each inventory, are located in appendix C. Scores range from 0-100 percent in both the inquiry and dis-inquiry dimensions. Interpretation of behavior is as follows: 0-20 means the behavior rarely occurs; 21-40 means the behavior occurs occasionally; 41-60 means the behavior occurs half the time; 61-80 means the behavior occurs frequently; and 81-100 is interpreted as behavior that occurs habitually.

The Teacher Practices Inventory-Student (TPI-S) and the Teacher Practices Inventory (TPI) are parallel instruments to the SBI and were obtained from the same source. The TPI-S is used by students to assess the inquiry and dis-inquiry teaching practices of the classroom instructor. The TPI is a self-evaluation instrument used by the classroom teacher to assess their own teaching practices in these same two dimensions. Scoring procedures

and scoring interpretation are also parallel in form to the SBI. Copies of these inventories and their scoring sheet are located in appendix D.

The reliability estimates of the SBI, TPI-S, and TPI have been computed using the Kuder-Richardson 21 formula to measure internal consistency. The inquiry and dis-inquiry scores have been consistently about .70. In affective type instruments such as these an internal consistency correlation near .60 is considered satisfactory, reports the institute's statistician (Piotrowski, 1980). The reported correlation estimates are, thus, more than what is necessary to meet acceptable criteria for reliability.

Validity of the SBI, TPI-S, and TPI instruments has been ascertained in a number of ways. Convergent validity and discriminant validity were tested using a method called multitrait-multimethod correlation analysis. Construct validity has been tested using methodology articulated by Shavelson (Piotrowski, 1980).

The Learner Observation Form (LOF) is a subjective evaluation designed to be administered at the completion of a course. It too is copyrighted by the Institute for Inquiry in Education, Incorporated. The LOF asks for responses to two questions. One question asks the student to write what they felt was the instructor's

primary intention for them as a learner. The second question asks the students what they felt was the most important impact the course had on them. Each answer is scored on a basis of 0-3 with 3 being considered indicative of more self-directed, problem solving students. No data on reliability or validity are available. Copies of the LOF and its scoring sheet are located in appendix D.

The four achievement (content) tests were developed by the author. Data on reliability and validity have not been obtained. Copies of each examination are located in appendix B. Scoring was done on a basis of 0-100 percent with a 70 percent average for the four examinations being the minimum passing grade for the course when these tests were administered to the 1978 comparison group.

The Learning Style Inventory was developed by Professor David A. Kolb, Case Western Reserve University. It is designed to assess a student's distinctive learning method. Scores fall on a range of 0-24 in each of four categories: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. The higher the score in each section the more likely it is that this trait represents a predominant learning

method for the student. Copies of the inventory, directions for scoring, and scoring interpretation are located in appendix D. Reliability and validity data for this instrument are not available.

Procedures for Analyses of Data

The type of analyses with Statistical Package for the Social Sciences (SPSS were:

1. t-Test: Compare means of content tests, 1978 group versus 1980 group
2. t-Test: Compare pre-interim-post inquiry and dis-inquiry SBI scores for the 1980 group
3. t-Test: Compare SBI baseline means, 1979 group versus 1980 group
4. Regression: Influence of LSI, DHAT, GPA on content test scores; SBI pre; SBI post: and SBI change; and LOF for the 1980 group
5. Correlation: All summary scores for the 1980 group
6. Reliability: SBI (1980 group) and TPI-S
7. The level of statistical significance was .05

CHAPTER IV

FINDINGS

A computer assisted analysis of the data collected for the three comparison groups was conducted. The Statistical Package for the Social Sciences (SPSS) was used. The findings of the data collected during the study period, for the purpose of testing the hypotheses set forth, are reported here.

Preventive Dentistry Content Examinations

A t-test of the mean class scores for the Preventive Dentistry content examinations (the average score of the four content test scores) of the 1978 and 1980 comparison groups showed a significant difference ($p=.024$). The 1978 group had a mean test score of 79.25 and the 1980 group showed a mean test score of 74.25. The t-test comparisons of each of the four content tests administered to the two classes were done. There was a significant difference in the 1978 and 1980 class means on only one of the four examinations, the third test. Refer to table 4 for content test score statistics.

TABLE 4

t-TEST COMPARISON OF PREVENTIVE
DENTISTRY CONTENT TESTS

Test	Year	Mean	Standard Deviation	2-Tail Probability
1	1978	76.29	6.99	.201
	1980	73.21	9.31	
2	1978	80.08	9.39	.312
	1980	77.58	7.44	
3	1978	82.58	10.72	.011*
	1980	70.83	12.51	
4	1978	77.38	9.74	.403
	1980	75.00	9.75	
Average of 4 tests	1978	79.25	7.13	.024*
	1980	74.25	7.67	

*p < .05

Analysis of SBI Scores

The t-test comparisons of the 1980 group--pre, interim, and post Student Behavior Inventory (SBI) scores--revealed no significant differences in either the inquiry or dis-inquiry dimensions of the inventory. The mean pre SBI inquiry score was 64.33 and the mean post SBI inquiry score was 66.67. Two-tail probability was 0.336. According to SBI scoring interpretations the 1980 class had a mean score indicating the class demonstrated inquiry behaviors frequently, when tested near the beginning of the semester. Although the class mean increased slightly during the course it was not a significant gain and their inquiry behaviors remained in the same category at the end of the semester.

The mean pre SBI dis-inquiry score was 55.83 and the post SBI dis-inquiry score was 58.79. These means were not significantly different ($p=.084$). The dis-inquiry dimension of the learning behaviors of the class remained in the range indicating dis-inquiry behaviors occurred half the time. See table 5 for statistics on SBI scores.

TABLE 5
t-TEST COMPARISONS OF THE SBI ADMINISTERED TO
the 1980 COMPARISON GROUP

Inquiry Dimension				Dis-inquiry Dimension			
Time of Test	Mean	Standard Deviation	2-Tail Probability	Time of Test	Mean	Standard Deviation	2-Tail Probability
Pre	64.33	17.70	0.776	Pre	55.83	9.80	0.250
Interim	64.96	19.42		Interim	57.67	9.77	
Pre	64.33	17.70	0.336	Pre	55.83	9.80	0.084
Post	66.67	17.71		Post	58.79	7.37	
Interim	64.96	19.42	.467	Interim	57.67	9.77	0.564
Post	66.67	17.71		Post	58.79	7.37	

Mean Scores of the TPI-S and TPI

The mean score of the Teacher Practices Inventory-Student (TPI-S), at the beginning of the semester for the 1980 group, was 72.13 and at the conclusion of the semester was 77.79 in the inquiry dimension of the instrument. The dis-inquiry dimension showed means of 83.20 for the pre TPI-S and 89.92 for the post TPI-S. According to scoring interpretations for the inventory, this showed that the students perceived the teacher's inquiry practices to be occurring frequently and dis-inquiry practices to be occurring habitually. The classroom instructor's evaluation of her own teaching practices, Teacher Practices (TPI), was an inquiry score of 79 and a dis-inquiry score of 22 at midsemester. The teacher perceived her inquiry practices to be at the same level as did the students but she perceived herself to be using dis-inquiry only rarely, (see table 6).

Reliability of SBI and TPI-S Instruments

Reliability/correlation data from all SBI and TPI-S evaluation instruments administered to the 1980 comparison group were computed using test-retest methodology. Results showed a range of 0.78 to 0.84 for the

TABLE 6

COMPARISON OF MEAN SCORES OF THE TPI-S AND TPI
FOR THE 1980 GROUP

	Inquiry Dimension			Dis-inquiry Dimension		
	Time of Test	Mean	Standard Deviation	Time of Test	Mean	Standard Deviation
TPI-S	Pre	72.13	21.72	Pre	83.20	19.35
	Interim	65.75	13.00	Interim	79.46	10.51
	Post	77.79	14.99	Post	89.92	6.90
TPI	February	67.0		February	33.0	
	March	79.0		March	22.0	

inquiry values of the SBI. These meet or exceed the minimal level of .60 for reliability coefficients used to compare evaluations. The range of reliability values for the dis-inquiry dimension of the SBI was 0.43 to 0.69. Reliability values for the TPI-S were a range of 0.48 to 0.69 for the inquiry values and a range of 0.42 to 0.59 for the dis-inquiry values. The dis-inquiry dimension of the SBI, and the inquiry and dis-inquiry dimension of the TIP-S did not meet the minimal level of .60 for reliability coefficients used to compare evaluations. All reliability correlations were significant at the .05 level (see tables 7 and 8). Because of the nature of the data file used for the pre 1979 comparison group and the LOF scores for the 1980 group it was not possible to compute reliability for these instruments as originally proposed.

Findings of the Learning Style Inventory

The Learning Style Inventory (LSI), which was administered to the 1980 comparison group in April, showed the class to be balanced. No one mode was significantly higher than the others. A score of 24 was possible in each of the four learning styles. The class means

TABLE 7

RELIABILITY COEFFECIENTS FOR THE SBI*

	SBI I Interim	SBI I Post	SBI D-I Interim	SBI D-I Post
SBI I Pre	0.8403	0.7838		
SBI I Interim		0.8185		
SBI D-I Pre			0.6979	0.5946
SBI D-I Interim				0.4256

*0.60 is the minimally acceptable reliability coefficient

Key: I = Inquiry
DI = Dis-Inquiry

TABLE 8

RELIABILITY COEFFECIENTS FOR THE TPI-S*

	TPI-S I Interim	TPI-S I Post	TPS-S D-I Interim	TPI-S D-I Post
TPI-I I Pre	0.5311	0.4738		
TPI-S I Interim		0.6891		
TPI-S D-I Pre			0.4170	0.5790
TPI-S D-I Interim				0.5907

*0.60 is the minimally acceptable reliability coefficient

Key: I = Inquiry
DI = Dis-Inquiry

were: 15.79 for concrete experience, 15.13 for reflective observation, 15.88 for abstract conceptualization, and 15.75 for active experimentation.

Findings of the Learner Observation Form

The Learner Observation Form (LOF) administered at the conclusion of the semester for the 1980 group showed a class mean of 1.79 in the intentions dimension of the instrument and a class mean of 2.21 in the impact dimension of the instrument. Using the scoring interpretation which accompanies the instrument, it can be interpreted that the average student's perception as to the instructor's primary intention for them as the learner was application of basic knowledge and skills. The average student's perception as to the most important impact the course actually had on them was the same, primarily application of basic knowledge and skills. A total of 5 (21 percent of the class) scored a 3 on intentions and 13 (54 percent of the class) scored a 3 on impact indicating that intentions of the teacher and impact of the course on them was perceived as primarily development of self-awareness, self-directed, self-evaluative, problem solving behavior (inquiry behavior).

Regression Analysis

A multiple step-wise regression analysis of the influence of the Learning Styles Inventory, Dental Hygiene Aptitude Test scores, and GPA on the content tests average; Student Behavior Inventory pre, post, and change scores; and the Learner Observation Form scores for the 1980 comparison group was conducted. Three independent variables exerted significant influence on the dependent variables ($F 4.30$ $\alpha .05$ and $1/22$ df) (see table 9).

TABLE 9
SIGNIFICANT RESULTS OF MULTIPLE
STEP-WISE REGRESSION ANALYSIS

Independent variable	Dependent variable	R	B	F
LSI-Active Experimentation	SBI pre Inquiry Score	.443	2.670025	5.37488
LSI-Reflective Observation	SBI-Post Inquiry Score	.520	-2.488677	8.14600
LSI-Concrete Experience	Average Content Test Score	.513	-1.670466	7.87554

Pearson's Correlation Coefficients

Pearson's r was computed comparing all variables in the 1980 group data. Several statistically significant positive and negative relationships of note were found (see tables 10 and 11).

TABLE 10
SIGNIFICANT POSITIVE PEARSON PRODUCT MOMENT
CORRELATION COEFFICIENTS FOR DATA
ON 1980 GROUP*

Variables	Pearson's r
DHAT-Numerical/Content test #1	0.4281
DHAT-Numerical/Content test #2	0.5419
DHAT-Numerical/Content tests average score	0.4082
DHAT-Reading/Content test #3	0.3473
DHAT-Total Score/Content test #3	0.3483
GPA/Content test #1	0.4008
GPA/Content test #3	0.3725
GPA/Content tests average score	0.4167
LSI/Active Experimentation/LOF-Intention	0.4042
LSI-Abstract Conceptualization/LOF-Impact	0.3506
LSI-Active Experimentation/SBI-Inquiry (pre)	0.4431
LSI-Active Experimentation/SBI-Inquiry (interim)	0.3549
LSI-Active Experimentation/SBI-Inquiry (post)	0.4121

* $p < .05$

TABLE 11

SIGNIFICANT NEGATIVE PEARSON PRODUCT MOMENT
CORRELATION COEFFICIENTS FOR DATA
ON 1980 GROUP*

Variables	Pearson's r
SBI-Inquiry (pre)/LOF-Impact	-0.4064
SBI-Inquiry (interim)/LOF-Impact	-0.3844
SBI-Inquiry (post)/LOF-Impact	-0.4507
SBI-Inquiry (pre)/LSI-Reflective Observation	-0.4018
SBI-Inquiry (interim)/LSI-Reflective Observation	-0.4248
SBI-Inquiry (post)/LSI-Reflective Observation	-0.5198
LSI-Concrete Experience/Content test average scores	-0.5134

*p < .05

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

Summary

A quasi-experimental study was conducted to ascertain if a teaching methodology characterized by inquiry teaching practices would result in (1) increased student achievement, as measured on course content examinations, and (2) increased student inquiry behaviors, as measured by a Student Behavior Inventory.

Three groups of students, all of whom were previously enrolled in the TWU Dental Hygiene Program's course in Preventive Dentistry, were the subjects of the study. One class of 24 completed the course in 1978 when traditional expository teaching practices were utilized. A second group of 23 completed the course in 1979 and experienced traditional methodology the first half of the semester and inquiry teaching practices the last half of the semester. A third group completed the course in 1980 and were exposed to the independent variable, inquiry methodology, the entire semester. The three comparison groups were statistically equivalent groups as

measured by GPA and Dental Hygiene Aptitude Test scores. The 1979 and 1980 groups were equivalent on pre SBI scores.

The first null hypothesis, dealing with achievement, was tested by comparing content test scores for the 1978 group, whose tests were used to determine their course grade, with the 1980 group's content test scores. The 1980 group had the same content tests administered to them as did the 1978 group but the test scores were utilized by the students only as formative feedback and they were informed at the beginning of the course that the tests would have no effect on their course grade.

The second null hypothesis, dealing with increased student inquiry behavior, was tested by comparing the pre, interim, and post SBI scores of the 1980 group. The pre SBI testing was delayed one month after the course began due to an error. The information on the pre SBI was thus obtained by asking the students to use retrospective evaluation.

Additional data used to lend internal validity to the study was obtained by administering a Learning Style Inventory (LSI), a Teacher Practice Inventory-Student (TPI-S), a Teacher Practice Inventory (TPI), and a Learner Observation Form (LOF).

Computer assisted analysis of data was performed using the Statistical Package for the Social Sciences (SPSS).

Conclusions

Analysis of the data from this study led to the following conclusions subject to inherent methodolgical limitations:

1. Hypothesis One: There will be no statistically significant difference in the mean score of the Preventive Dentistry achievement (content) examinations for the 1978 comparison group as contrasted by the 1980 comparison group. This hypothesis was rejected.
2. Hypothesis Two: There will be no statistically significant difference in the inquiry behavior of the 1980 comparison group as measured by the SBI near the beginning and at the end of the semester during which the course is taught. This hypothesis was retained.

On the basis of the data presented, it was concluded that inquiry teaching methodology does not produce better results in terms of student achievement of

content materials or improvement in inquiry learning behaviors as measured by the SBI.

Discussion

There are several findings and observations, relative to this study, which warrant discussion. One of these is the fact that the 1978 group had a significantly higher mean score, for the average of the four content examinations, than did the 1980 group. The theory that served as the basis for this hypothesis was that students, who are participating in a class (1980) with an inquiry learning environment, will compensate for the lack of external motivation, produced when the instructor gives them a grade based on test scores, with their own internal motivation to study. A difference, such as the one seen on this research project in favor of the 1978 group whose test scores were used for summative grading purposes, should not be observed if such a theoretical assumption relative to inquiry learning behaviors is valid. If it were valid the 1980 group, whose test scores were used only for formative feedback, should have been significantly greater than the 1978 group.

It is interesting to note, however, that in analysis of the class means of each of the four content

tests individually, it was only in one of the four tests that a significant difference in class mean scores (in favor of the 1978 group) existed. The third content examination was the first of three examinations which were taken by the students on the same day. Unknown to the instructor in advance, the students also had tests in periodontology and pathology both scheduled for later in the day. The students said they had spent many hours the preceding day in study for these examinations and appeared to be quite tense. Perhaps their tension and fatigue can account for their performing at such an extremely lower level than did the 1978 group on this one examination. If these circumstances had not intervened a difference in class means on this particular examination might not have occurred. Different results in the class means representing the average scores of the four examinations would then have been reflected.

As stated in the limitations to the study, the reliability and validity of the content tests had not been determined. Lack of either reliability or validity of the tests may have been factors which affected the outcome.

The 1980 comparison group developed the grading criteria for their own course grade. Content test scores

were excluded as a criteria. The students were told that the four periodic examinations were only to provide them with formative feedback as to the extent to which they were acquiring content material. This was apparently a novel approach to grading for most of the students in the class. They continually asked for reassurance, after each examination, that their test scores would not be used to influence their grade and they asked questions such as, "Are you sure you are not giving us a final examination?"

It should be further noted that the 1980 group, in contrast to the 1978 group, did not know the days on which their examinations were scheduled. They did not have advance notice which would have enabled them to memorize facts just previous to the examination as is often times a typical study pattern for students. Perhaps it is possible to conclude then that internal motivation was an operant factor in the 1980 group as is reflected in the fact that content test scores were not significantly lower in any of the four tests except for the third examination.

Some comments are also in order regarding the inquiry behavior of the students in the 1980 class. According to SBI scoring interpretations the class had a mean inquiry score which indicated that the group used inquiry behaviors frequently, when tested near the beginning of the semester. The test showed that the mean inquiry score had increased from 64.33 percent (pre) to 66.67 percent (post). This was not, however, statistically significant, nor was it a large enough gain to interpret that the class had moved from using inquiry behaviors frequently to habitually. The true gain in inquiry behavior for the semester may not be reflected in these statistics since the pre SBI was not administered until one month of the semester had elapsed. When the pre SBI was administered in February the students were asked to reflect back to their perceptions at the beginning of the semester and respond to the inventory accordingly. Exposure, however, to the treatment methodology may have already had an effect on their responses.

Subjective observation of the behavior of the students in the 1980 class left the impression that inquiry teaching practices do have merit in the classroom.

These practices stimulated an eagerness in the students to discover subject matter more independently rather than waiting passively to have it presented to them.

Statistics about class means obtained from the Learning Style Inventory (LSI) showed that the 1980 class did not have a predominant learning style. Class mean scores in each mode of the inventory (concrete experience, reflective observation, abstract conceptualization and active experimentation) were approximately 15 on a scale of 24. What is noteworthy is the significant positive correlation of the active experimentation learning style to both the pre and post inquiry means of the SBI, and the significant influence of active experimentation on pre inquiry scores in the multiple step-wise regression analysis. Active experimentation is described by the LSI as a learning style characterized as practical, doing, active, pragmatic, speculation/discussion supported by own experience, multiple experiences before generalization, excitement after doing something, and experiment (see LSI in appendix D). These are all characteristics which coincide with the category descriptions of inquiry behaviors such as situations of experience, development of challenging problems, generation of ideas, observation

and collection of data, development of reasoned hypothesis, experimental application and testing, and evaluation and judgment of results (see category descriptions in appendix A).

The reflective observation mode of the LSI, however, exhibited a significant negative Pearson's r correlation with SBI inquiry scores on all of the SBI evaluations. The reflective observation mode also exerted a significant negative influence on the post inquiry scores as determined in the multiple step-wise regression analysis. The LSI describes the reflective observation mode with terms and phrases such as tentative; reserved; learns by listening, observing, reading; resists giving specific examples to support generalization; less risk-taking and slower to conclude from data (see appendix D). This learning mode, as described, does seem in direct opposition to inquiry behaviors.

The dis-inquiry dimension of the pre, interim, and post SBI and TPI-S mean scores for the 1980 class resulted in unexpected findings. There was a slight increase in scores as the semester progressed rather than a decrease in dis-inquiry scores as might be expected

when a student is exposed to this treatment methodology over the course of four months. This may be explained by the fact that these students have had traditional structured, expository type of courses up to this midpoint in their college careers. Dis-inquiry learning behaviors, thus, may be too strongly inculcated to be diminished by one course in one semester as shown on the SBI dis-inquiry dimension. Also, students, because of the nature of their previous college experiences, may not be separating out past and current courses from this teacher in this course when responding to the TPI-S. Another possible explanation for the increase in dis-inquiry scores might be that the instructor was not nearly as effective in utilizing inquiry teaching practices to the exclusion of dis-inquiry practices as she perceived herself to be.

The results of the Teacher Practice Inventory-Student (TPI-S) and Teacher Practices Inventory (TPI) with which the teacher performed self-evaluation are also incongruent in the dis-inquiry dimension. The students perceived the teacher to be habitually using dis-inquiry teaching practices (neglect of direct experience, reliance upon extrinsic motivation, making learning a direct and conscious end in itself, the

mechanical following of an established method and the imposition of a general method on all alike). The teacher, conversely, evaluated herself to be using dis-inquiry practices only rarely in her teaching methodology.

The subjective responses to the Learner Observation Form (LOF) were scored by the instructor. They showed that the teacher rated 54 percent of the 1980 class as evidencing inquiry behaviors on the basis of their responses to the impact question, "What is the most important impact the course has actually had on you at this point?" Only 25 percent of the class, however, evaluated themselves as having inquiry behaviors which they used habitually (scores greater than 80 percent) on the post SBI. This represents a difference in perception of student learning behaviors between the student and teacher.

The internal validity of the study, therefore, would seem to be verified by most of the data collected on the 1980 group. The exceptions were the dis-inquiry dimension of the TPI and the impact dimension of the LOF.

Recommendations

On the basis of the conclusions which were presented and the observations noted in the discussion it is recommended that this study be replicated with the following changes:

1. Limiting the comparison groups to two; one which would serve as the control group, receiving traditional expository teaching methodology, and the other which would receive the treatment variable, inquiry teaching practices
2. Increasing the number of subjects in each of the two comparison groups
3. Conducting an item analysis of the Preventive Dentistry content tests to establish reliability and validity of these instruments
4. Establishing reliability and validity of the LSI and LOF
5. Administering the SBI, TPI-S, LSI, and LOF evaluations to both the treatment and control groups
6. Having students complete the SBI pre test on the first day the class meets
7. Including provisions for peer evaluation of the classroom teacher's inquiry practices

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APPENDIXES:

- Appendix A: Category Descriptions for Deweyan Inquiry
- Appendix B: Preventive Dentistry Content (Achievement) Examinations
- Appendix C: Student Behavior Inventory
- Appendix D: Evaluation Instruments Used to Assess Internal Validity:
 - 1. Teacher Practices Inventory-Student
 - 2. Teacher Practices Inventory
 - 3. Learning Styles Inventory
 - 4. Learner Observation Form

Appendix A

Category Descriptions for Deweyan Inquiry

Category Description: Deweyan Inquiry*

1. SITUATIONS OF EXPERIENCE. This category represents the first stage of Dewey's concept of reflective thinking, which he equates with an educative experience. The process is begun by giving students something to do which calls for the noting of connections between their doing and its consequences.
2. THE DEVELOPMENT OF CHALLENGING PROBLEMS. There can be no stimulus to thought unless some difficulty, problem, or trouble develops to prevent the completion of the student's activity and the realization of his/her purposes, unless some frustration or tension occurs. Dewey would have the teacher deliberately confront students with problematic situations which require them to make choices, ask questions which "stump" students--the sort they cannot answer without taking time to think and to investigate. Although he wanted to make problems large enough and tough enough to challenge thought, he felt they should be small enough and familiar enough so that the student is not overwhelmed. In addition, he was concerned that the problem be one that the student sees as a genuine problem, rather than the teacher's or textbook's problem.
3. THE GENERATION OF IDEAS. This is the creative stage of thinking where students are encouraged to catch hold of ideas and "run with them" beyond what is, as yet, known for sure. They wrestle with the conditions of the problem first hand, offer tentative explanations and interpretations of their difficulty, and seek strategies for finding their own way out. Put another way, Dewey advocates that teachers have students formulate tentative hypotheses.

*Based on the work of Brown in The Experimental Mind in Education, Harper & Row, 1968.

4. THE OBSERVATION AND COLLECTION OF DATA. This category might be called "The Use of Subject Matter." It suggests that the student should look for detailed facts and information needed to deal with the problem he/she faces and that the best kind of subject matter is that which the student has to adapt and apply to the question for himself. Dewey also advocates that the student should compare present problems with other problems he/she faced, find accounts of the experiences of other people in circumstances similar to his/her own, and contrast the findings of others with his/her own.
5. THE DEVELOPMENT OF REASONED HYPOTHESES. Dewey recommends that teachers, if they accept students' guesses at possible answers, should insist that they follow-up their guesses by checking them against all available evidence; lead students to develop their tentative suggestions in an orderly way, to make their ideas more precise and more consistent; and, that students should reconsider their ideas with a wider range of facts or support their beliefs and opinions with factual evidence.
6. EXPERIMENTAL APPLICATION AND TESTING. This step is the "proof of the pudding." The educational practices recommended by Dewey would have students take a stand on one hypothesis or proposal and carry it through to see what happens. Guesses are tested by acting on them.
7. EVALUATION AND JUDGMENT OF RESULTS. In the "spirit of science" students are encouraged to view the results of their experience dispassionately, to accept failure as one of the calculated risks of trying. This requires a shift in emphasis in the evaluation climate in a classroom or program. Students need to be freed from constant external judgments by teachers and to be made responsible for making self-evaluations. They participate in the evaluation of their own efforts and be given an opportunity to make revisions and corrections in their work accordingly. Teachers should, in this view, encourage answers to be treated as intermediate in learning, not final.

Category Descriptions: Deweyan Dis-Inquiry*

8. NEGLECT OF DIRECT EXPERIENCE. This category reflects the opposite side of the first Inquiry category, SITUATIONS OF EXPERIENCE. Obviously, if students are expected to sit quietly for long stretches at a time, listening, watching, or waiting their turn in a situation where the teacher is the principal actor, they cannot be engaged in doing something that will enable the noting of connections between their doing and its consequences.

9. RELiance UPON EXTRINSIC MOTIVATION. It was Dewey's belief that the teacher should organize learning around the sorts of things that would stimulate students' interest and attention outside the confines of a formal educational setting. Natural interest in subject matter is killed by practices that discourage arguments and disagreements among students, that put a damper on instances of spontaneous enjoyment or excitement. Extrinsic motivation is necessary when the objective is to capture answers apart from the enjoyment of the chase, that is, apart from the sport of inquiring and questioning. It takes the form of using competition between students as a means of stimulating them to their best efforts, appealing to students to "try harder", punishing failure to pay attention and get interested. Motivation of this sort is a sure indication that subject matter has been reduced to routine stuff, cut and dried, separated from the reality that makes it exciting.

10. MAKING LEARNING A DIRECT AND CONSCIOUS END IN ITSELF. Dewey rejected the notion that the purpose of education is to acquire and possess knowledge. He saw learning not as an end in itself but as a means to the useful purposes to which it can be

*Based on the work of Brown in The Experimental Mind in Education, Harper & Row, 1968.

put in the future. Disagreement with Dewey on this issue is indicated in practices which make it urgent to get problems solved. Questions are answered as if confusion and puzzlement on the part of students were some sort of intolerable disease which must be prevented or, if it occurs, cured as quickly and correctly as possible. The characteristic climate in which such practice thrives is direct, business-like, controlled. There is no dilly-dallying, no wasting of time with roundabout, indirect approaches. The teacher assigns work to be accomplished. Students are to study and learn, not play games or pursue wild-goose chases. They should stick to facts, what is known for sure, and their suggestions are considered appropriate only when closely related to the subject being studied. Much time and effort is devoted to correcting students' mistakes and analyzing the causes of their failures.

11. THE MECHANICAL FOLLOWING OF AN ESTABLISHED METHOD.
Even though Dewey was an advocate of a method (reflective thinking or inquiry), he saw dangers in following that or any other method routinely--as if its steps had been prescribed and fixed by some unquestionable authority. He condemned teacher practices which follow "proven methods" worked out by "experts" and given ready-made in manuals and courses of study. The teacher who assigns and clearly defines the study problems for students so they will have no doubts as to exactly what they are to do obviously sees the educational process as merely a means to the achievement of some external end imposed from without (the school, faculty, etc.). This notion leads to lock-step rigidity in teaching methods.
12. THE IMPOSITION OF A GENERAL METHOD ON ALL ALIKE.
Dewey objected to methods which drive students in a group, as if they were a herd of cattle, down the same path in order to reach the same goals at the same time. Indications that such

is the case are when teachers hold all students equally responsible for answering certain questions and for finishing a given assignment within a definitely fixed time limit. Another tip-off is the so-called democratic procedure of having students vote and abide by the will of the majority whenever there is a disagreement about what is good, right, or desirable.

Appendix B
Preventive Dentistry Content (Achievement)
Examinations

PREVENTIVE DENTISTRY

DNTH 3143

Examination Number 1

1. You have a 22 year old male on whom you have just recorded the following vital signs. Circle the one(s) which you would consider abnormal and call to the attention of the dentist:
 - a. temperature: 98.6⁰, 10 a.m.
 - b. pulse rate: 120 beats/min.; bounding and regular
 - c. respiration: 15 breaths/min.; regular, full
 - d. blood pressure: 145/95; right arm
2. In taking the pulse rate you:
 - a. locate the brachial artery
 - b. use your thumb to feel the pulse
 - c. count for 15 seconds and multiply by two if pulse is regular
 - d. do not exert too much pressure on artery as it could cause syncope
3. Why is plaque control especially important for patients who received facial and cervical radio-therapy?
 - a. they experience decreased salivation and increased plaque accumulation
 - b. risk of poor post-irradiation healing if teeth must be extracted
 - c. it is difficult for these patients to wear dentures
 - d. all the foregoing foils are correct
 - d. only foils A and B are correct
4. A dentist decides to initiate a plaque control program in his office. His first graduates of the program should be:
 - a. a few of his most intelligent and highly motivated patients
 - b. himself and his family
 - c. his auxiliary personnel in the office
 - d. one of his friends in the local dental society

5. Plaque is essential in the caries process on:
 - a. smooth enamel surfaces
 - b. root surfaces
 - c. occlusal surfaces
 - d. a + c
 - d. a + b
6. The "glue" which causes plaque to adhere to tooth surfaces is:
 - a. Streptococcus mutans
 - b. Hyaluronidase
 - c. Nasmyth's membrane
 - d. Polysaccharide
7. Carbohydrate containing food eaten at meal time is less cariogenic than foods eaten between meals because:
 - a. increased salivation and muscular movements expedite food clearance
 - b. they are chewed and swallowed more rapidly
 - c. they are usually liquid as opposed to solids
 - d. there is no difference
8. This may be a food additive which will inhibit the cariogenic potential of carbohydrate foods in the future:
 - a. phosphates
 - b. chlorhexidine
 - c. levan
 - d. lactic acid
9. The agents responsible for inducing inflammation in the gingival connective tissue are:
 - a. streptococcus mutans bacteria
 - b. enzymes and endotoxins
 - c. acids with a critical pH of below 5.5
 - d. mechanical irritation of calculus

10. Assume you have a patient with advanced periodontal disease. Rank (1-4) the tissues of the periodontium through which the inflammation spread:
- ☐ alveolar bone
 - ☐ sulcular epithelium
 - ☐ gingival connective tissue
 - ☐ periodontal ligament
11. Why should dentists have a periodontal attitude toward operative dentistry?
- a. it will generate more prosthetic work for them
 - b. the average patient places a high value on this
 - c. dental pulp cannot be replaced
 - d. periodontal ligament cannot be replaced by a substitute material
12. Which socio-economic class will respond to plaque control with the reasoning being "it is good for you"?
- a. middle class
 - b. upper class
 - c. lower class
 - d. children
13. A common area of heavy plaque accumulation is:
- a. the surface of calculus deposits
 - b. the cervical third of the crown--both facial and lingual surfaces
 - c. the tooth surface making up one wall of the gingival sulcus
 - d. all these sites are common locations of plaque deposit
14. Patients need to be aware of the fact that plaque will re-colonize in:
- a. 3-4 days
 - b. 12-24 hours
 - c. three hours
 - d. one week

15. The ultimate objective of plaque control is:
- to make the public aware of preventive dental services
 - decrease the amount of operative cases dentists will have to see
 - give the hygienist a more challenging service to perform
 - create a sense of responsibility in the patient for the level of his oral health
16. In a control program, the early involvement of the patient in the discovery of plaque in his own mouth and his successful removal of it is important because:
- it gives him immediate feedback of the information you have given him concerning plaque
 - if he removes the plaque this makes less work for you
 - this is a waste of valuable appointment time which should be spent lecturing to him
 - this gives you an opportunity to point out what a poor job he has been doing in the past
17. The principles of dental plaque control were first described by:
- Robert Barkley, D.D.S.
 - Sumter Arnim, Ph.D.
 - Merrill Wheatcroft, D.D.S.
 - C.C. Bass, M.D.
18. You have a patient return for their recall appointment two weeks following their plaque control series and they show many stained areas of plaque. The most effective reaction to this by you would probably be:
- say in a sarcastic voice, "You're not wasting anyone's money but your own."
 - tell them, "At this rate of neglect you'll probably be wearing dentures in 5 years."
 - say, in a sincere voice, "You've caught on to brushing and flossing faster than any patient I've had so far."
 - point out areas where they are doing a good job and then ask them to show you areas where they need improvement and proceed to have them remove the plaque there

19. Which of the following statement(s) concerning patient motivation is true?
- a. a satisfied need is a good motivator
 - b. the hygienist's sincerity, compliments and enthusiasm are positive motivators
 - c. threats are recommended motivational technique
 - d. all of the above statements are correct
20. The ideal number of plaque control appointments in the initial series is:
- a. five consecutive days
 - b. four appointments spaced one week apart
 - c. determined by the patient's comprehension, motivation and dexterity skills
 - d. one appointment is usually sufficient with six month recall appointments
21. A child is usually ready to do all of his own tooth-brushing when:
- a. 5 years old
 - b. he can feed himself
 - c. 7 years old
 - d. he can bathe himself
22. In plaque control we are enlisting a new member of the dental health team. This is:
- a. the control therapist
 - b. the preventive dentist
 - c. the patient
 - d. the expanded duties auxiliary
23. This is a complicating factor in instructing and motivating patients:
- a. we have no power to compel performance
 - b. the dental office may be an anxiety arousing setting
 - c. the dentist and his auxiliaries often have little training to be effective teachers
 - d. all the preceding foils are correct

24. You have the patient circle in red all the sugar-containing foods in his five day diet diary. This is an example of:
- self pacing
 - small step size
 - anxiety avoidance
 - active participation
25. The levels of need in our society which are the best motivators are:
- physiological and security
 - social and esteem
 - esteem and self realization
 - survival and protection
26. This is an example of the primary level of preventive dentistry:
- performance of an oral prophylaxis on a patient with gingivitis
 - placement of a bridge following the loss of teeth
 - advising a patient to brush with a fluoride containing dentifrice
 - taking a smear of suspicious oral lesion
27. Which of these statements are phrased acceptably:
- "You're not getting your back teeth properly clean."
 - "If you don't clean your back teeth better the gum tissue is going to begin bleeding."
 - "You're not really cleaning your back teeth, but the fronts are beautiful."
 - "You're doing a beautiful job of cleaning your front teeth, but you're not getting at the back ones."
28. Assume you're talking to a patient who is 40, confident, in a good job and whose world apparently couldn't be brighter. The most effective way of motivating him in plaque control would be to appeal to which level of need?
- security
 - social
 - esteem
 - physiological

29. Suppose you discover the patient in Question 28 has some early signs of chronic inflammation of the gingiva. What would be the best appeal statement to him?
- a. "If you don't clean them you're going to lose them."
 - b. "Keeping your mouth in good health will augment your appearance."
 - c. "With better oral hygiene you'll never need to worry about bad breath."
 - d. "As an executive you know the value of a good investment, and plaque control is just that."
30. If you cultivate a positive approach with patients, you will find:
- a. they are more cooperative and easier to motivate
 - b. they mark you as being too easy, and thus not place the proper importance on what you tell them
 - c. you are wasting a lot of valuable time trying to think of how to phrase things just the right way
 - d. it takes longer to get the desired results than threats do
31. Which of these statements is accurate in regard to the application of APF topical gel?
- a. start the timer and then apply fluoride for 5 minutes
 - b. rinsing the mouth after the application will help remove the unpleasant taste
 - c. dry with compressed air and follow with insertion of cotton rolls
 - d. apply to one half of mouth at a time, using a systematic method of application
32. You are going to apply APF to the mouth of a child who has no permanent second molars erupted. Your cotton rolls should:
- a. be extended just to the distal of the last tooth, both lingually and facially in the lower arch
 - b. be held in place with your fingers instead of holders
 - c. not be required as long as a saliva ejector is used
 - d. be a continuous cotton roll on the facial surface

33. A good motivating technique is:
- a. be stern and forceful
 - b. lavish the patient with compliments
 - c. try to project a future made better because of the product you have to sell (plaque control)
 - d. threaten with dental pain and possible tooth loss
34. It is recommended that you leave a thermometer bulb under the tongue for a minimum of _____ minutes to take an accurate temperature reading.
- a. 3
 - b. 5
 - c. 7
 - d. 15
35. Before placing a thermometer in patient's mouth wipe from _____ to _____ with a rotating motion using a cleaning gauze wipe.
- a. from stem to bulb
 - b. isn't necessary since bulb has been immersed in alcohol
 - c. from bulb to stem
 - d. from constriction to bulb
36. According to the American Heart Association a normal pulse rate is:
- a. 60-70
 - b. 50-100
 - c. 70-120
 - d. 80-100
37. Which of the following factors can increase respiratory rate:
- a. infectious process
 - b. meals which were recently eaten
 - c. use of cold liquids prior to taking
 - d. malignant neoplasms

38. The "normal" blood pressure for a 20 to 25 year old is:
- a. 90/70
 - b. 100/80
 - c. 120/80
 - d. 150/90
39. When taking blood pressure increase the pressure in the cuff:
- a. slowly
 - b. with the patient in a standing position
 - c. up to 200
 - d. up to palpitory pressure +30
40. State two factors which make a wife and/or mother an important person in preventive dentistry.
- a.

b.

PREVENTIVE DENTISTRY

DNTH 3143

Examination Number 2

1. This term is useful in describing foods high in sugar content to patients undergoing dietary counseling because it connotes that sugar is important in the etiology of both caries and periodontal disease.
 - a. cariogenic foods
 - b. foundation foods
 - c. empty calorie foods
 - d. hazardous foods
2. When performing dietary counseling it is preferable to express dietary needs in terms of:
 - a. basic four food groups
 - b. recommended dietary allowances
 - c. minimum daily requirements
 - d. caloric needs
3. This age group of the population has notoriously bad diets:
 - a. adolescents
 - b. infants
 - c. middle age
 - d. children
4. One of the best ways to learn how a patient's life-style influences his dietary habits is to:
 - a. do a 5 day diet diary
 - b. ask him to relate a typical day's routine to you
 - c. taking a complete medical and dental history
 - d. observe how he is dressed

5. Dental caries can be considered as a disease which:
 - a. is an excess of a food component in the diet
 - b. is a deficiency disease
 - c. can not be prevented by dietary means
 - d. can be treated by a well balanced diet
6. A patient is most apt to convert himself to new dietary habits that:
 - a. provide three square meals per day
 - b. exclude fermentable sugars
 - c. retain as many of his food habits as possible that are good or not harmful
 - d. requires the person in charge of his food preparation to spend more time
7. When giving patients a diet diary:
 - a. use a 24 hour recall for the first day
 - b. do not give them dietary information concerning the relationship of specific foods to oral health
 - c. ask them to record everything eaten in contrast to everything served
 - d. all the preceding points should be remembered
8. Which of the following facts is true regarding sugar?
 - a. on the tooth surface, it can be converted to acid within a few minutes time
 - b. the amount of sugar consumed is more detrimental to the teeth than the time at which it is consumed
 - c. maple syrup is not as detrimental as table sugar
 - d. the Vipeholm caries study showed sugar in solution to be more cariogenic than the same amount in solid form
9. The food items which the patient circles in red on his diet diary are:
 - a. orally safe
 - b. hazardous to dental health
 - c. starches
 - d. reflecting the detergent aspect of the diet

10. When you evaluate your patient's food diary in terms of daily adequacy of four food groups, you are:
 - a. doing a qualitative analysis
 - b. striving to show the daily total carbohydrate intake in excess of 100 grams
 - c. primarily interested in showing the patient which groups he eats an excess of
 - d. comparing actual weekly intake to suggested weekly intake as recommended by the Food and Nutrition Board of the National Research Council
11. The objective of the diet plan formulated by Dr. Philip Jay is:
 - a. to transform the bacterial flora of the mouth to resemble that of caries free individuals
 - b. to bring about a permanent change in dietary habits
 - c. to restrict all forms of carbohydrate for a minimum of six weeks
 - d. none of the preceding answers are correct
12. Which of the following statements are true regarding Diet Plan 1 of Dr. Jay's diet?
 - a. the patient remains on it until the LBA count drops to below 10,000
 - b. potatoes and bread are the only carbohydrate allowed
 - c. if the patient wishes to consume more food than listed on the diet plan, he may choose from fruits or Group A vegetables
 - d. The LBA count will be reduced by about 80% within a few days in most patients
13. To insure adequate minerals and vitamins in a patient's diet, it is best to:
 - a. have dentist prescribe megadoses of this nutrient
 - b. advise patient to eat correct number of servings of foundation foods a day
 - c. tell the patient to cut down on the amount of refined and processed foods in diet
 - d. a & b
 - e. b & c

14. These carbohydrates are more cariogenic than others and readily available to our modern diet:
- a. monosaccharides
 - b. disaccharides
 - c. polysaccharides
 - d. starch and dextrins
15. Which c.a. test is this statement descriptive of?
- a. D-K
 - b. Latobacillus plate count
 - c. Modified Snyder Test
 - d. Salivary flow test
16. Greatly reducing the sucrose level in our modern diets is difficult because:
- a. people derive a great deal of pleasure in eating them
 - b. they are necessary to provide the energy level needed by our population
 - c. there aren't enough satisfactory substitutes
 - d. it is not difficult to reduce the sucrose level in most peoples' diet because they are some of the most expensive foods we buy
17. The most meaningful way to demonstrate a new brushing technique to your patient would be:
- a. to go through a pictorial pamphlet which he can take home
 - b. on a study model of his mouth
 - c. to have him observe an oral hygiene film
 - d. to have him observe in a mirror as you demonstrate the technique in his mouth

18. This is the correct brush placement when demonstrating the Bass Technique of brushing:
- place sides of bristles against attached gingiva with bristle tips directed apically
 - sides of bristles resting against the enamel with the brush tips toward the occlusal or incisal plane
 - bristle tips directed at a 45° angle to long axis of tooth with the tips on the tooth surface, and directed toward the gingival margin
 - none of these answers is correct
19. Which of these statements are true in regard to interdental cleaning?
- waxed floss absorbs plaque better
 - floss cleans concave areas well
 - if the patient is using a fluoride dentifrice, he should clean with floss before brushing
 - floss is necessary only if time permits
20. Automatic toothbrushes are valuable assets in the control program of which type of patients:
- those who have poor manual dexterity
 - to people with orthodontic appliances
 - to all patients who can afford them
 - none--research has shown them to have a more adverse effect than good effect
21. The best type of toothbrush to recommend to someone whom you are instructing in the Bass method of brushing is:
- a bristle diameter of .0035 inches
 - a brush with an uneven brushing plane where the toe end bristles are elevated
 - a natural bristle brush
 - a brush with soft bristles

22. This is a good tool to use in cleaning plaque from exposed furcation areas:
- a. pipe cleaner
 - b. yarn
 - c. gauze strip
 - d. Stim-u-dent
23. This type of patient might benefit the most from the use of an oral irrigator:
- a. patient with poor dexterity
 - b. patient with gingivitis
 - c. patient with heavy plaque build-up
 - d. patient with orthodontic bands
24. You have a patient with several 5 mm interproximal pockets. In giving plaque control instructions which of the following aids would you recommend to remove plaque from the tooth surfaces in these areas?
- a. Stim-u-dent
 - b. dental floss
 - c. oral irrigator
 - d. Perio-aid
25. Potato chips may be suggested as a fairly non-hazardous snack food because:
- a. of their high fat content
 - b. they are made with enriched flour
 - c. of their high salt content
 - d. they are not a food group item
26. Your patient's diet diary showed his favorite snack foods to be the following items. Circle the one least likely to cause caries:
- a. Fritos corn chips
 - b. Dr. Pepper
 - c. cough drops
 - d. Salami

27. A fixed income is an important factor in food selection of this group:
- a. adolescent
 - b. children
 - c. 30-65 age group
 - d. over 65 age group
28. The best way to show patients the effects of plaque is:
- a. in his own mouth
 - b. a good photograph
 - c. on a model
 - d. a short movie cassette film
29. You would teach a patient a new brushing technique if:
- a. the one they are using isn't effectively removing plaque
 - b. the technique they are using is causing gingival recession
 - c. the technique they are using is causing tooth abrasion
 - d. if any of the foregoing foils are occurring, you should change his brushing habit
30. When advising patients about flossing you should:
- a. tell them to snap the floss between the contacts
 - b. wrap the floss around each proximal surface in a "C"
 - c. shoe shine the proximal surfaces (move floss back and forth)
 - d. use thumbs as scrolls to wind floss on
31. You have a patient on whom you have charted 20 carious surfaces and the modified Synder Test shows rampant caries activity. What would you advise them with regard to frequency of toothbrushing?
- a. after every meal
 - b. once per day
 - c. twice per day
 - d. every hour when possible

32. You have a patient with gingival involvement but low caries susceptibility. How often would you advise them to brush and floss?
- a. after every meal
 - b. once per day
 - c. twice per day
 - d. every hour when possible
33. The two tests which the authors of your text recommend for every patient who may be suspected of being susceptible to dental caries are:
- a. Snyder and salivary flow and viscosity determinations
 - b. Plaque pH and Lactobacillus colony count
 - c. Lactobacillus colony count and Snyder
 - d. Plaque pH and Snyder
34. To improve the quality of the diet of a 73 year old man who lives alone but is in apparently good general health, you might tell him about:
- a. sugar substitutes
 - b. Meals on Wheels
 - c. eating dinner in a restaurant once a day
 - d. the advantages of a nursing home
35. One serving from the bread-cereal group may be fulfilled by eating:
- a. 3/4 cup cooked cereal
 - b. 12 potato chips
 - c. 1 cup dried beans
 - d. 1/2 cup pasta
36. What is an essential amino acid?
- a. one that can be synthesized in the body
 - b. one with a biologic value of 100
 - c. amino acids which man must acquire through his diet
 - d. those found in cereal grains and nuts

37. When advising patients relative to the fat content of their diet:

- a. tell them to increase their beef and pork intake and avoid fish and chicken
- b. advise them to increase the polyunsaturated fatty acids (vegetable fats)
- c. advise them to read labels and if they see linoleic acid avoid the product
- d. the hygienist has no business going into this aspect of the patient's diet

The following 3 questions are based on this label from a cereal box:

Ingredients: sugar, yellow corn flour, rice flour, wheat flour, oat flour, coconut oil, salt, artificial flavor, sodium ascorbate (Vitamin C), reduced iron, niacinamide, yellow #5, artificial color, Vitamin A Palmitate, BHT (a preservative), Pyridoxine hydrochloride (Vitamin B₆), Riboflavin (Vitamin B₂), Thiamine Mononitrate (Vitamin B₁), Vitamin D₂ and Vitamin B₁₂.

38. List the sugar(s) in the cereal:

39. What is the major ingredient and which is present in the least amount?

40. Are the sugar(s) a major ingredient? Explain your answer.

41. One effect of the increased intake of highly refined and processed foods in the U.S. diet is:
- a. reduced dietary content of trace elements
 - b. a decrease in the polysaccharide plaque matrix
 - c. an increased prevalence of lung cancer
 - d. a better supply of the B vitamins than we previously had
42. You should counsel patients to include detergent foods in their diet because:
- a. stimulate salivary flow
 - b. remove plaque from teeth
 - c. improve fiber content of diet
 - d. a & b
 - e. a & c
43. The following is an excerpt from a patient's diet diary. The acid exposure time for this day is _____ minutes.

Breakfast:	Coffee, no sugar
7:30 a.m.	Sweet Roll
10:00 a.m.	Coke
10:05 a.m.	1 stick Wrigley's gum
Lunch:	Coke
12:00 noon	Hamburger with lettuce and tomato on bun
3:00 p.m.	Mounds candy bar
Dinner:	Iced tea with sugar
6:00 p.m.	2 pieces baked chicken
	Mixed tossed salad with Ranch Style dressing
	1 slice chocolate cake
8:45 p.m.	Bag of caramel corn

44. After the critical pH is reached in plaque, it takes at least _____ for the salivary buffers to neutralize the acid.
- a. 20 minutes
 - b. a few minutes
 - c. one hour
 - d. 45 minutes
45. A child is usually ready to do all his own tooth-brushing when:
- a. 5 years old
 - b. he can feed himself
 - c. 10 years old
 - d. he can bathe himself
46. The best parent/child position, as demonstrated in class, for toothbrushing is:
- a. child facing parent
 - b. child with his back to parent
 - c. child laying in parent's lap
 - d. child standing on a chair looking at parent
47. You should teach patients using a Perio-aid to:
- a. hold the toothpick perpendicular to the tooth surface
 - b. carry it no deeper than 2 mm into the sulcus
 - c. use nothing but flat toothpicks
 - d. try to reach the junctional epithelium with the tip of the toothpick
48. Between meal snack suggestions which the patient is most apt to utilize are:
- a. fresh fruits
 - b. fresh vegetables
 - c. salty foods
 - d. non-hazardous foods he's eating a lot of a meal-times as seen in his diet diary

49. The TDHA Journal article, "Substitutes for High Surcose Snacks" mentions this snack item as rising greatly in consumption over the past 20 years.
- a. candy bars
 - b. chewing gum
 - c. carbonated beverages
 - d. ice cream bars
50. List at least three (3) criteria a caries activity test must meet for office use
- a.
 - b.
 - c.

PREVENTIVE DENTISTRY EXAMINATION

DNTH 3143

Examination Number 3

1. A patient completes Dr. Barkley's plaque control program and comes back three months later for a recall appointment. The patient's gums bleed in several interproximal areas when he demonstrated his flossing technique correctly. Dr. Barkley views this as an indictment of the patient showing that:
 - a. he is snapping the floss through the contact areas
 - b. he has periodontitis
 - c. he has not been flossing on a daily basis
 - d. he has calculus on his teeth
2. One of the main reasons Dr. Barkley charges a fee for dietary counseling is:
 - a. so the patient will follow through on it because they've invested in advice given
 - b. to pay for his flying lessons
 - c. to pay his hygienist's salary
 - d. to make sure the patient keeps the appointment
3. A dosage of 0.5 mg F/kilogram body weight for periods of time in excess of one year has been reported to be of significant value in the treatment of which of these diseases:
 - a. sickle cell anemia
 - b. osteoporosis
 - c. herpes simplex
 - d. asthma
4. Why is the ingestion of drinking water containing the optimal amount of fluoride widely recognized as an excellent public health measure?
 - a. it requires no conscious effort on the part of individuals
 - b. it confers 100% protection against dental caries if consumed from birth
 - c. it can easily be made available to every person in this country
 - d. because every state has a law making it mandatory

5. The main value of a prescription for a vitamin-fluoride supplement is:
 - a. the presence of the fluoride with vitamins makes the uptake of calcium and phosphorous greater
 - b. the vitamins serve as a crutch to insure children will receive the fluoride supplement more consistently
 - c. Vitamin A in the preparation insures greater uptake of the fluoride by the ameloblasts
 - d. most children need vitamin supplementation, so it is only convenient to add fluoride to it
6. The permanent cariostatic influence of topical fluoride applications may be due to:
 - a. the formation of a more perfect enamel crystal
 - b. the production of enamel surface hyperplasia
 - c. the transient accumulation of calcium fluoride
 - d. an increase in the fluorhydroxyapatite in the surface enamel
7. The threefold greater fluoride content of enamel surfaces when a fluoride-containing paste is applied with a toothbrush as compared to a prophylaxis cup is probably due to:
 - a. the child experiencing less anxiety
 - b. less salivary flow stimulated by brushing
 - c. the child being more systematic with brushing than the hygienist is with the cup
 - d. a lesser amount of enamel abrasion associated with the toothbrushing
8. Multiple fluoride therapy as defined in your text:
 - a. results in 95% caried reduction
 - b. has been shown clinically effective using any combination of SnF_2 , APF, or NaF
 - c. includes one systemic and three topical procedures
 - d. utilizes fluoride incorporated in prophylaxis cups, zinc phosphate cements, cavity liners, and nighttime mouthpieces

9. When optimum amounts of fluoride are delivered through the water supply system, tooth decay declines by approximately _____ in the mouths of individuals drinking this water from birth to eruption of all permanent teeth.
 - a. 20-40%
 - b. 30-55%
 - c. 50-65%
 - d. 70-85%
10. For maximum inhibition of dental caries, fluoridated water should be consumed:
 - a. continually by all ages starting in infancy
 - b. continually by children from birth to 13 years of age
 - c. continually by children from 3 years to 12 years of age
 - d. on an intermittent basis by all ages
11. If the patient is protected by fluoridated water or professional topical fluoride treatments, advising him to brush regularly with certain clinically proven fluoride dentifrices may result in:
 - a. no additional protective benefits
 - b. undesirable dental fluorosis
 - c. increased resistance to tooth decay
 - d. none of the above
12. Fluoride is an essential nutrient. It is necessary for:
 - a. healthy tooth formation
 - b. healthy skeletal development
 - c. normal growth and development
 - d. all of the above
13. Which parts of the tooth receive the greatest benefits from fluorides?
 - a. the pit and fissure surfaces
 - b. the smooth tooth surfaces
 - c. all tooth surfaces
 - d. none of the above

14. School water fluoridation is a viable dental public health measure at:
- 2.0 times the optimum recommended for community fluoridation of the same geographic area
 - 4.5 times the optimum recommended for community fluoridation of the same geographic area
 - 8.0 times the optimum recommended for community fluoridation of the same geographic area
15. Which of the following statements is true?
- fluoridation causes cancer
 - fluoridation causes heart disease
 - fluoridation does not result in a higher incidence of kidney disease
 - fluoridation increases vulnerability to anemia
16. Do patients of all ages benefit equally from properly prescribed fluoride supplement tablets?
- yes, all patients benefit equally
 - no, all benefit somewhat, but young children benefit most
 - no, all benefit somewhat, but teenagers benefit most
 - no, only adults show protective gains
17. What are the two most important facts to know about a patient when prescribing a fluoride supplement?
- his age and previous caries history
 - his age and daily food diet
 - his age and the fluoride content of his drinking water
 - his previous caries history and normal fluoride intake
18. The best time of day to take a fluoride supplement or apply a home topical agent is:
- bedtime
 - when arriving home from school
 - lunch time
 - upon arising in the morning

19. To obtain optimal benefits from fluoride tablets, which of the following should you not advise the patient to do?
- chew them well and swish them around the mouth.
 - use dental floss and brush thoroughly before ingestion.
 - avoid rinsing, eating or drinking for a few hours after ingestion.
 - dissolve them in water.
20. What is necessary for a fluoride dentifrice formula to provide therapeutic efficacy?
- having fluoride in the formula
 - maintaining therapeutic ions in an active and stable state
 - neither of the above
21. What factor(s) should the dentist consider when recommending a fluoride mouthrinse?
- the patient's age and the development of his reflexes
 - the level of fluoride in the water supply
 - both of the above
22. Which statement concerning the metabolism of fluoride is false?
- fluoride is absorbed through the lungs and the gastrointestinal tract
 - fifty percent of fluoride ingested by children is retained in the blood
 - beyond age 50, very little ingested fluoride is retained
 - the history of fluoride intake influences how much will be retained
23. When systemic fluoride is absorbed by the body, most of it is:
- deposited in the skeleton
 - deposited in the skeleton, saliva and soft tissues
 - deposited in the skeleton or excreted in the urine

24. Symptoms of acute toxicity include
- a. cramps
 - b. nausea
 - d. vomiting
 - d. diarrhea
 - e. all of the above
25. Fluoride substitutes for which of the following ions in hydroxyapatite?
- a. Ca^{++}
 - b. OH^-
 - c. HPO_4^-
 - d. HCO_3^-
26. Fluoride in a community water supply at the level of 2.5 ppm may cause:
- a. arteriosclerosis
 - b. osteoporosis
 - c. dental fluorosis
 - d. all of the above
27. These foodstuffs have the greatest level of fluoride:
- a. orange and grapefruit
 - b. beets and cauliflower
 - c. fish and tea
 - d. eggs and milk
28. Fluoridation of school water supplies:
- a. is illegal in Texas
 - b. contains a higher concentration of fluoride per million parts of water than communal fluoridation
 - c. has been shown, after 10 years of fluoridation, to reduce the caries incidence of school children by 50-60%
 - d. has been declared unconstitutional

29. Circle the correct statement:

- a. the teeth receiving the greatest protection from fluoridated water are maxillary anteriors
- b. the tooth surfaces receiving the greatest protection from fluoridated water are proximal surfaces
- c. fluoridated water will exert a topical effect in the posteruptive stage
- d. all of the preceding statements are correct

30. The lowest level of fluoride which will provide maximum prevention of dental caries is:

- a. 0.7 ppm
- b. 0.7-1.2 ppm depending on the climate
- c. 1.0 ppm
- d. scientists have not determined this yet

31. Today we call Colordado Brown Stain by this name:

- a. endemic dental fluorosis
- d. decalcification
- c. black line stain
- d. congenital erosion

32. The fluoride added to water at the community water treatment plant:

- a. does not produce as great a caries reduction as the equivalent amount naturally occurring in water
- b. is added at the recommended level of 0.7 ppm in Texas
- c. is incorporated in the enamel crystals as fluorapatite
- d. is not commonly a stannous fluoride compound

33. Circle the correct statement pertaining to fluoride supplementation by use of sodium fluoride solution

- a. costs about the same per person per year as water fluoridation
- b. the higher the natural fluoride level in the drinking water, the lower the amount of NaF in the solution
- c. the child drinks 4 oz. of solution per day
- d. the fluoride concentration is equivalent to 2.5 ppm to allow for days the parent forgets to give it to the child

34. The number of people in the U.S. drinking fluoridated water is about
- a. 4 million
 - b. 10 million
 - c. 50 million
 - d. 100 million
35. Circle the statement concerning fluoridation which is true of Texas.
- a. a mandatory fluoridation law was enacted by the legislature in 1970
 - b. the people in Bartlett, Texas, drank water with a toxic fluoride level until 1945
 - c. Texas is one of six states with large number of communities having a fluoride level of 0.7 ppm or better
 - d. fluoridation has never been defeated when a referendum was held concerning it in Texas
36. Which of these is an important factor in predicting a successful fluoridation campaign?
- a. a vocal group stating fluoridation is a form of socialized medicine
 - b. a community containing many older families
 - c. a history of successful voting records on school bond issues and public health measures
 - d. a campaign leader selected on the basis of his in-depth knowledge of fluoride chemistry
37. In addition to caries reduction, a benefit from topical fluoride application is:
- a. lowered plaque incidence
 - b. stimulation of ameloblasts to produce a stronger enamel
 - c. better gingival tissue keratinization
 - d. control of dental hypersensitivity
38. The least effective tray method of applying the APF gel is the:
- a. wax tray
 - b. tray with foam liner
 - c. custom fitted polyvinyl tray
 - d. disposable polystyrene trays

39. The main value of using fluoride prophylaxis paste is:
- eliminating the need for further topical application
 - giving it to patients for routine home use rather than the F dentifrices available in drug stores
 - adding fluoride to the surface enamel at the same rate it is being removed by the process of the prophylaxis
 - giving the paste a better flavor and increased abrasiveness

MATCH THE TOPICAL FLUORIDE COMPOUND TO THE STATEMENT
DESCRIPTIVE OF IT:

SnF₂ APF NaF

- _____ 40. Low concentrations overcome its adverse side effects.
- _____ 41a These two compounds applied sequentially (answer
- _____ 41b in correct order of application) may give up to a 95% enamel solubility reduction. (has 2 answers)
- _____ 42. Is the compound in most popular use in private offices
- _____ 43. Occasionally will cause a chemical burn on gingival tissue in an 8% solution
- _____ 44. Is used as a rinse at each dental appointment in a 0.4% solution
- _____ 45. Does not have any shelf life when in solution in distilled water, but does in glycerin
- _____ 46. Has a greater enamel uptake than the other 2 compounds when each is used alone
- _____ 47. Has a bitter taste in an 8% solution
- _____ 48. Is applied at ages 3, 7, 10 and 13
- _____ 49. contains orthophosphoric acid
- _____ 50. The first topical fluoride tested for effectiveness in the early 1940's

PREVENTIVE DENTISTRY

DNTH 3143

Examination Number 4

1. The "spot" for correct tongue placement in a normal swallow is:
 - a. the soft palate
 - b. the vermillion border of the lower lip
 - c. the lingual surface of the upper anterior teeth
 - d. the alveolar ridge above the maxillary anterior teeth
2. How much pressure is exerted by the tongue with each swallow?
 - a. 1/2 lb.
 - b. 2 lbs.
 - c. 6 lbs.
 - d. 20 lbs.
3. In a tongue thruster this muscle does not contract during a swallow but its movement can be felt during a correct swallow:
 - a. Masseter
 - b. Mentalis
 - c. Styloglossus
 - d. Orbicularis Oris
4. The reason a large tongue cannot expand posteriorly:
 - a. the posterior teeth are in its way
 - b. musculature of the tongue will not allow it to do so
 - c. pharyngeal airway must be maintained
 - d. the larynx could not function
5. During the mixed dentition stage the tongue may be very protrusive but not have an abnormal swallow pattern due to:
 - a. missing incisors
 - b. rapidly growing tonsil and adenoid tissue
 - c. the growth spurt of the mandible has not occurred yet
 - d. all the foregoing are correct

6. One detail of an abnormal swallow is:
 - a. lip incompetency
 - b. movement of muscles of expression
 - c. tongue tip touching alveolar ridge behind upper anterior teeth
 - d. smooth arcing of hyoid bone
7. Tongue thrust children often experience this type of speech disorder:
 - a. monotone voice
 - b. stuttering
 - c. articulation problems
 - d. symbolization
8. These sounds are produced with the tongue tip on the same "spot" as for a normal swallow:
 - a. t, d, n, l
 - b. m, b, p
 - c. th
 - d. s, r
9. When you do an examination on a tongue thrust patient and use the forefingers to part the lips as he swallows, you will feel:
 - a. the temporal muscle contract
 - b. the hyoid make a smooth arc
 - c. the teeth go into a centric occlusion
 - d. the lips become tense and tight
10. Many apparent tongue thrust cases up to this age will self-correct due to a change in environmental factors. After this age, however, the pattern needs treatment if change is to occur. The age is:
 - a. 2 years
 - b. 5 years
 - c. 7 years
 - d. 10-12 years

11. In reviewing the medical history of a tongue thrust child you note history of frequent colds and upper respiratory infections. The wisest treatment decision would be:
 - a. myofunctional therapy
 - b. a reminder appliance
 - c. adopt a "wait and see what happens" policy
 - d. refer child to a physician
12. The key to successful myofunctional therapy is:
 - a. an extremely intelligent child
 - b. a person over 50 years of age
 - c. a cooperative, well motivated parent and child
 - d. purchasing the expensive equipment needed
13. Which phase of myofunctional therapy will require the most time spent on it by both therapist and patient?
 - a. awareness
 - b. correction
 - c. reinforcement
 - d. symbolization
14. During the awareness phase of myofunctional therapy the exercises are directed at:
 - a. making the correct swallow a reflexive action
 - b. learning parts of proper swallow
 - c. timing how long tongue tip can hold food or elastic in place on spot
 - d. making first swallow of meal with correct swallow
15. The objective of the exercises used in the correction phase of therapy is:
 - a. give patient the touch sensation of alveolar ridge as opposed to tooth surface
 - b. carry proper swallow over into sleeping hours
 - c. strengthen muscles and build skills
 - d. use proper swallow at mealtimes

16. During the correction phase the child should practice his correct swallow:
 - a. in front of a mirror
 - b. 30 minutes per day
 - c. while reading in school
 - d. only when the therapist can observe it
17. During the reinforcement phase:
 - a. the patient swallows all food at mealtime with the correct swallow
 - b. the patient can quit using reminder signs
 - c. the parent should check on sleeping child to be sure mouth is closed
 - d. exercises mainly involve making lingua-alveolar sounds
18. The button exercises to perform tug-of-war and the "marshmallow" twist are designed for this particular problem:
 - a. tongue thrust
 - b. thumb sucking
 - c. mouth breathing
 - d. lip incompetency
19. A child with a Class II malocclusion should not be advised to play this instrument:
 - a. trumpet
 - b. clarinet
 - c. flute
 - d. French horn
20. This sugar substitute is 300 times sweeter than an equal amount of sugar:
 - a. sorbitol
 - b. saccharin
 - c. cyclamates
 - d. aspartame

21. It is sound advise to recommend to patients that they use natural sugars such as brown sugar and honey in place of refined sugar because:
- it will cause less decay
 - it costs considerably less
 - they add large amounts of minerals and vitamins to our daily nutrient needs
 - there is no basis for recommending natural or refined sugars
22. It is difficult to have wide acceptance of sugar substitutes by food manufacturers because:
- other than caries it has no harmful effect
 - the sugar industry represents a formidable lobby
 - there are no substitutes available
 - it is the only food with which we can meet our calorie needs
23. After this age the mandibular arch length from the area of the distal surface of the second deciduous molar on one side to the distal surface of the second deciduous molar on the other side does not change:
- 1 year
 - 3 year
 - 10 years
 - 18 years
24. You often see tooth mobility and periodontal disease in the supporting structures of anterior teeth in the mouth of the professional musicians who play these instruments:
- single reed
 - brass
 - violin
 - double reed
25. This sugar substitute is 160 times sweeter than sucrose but its poor stability in acidic solutions may limit its use in carbonated beverages
- aspartame
 - chlorogenic acid
 - miracle fruit
 - sorbitol

26. This sugar substitute is about as sweet as sugar. Initial clinical studies on it were done in Finland:
- a. dihydrochalcone
 - b. xylitol
 - c. saccharin
 - d. monellin
27. Today the majority of the annual sucrose production in the United States is sold to:
- a. individual consumers
 - b. food processors
 - c. governmental agencies
 - d. dental researchers
28. These deciduous teeth are wider than their permanent replacements:
- a. centrals
 - b. laterals
 - c. cuspids
 - d. molars
29. When lower deciduous cuspids are removed early to allow adequate space for permanent incisors to erupt this is the best device:
- a. band and loop spacer
 - b. a Hawley retainer
 - c. crown and loop spacer
 - d. a lingual arch wire
30. Clinically, an ankylosed tooth is recognized because:
- a. it exhibits mesial drift
 - b. it is below the occlusal plane on lower arch or above the occlusal plane on the upper arch
 - c. you can't see a periodontal membrane on clinical examination
 - d. there is a Class III occlusion

31. A longitudinal study of teenage eating habits showed that:
- a. breakfast was the meal most frequently skipped
 - b. there was a tendency to substitute soft drinks for milk
 - c. mothers were responsible, in most cases, for purchase and preparation of food
 - d. protein rich foods were not well accepted and were only eaten in small amounts
32. This is the reason why delegation of many preventive dentistry procedures to auxiliary personnel is a wise decision for dentists to make:
- a. the auxiliary is psychologically at a more even level with the patient than the dentist
 - b. the auxiliary finds it easier to communicate in lay language
 - c. the dentist can afford to have the auxiliary spend a greater amount of time with the patient than he can
 - d. all the foregoing foils are good reasons
33. The authors of your text feel that the minimum adequate size for a disease control room is:
- a. 4' x 6'
 - b. 6' x 9'
 - c. 10' x 12'
 - d. 90 square feet
34. An advantage of having a room in the office set aside as a control room is:
- a. overflow restorative cases can be seen and treated in it
 - b. it keeps the operatories clear
 - c. it will emphasize to the patient the importance that the office gives to its control program
 - d. it insures privacy in which to "scold" patients who aren't following through on home care advice

35. A good technique to insure that patients are paying attention to the control therapist is:
- a. use the imperatives
 - b. use "fear" tactics
 - c. rely mainly on audiovisuals
 - d. ask thoughtful questions
36. The most frequent ending of the primary arches when the teeth are occluded is a:
- a. distal terminal step
 - b. primate spaces
 - c. mesial terminal step
 - d. straight terminal plane
37. Your 7 year old patient has a cusp to cusp relationship of his permanent first molars. He has regular dental treatment, but no interceptive orthodontics. Five years later you chart his occlusion as a normal first molar relationship. One factor which was probably responsible for this change is:
- a. the opening of primate spaces in the mandible
 - b. the leeway space is greater in the mandible than in the maxilla
 - c. an open maxillary arch and a closed mandibular arch
 - d. increase in arch length of the mandible anterior to the first molar
38. This permanent tooth follows a more difficult and tortuous path of eruption than any other tooth
- a. lower first molar
 - b. upper first bicuspid
 - c. lower central incisors
 - d. upper cuspids
39. It is estimated that the five year cure rate for oral cancer could be doubled if treatment were initiated at a time when the lesions were less than _____ in diameter.
- a. one cm.
 - b. two cm.
 - c. three cm.
 - d. six cm.

40. The most common primary malignant tumor of the oral cavity is:
- a. epidermoid carcinoma
 - b. sarcoma
 - c. lymphoma
 - d. leukoplakia
41. The answer you specified in question number 40 is most frequently located, intra-orally, on:
- a. fauces
 - b. epiglottis
 - c. tongue
 - d. buccal mucosa
42. These are etiological factors which show a highly positive correlation with the incidence of leukoplakia and oral neoplasms:
- a. hereditary pattern and nutrition
 - b. estrogen and androgen levels
 - c. excessive smoking and ingestion of alcohol
 - d. asbestos and aniline dyes
43. Oral cytology is indicated for those patients who:
- a. exhibit any suspicious oral lesion
 - b. who refuse biopsy
 - c. who have a lesion smaller than 2 cm in diameter
 - d. exhibit any white lesions
44. A common post irradiation finding after treatment of oral cancer by radiotherapy is:
- a. osteitis
 - b. reduced bacterial activity
 - c. wrap-around caries
 - d. increased tendency toward periodontal disease
 - e. a & b
 - f. c & d

45. In a plaque control program this is a "reasonable" request to make of every patient who goes through the program:
- a. to quit smoking cold turkey
 - b. eliminate between meal snacks for a week
 - c. use a home topical fluoride gel
 - d. make a commitment as to how many times weekly he will floss.
46. The Department of Agriculture is proposing:
- a. to provide multi-vitamins to indigent children in the school lunch program
 - b. add a fortified "superdoughnut" to the school breakfast program
 - c. require schools taking part in their lunch program to incapacitate vending machines until after the last school lunch period of the day
 - d. to discontinue its school lunch program
47. You have a low income elderly patient. The dentist asks you to counsel him about a suitable liquid diet he can use for a few days following periodontal surgery. You suggest:
- a. boullion
 - b. homemade egg nog
 - c. Seven-Up
 - d. Nutriment
48. This is sound advice about eating habits for patients with new dentures:
- a. relearn to eat in reverse fashion--swallow, chew, bite
 - b. don't ever eat where anyone can see you
 - c. you can expect to eat better with dentures than your old deteriorated natural teeth
 - d. expect to live on a diet of baby food the rest of your life

49. It is sound advice to recommend this program to pregnant low income women:
- a. Meals on Wheels
 - b. W I C
 - c. food stamps
 - d. nutriment
50. Orthodontic patients should avoid eating:
- a. snacks
 - b. soft drinks
 - c. foods with a high sugar content
 - d. sugarless gum

Appendix C

Student Behavior Inventory

STUDENT BEHAVIOR INVENTORY

Form D

The purpose of this inventory is to provide a way for you to indicate how you respond to instructional situations with this particular instructor. Your task is to respond to each statement in terms of how frequently you find yourself behaving in the manner described.

Please try to respond to every item. Some items may seem somewhat unfamiliar to "strange." Don't let that disturb you. Since you are indicating the frequency of your behavior, for those items just indicate the lowest frequency.

Please respond in a thoughtful and careful manner. There is no time limit. AND AGAIN, BE SURE TO THINK ABOUT YOUR BEHAVIOR WITH THIS INSTRUCTOR, not with instructors in general.

For each item, read the statement, then determine your response by using the rating scale below. The rating scale should be viewed as a continuum on which four (4) points have been specified. The verbal description of each of the specified points is intended to give a more concrete way of distinguishing among the various points. You are to CHOOSE THE NUMBER ON THE SCALE (1, 2, 3, or 4) THAT MOST CLOSELY APPROXIMATES WHERE YOU FALL ON THE CONTINUUM:

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM
/	/	/	/
1	2	3	4

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Student Behavior Inventory
Form D

1. VERY OFTEN, that is, with this instructor I usually behave this way.
2. MORE-OFTEN-THAN-NOT, that is, better than half of the time I behave this way with this instructor.
3. ONCE-IN-A-WHILE, that is, I have behaved this way in instructional situations with this instructor on occasion, but this behavior is not customary for me.
4. VERY SELDOM or NEVER, that is, I simply do not behave this way in instructional situations with this instructor.

RECORD YOUR RESPONSE FOR EACH ITEM by CIRCLING the appropriate number (1, 2, 3, or 4) at the end of the statement.

CAUTION: You will note that many of the items are quite complex, that is, they contain more than one specific behavior. Be sure to respond to each item in its totality.

Be sure, too, to complete the identification information at the top of the next page. As explained in the letter given you by your instructor, your responses will be treated in strictest confidence. Data will be analyzed in terms of groups or clusters who respond in similar, specific ways. Scores will represent the average for the group, and individuals will not be identified.

Your thoughtful cooperation will be greatly appreciated.

STUDENT BEHAVIOR INVENTORY
Form D

INSTRUCTOR _____

COURSE _____

LEVEL _____

YOUR SOCIAL SECURITY # _____
(for matching purposes only)

DATE _____

SCALEVERY
OFTENMORE-OFTEN-
THAN-NOTONCE-IN-
A-WHILEVERY
SELDOM/
1/
2/
3/
4IN INSTRUCTIONAL SITUATION WITH THIS INSTRUCTOR, I FIND
MYSELF . . .circle your rating

- | | | | | |
|---|---|---|---|---|
| 1...concentrating on the task at hand
seldom involved with peripheral
issues that sometimes arise. | 1 | 2 | 3 | 4 |
| 2...letting my mind "run" to invent
possible approaches to problems
with which I'm dealing. | 1 | 2 | 3 | 4 |
| 3...evaluating my own effectiveness
rather than relying upon him/her
to do so. | 1 | 2 | 3 | 4 |
| 4...working on problems that develop
from my own experience rather
than on problems presented by
him/her. | 1 | 2 | 3 | 4 |
| 5...concentrating on mastering the
important knowledge and skills | 1 | 2 | 3 | 4 |
| 6...determining the validity of my
ideas and plans by carrying them
out and experiencing their
consequences. | 1 | 2 | 3 | 4 |

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM
/	/	/	/
1	2	3	4
7...evaluated by the same standards as all other students.	1	2	3 4
8...looking for the most accepted approach to professional problems I face.	1	2	3 4
9...stretching my mind to the limits of my imagination as I struggle with professional problems I face.	1	2	3 4
10...taking careful lecture notes to insure that I learn the important information.	1	2	3 4
11...turning my own experience to examine the desirability of pro- posed solutions to problems with which I'm dealing.	1	2	3 4
12...using models to guide my work	1	2	3 4
13...examining and using my own experience in ways that haven't occurred to me before.	1	2	3 4
14...analyzing my successes and fail- ures to formulate generalizations and then working to specify their limits.	1	2	3 4
15...exploring, reflecting about the meaning and consequences of my own experience.	1	2	3 4
16...comparing present problems I face with other similar problems I and others have faced.	1	2	3 4

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM	
/	/	/	/	
1	2	3	4	
17...determining the validity of my proposed solutions to problems by reconciling them against available data, rather than by relying upon this instructor to determine which solution is best	1	2	3	4
18...following the procedures (s)he advises as the most economical and efficient way to accomplish assigned tasks.	1	2	3	4
19...comparing the effectiveness of my efforts with those of other students	1	2	3	4
20...seeking feedback from the instructor in order to know whether my efforts are right or wrong	1	2	3	4
21...studying assigned material diligently, so that I can respond to questions asked by the instructor.	1	2	3	4
22...adventuring into "deep water" tackling problems that appear to be "over my head."	1	2	3	4
23...sorting through data to determine the facts and information I need to address problems with which I'm dealing, rather than turning to the instructor.	1	2	3	4
24...encouraged to choose and act on one well-supported course of action at a time, even if that course is different from the one I know the instructor thinks is best.	1	2	3	4

VERY
OFTEN

MORE-OFTEN-
THAN-NOT

ONCE-IN-
A-WHILE

VERY
SELDOM

/	/	/	/
1	2	3	4

25...pushed to support my beliefs and opinions with factual evidence.	1	2	3	4
---	---	---	---	---

26..."getting a handle on" problems to work on as a result of dealing with the unexpected consequences of actions I take.	1	2	3	4
---	---	---	---	---

Code Number of Student _____

Handscoring Scheme for SBI Form D or SBI Program Form DInstructions:

Step 1. Transfer (1 through 4) from questionnaire onto spaces on the left. Number below space refers to particular item.

Step 2. Sum raw items values in each row. Place sum in Raw Category Score space. Perform division to obtain category percent score.

CATE- GORY	RAW ITEM VALUES WITH NUMBER OF RESPECTIVE ITEM IDENTIFIED BELOW	RAW CATEGORY SCORE	REVERSED RAW CATEGORY SCORE	CATETORY PERCENT SCORES
1	<u>4</u> <u>15</u>	(8 -)	= (/6) x 100	=
2	<u>22</u> <u>26</u>	(8 -)	= (/6) x 100	=
3	<u>2</u> <u>9</u> <u>11</u> <u>13</u>	(16 -)	= (/12) x 100	=
4	<u>16</u> <u>23</u>	(8 -)	= (/6) x 100	=
5	<u>17</u> <u>25</u>	(8 -)	= (/6) x 100	=
6	<u>6</u> <u>24</u>	(8 -)	= (/6) x 100	=
7	<u>3</u> <u>14</u>	(8 -)	= (/6) x 100	=
8	<u>1</u> <u>10</u>	(8 -)	= (/6) x 100	=
9	<u>19</u> <u>21</u>	(8 -)	= (/6) x 100	=
10	<u>5</u> <u>10</u> <u>20</u>	(12 -)	= (/9) x 100	=
11	<u>8</u> <u>18</u>	(8 -)	= (/6) x 100	=
12	<u>7</u> <u>12</u>	(8 -)	= (/6) x 100	=

Handscoring Scheme for SBI Form D or SBI Program Form D

Instructions:

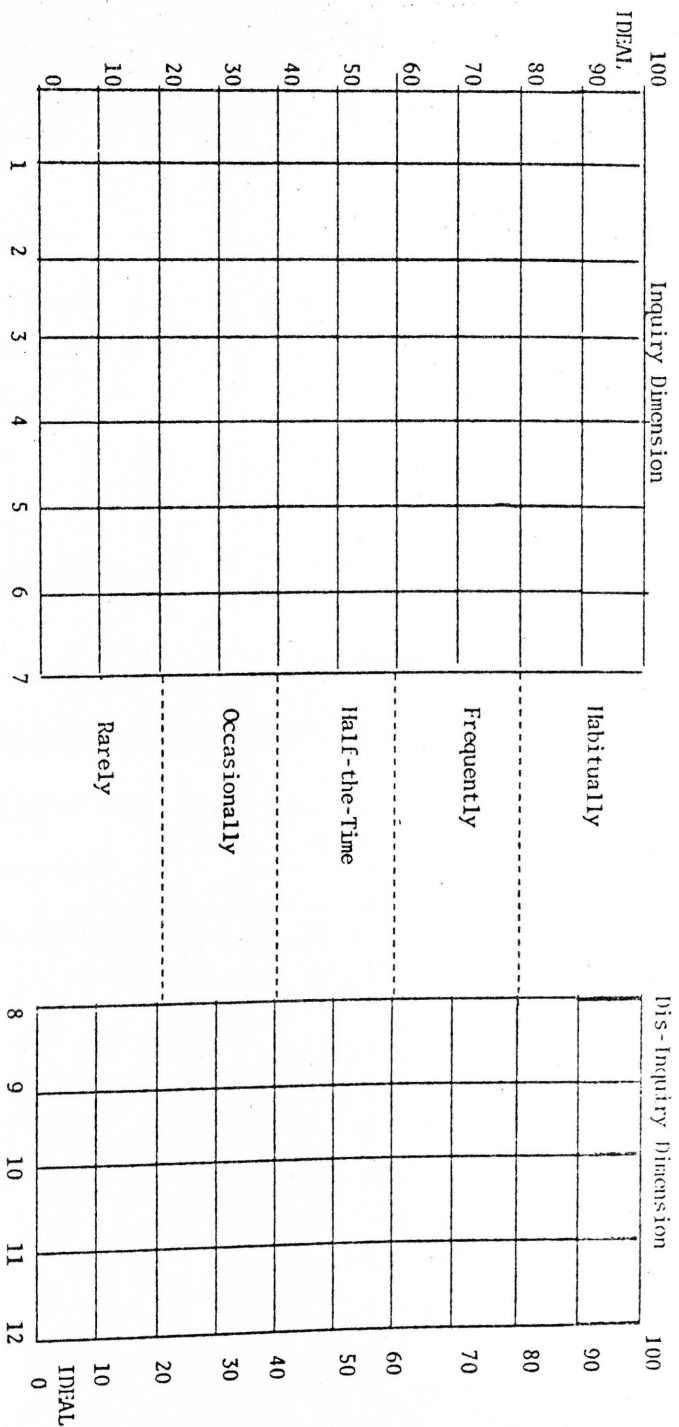
Inquiry Percent Score: Sum Reversed Raw Category
Scores of Categories 1 through 7 and divide by
48 (/48) = _____

Dis-Inquiry Percent Score: Sum Reversed Raw Cate-
gory Scores of Categories 8 through 12 and divide
by 45 (/45) = _____

Scores:

Categories

Situations of Experience
The Development of Challenging Problems
The Generation of Ideas
The Observation and Collection of Data
The Development of Reasoned Hypotheses
Experimental Application And Testing
Evaluation and Judgment of Results
Neglect of Direct Experience
Reliance Upon Extrinsic Motivation
Making Learning A Direct And Conscious End in Itself
The Mechanical Following of An Established Method
The Imposition of a General Method on All Alike



Appendix D

Evaluation Instruments Used to Assess Internal Validity

1. Teacher Practices Inventory-Student
2. Teacher Practices Inventory
3. Learning Styles Inventory
4. Learner Observation Form

TEACHER PRACTICE INVENTORY-STUDENT

Form P

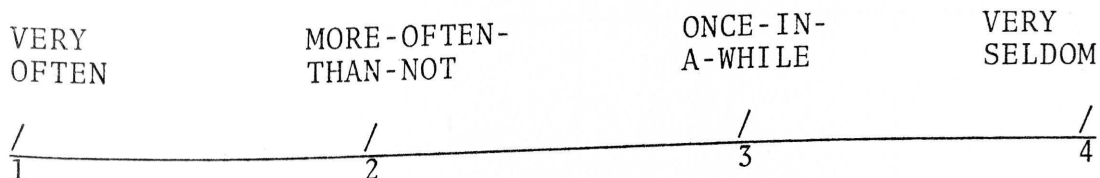
This inventory asks you to consider the teaching behavior of instructors in this program. Each statement describes a teacher practice--something a teacher might do in an instructional situation. Many different and opposing kinds of teacher practices are presented, though they represent only a portion of the possible practices that might have been included.

YOUR TASK IS TO RESPOND TO EACH STATEMENT IN TERMS OF HOW, IN GENERAL, YOU PERCEIVE THAT INSTRUCTORS IN THIS PROGRAM ACTUALLY FUNCTION. The best answer to each statement is your estimate of how frequently they actually behave in the manner described.

Please try to respond to every item. Some items may seem somewhat unfamiliar or "strange". Don't let that disturb you. Since you are indicating the frequency of behavior, for those items just indicate the lowest frequency.

Please respond in a thoughtful and careful manner. There is no time limit.

For each item, read the statement, then determine your response by using the rating scale below. The rating scale should be viewed as a continuum on which four (4) points have been specified. The verbal description of each of the specified points is intended to give you a more concrete way of distinguishing among the various points. You are to CHOOSE THE NUMBER ON THE SCALE (1, 2, 3, or 4) THAT MOST CLOSELY APPROXIMATES WHERE INSTRUCTORS, IN GENERAL, FALL ON THE CONTINUUM:



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Teacher Practices Inventory-Student
Form P

1. VERY OFTEN, that is, in this program, this behavior is characteristic of instructors; they usually behave this way in instructional situations.
2. MORE-OFTEN-THAN-NOT, that is, better than half of the time instructors in this program behave this way in instructional situations.
3. ONCE-IN-A-WHILE, that is, instructors in this program behave in this way in instructional situations on occasion, but this behavior is not customary.
4. VERY SELDOM or NEVER, that is, this behavior simply is not characteristic of instructors in this program.

RECORD YOUR RESPONSE FOR EACH ITEM BY CIRCLING the appropriate number (1, 2, 3, or 4) at the end of the statement.

CAUTION: You will note that many of the items are quite complex, that is, they contain more than one specific behavior. Be sure to respond to each item in its totality.

Be sure, too, to complete the identification information at the top of the next page. Your responses will be treated in strictest confidence. Data will be analyzed in terms of groups or clusters who respond in similar, specific ways. Scores will represent the average for the group, and individuals will not be identified.

Your thoughtful cooperation will be greatly appreciated.

TEACHER PRACTICES INVENTORY-
STUDENT
Form P

Social Security Number:

Last Four Digits: _____

Today's Date _____

Please Check:

Undergraduate _____

Graduate _____

SCALE

VERY
OFTEN

MORE-OFTEN-
THAN-NOT

ONCE-IN-
A-WHILE

VERY
SELDOM

/

1

/

2

/

3

/

4

IN GENERAL, INSTRUCTORS IN THIS PROGRAM...

circle your rating

- | | | | | |
|--|---|---|---|---|
| 1...give students an outline of course material and procedures so that they know exactly what they are expected to do. | 1 | 2 | 3 | 4 |
| 2...ask another student to supply the correct answer when one student can't answer a question, in order to alleviate uncertainty and get on with the task at hand. | 1 | 2 | 3 | 4 |
| 3...give students a free rein in devising and inventing proposals to shed light on professional problems they face. | 1 | 2 | 3 | 4 |
| 4...have students determine the effectiveness of their actions, rather than doing so themselves. | 1 | 2 | 3 | 4 |
| 5...have students concentrate on the task at hand and discourage them from initiating tangential discussions. | 1 | 2 | 3 | 4 |

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM		
/	/	/		/	
1	2	3		4	
6...help students to identify problems to be solved by pushing them to examine their own experiences, rather than by presenting them with generally recognized problems from the field.		1	2	3	4
7...organize instruction to insure that students' attention and efforts are centered on the acquisition of knowledge and skills.		1	2	3	4
8...give students a chance to discover, by experiencing actual effects, whether their choice of one course of action rather than another was a judicious one.		1	2	3	4
9...organize instruction to insure that students confront and struggle with the unexpected consequences of their decisions/actions.		1	2	3	4
10...hold all student equally responsible for the same material.		1	2	3	4
11... push students to stretch their minds, generate one suggestion after another to develop possible ways of dealing with professional problems, rather than emphasizing one or two best approaches.		1	2	3	4

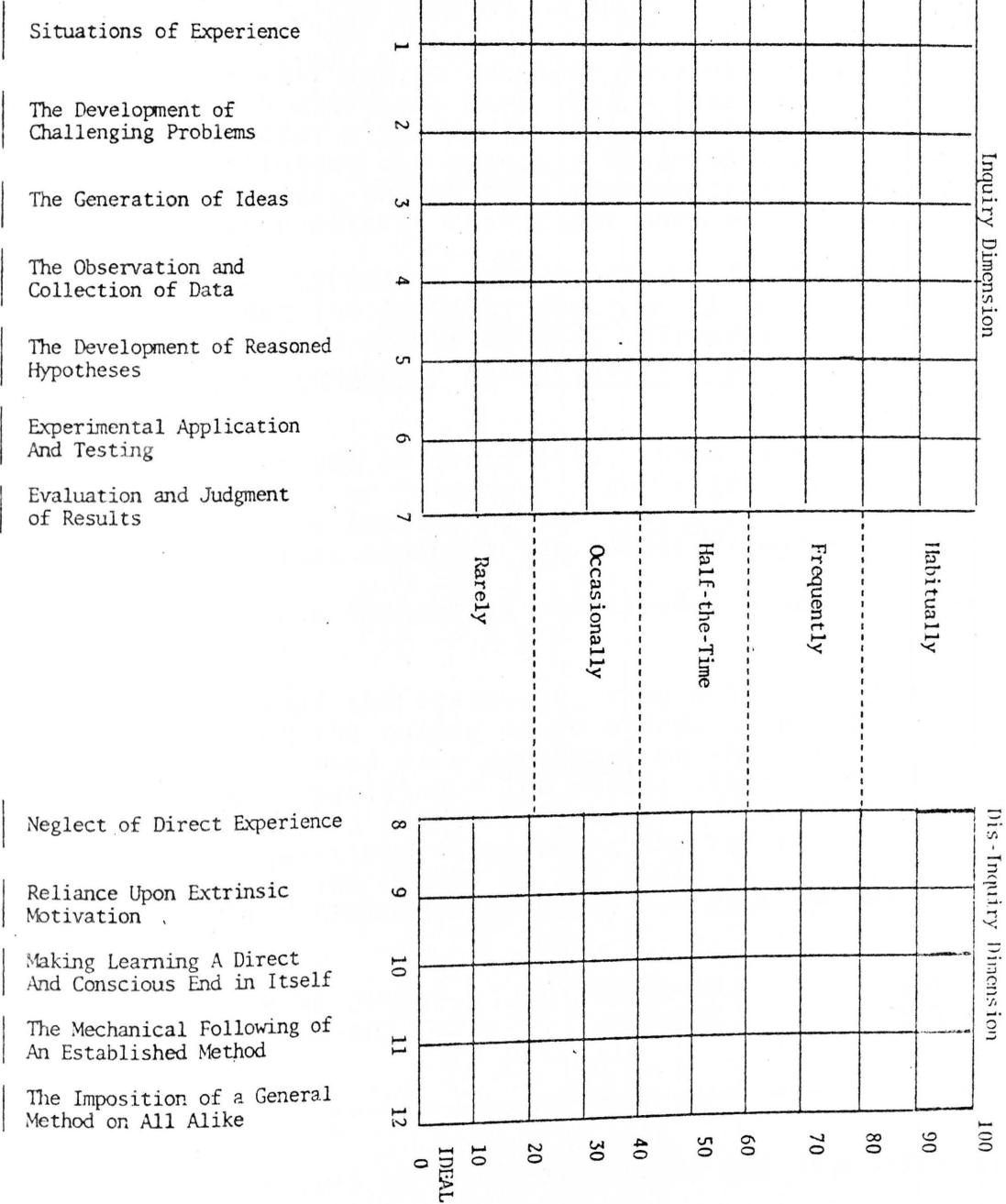
VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM
/	/	/	/
1	2	3	4
12...conduct their classes in an efficient manner to insure that students will learn what they need to know.		1	2 3 4
13...utilize the lecture method to cover the important topics.		1	2 3 4
14...have students "square" proposed solutions to problems with knowledge from their own experience.		1	2 3 4
15...give students models to show them what their performance/work should look like.		1	2 3 4
16...encourage students to utilize everyday knowledge and experience in ways that may not have occurred to them before, as they wrestle with professional problems.		1	2 3 4
17...push students to formulate and specify the limits of generalizations based on the successes and failures of a course of action they undertake.		1	2 3 4
18...have students determine the validity of their proposed solutions to problems by reconciling them against the best available data, rather than determining for them which solution is best.		1	2 3 4

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM	
/	/	/	/	
1	2	3	4	
19...organize instruction to insure that students explore the meaning and consequences of their everyday knowledge and experience.		1	2	3 4
20...push students to compare present professional problems they face with other similar problems they and others have faced.		1	2	3 4
21...have students choose and act on on well-supported course of action at a time, even when they believe that course is not the best one.		1	2	3 4
22...try to show students the most economical and efficient way to get a job done, and expect them to do it pretty much that way.		1	2	3 4
23...have students work on their own problems created by them and/or textbooks.		1	2	3 4
24...make a direct presentation of the subject matter to be learned.		1	2	3 4
25...turn to material in recognized textbooks to assess the appropriateness of information and/or ideas cited by students.		1	2	3 4
26...like to motivate students to intellectual effort by rewarding them with recognition of some kind.		1	2	3 4

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM
/	/	/	/
1	2	3	4
27...use a set standard to judge the work of all students.		1	2 3 4
28...organize instruction to insure that the important information to be learned is carefully presented so that students can note it.		1	2 3 4
29...help students to recognize the correctness of their efforts by giving them immediate feedback about whether they are right or wrong.		1	2 3 4
30...ask students the kinds of questions they should be able to answer if they have studied assigned material.		1	2 3 4
31...encourage students to adventure into "deep water", to tackle pro- fessional problems that appear to be "over their heads".		1	2 3 4
32...follow a planned schedule to in- sure that the necessary amount of time is spent on each topic.		1	2 3 4
33...have all students working on the same problem at the same time.		1	2 3 4
34...have students sort through data to determine facts and information they need, even when it seems more efficient to provide them with the necessary facts and information.		1	2 3 4

Scores:

Categories



TEACHER PRACTICES INVENTORY

Form D

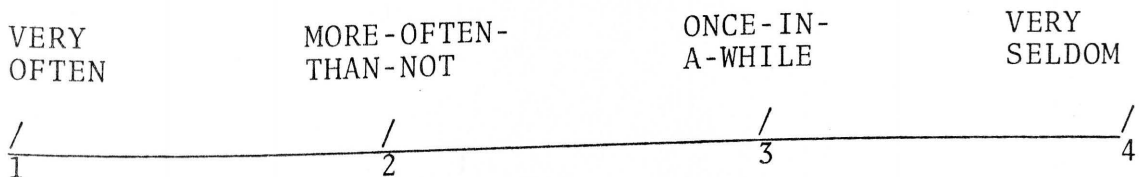
This inventory asks you to consider your own behavior as a teacher. Each statement describes a teacher practice--something a teacher might do in an instructional situation. Many different and opposing kinds of teacher practices are presented, though they represent only a portion of the possible practices that might have been included.

YOUR TASK IS TO RESPOND TO EACH STATEMENT IN TERMS OF HOW YOU PERCEIVE THAT YOU ACTUALLY FUNCTION IN AN INSTRUCTIONAL SITUATION. The best answer to each statement is your estimate of how frequently you actually behave in the manner described.

Please try to respond to every item. Some items may seem somewhat unfamiliar or "strange". Don't let that disturb you. Since you are indicating the frequency of behavior, for those items just indicate the lowest frequency.

Please respond in a thoughtful and careful manner. There is no time limit.

For each item, read the statement, then determine your response by using the rating scale below. The rating scale should be viewed as a continuum on which four (4) points have been specified. The verbal description of each of the specified points is intended to give you a more concrete way of distinguishing among the various points, You are to CHOOSE THE NUMBER ON THE SCALE (1, 2, 3, or 4) THAT MOST CLOSELY APPROXIMATES WHERE YOU FALL ON THE CONTINUUM:



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1. VERY OFTEN, that is, this behavior is characteristic of me; I usually behave this way in instructional situations.
2. MORE-OFTEN-THAN-NOT, that is better than half of the time, I behave this way in instructional situations.
3. ONCE-IN-A-WHILE, that is, I have behaved this way in instructional situations on occasion, but this behavior is not customary.
4. VERY SELDOM or NEVER, that is, this behavior simply is not characteristic of me.

RECORD YOUR RESPONSE FOR EACH ITEM by CIRCLING the appropriate number (1, 2, 3, or 4) at the end of the statement.

CAUTION: You will note that many of the items are quite complex, that is, they contain more than one specific behavior. Be sure to respond to each item in its totality.

Be sure, too, to complete the identification information at the top of the next page. Your responses will be treated in strictest confidence.

Your thoughtful cooperation will be greatly appreciated.

TEACHER PRACTICES INVENTORY
Form D

Social Security #: _____

Name: _____

Today's Date: _____

SCALEVERY
OFTENMORE-OFTEN-
THAN-NOTONCE-IN-
A-WHILEVERY
SELDOM

/	/	/	/
1	2	3	4

IN GENERAL, I...

Circle your rating

- | | | | | |
|--|---|---|---|---|
| 1...give students an outline of course material and procedures so that they know exactly what they are expected to do. | 1 | 2 | 3 | 4 |
| 2...ask another student to supply the correct answer when one student can't answer a question, in order to alleviate uncertainty and get on with the task at hand. | 1 | 2 | 3 | 4 |
| 3...give students a free rein in devising and inventing proposals to shed light on problems they face. | 1 | 2 | 3 | 4 |
| 4...have students determine the effectiveness of their actions, rather than my doing so. | 1 | 2 | 3 | 4 |
| 5...have students concentrate on the task at hand and discourage them from initiating tangential discussions. | 1 | 2 | 3 | 4 |

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM	
/	/	/	/	
1	2	3	4	
6...help students identify problems to be solved by pushing them to examine their own experiences, rather than by presenting them with generally recognized problems from the field.	1	2	3	4
7...organize instruction to insure that students' attention and efforts are centered on the acquisition of knowledge and skills.	1	2	3	4
8...give students a chance to discover by experiencing actual effects, whether their choice of one course of action rather than another was a judicious one.	1	2	3	4
9...organize instruction to insure that students confront and struggle with the unexpected consequences of their decisions/actions.	1	2	3	4
10...hold all students equally responsible for the same material.	1	2	3	4
11...push students to stretch their minds, generate one suggestion after another to develop possible ways of dealing with problems, rather than emphasizing one or two best approaches.	1	2	3	4
12...conduct my classes in an efficient manner to insure that students will learn what they need to know.	1	2	3	4

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM
/	/	/	/
1	2	3	4
13...utilize the lecture method to cover the important topics.		1 2	3 4
14...have students "square" proposed solutions to problems with knowledge from their own experience.		1 2	3 4
15...give students models to show them what their performance/work should look like.		1 2	3 4
16...encourage students to utilize everyday knowledge and experience in ways that may not have occurred to them before, as they wrestle with problems.		1 2	3 4
17...push students to formulate and specify the limits of generalizations based upon the successes and failures of a course of action they undertake.		1 2	3 4
18...have students determine the validity of their proposed solutions to problems by reconciling them against the best available data, rather than my determining which solution is best.		1 2	3 4
19...organize instruction to insure students' exploration of the meaning and consequences of their everyday knowledge and experience.		1 2	3 4

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM
/	/	/	/
1	2	3	4
20...push students to compare present problems they face with other similar problems they and others have faced.	1	2	3 4
21...have students choose and act on one well-supported course of action at a time, even when I believe that course is not the best one.	1	2	3 4
22...try to show students the most economical and efficient way to get a job done; and expect them to do it pretty much that way.	1	2	3 4
23...have students work on their own problems, rather than on problems created by me and/or textbooks.	1	2	3 4
24...make a direct presentation of the subject matter to be learned.	1	2	3 4
25...turn to material in recognized textbooks to assess the appropriateness of information and/or ideas cited by students.	1	2	3 4
26...like to motivate students to greater intellectual effort by rewarding them with recognition of some kind.	1	2	3 4
27...use a standard to judge the work of all students.	1	2	3 4
28...organize instruction to insure that the important information to be learned is carefully presented so that students can note it.	1	2	3 4

VERY OFTEN	MORE-OFTEN- THAN-NOT	ONCE-IN- A-WHILE	VERY SELDOM		
/	/	/	/		
1	2	3	4		
29...help students to recognize the correctness of their efforts by giving them immediate feedback about whether they are right or wrong.		1	2	3	4
30...ask students the kinds of questions they should be able to answer if they have studied assigned material.		1	2	3	4
31...encourage students to adventure into "deep water", to tackle problems that appear to be "over their heads".		1	2	3	4
32...follow a planned schedule to insure that the necessary amount of time is spent on each topic.		1	2	3	4
33...have all students working on the same problems at the same time.		1	2	3	4
34...have students sort through data to determine facts and information they need, even when it seems more efficient to provide them with the necessary facts and information.		1	2	3	4

Hand scoring scheme for Inquiry measures (TPI and TPI-S)

There are five steps in hand scoring the inquiry measures:

1. Transfer RAW ITEM values (1 thru 4) from instrument onto this sheet
2. Sum the raw item values in each category and place value in RAW SUM column
3. Perform an arithmetic operation involving the raw sum and place this value in the space labelled CATEGORY SCORE
4. Perform a final arithmetic operation to obtain PERCENT SCORES for 12 categories
5. Perform another series of arithmetic operations to obtain Inquiry and Dis-Inquiry dimension Percent Scores

CATEGORY	RAW ITEM VALUES WITH NUMBER OF ITEM PLACED BELOW EACH BRACKETS	RAW SUM	CATEGORY SCORE	PER- CENT SCORE
1	(6) (19)	(8-) = (/6) x 100 =		
2	(9) (23) (31)	(12+) = (/9) x 100 =		
3	(3) (11) (14) (16)	(16-) = (/12) x 100 =		
4	(20) (34)	(8-) = (/6) x 100 =		
5	(18) (21)	(8-) = (/6) x 100 =		
6	(8) (21)	(8-) = (/6) x 100 =		
7	(4) (17)	(8-) = (/6) x 100 =		

CATEGORY	RAW ITEM VALUES WITH NUMBER OF ITEM PLACED BELOW EACH BRACKETS	RAW SUM	CATEGORY SCORE	PER- CENT SCORE
8	(5) (24) (28)	(12-)	= (/9) x 100 =	
9	(1) (25) (26) (30)	(16-)	= (/12) x 100 =	
10	(2) (7) (12) (29)	(16-)	= (/12) x 100 =	
11	(22) (32)	(8-)	= (/ 6) x 100 =	
12	(10) (13) (15) (27) (33)	(20-)	= (/15) x 100 =	

Computation of Inquiry and Dis-Inquiry Percent Scores:

Inquiry Percent Score: Arithmetic sum of CATEGORY SCORES
FOR CATEGORY 1, 2, 3, 4, 5, & 7 = _____
and Value of following operation
(4 - RAW SCORE for item 8) = _____

Add above two numbers: _____

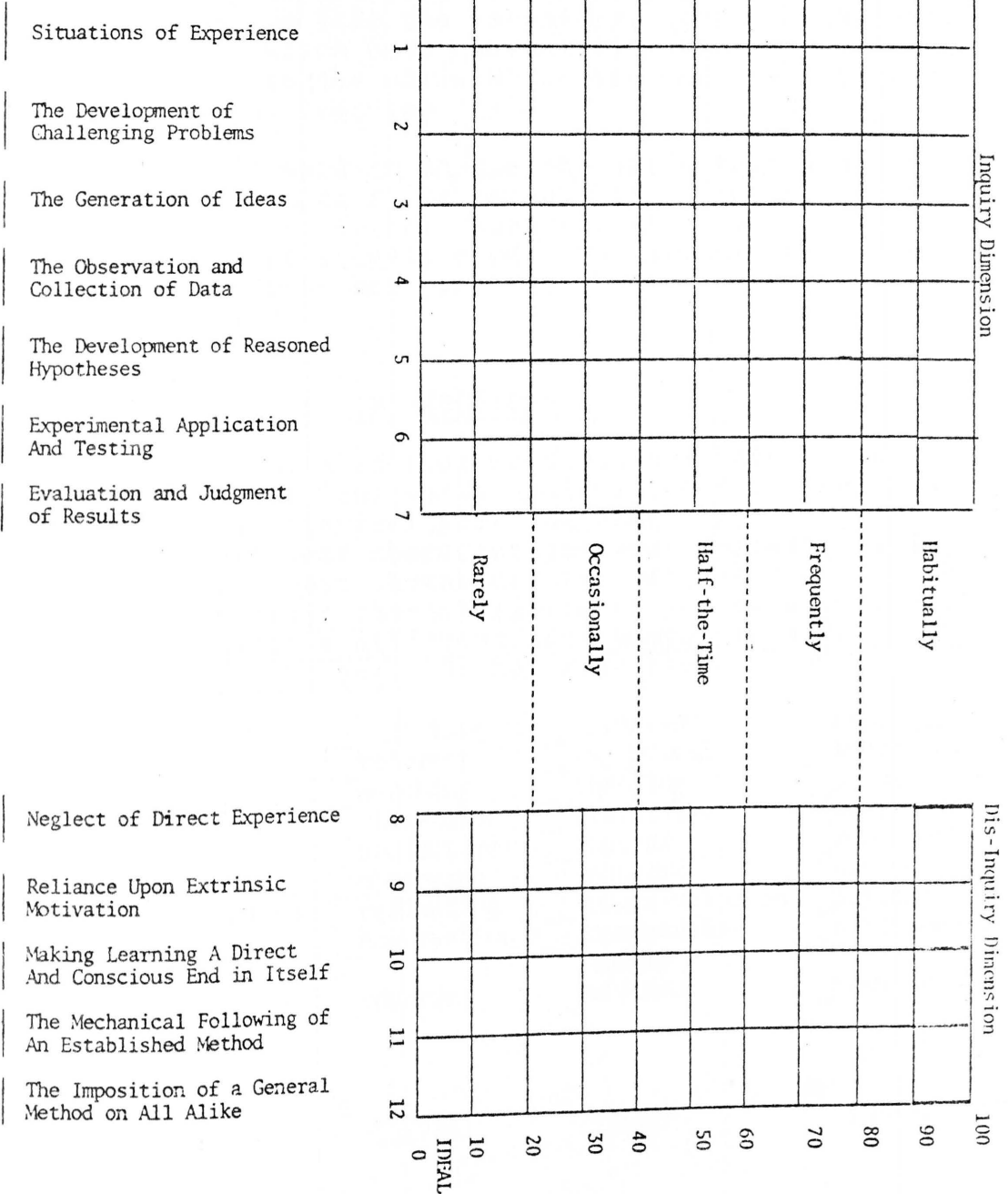
Divide the number by 48 and
multiply by 100. (/48) x 100 = _____

Dis-Inquiry Percent Score: Arithmetic
sum of CATEGORY SCORES FOR CATEGORY
8, 9, 10, 11, & 12 = _____

Divide this number by 54 and
multiply by 100 (/54) x 100 = _____

Scores:

Categories



LEARNING STYLE INVENTORY

This inventory is designed to assess your method of learning. As you take the inventory, give a high rank to those words which best characterize the way you learn and a low rank to the words which are the least characteristic of your learning style.

You may find it hard to choose the words that best describe your learning style because there are no right or wrong answers. Different characteristics described in the inventory are equally good. The aim of the inventory is to describe how you learn, not to evaluate your learning ability.

INSTRUCTIONS

There are nine sets of four words listed below. Rank order each set of four words assigning a 4 to the word which best characterizes your learning style, a 3 to the word which next best characterizes your learning style, a 2 to the next most characteristic word, and a 1 to the word which is least characteristic of you as a learner. Be sure to assign a different rank number to each of the four words in each set. Do not make ties.

- | | | | |
|----------------------------|--------------------|------------------------|---------------------|
| 1. <u>discriminating</u> | <u>tentative</u> | <u>involved</u> | <u>practical</u> |
| 2. <u>receptive</u> | <u>relevant</u> | <u>analytical</u> | <u>impartial</u> |
| 3. <u>feeling</u> | <u>watching</u> | <u>thinking</u> | <u>doing</u> |
| 4. <u>accepting</u> | <u>risk-taker</u> | <u>evaluative</u> | <u>aware</u> |
| 5. <u>intuitive</u> | <u>productive</u> | <u>logical</u> | <u>questioning</u> |
| 6. <u>abstract</u> | <u>observing</u> | <u>concrete</u> | <u>active</u> |
| 7. <u>present-oriented</u> | <u>reflecting</u> | <u>future-oriented</u> | <u>pragmatic</u> |
| 8. <u>experience</u> | <u>observation</u> | <u>conceptuali-</u> | <u>experimental</u> |
| | | <u>zation</u> | |
| 9. <u>intense</u> | <u>reserved</u> | <u>rational</u> | <u>responsible</u> |

FOR SCORING ONLY

CE	RO	AC	AE
<u>234578</u>	<u>136789</u>	<u>234589</u>	<u>136789</u>

Note. From Organizational Psychology, An Experimental Approach by D. A. Kolb, I. M. Rubin, and J. M. McIntyre, 1971. Copyright 1971 by D. A. Kolb, I. M. Rubin, and J. M. McIntyre, Reprinted by permission.

ASSIMILATORS

AC AND RO

abstract over concrete and reflective over active greatest strength lies in the ability to create theoretical models; excels in inductive reasoning, accumulating and assimilating disparate observations into an intergrated explanation, less interested in people, more concerned with practical theories, style and characteristics of basic sciences rather than applied sciences.

DIVERGERS

CE AND RO

concrete over abstract and reflective over active greatest strength lies in the imaginative ability; excels in the ability to view the concrete situation from many perspectives and to organize many relationships into a meaningful whole, performs better in situations that call for generation of ideas such as "brainstorming" idea sessions, are generally interested in people over things, broader interests and tend to specialize in the arts or humanities.

CONVERGERS

AC AND AE

abstract over concrete and active over reflective; strength lies in the practical application of ideas, does best in situations like conventional intelligence tests where there is a single correct answer or solution to a question or a problem. His knowledge is organized in such a way that, through hypothetical reasoning, he can focus it on specific problems, prefers to deal with things rather than people, interests are less broad and chooses to specialize in the physical sciences.

ACCOMMODATORS CE AND AE

concrete over abstract and active over reflective; strength lies in doing things; in carrying out plans and experiments and involvement in new experiences: tends to be a risk-taker more so than others with different learning styles: tends to excell in those situations where he must adapt himself to specific immediate circumstances: tends to solve problems in an intuitive trial and error manner relying heavily on others for information rather than own analytic ability.

Some comments

These descriptions of learning styles can be considered as distinctive abilities of respective individuals and not as set and overriding dominant predispositions. The learning style perhaps best characterizes WHEN and HOW individuals RECOGNIZE, SEEK, and UTILIZE educational experiences.

The learning model in a problem solving situation can be considered as a cyclical process from concrete experience through reflective observation and abstract conceptualization to active experimentation. Like the Wankel engine rotating, the individual alternates in different learning styles in different phases of the problem solving approach.

Characteristic Behaviors for Learning Styles

CONCRETE EXPERIENCE

receptive, feeling,
accepting, intuitive
present-oriented, experience

prefer to follow directions
prefer structure, ambiguous situation produces anxiety
skill-oriented rather than idea-oriented
question of "How to do X?"
not WHY? or what does it relate to?
attends to details
uses concrete experience to formulate abstractions;
less able to use "lecture-type"
learns by visual presentation
becomes involved openly
tests things out by exploration
"naive" way of accommodating

REFLECTIVE OBSERVATION

tentative, watching, observing, reflecting, observation, reserved

may appear to be uninvolved
learns by listening, observing, reading
almost voracious appetite to take in information, may be avoiding acting
doesn't give many cues about what is going on inside
resist giving specific examples to support generalization
resistant to change, less risk-taking
slower to conclude from data
forms tentative conclusions
hesitant to reveal conclusions
enthusiastic observation

Characteristic Behaviors for Learning Styles

ABSTRACT CONCEPTUALIZATION

analytical, thinking,
 evaluative, logical,
 conceptualization,
 rational

theoretical

can use vicarious ex-
 perience to conceptu-
 alize

arrives at generalizations
 readily from very little
 data

generally open to change
 multiple generalizations
 and possibilities around
 a problem

hard to experience a prob-
 lematic situation

resistance to hanging-in
 on a problem

reflective, pushes ideas
 on his/her own

ACTIVE EXPERIMENTATION

practical, doing, active,
 pragmatic, experimenta-
 tion, responsible

speculation/discussion

supported by own experi-
 ence, specific examples
 multiple experiences before
 generalization

excitement AFTER doing
 something

anxious to DO something

challenge generalizations

with specific experiences

organized, like to plan

practice, experiment

SCORING

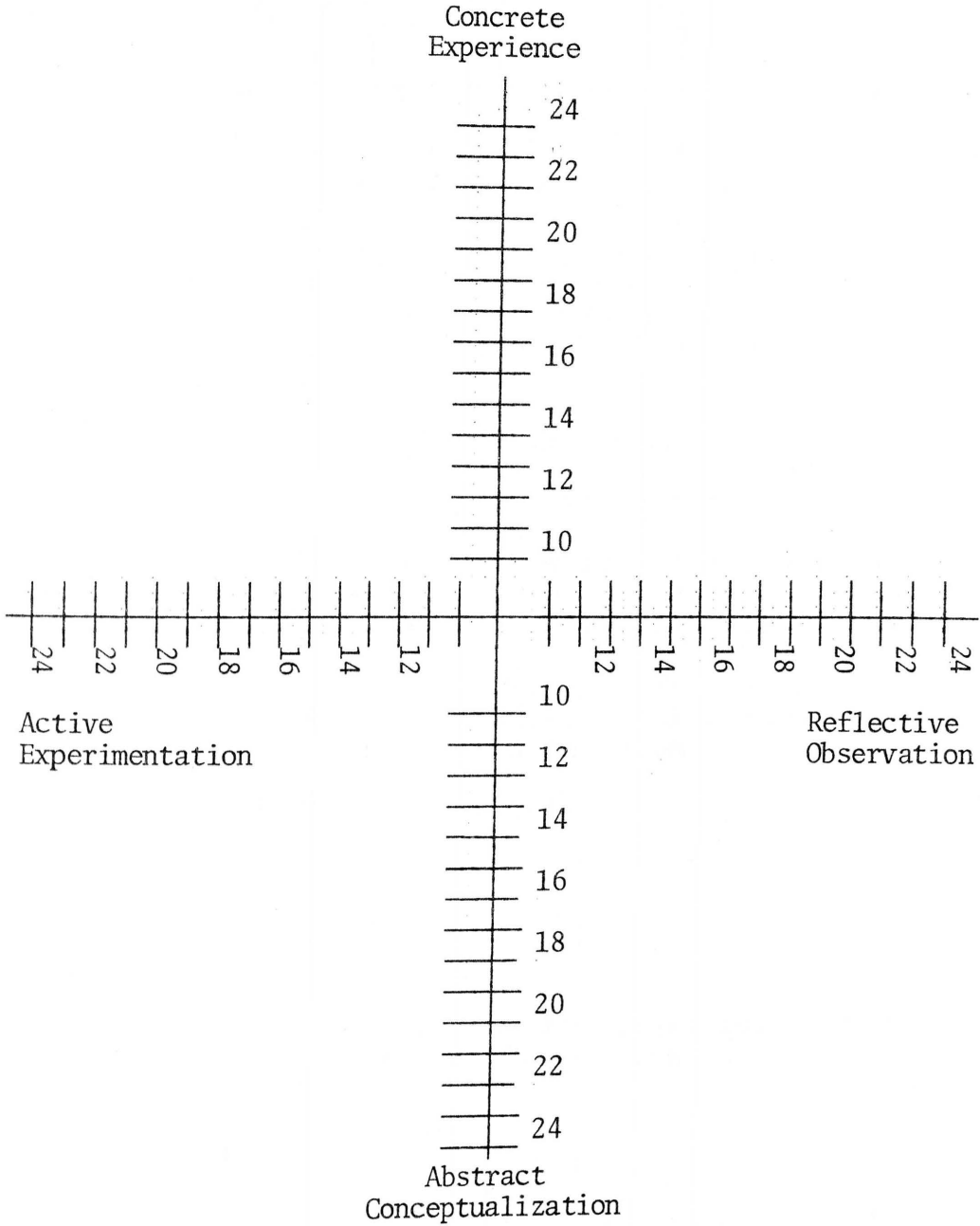
At the bottom of each column are four blanks each preceded by two letters and above a set of numbers. To find your scores for each of the four categories--concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE)--add up the values for only those items corresponding to the number below the blank.

For example, for the CE score, omit items 1, 6, and 9. Add up only the values of the remaining items: 2, 3, 4, 5, 7, 8.

To graph your learning style profile, plot the score on the appropriate axis and join those points with lines.

Note: No category score should be more than 24.

LEARNING STYLE INVENTORY SCORING GRAPH



Learner Observation Form

Name of Instructor: _____

Name of Course: _____

Today's Date: _____

* * * * *

The above-identified instructor has elected to participate in an educational program intended to increase his/her effectiveness as an educator. Your honest observations at this point in the above-identified course can help your instructor a great deal.

Will you please take just a few minutes to think about and respond to the two questions on the attached sheet. Then give your completed form to your instructor.

If you would like to discuss your observations with your instructor, do feel free to do so but not before you have written your responses to the two questions.

PLEASE NOTE THAT WHAT YOU SAY WILL HAVE NO BEARING ON ANY EVALUATION OF YOU AS A LEARNER. Your comments are to help the instructor who has asked for them.

Thanks in advance for your help.

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1. Think about the course identified on the previous page. Do your best to reconstruct in your mind the essence of this course to date. What do you believe is the instructor's primary intention for you as a learner in this course? Put another way, what is the most important impact, as you see it, that this instructor intends this course to have on you?
2. How have you actually experienced the course so far? What is the most important impact the course has had on you at this point? Elaborate as fully as you can.

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INTENTIONS/IMPACT REFERENCE SCALE

Coding instructions for responses to Learner's Observation form (LOF):

- 0 not obviously related to 1, 2, or 3
- 1 primarily acquisition of basic knowledge and/or skills
- 2 primarily application of basic knowledge and/or skills
- 3 primarily development of self-awareness, self-directed, self-evaluative, problem-solving behavior