

STUDENT TEACHER ATTITUDES TOWARDS CHILDREN  
OF DIFFERENT GRADE LEVELS AS INDICATED BY  
THE MINNESOTA TEACHER ATTITUDE INVENTORY

by

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## ABSTRACT

Many writers consider it "desirable" that teachers hold "democratic" attitudes towards those they teach. A number of studies have indicated that the Minnesota Teacher Attitude Inventory (MTAI) may be used as an indicator of a respondent's "democratic" attitudes towards pupils. Several researchers using the MTAI to study student teacher attitudes have shown that groups of secondary student teachers obtained significantly lower mean scores than did groups of elementary student teachers. This finding may indicate that elementary student teachers tend to hold more "democratic" attitudes towards the education of children generally than do secondary student teachers. Such an interpretation could serve as a basis for criticism of the procedures whereby candidates for secondary teaching are selected and trained.

In this study, a rival interpretation was advanced and tested. The writer proposed that the aforementioned finding may indicate that student teachers generally hold different attitudes towards children of different age and grade levels. In an experimental test of this interpretation, the writer examined the credibility of three major propositions:

1. Secondary student teachers completing the MTAI read such general words as "pupil" and express

attitudes which they consider to apply more appropriately to grade eight students than to grade four students; however, elementary student teachers express attitudes which they consider to apply more appropriately to grade four students than to grade eight students.

2. Secondary and elementary student teachers obtain higher scores when they respond to the MTAI with reference to grade four students than they do when they respond to the MTAI with reference to grade eight students.
3. There is no difference between the mean scores of elementary and secondary student teachers when both groups respond to the MTAI with reference to students of the same specified grade level (either grade four or grade eight).

Each of 294 randomly selected elementary and secondary student teachers in a one-year graduate transfer program received an Inventory in one of three forms: the MTAI in its standard form, the MTAI in a form requiring completion with reference to grade four students or the MTAI in a form requiring completion with reference to grade eight students. Scores of 214 respondents were arranged in a  $3 \times 2 \times 2$  factorial design with the following three fixed factors: the "MTAI Condition" for the subject (3 forms), "Sex" of the subject (2 forms) and "Specialty"

of the subject (elementary or secondary).

Twenty-four elementary and thirty-eight secondary subjects who completed the standard form of the MTAI indicated the grade level (either four or eight) to which they considered their responses to apply most appropriately. Their choices were tallied in a 2x2 contingency table.

Results of a chi-square test supported the first proposition. That is, secondary respondents tended to consider their expressed attitudes to apply more to grade eight students than to grade four students, and elementary respondents tended to reverse the order of the grades. Results of analysis of variance and multiple comparisons did not support the second and third propositions. Neither elementary nor secondary subjects differed in their MTAI scores with reference to grade four and grade eight pupils. The results indicated that elementary subjects had higher scores than secondary subjects with reference to both grade four and grade eight pupils.

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Thesis Committee Chairman

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## CHAPTER I

### INTRODUCTION

In the following discussions, the term "attitude" is used to mean a predisposition to respond in a particular way toward a specified class of objects (Rosenberg, Hovland, McGuire,, Abelson and Brehm, 1960, p. 1)

Getzels and Jackson state "The importance of understanding teacher attitudes would certainly justify any efforts to make the MTAI more meaningful" (1963,, p. 522). The roles of many teachers may be changed by advances in educational technology. Relieved of the functions of mechanical instruction, a teacher may be required to make a "... more skillful use of the human factor in the development of his pupils" (Laycock, 1971, p. 177). There is increasing evidence to support the view that the attitudes of teachers significantly influence the classroom behavior and social interactions of their students (Yee and Fruchter, 1971, p. 131). So it is conceivable that in the future certain attitudes may be considered important qualifications for prospective teachers. Many educators and writers consider it desirable that children have teachers with "democratic" rather than "authoritarian" attitudes (McGee, 1955; Cole, 1959; Grand, 1959; Remmers, 1963; Blume, 1964; Vogt, 1968; Scarr, 1970; Burbidge, 1971; Alcock, 1971). The MTAI appears to differentiate respondents with "authoritarian" attitudes from those with "democratic" attitudes.

Researchers have found significant differences between the MTAI mean scores of various groups of prospective and practicing teachers. Over the course of twenty years, studies have shown that teachers and student teachers of the secondary specialty tend to obtain lower scores than do teachers and student teachers of the elementary specialty; nevertheless, there may be no warrant for the inference that elementary specialists tend to have more "democratic" attitudes towards children than do secondary specialists. Until researchers are able to account for the elementary-secondary differences on the MTAI, this inventory should not be used as a "screening" device.

Although many have speculated on the meaning of the "specialty" difference, few have advanced empirically testable hypotheses to account for it. The present study was an attempt to examine experimentally a plausible explanation for the significant difference often found between the MTAI mean scores of groups of secondary and elementary student teachers.

## CHAPTER II

### REVIEW OF THE LITERATURE AND STATEMENT OF THE PROBLEM

#### 1. THE PREDICTIVE VALIDITY OF THE MTAI

The MTAI was designed for the purpose of measuring "... those attitudes of a teacher which predict how well he will get along with pupils in interpersonal relationships, and indirectly how well satisfied he will be with teaching as a vocation" (Cook, Leeds and Callis, 1952, p. 3). It consists of 150 statements in a Likert Scale format, so that a respondent can strongly agree, agree, be undecided, disagree or strongly disagree. The Inventory was empirically constructed to discriminate between teachers classified as "superior" or "inferior" on the basis of their principal's ratings of their ability to maintain "harmonious relations" in the classroom (Leeds, 1950, p. 7). The device has been shown to have high split-half reliability, and some concurrent validity studies with the initial and published forms of the MTAI have yielded significant correlation coefficients up to .63 (Leeds, 1950; Leeds, 1952; Callis, 1953; Cook, Kearney, Rocchio and Thompson, 1956). In these studies the validation criteria consisted of ratings provided by groups such as principals, expert observers and students. In a predictive validity study, Stein and Hardy (1956) related MTAI scores of student teachers to ratings made during

subsequent practice teaching. The combined ratings of pupils and university advisers when correlated with the MTAI scores of elementary and secondary student teachers gave validity coefficients of .387 and .559 respectively.

The results of certain other validity studies have not been as encouraging. Chappell and Callis (1954) found that MTAI scores were not significantly related to criteria ratings in a military training situation. The study's conclusion was that teaching children is different from teaching adult soldiers. Sandgren and Schmidt (1956) concluded from their research that there was no significant relation between MTAI scores and the ratings of critic teachers. Other studies revealed no significant relationship between MTAI scores and the ratings of supervisors (Oelke, 1956; Fuller, 1951). Yee (1967) found only a "small" relationship between MTAI scores and pupil ratings ( $r = .17$ ) and a relationship of MTAI scores to ratings of principals which was only "modest" ( $r = .24$ ). The foregoing findings suggest that there are teaching situations in which various "raters" may not consider that a teacher with "democratic" attitudes has accomplished "harmonious relations" in the classroom. Furthermore, what is good teaching rapport in the opinion of some may be poor teaching rapport in the view of others (cf. Getzels and Jackson, 1963, p. 575). Because a teacher's behavior and attitudes may be some function of classroom atmos-

phere, it is precarious to accept concurrent validity as a substantiation of predictive validity. The fact that teachers exhibit "democratic" attitudes on the MTAI and concurrently are rated as having "harmonious relations" in particular classrooms is not a sufficient basis for claiming that the same teachers would establish "harmonious relations" in any classroom of students. Because much of the case for the validity of the MTAI is based on concurrent comparisons of the scores and ratings of inservice teachers, there is some doubt that the Inventory can be used for its intended predictive purposes (Cronbach, 1953, p. 798).

## 2. THE MTAI AS AN INDICATOR OF "DEMOCRATIC" ATTITUDES TOWARDS STUDENTS

Although the MTAI's predictive validity for its designed purpose is questionable, it may be used as an indicator of a respondent's attitudes towards pupils (Yee, 1967, p. 158). In building the MTAI, Cook, Leeds and Callis assumed that a teacher with a high score would work with his pupils in a "... social atmosphere of co-operative endeavor where individuals were permitted the freedom to think, act and speak one's mind with mutual respect for the feelings, rights and abilities of others" (1951, p. 3). On the other hand, the authors of the MTAI assumed that a teacher with a low score would resemble the "authoritarian personality" described by Adorno

et al (1950).

Following their factor analytic study of the MTAI, Ferguson, Brown and Callis (1954) concluded that it measures a single attitude factor; however, more methodologically adequate factor analyses by Horn and Morrison (1965) and Yee and Fruchter (1971) revealed that the MTAI does not measure a single unitary trait. A total MTAI score represents several largely independent response consistencies. Five major factors have emerged. Factor I has been labelled "Understanding and democratic versus aloof, harsh and autocratic in dealings with pupils". Agreement with Factor II items suggests a "... desire to subordinate pupil interest and inclination to a strict subject-centered curriculum and authoritarian teacher expectations". Disagreement with Factor II items reflects a view that the pupils' interests, motivation and open interaction with teachers is basic to effective learning situations. Factor III has been titled "Punitive Intolerance Versus Permissive Tolerance for Child Misbehavior". Factor IV tends to describe "... an attitude that concerns facilitating pupils' interests and achievement" either by "controlling" or "laissez-faire" methods. The items in Factor V express the view that "... most children and pupils acquiesce to the teacher and imply that they should" (Yee and Fruchter, 1971, pp. 121-128). Horn and Morrison (1965) employed responses of 305 college students enrolled in education courses. Yee and Fruchter (1971) used re-

sponses of 368 in-service teachers with an average of about ten years of teaching experience. The similarities between Horn and Morrison's and Yee and Fruchter's results suggest that factor analyses of MTAI responses of other samples of prospective or practicing teachers "... will not produce radically different outcomes" (Yee and Fruchter, 1971, p. 131).

Horn and Morrison (1965) reported that intercorrelations of their five major factors fell into a positive manifold. This consideration has permitted Morrison and Romoser to write that the total MTAI scale "evidently involves a syndrome which could be labelled authoritarian" (1967, p. 58). Some support for the foregoing statement may be found in the results of research involving the MTAI and the F Scale. Piers (1955) and Sheldon, Coale and Copple (1959) found that "democratic" personality types tend to obtain high MTAI scores, while "authoritarian" personality types tend to obtain low MTAI scores (Getzels and Jackson, 1963, p. 522).

Researchers who have found differences between elementary and secondary subjects on the MTAI have made comparisons of scores based on the total scale of the Inventory. Because the writer is concerned with such differences, he too will examine scores based on the total scale of the MTAI. This study was designed to test one particular explanation of the difference often found between mean



total MTAI scores of groups of elementary and secondary student teachers. The explanation was developed independently of the consideration that the differences observed between total MTAI scores may be differences on only certain factors within the scale.

Although the content of the MTAI can be more precisely defined with descriptions of its separate factors rather than its total scale, the present study assumes that relatively high MTAI total scores reflect a collection of attitudes which may be characterized as "democratic" and that relatively low MTAI scores reflect a collection of attitudes which may be described as "authoritarian". Some writers in describing the attitudes reflected by relatively high MTAI scores have used such words as "favorable" and "socially acceptable" (Sandgren and Schmidt, 1956; Walberg, 1964). When such terms are used to describe "specialty" differences on the MTAI, secondary respondents tend to appear less fit to teach the young than do elementary respondents. This type of conclusion would be particularly unfair if it could be demonstrated that the differences between MTAI mean scores of elementary and secondary respondents were the results of a characteristic of the Inventory.

### 3. STUDIES OF THE ATTITUDES OF PROSPECTIVE AND PRACTICING TEACHERS

Using the MTAI, researchers have completed many

studies of the attitudes of teachers and student teachers. A number of these studies have indicated that increases in formal education are generally accompanied by significant increases in the mean MTAI scores of groups of student teachers (Callis, 1950<sup>1</sup>; Sandgren and Schmidt, 1956; Dunham, 1958; Hoyt and Cook, 1960; Munro, 1960; Brim, 1966; Thompson, 1967; McEwin, 1968; Muuss, 1969); however, actual teaching experience often is accompanied by significant decreases in the mean MTAI scores of beginning teachers (Callis, 1950; Day, 1959; Hoyt and Cook, 1960; Rabinowitz and Rosenbaum, 1960; Oana, 1965; Gewinner, 1967; Muuss, 1969). The difficulties of measuring "true change" and of ascribing this "change" to the influence of particular factors prevent one from forming positive conclusions about the "changes" of MTAI scores described in the foregoing sentences (Campbell and Stanley, 1963; Cronbach and Furby, 1970); furthermore, "... our cultural stereotypes are such that we would almost never consider the possibility of the student's behavior causing the teacher's" (Campbell and Stanley, 1963, p. 235).

It is possible that the events most pertinent to the

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1. In his study Callis used an inventory which was a "slight extension" of the one originally developed by Leeds. The correlation between the extended and original inventories was .95 (Callis, 1950, p. 718). Of the 150 items in the published MTAI, 129 were taken from Leeds' 164 item inventory and 21 from Callis' 239 item inventory (Cook, Leeds and Callis, 1951, p. 13).

rise or fall of a teacher's MTAI score is her experience with the students she teaches. This consideration is encouraged by studies which have indicated that groups of elementary teachers tend to have higher MTAI mean scores than do groups of secondary teachers (Cook, Leeds and Callis, 1952; Stein and Hardy, 1957; Hoyt and Cook, 1960). It seems plausible that the experience of teaching young children is quite different from the experience of teaching adolescents.

The data of several studies show that the mean MTAI scores of groups of students preparing to teach elementary grades often exceed those obtained by groups of students preparing to teach secondary grades. Using the 239-item form of the Inventory, Callis studied beginning juniors and graduating seniors in the College of Education at the University of Minnesota. He concluded that "... there are significant differences in teacher-pupil attitudes among subjects classified by their major curriculum and ... these differences are present in about the same magnitude at the beginning of professional training as at the end of it ..." (1950, p. 726). Callis found that the MTAI mean score of elementary student teachers was higher than that of secondary student teachers.

Sangren and Schmidt (1956) studied 393 senior students at a midwestern state teachers college. On a first administration of the MTAI, elementary, secondary academic

and secondary non-academic groups obtained, respectively, mean scores of 57, 45.8 and 37.2. The order of group means remained the same on a second administration of the Inventory following practice teaching. The mean scores were 65.8, 53.1 and 48.8. The researchers did not comment on the statistical significance of these findings.

Normal school students enrolled in a one-year course at the University of Manitoba were studied by Stein and Hardy (1957). They found that the MTAI "differentiated significantly" between student teachers of different "grade-levels". The mean score of the prospective elementary teachers was greater than that of the prospective secondary teachers.

Beamer and Ledbetter (1957) examined the MTAI scores of teachers enrolled in education courses at North Texas State College. The mean score of eighty-seven elementary subjects was greater than that of fifty-four secondary subjects. The statistical significance of the difference was not reported.

A longitudinal study by Hoyt and Cook (1960) indicated that, from their first to their last years of professional training at the University of Minnesota, elementary student teachers tended to have higher levels of MTAI scores than did secondary student teachers. With teaching experience, both elementary and secondary teachers tended to produce lower MTAI mean scores; however, the elemen-

tary teachers remained with higher mean scores than did the secondary teachers. Hoyt and Cook summarized their findings of twelve years of study with the MTAI: elementary student teachers typically score 60 in their junior year and 80 in their senior year; secondary student teachers typically score 45 in their junior year and 65 in their senior year.

Munro (1960) administered the MTAI to groups of students in different programs in the Faculty of Education at the University of British Columbia. All subjects intended to teach the next year. Results showed that the mean score of the elementary group (Juniors) was significantly higher than that of each of the secondary groups (Third year students, Industrial arts students and Graduate one-year-program students).

McEwin (1968) used the MTAI in a longitudinal study at East Texas State University. His data revealed a pattern similar to that found by other researchers. The MTAI mean score of a group of elementary student teachers exceeded that of a group of secondary student teachers on each of 3 administrations: at the beginning of the spring semester methods courses, at the beginning of student teaching and after completion of student teaching.

#### 4. STATEMENT OF THE PROBLEM

On the basis of observed differences similar to those discussed in the foregoing paragraphs, Sandgren and

and Schmidt concluded, "Elementary curriculum student teachers have more favorable attitudes toward school work and children as expressed by their MTAI scores than do student teachers following other curricula" (1956, p. 579). Kearney and Rocchio have suggested that teacher education institutions should build their curriculums "with reference to improvement on MTAI scores" (1956, p. 706). Acceptance of Sandgren's and Schmidt's conclusion and Kearney's and Rocchio's suggestion may lead a reader to suspect that selection and training programs for secondary teachers are somehow less adequate and more in need of revision than those for elementary teachers. At the very least, a reader may come to believe that "... investigation in the area of teachers' attitudes might be worthwhile to determine, if possible, the factors in our society that produce such differences in attitudes ..." as those that have been observed between various groups of student teachers (Munro, 1960). Further investigation may reveal that Sandgren and Schmidt's conclusion is unwarranted and that Kearney and Rocchio's suggestion should not be considered seriously while the MTAI remains in its present form. The problem of examining one possible explanation of why groups of elementary student teachers usually obtain higher MTAI mean scores than do groups of secondary student teachers is the concern of the present study.

## CHAPTER III

### RESEARCH HYPOTHESES

#### 1. RATIONALE FOR THE HYPOTHESES

A characteristic of the MTAI may have some bearing upon the present research problem. The authors of the MTAI have written: "Due to possible ambiguity and the general nature of some of the items, there may be varying interpretations" (Cook, Leeds and Callis, 1951, p. 5). The authors consider it an important factor in the Inventory to have subjects "... answer items according to their own understanding of them" (1951, p. 5). But, with reference to psychological measuring devices of various kinds, Guilford has stated, "When the instructions leave too much to the imagination of the examinee, he invents his own goal and his own task and if these differ among examinees, we have lost the experimental conditions necessary for meaningful scores" (1967, p. 277). A symbol's connotative or affective meanings held by two individuals cannot be meaningfully compared unless the denotative meaning of the symbol is similar for both individuals. Of the 150 items in the MTAI, 113 contain such general words as "pupil", "pupils", "child", "children" and "young people". The differences that have been observed between the MTAI mean scores of groups of elementary and secondary student teachers may reflect different responses

these groups make to systematically different conceptions of the referent of such general words as "pupil". Yee and Kriewall have claimed that the MTAI "... remains the most popular and perhaps best indicant of teacher's attitudes towards children ..." (1969, p. 11). It is possible that secondary student teachers responding to the MTAI do not have "children" in mind.

In his "Dictionary of Psychology", Drever states that an attitude involves "... expectancy of a certain kind of experience and readiness with an appropriate response ..." (1956, p. 22). A student teacher preparing to teach at certain grade levels reasonably expects that he will have teaching experience at those grade levels. It is plausible that if this teacher were asked to express his attitudes towards "pupils", he would make his responses with reference to the "pupils" that he expects to teach and/or has already taught during his practice teaching sessions. Generally, elementary student teachers prepare themselves to teach children from six to thirteen, the approximate age at which puberty and adolescence begin (Sandstrom, 1969). Almost all pupils taught by teachers of secondary grades have entered their adolescent stage of growth.

The characteristics of "children" and "adolescents" have been discussed by many writers. (Jersild and Tasch, 1949; Laycock, 1954; Crow and Crow, 1965; Coan, 1966; Sand-



strom, 1968; Alexander, 1969, to name a few.) There appears to be widespread agreement that, unlike childhood, adolescence is a stage of development often characterized by considerable stress and conflict. It is the time of "rebellion against authority at home and at school" (Jersild, 1968, p. 15). Because the adolescent may find it safer to rebel against less frightening symbols of authority, he may be more hostile with adults who are permissive and sympathetic than he is with those who are severe and oppressive (Alexander, 1969, p. 252). Student teachers may well expect the behavior of adolescent pupils to differ somewhat from that of pupils who are children, and their attitudes towards these two classes of pupils may be different. It seems reasonable that the MTAI responses of student teachers may vary as different reference groups are evoked for such words as "pupil". Cook, Leeds and Callis attributed no particular significance to their finding that teachers of grades one to three scored highest while teachers of grades seven and eight scored lowest on the MTAI (1951, p. 12). This writer suspects that such facts may intimate not only the nature of the attitudes elementary and secondary student teachers hold towards the pupils they expect to teach, but also the nature of the attitudinal adjustments elementary and secondary student teachers would tend to make if they were asked respectively to consider "adoles-

cents" and "children" in their responses to items of the MTAI.

A study may help to determine the following: whether or not groups of elementary and secondary student teachers responding to the MTAI consider different reference groups of such words as "pupil"; whether or not groups of elementary and secondary student teachers hold different attitudes towards "pupils" of a specified age and grade level; whether or not groups of the same student teaching specialty (elementary or secondary) hold different attitudes towards "pupils" of different specified age and grade levels; and finally, whether or not student teachers generally hold different attitudes towards "pupils" of different specified age and grade levels.

## 2. THE RESEARCH HYPOTHESES

- I Elementary student teachers completing the MTAI with standard instructions will obtain a higher mean score than do secondary student teachers completing the MTAI with standard instructions. [The Inventory with standard instructions will be referred to as the "MTAI (Standard)".]
- II a Secondary student teachers completing the MTAI with standard instructions will consider their expressed attitudes to apply more appropriately to grade eight pupils than to grade four pupils.

- b Elementary student teachers completing the MTAI with standard instructions will consider their expressed attitudes to apply more appropriately to grade four pupils than to grade eight pupils.
- III There will be no difference between the mean scores of groups of elementary and secondary student teachers who complete the MTAI with instructions to make all responses with reference to grade four pupils (ages 9 to 11).  
[The Inventory with such instructions will be referred to as the "MTAI (MOD 4)".]
- IV There will be no difference between the mean scores of groups of elementary and secondary student teachers who complete the MTAI with instructions to make all responses with reference to grade eight pupils (ages 13 to 15).  
[The Inventory with such instructions will be referred to as the "MTAI (MOD 8)".]
- V Secondary student teachers completing the MTAI (MOD 4) will obtain a higher mean score than will secondary student teachers completing the MTAI (MOD 8).
- VI Elementary student teachers completing the MTAI (MOD 4) will obtain a higher mean score than will elementary student teachers completing the MTAI (MOD 8).

VII     The mean score of student teachers (elementary and secondary) completing the MTAI (MOD 4) will be higher than the mean score of student teachers (elementary and secondary) completing the MTAI (MOD 8).

It is expected that the results of empirical tests of these seven hypotheses will help to refute Sandgren and Schmidt's conclusion that "Elementary curriculum student teachers have more favorable attitudes toward school work and children as expressed by the MTAI scores than do student teachers following other curricula" (1956, p. 679).

## CHAPTER IV

### RESEARCH DESIGN AND PROCEDURES

#### 1. THE DESIGN

A 3x2x2 factorial design with three fixed factors and unequal cell frequencies was used in this study (see Table 2, p.39). The fixed factors were as follows:

a. Condition Factor. The three levels of this factor were three forms of the MTAI:

- 1) The first level was the MTAI in its standard form [MTAI (Standard)]. Subjects completing this Inventory were required to make their responses with reference to such general symbols as "pupil", "pupils", "child", "children" and "young people". To the bottom of the last page of the Inventory was attached the statement, "Please indicate the grade level of the students to whom you consider your expressed opinions to apply more appropriately: Grade 4 ☐ or Grade 8 ☐".
- 2) The second level was the Inventory in a modified form [MTAI (MOD 4)]. To the top of each page of this MTAI was attached the statement: "Note: Please consider all statements to be made with reference to Grade 4 pupils (ages 9 to 11)."

- 3) The third level of the condition factor was the Inventory in a modified form [MTAI (MOD 8)]. To the top of each page of this MTAI was attached the statement: "Note: Please consider all statements to be made with reference to Grade 8 pupils (ages 13 to 15)."

Grades four and eight were selected as approximate levels between which considerable changes of behavior often occur in students. Sandstrom considers the way of life of a ten-year-old child to be normally harmonious and well balanced and that the eleventh year is an uncommonly happy phase (1968, p. 220 and p. 62). According to Alexander, the child's activities and behavior in the middle childhood period usually are more easily controlled than in either the early childhood or adolescent periods (1969, p. 159). The adolescent may seek release from the adult control he accepted in his childhood (Crow and Crow, 1965, p. 212). Seeking independence, he suddenly may become unwilling to accept adults as protectors and supervisors (Laycock, 1954, p. 33). He even may resent adult assistance when it is offered to him (Crow and Crow, 1965, p. 8).

b. Specialty Factor. The specialty categories involved in this study were as follows:

- 1) Students in the "One-Year Programme (Secondary) for Graduates" (The University of British Columbia Calendar, 1971/72, p. 158). These students held first degrees and were preparing to teach secondary grades (8 to 12).
- 2) Students in the One-Year Programme (Elementary) for Graduates. These students held first degrees and were preparing to teach intermediate grades (4 to 7) and primary grades (1 to 3).

Research has indicated that MTAI scores of primary student teachers tend to exceed those of intermediate student teachers. (Cook, Leeds and Callis, 1951; Stein and Hardy, 1957). However, the small number of students with first degrees who were preparing to teach primary grades prevented the writer from including "primary" as a separate level of the specialty factor.

c. Sex Factor. Cook, Leeds and Callis reported "Men and women graduate students in general have mean MTAI scores which are not significantly different" (1952, p. 7). On the other hand,

Sandgren and Schmidt (1956),, studying elementary and secondary seniors, found that the women had significantly higher scores on the MTAI than did the men. Similar results were obtained by McEwin (1968). His study indicated that, in both elementary and secondary specialties, the women student teachers obtained higher MTAI scores than did the men. On the basis of a study with elementary junior student teachers at the University of British Columbia, Munro (1960) concluded that the possibility of sex differences in MTAI scores should be investigated. Because "specialty" differences that have been observed in some previous studies may have been due to "sex" differences, it was decided that sex would be included as a factor in this study.

## 2. PRE-EXPERIMENTAL PROCEDURES

Requests for permission to administer the MTAI to a sample of students in the one-year graduate transfer programme after the November practice teaching session were sent to Elementary and Secondary Directors in the Faculty of Education at the University of British Columbia. Permission was granted, and in October of 1971, the names of all students enrolled in the one-year graduate transfer programme were obtained from the Student Teaching Office. There were thirteen regular student teaching seminars



(Education 497) to which students in the elementary one-year graduate transfer programme had been assigned, and there were thirty-six seminars (Education 499) to which the students in the secondary one-year graduate transfer programme had been assigned.

A letter requesting assistance was sent to each of the elementary and secondary seminar advisers (see Appendix A). Each adviser was asked if he would permit randomly selected students in his seminar to complete anonymously the MTAI. A list of names of all students in the seminar was included in the letter. Advisers indicated their willingness to help by returning the list of names with corrections of any errors and/or omissions. Permission to proceed with the study was received from all advisers by letter or telephone.

### 3. SUBJECTS AND SAMPLING

Student teachers at various levels of elementary and secondary professional training were considered for inclusion in this study. It was decided that only the population of students in one-year graduate transfer programmes would be sampled in order to reduce the possible effects (upon MTAI scores) of subjects having different lengths of professional training in elementary or secondary education. Information received from elementary and secondary seminar advisers indicated that the group of students in the regular graduate transfer pro-

gramme consisted of 57 men (elementary programme), 86 women (elementary programme), 222 men (secondary programme) and 155 women (secondary programme).

Three hundred copies of the MTAI were purchased. The research design required that there be three groups of subjects for each of four specialty-sex combinations (see Table 2, p.39). The sampling fractions of the specialty-sex sub-populations could not be made equal without reducing the possible maximum size of the three elementary male groups to an unacceptably low number<sup>1</sup>. It was decided that the assumptions for analysis of variance would be more easily met if the sampling were not representative of the specialty-sex composition of the population of graduate transfer students. The effect of this decision was to preclude any possibility that the results of this study could be generalized to the entire population of graduate transfer students. This loss of "external validity" is regrettable, but not uncommon according to Runyon and Haber (1967). They state:

In the typical experimental situation, the actual population or universe does not exist. What we attempt to do is find out something about the characteristics of the population if it did exist. Thus our sample groups provide us with information about the characteristics of a population if it did, in fact, exist (1967, p. 127).

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1 In a written reply to this writer's request for information, Albert H. Yee of the University of Wisconsin indicated that if "sex" and "specialty" were critical factors, then the cell frequencies should be much larger than ten.

In the present study then, an "artificial population" was assumed.

All fifty-seven (or 100 per cent) of the elementary men received invitations to participate (see Appendix B). Simple random samples were drawn from the other sub-populations to determine which students would receive invitations. Sizes of the samples were as follows: sixty-nine (or 80 per cent) of the elementary women, ninety (or 40 per cent) of the secondary men and seventy-eight (or 50 per cent) of the secondary women. Each of the fifty-seven elementary men was assigned at random to one of three groups, and each of the three groups was randomly assigned to a condition [MTAI (Standard), MTAI (MOD 4) or MTAI (MOD 8)]. The same procedure was followed with the random samples of elementary women, secondary men and secondary women. In this way, twelve specialty-sex-condition groups were formed (see Table 2, p. 39). The random assignment of subjects to groups and groups to conditions was an attempt to achieve a pretreatment "equality" of the three condition groups within each specialty-sex sample (Campbell and Stanley, 1963, p. 176). This all-purpose method was used in light of Lord's assurance that "There is simply no logical or statistical procedure that can be counted on to make the proper allowance for uncontrolled pre-existing differences between groups" (1967, p. 305).

#### 4. ADMINISTRATION OF THE MTAI

The name of each student in each of the twelve specialty-sex-condition groups was typed on a card, and this card was stapled to an envelope which was marked only with the name of the student's seminar adviser for teaching practice. Into the envelope were placed the following items:

- a. An appropriate form of the MTAI determined by the "condition" the student was to receive:  
MTAI (Standard), MTAI (MOD 4) or MTAI (MOD 8).
- b. An IBM answer sheet at the top of which was one of twelve Roman numerals identifying the student's particular specialty-sex-condition group.
- c. A letter requesting the student's assistance (see Appendix B). Other purposes of this letter were as follows:
  - 1) To assure the student that he could become an anonymous respondent by simply removing his name card from the envelope. [Sorenson (1956) found that signing or not signing an answer sheet may affect MTAI scores.]
  - 2) To promise the student a summary of the study's results. [McLeish (1969) believes that such a promise helped to increase the percentage of his survey returns.]

- 3) To ask the student to complete all questions, and to replace the MTAI and answer sheet into the envelope.
- 4) To request that the student return the sealed envelope to his seminar adviser. [Rosenberg (1965) reported that a subject's "evaluative apprehension" can confound the effects of a treatment. A student could be reluctant to respond candidly if he suspected that his seminar adviser could easily appraise his response sheet before sending it to the experimenter.]

The filled envelopes of the students in a particular seminar section were placed into a larger envelope on which was written the name of the seminar adviser and the number of student envelopes enclosed.

To the large envelope was attached a letter to the adviser (see Appendix C), the purposes of which were as follows:

- a. To thank the adviser for his help.
- b. To request that the adviser distribute the envelopes to the students in his seminar.
- c. To ask the seminar adviser to leave with the writer's faculty advisers the returns which he receives.

Materials described in the foregoing paragraphs were mailed to the seminar advisers on November 19th, after the students had completed their first practice teaching session of the academic year.

On the basis of information received from some of the seminar advisers,, it was decided that no attempt would be made to standardize the mode of administration of the MTAI. In some cases, advisers indicated that it would not be convenient for students to complete the MTAI during the seminar meeting time; furthermore, it was recognized that not all students would be regular or punctual in their seminar attendance. For these reasons,, no time limits for completion of the MTAIs or instructions specifying administrative procedures were left with the advisers. Although it can be argued that failure to standardize administration of the MTAIs jeopardized the internal validity of the study, it seems unlikely that this lack of standardization introduced any systematic bias into the results. The MTAI is largely self-administering: all instructions needed for its completion are found within the inventory. All of the advisers were members of a Faculty of Education and presumably were aware of the influence their introductory comments might have upon a student's responses to an attitude inventory. Of greater significance, however, is the fact that subjects for the three conditions were selected at random from

specialty-sex groups without any consideration of the seminar sections. So it was that anyone of the 49 seminar groups might have included students in all three conditions.

## 5. RETURNS

Two hundred ninety-four envelopes for students were sent to seminar advisers on November 19th. By December 18th, 162 (55 per cent) of the inventories had been returned in completed condition. By January 18th, useable returns numbered 198 (67 per cent). Because the MTAIs had been completed anonymously and no surreptitious identification method was used, the writer could not direct appeals for cooperation to individual nonrespondents. To encourage returns, a letter expressing thanks for assistance with the collection of data was sent to each seminar adviser (see Appendix D). Attached to this letter were thank-you notes for all seminar members who had received MTAIs (see Appendix E). Each note requested that the student return his MTAI if he had not done so already. On February 11th, the last MTAIs were collected from advisers, and the final total of useable returns increased to 214 (73 per cent).

The number of returns for each specialty-sex group is displayed in Table 1.

TABLE 1

## RETURNS

Specialty	Number of Returns (and Returns as a Percentage of Sample)	
	Male	Female
Elementary	N = 38 (67 per cent)	N = 42 (61 per cent)
Secondary	N = 70 (78 per cent)	N = 64 (82 per cent)

The return ratios of the elementary group (63.5 per cent) and the secondary group (78.8 per cent) were significantly different ( $p < .03$ ) (see Appendix G1). The literature does not appear to offer any rationale for such a finding. It might be explained by the fact that an approximate mean number of ten MTAs was distributed by each elementary seminar adviser, while secondary advisers each distributed about five MTAs. Conceivably it is more convenient to collect five MTAs than it is to collect ten MTAs.

Also, it may be significant that all subjects were informed that they were part of a "random sample". In an effort to meet design requirements, the writer included all elementary men and 80 per cent of the elementary



women. This means that almost all students in the elementary seminars received inventories. By contrast, the number of subjects in each secondary seminar was a small fraction of the total class membership. The "special attention" received by secondary subjects may have encouraged individual participation (a "Hawthorne" effect), whereas the apparently "indiscriminant group treatment" received by elementary subjects may have provided little incentive for individual participation (a "reverse Hawthorne" effect).

Student comments written on several of the returned MTAIs suggested at least one possible reason for the lack of response of some elementary and secondary subjects. Four respondents indicated that the time of MTAI distribution was inconvenient. On November 19th, the students just had completed two weeks of practice teaching and in twenty-one days they would begin to write Christmas exams. It is conceivable that some students simply discarded the MTAI instead of spending study-time in its completion.

In the letter accompanying each MTAI, the writer asked the students to respond to all statements and to return all materials. Seven respondents returned only their IBM answer sheets. Each of three other respondents returned his answer sheet together with the strip of paper that had been fastened to the bottom of the last page of his MTAI booklet. (On this strip of paper was

the request that the student indicate to which one of two specified grade levels he would consider his responses to apply more appropriately.) Subject behaviors noted in the foregoing sentences suggest the possibility that some of the nonrespondents may have kept the MTAI and its answer sheet because of personal interest in the device. In this study, an arrangement should have been made to provide interested subjects with copies of the inventory they were asked to complete and return.

#### 6. SCORING THE RETURNS

Cook, Leeds and Callis developed an empirical scoring key for the MTAI by considering the differences between the responses of 100 "superior" and 100 "inferior" teachers (see Chapter II, Part 1). With the "empirical" key, high scores do reflect child centered, permissive attitudes; however, the scoring weights of some of this key's items appear to be illogical (Cronbach, 1953). For example, item one reads, "Most children are obedient." Responses are weighted as follows:

Strongly agree	(1)
Agree	(-1)
Undecided or uncertain	(0)
Disagree	(-1)
Strongly disagree	(0)

Both "agreement" and "disagreement" on this item are

penalized.

Keys with scoring weights that are more "logical" have been discussed by Gage (1957) and Yee and Kriewall (1969). These logical keys do not appear to give the MTAI appreciably higher measures of validity and reliability. The principle advantage claimed for logical scoring over empirical scoring is that with the former, "MTAI measures can be conceptualized in terms of relatively simple and communicable theory" (Gage, 1957, p. 215).

The objective of the present study is to attempt some explanation of the secondary-elementary difference that has appeared in the results of a number of researches. In these researches, only the empirical scoring key was used. So that the present study would have a direct relevance to the work that already had been done, the empirical key was used to score the returned inventories.

Of the MTAs returned, 214 were useable; seventeen were not because they were partially or totally incomplete with or without explanations. Of the seventeen inventories, four were from students who refused to cooperate and expressed such objections as: the inventory is of "foreign" origin, completing the inventory is a "waste of time", and pupils should not be considered as "objects". Seven MTAs were returned without any responses or written comments. The remaining six answer sheets were unuseable because they lacked response for one or more items.

The useable MTAI's were scored by hand according to instructions found in the MTAI Manual. Together with a total score for each answer sheet, a score for odd items and a score for even items was determined to facilitate an odd-even split-half reliability calculation (see Appendix H).

Each subject under the MTAI (Standard) condition was asked to indicate whether he considered his responses to apply more appropriately to grade four pupils or to grade eight pupils. Completed responses for this item were tallied in a contingency table for each specialty-sex group.

## 7. DATA ANALYSIS

Data of this study were analysed to permit a test of each of the following null hypotheses at the .05 level of significance:

- I     There is no significant difference between the mean scores of elementary subjects in the MTAI (Standard) condition and secondary subjects in the MTAI (Standard) condition.
- II    With regard to the grade levels to which they report their responses to apply more appropriately, there is no significant difference between elementary subjects in the MTAI (Standard) condition and secondary subjects in the MTAI (Standard) condition.

- III     There is no significant difference between the mean scores of elementary subjects in the MTAI (MOD 4) condition and secondary subjects in the MTAI (MOD 4) condition.
- IV     There is no significant difference between the mean scores of elementary subjects in the MTAI (MOD 8) condition and the secondary subjects in the MTAI (MOD 8) condition.
- V      There is no significant difference between the mean scores of secondary subjects in the MTAI (MOD 4) condition and the secondary subjects in the MTAI (MOD 8) condition.
- VI     There is no significant difference between the mean scores of elementary subjects in the MTAI (MOD 4) condition and the elementary subjects in the MTAI (MOD 8) condition.
- VII    There is no significant difference between the mean scores of the subjects (elementary and secondary) in the MTAI (MOD 4) condition and the subjects (elementary and secondary) in the MTAI (MOD 8) condition.

Statistical procedures used in the testing of null hypotheses I, III, IV, V, VI and VII included: the calculation of means and standard deviations for each of the twelve cells, a chi-square test for proportionality of cell frequencies, a test for the normality of the

data distributions, Bartlett's test for homogeneity of the twelve cell variances, an analysis of variance with unequal cell frequencies (a general linear model) and the Bonferroni t-statistic for all planned comparisons. The procedure used with null hypothesis II was the chi-square test of the independence of categorical variables.

Cook, Leeds and Callis (1951) and Yee (1967) used the Spearman-Brown method with odd-even correlations to estimate the internal consistency of the standard form of the MTAI as .89. To examine modification effects upon the Inventory's split-half reliability with subjects in this study, odd-even internal consistency estimates were performed for each of the three MTAI forms. A test for the significance of a difference between two correlation coefficients for independent samples was used to compare the coefficient of the MTAI (Standard) form with that of each modified form of the Inventory.

When major analyses of the data were complete, a brief summary of results was prepared (see Appendix F). On April 4th, 1972, each seminar adviser was sent this summary together with copies for distribution to his seminar members who had been asked to participate.

## CHAPTER V

### STATISTICAL RESULTS

Numbers of subjects and Inventory mean scores for groups in this study are displayed in Table 2. Group frequencies do not depart significantly from proportionality, and no adjustment of frequencies was made ( $\chi^2 = .885$ ;  $df = 6$ ;  $p > .98$ ) (see Appendix G2). Raw scores for each group are found in Appendix H. These scores were used in tests of two of the standard assumptions for the analysis of variance. The assumption that group scores were sampled from normal distributions was supported by a chi-square test ( $\chi^2 = 15.116$ ;  $df = 9$ ;  $p > .05$ )<sup>2</sup>. A frequency distribution of mean deviation scores is displayed in Appendix I. Results of Bartlett's test for the assumption of homogeneity of group variances permitted acceptance of the hypothesis that variances are equal ( $\chi^2 = 20.66$ ;  $df = 11$ ;  $p > .01$ )<sup>3</sup>. On the bases of the foregoing two assumptions and the knowledge that scores were sampled at random from independent populations, an analysis of variance for unequal cell frequencies was undertaken.<sup>4</sup>

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2 The University of British Columbia Computing Center, "Goodness of Fit Tests" UBC FREQ July, 1971.

3 The University of British Columbia Computing Center, "Bartlett's test for Homogeneity of Variance" UBC HVAR September, 1970.

4 The University of British Columbia Computing Center, "General Linear Hypothesis" UBC BMDX64 August, 1971.

TABLE 2

## NUMBER OF SUBJECTS AND INVENTORY

## MEAN SCORES FOR GROUPS

Specialty	Sex	Condition			Specialty Means		Sex Means
		MTAI (Standard)	MTAI (MOD 4)	MTAI (MOD 8)			
Elementary	Male	$\bar{X} = 31.07$ N = 15	$\bar{X} = 57.91$ N = 11	$\bar{X} = 62.58$ N = 12	$\bar{X} = 58.63$ N = 80	Female	$\bar{X} = 50.43$ N = 106
	Female	$\bar{X} = 67.86$ N = 14	$\bar{X} = 69.54$ N = 13	$\bar{X} = 62.47$ N = 15			
Secondary	Male	$\bar{X} = 38.67$ N = 24	$\bar{X} = 37.86$ N = 21	$\bar{X} = 37.16$ N = 25	$\bar{X} = 38.88$ N = 134	Male	$\bar{X} = 41.72$ N = 108
	Female	$\bar{X} = 33.60$ N = 20	$\bar{X} = 41.50$ N = 22	$\bar{X} = 44.23$ N = 22			
MTAI Condition Means		$\bar{X} = 41.32$ N = 73	$\bar{X} = 48.49$ N = 67	$\bar{X} = 48.51$ N = 74			



A summary of the overall analysis is presented in Table 3.

The analysis of variance allows for estimation of seven different effects upon the MTAI scores. Three "main effects" include those of Specialty, Sex and Condition. Four "interaction effects" include those of Specialty x Sex, Specialty x Condition, Sex x Condition and Specialty x Sex x Condition. The data of Table 3 indicate a highly significant effect of Specialty upon scores ( $F = 20.57$ ;  $df = 1/202$ ;  $P = .00002$ ). Also significant in this study is the main effect of Sex ( $F = 4.27$ ;  $df = 1/202$ ;  $p = .037$ ). The F ratio for the main effect of Conditions did not reach the .05 level of significance ( $F = 1.89$ ;  $df = 2/202$ ;  $p = .148$ ). That is, we cannot confidently discount the possibility that observed differences among means of three different MTAI groups were due to chance factors.

Bonferroni t-statistics were used to make the six planned comparisons among the mean scores of this study (see Appendix G3). The results of the comparisons are displayed in Table 4. The conceptual unit for the significance level using Bonferroni t-statistics is the entire collection of planned comparisons. The long run average of Type I errors that will be made for the six comparisons is  $\alpha = .05$ . Contrasts found to be insignificant permitted acceptance of null hypotheses I, V, VI and VII. Contrasts found to be significant permitted rejection of

TABLE 3  
SUMMARY OF ANALYSIS OF VARIANCE  
FOR INVENTORY SCORES

Source	df	MS	F	Sig. Level
Specialty	1	19309.41	20.57	<.001
Sex	1	4007.92	4.27	<.05
Condition	2	1774.62	1.89	
Spec. x Sex	1	2506.26	2.67	
Spec. x Cond.	2	536.03	.57	
Sex x Cond.	2	683.17	.73	
Spec. x Sex x Cond.	2	2708.29	2.88	
Error	202	938.55		

TABLE 4

BONFERRONI t-STATISTICS FOR SIX PLANNED COMPARISONS:  $\alpha = .05$ 

Null Hypothesis	Means Compared	Absolute Value of Contrast $ \hat{\psi} $	Critical Difference (d)	Confidence Interval		Significant Difference
				Lower Limit	Upper Limit	
I	Elem. MTAI (Stand.) vs Sec. MTAI (Stand.)	12.26	19.64	-7.38	31.90	No
III	Elem. MTAI (MOD 4) vs Sec. MTAI (MOD 4)	24.49	20.92	3.57	45.41	Yes
IV	Elem. MTAI (MOD 8) vs Sec. MTAI (MOD 8)	22.05	19.83	2.22	41.88	Yes
V	Sec. MTAI (MOD 4) vs Sec. MTAI (MOD 8)	.75	17.33	-16.58	18.08	No
VI	Elem. MTAI (MOD 4) vs Elem. MTAI (MOD 8)	1.69	23.04	-21.35	24.73	No
VII	Elem.-Sec. (MOD 4) vs Elem.-Sec. (MOD 8)	.02	13.84	-13.82	13.86	No

null hypotheses III and IV (see p.36).

Twenty-nine elementary and forty-four secondary student teachers completed the standard form of the MTAI. Of these two groups, twenty-four and thirty-eight subjects, respectively, responded to the forced choice item that was fastened to the last page of the standard MTAI. The item requested that the subject choose four or eight as the grade level of students to whom he would consider his Inventory responses to apply most appropriately. Table 5 displays the frequencies of choices made by subjects. Because the elementary and secondary groups were independent and the data were tallied in discrete categories, the chi-square test of the independence of categorical variables was applied. Results led to rejection of null hypothesis II ( $\chi^2 = 32.97$ ;  $df = 1$ ;  $p < .0005$  in one-tailed test) (see Appendix G4). Further analysis showed that secondary men and women did not differ with respect to their choice of grade level: both groups tended to choose grade eight. Among elementary subjects, men showed a less pronounced tendency than women to choose grade four; however, the observed chi-square value of .603 was much smaller than the critical value required for significance at  $\alpha = .05$ .

The odd-even scores of the twelve specialty-sex-condition groups and of the three groups of subjects who completed different forms of the MTAI are found in Append-

ix H. Displayed in Table 6 are the corrected odd-even reliability coefficients for each of the specialty-sex-condition groups and for the three forms of the Inventory.<sup>5</sup> (see Appendix G5 for "correction" formula) Each group of subjects who completed a form of the MTAI was regarded as an independent sample, and the differences among the reliability coefficients of the three groups were tested for significance (see Appendix G6). Comparisons of the reliability coefficient for the MTAI (Standard) with those for the MTAI (MOD 4) and the MTAI (MOD 8) showed negligible differences  $\left[ Z \text{ (Standard vs MOD 4)} = .422, p > .67 \right.$  and  $Z \text{ (Standard vs MOD 8)} = .601, p > .54 \left. \right]$ .

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5 The University of British Columbia Computing Center, "Triangular Regression Package" UBC TRIP February, 1972.

TABLE 5

NUMBER OF ELEMENTARY AND SECONDARY SUBJECTS  
 INDICATING GRADE OF PUPILS TO WHOM THEIR  
 RESPONSES APPLY MOST APPROPRIATELY: MTAI (STANDARD)

Specialty	Choice of Grade		Row Total
	Four	Eight	
Elementary	18	6	24
Secondary	1	37	38
Column Total	19	43	62

Sex in Elementary Specialty	Choice of Grade		Row Total
	Four	Eight	
Male	7	4	11
Female	11	2	13
Column Total	18	6	24

Sex in Secondary Specialty	Choice of Grade		Row Total
	Four	Eight	
Male	1	20	21
Female	0	17	17
Column Total	1	37	38

TABLE 6

ODD-EVEN RELIABILITY\* FOR EACH OF THE  
SPECIALTY-SEX-CONDITION GROUPS AND FOR  
EACH OF THE THREE FORMS OF THE MTAI

Group			No. of Subjects	SD	Correlation Coefficient
Spec.	Sex	Cond.			
		Elem. Males (Stand.)	15	31.86	.891
		Elem. Males (MOD 4)	11	25.55	.931
		Elem. Males (MOD 8)	12	27.45	.942
		Elem. Females (Stand.)	14	18.86	.839
		Elem. Females (MOD 4)	13	18.60	.736
		Elem. Females (MOD 8)	15	23.58	.813
		Sec. Males (Stand.)	24	31.96	.926
		Sec. Males (MOD 4)	21	33.45	.912
		Sec. Males (MOD 8)	25	26.34	.885
		Sec. Females (Stand.)	20	26.54	.769
		Sec. Females (MOD 4)	22	40.03	.907
		Sec. Females (MOD 8)	22	40.48	.913

Form of MTAI	No. of Subjects	SD	Correlation Coefficient
Standard	73	30.85	.885
MOD 4	67	34.13	.901
MOD 8	74	32.28	.906

\* Corrected for attenuation with the Spearman-Brown formula.

## CHAPTER VI

### DISCUSSION

#### 1. INTERPRETATION OF RESULTS

The outcome of the comparison between the mean scores of secondary subjects in the MTAI (Standard) condition and elementary subjects in the MTAI (Standard) condition was not as predicted in research hypothesis I. Although the difference was in the expected direction, it did not reach the critical value needed for significance at the .05 level with the BONFERRONI  $t$  procedure. It should be noted that this procedure is very conservative: "The advantage of being able to make all planned comparisons is gained at the expense of an increase in the probability of making a type II error" (Kirk, 1968, p. 81). The difference between specialty group means on the standard MTAI was almost entirely due to the high mean score of the elementary women. The mean score of the elementary men was slightly below those of the secondary men and women.

The results provide grounds for accepting research hypothesis II. As predicted, there appeared to be a strong tendency amongst secondary subjects in the MTAI (Standard) condition to consider their expressed attitudes as being more appropriately applicable to grade eight pupils than to grade four pupils. Elementary subjects under the same condition tended to choose grade four as the level to which their attitudes more appropriately applied. Incidental



comments made by subjects upon returned inventories also suggested that secondary and elementary subjects in completing MTAI items may be referring to "pupils" at grade levels they expect to teach. Three subjects protested, in various ways, the request that they respond with reference to a grade level they had never taught and/or never expected to teach.

The tendency to select grade four over grade eight was more evident amongst elementary women than amongst elementary men. In the group of elementary men, (whose MTAI (Standard) mean score was similar to those of secondary subjects) four of eleven who responded to the grade-choice-item selected grade eight over grade four; only two of thirteen elementary women respondents did so. This suggests that performance level on the MTAI may be related to the grade level of the "pupil" considered by subjects as they complete the inventory; however, this indication was not supported by the other results of the study.

The expectation expressed by research hypothesis III was that elementary and secondary subjects under the MTAI (MOD 4) condition would obtain similar mean scores. Evidence indicated that the elementary subjects obtained significantly higher scores than did secondary subjects when both groups were instructed to make responses with reference to grade four children. The groups ranked in order of their means from highest to lowest were: elementary women, elementary men, secondary women and secondary

men. Research hypothesis IV was that elementary and secondary groups under the MTAI (MOD 8) condition would not differ in their inventory mean scores. The finding of this study was that the elementary group obtained a significantly higher mean score than did the secondary group. In the elementary group, the mean score of the men slightly exceeded the mean of the women; in the secondary group, the mean score of the women exceeded the mean of the men. The failure of research hypotheses I, III and IV indicates that the phenomenon of a "specialty" difference on the MTAI did not disappear when grade levels were specified, rather it became more evident than it was with elementary and secondary groups in the MTAI (Standard) condition.

Hypothesis V stated that secondary subjects under MTAI (MOD 4) would obtain a higher mean score than would secondary subjects under MTAI (MOD 8). Results showed that there was no significant difference between the secondary groups under these conditions. Results also contradicted research hypothesis VI. That is, elementary subjects completing the MTAI (MOD 8) did not obtain a significantly lower mean score than elementary subjects completing the MTAI (MOD 4). The failure of research hypotheses V and VI appears to indicate that neither elementary subjects nor secondary subjects hold more authoritarian attitudes towards grade eight pupils than towards grade four pupils. Secondary groups obtain relatively low MTAI means with reference

to both grade eight and grade four pupils; elementary groups obtain relatively high MTAI means with reference to both grade four and grade eight pupils.

The prediction of hypothesis VII was that the mean score of elementary and secondary subjects under the MTAI (MOD 4) condition would be significantly greater than the mean score of elementary and secondary subjects under the MTAI (MOD 8) condition. This study revealed that the difference was negligible: the responses of subjects involved in this study gave no support to the hypothesis that student teachers who consider grade eight pupils obtain lower MTAI scores than do student teachers who consider grade four pupils.

The factor which made the largest contribution to variance in the results of this study was the "Specialty" of respondents. Over all conditions, elementary subjects generally obtained higher mean scores than did secondary subjects. There was no significant specialty x condition interaction. This finding not only is consistent with those reviewed in Chapter II: it appears to lend credence to Sandgren and Schmidt's conclusion that "Elementary curriculum student teachers have more favorable attitudes towards school work and children as expressed by the MTAI scores than do student teachers following other curricula" (1956, p. 679).

The overall contribution of the "Sex" factor to variation in MTAI scores was significant. Over all con-

ditions, women generally obtained higher mean scores than did men. There was no significant sex x condition interaction. The finding of sex differences on the MTAI is similar to those of Sandgren and Schmidt (1956), Munro (1960) and McEwin (1968). The insignificance of the specialty x sex interaction suggests that women tend to obtain higher scores in both elementary and secondary specialties.

Odd-even split-half correlations of each of the three MTAI forms revealed that a specification of the grade level of "pupils" to be considered by respondents of the MTAI does not appreciably increase the "internal consistency" of the inventory. The reliability coefficients obtained in this study suggest that the MTAI total score is an indicator of some form of homogeneous attitude pattern.

## 2. LIMITATIONS

The observed differences between groups may have been influenced by factors other than those included in the design of this study. Random methods of selection were used in an attempt to achieve a pre-treatment "equivalence" of groups. The presumption of group equality, in terms of extraneous influences, is implausible due to the appearance of significantly different return ratios for elementary and secondary subjects. It is conceivable that some uncontrolled factor which produced the different

return ratios also accounted for the significant differences observed between Inventory scores of elementary and secondary subjects.

Another rival hypothesis for the differences observed between "specialties" is that systematic differences exist between applicants for secondary and elementary teacher training. In other words, the effects of "specialties" may well be confounded with a "selection" effect.

One cannot discount the possibility that the results were somehow biased by the fact that inventories were completed by subjects over a period of nearly three months. Intervening the dates of "initial distribution" and "final collection" were such events as the Christmas exams and the Christmas holidays. Ideally, all subjects should have completed the inventories simultaneously so that the periods of their professional training might have been approximately the same. As it was, different numbers of elementary and secondary subjects, depending upon situations in their particular specialties, may have decided to complete their inventories during the Christmas break. An MTAI completed after exams and in festive surroundings may be quite different from an MTAI completed directly after a challenging practice teaching session.

The "internal validity" of this study may have been much increased by the use of greater controls. On the other hand, increased controls may have reduced the feasi-

bility of this study and may have themselves produced distortions within the results. To illustrate: a number of seminar advisers made it clear that they would assist with the study only if each of their students were free to choose whether or not he would complete the inventory. So it was decided that the results of the study would be based upon only voluntary responses. If the writer had insisted that all inventories be completed at a certain time, he would have lost the cooperation of many advisers, and quite possibly, some of the returns he would have received would have been from inconvenienced and irate respondents.

The findings of a study with "external validity" may be generalized to certain populations, settings, treatment variables and measurement variables (Campbell and Stanley, 1963, p. 175). The treatment and measurement variables in this study have been described and are easily replicable. The levels of the "condition" factor were "fixed" and so the findings have no relevance to considerations of grade levels other than four and eight. The measurement variable was the MTAI in three forms all scored with the "empirical key".

"Population" and "ecological" validities are, to say the least, difficult to achieve for a study of attitudes. Some attempt has been made to describe the features of the setting from which the results emerged; however, left

undescribed are many aspects of the particular times and situations in which this study was completed. It is quite possible that the setting of the Faculty of Education at the University of British Columbia in the fall of 1972 or 1973 will be quite different from what that setting was in the fall of 1971. For example, there is evidence of a growing surplus of teachers in British Columbia. This trend could well produce changes in the structure and courses of the Faculty of Education; it also could produce changes in enrollments and attitudes of student teachers.

The "target" population of this study could be described as students enrolled in elementary and secondary one-year graduate transfer programs. At the outset of the research, the "experimentally accessible" population was the group of students enrolled in the elementary and secondary one-year graduate transfer programmes within the Faculty of Education at the University of British Columbia in the fall of 1971. Requirements of the research design made it necessary to use unequal sampling fractions for the four sub-populations within the available group; furthermore, returns from the samples were partial. These facts prevent an inference that the results of the study may be generalized to the actual population of students in the graduate transfer programmes. In fact, the results may be applicable to only a "hypothetical" population of voluntary respondents. The problem involved in generalizing

any study result to a "target" population has been expressed by Bracht and Glass; "The degree of confidence with which an experimenter can generalize to a target population is never known because the experimenter is never able to sample randomly from the true target population" (1968, p. 441).

At least one limitation of this study is related to the type of analysis employed. In using the analysis of variance techniques, it was a mathematical necessity to assume that random samples were drawn from "virtually infinite populations" in which MTAI scores had normal distributions. (Stanley and Glass, 1970, p. 274). Because the population sampled was clearly finite, "urn randomization" and non parametric techniques may have been more appropriate methods for this study. Such techniques would have produced smaller error terms and possibly more "significant" findings (Campbell and Stanley, 1963, p. 194).

### 3. FURTHER RESEARCH

Campbell and Stanley state that "... continuous multiple experimentation is more typical of science than once and for all definitive experiments" (1963, p. 173). The present study has failed to support the hypothesis of a relation between the scores of student teachers and the grade level of "pupils" they consider while responding to the MTAI; nevertheless, this writer believes that the



hypothesis warrants further empirical testing. In this study, it was presumed that a handprinted instruction fastened to the top of each inventory page would be followed conscientiously by each respondent (see Appendix J). It is possible that these instructions did not intrude sufficiently into the awareness of the subject while he was completing the MTAI. A more impressive presentation of instructions could have resulted in more impressive effects.

Various research designs should be considered in testing the hypotheses of this thesis. One design, which does not require an enormous faith that "randomization is equation", has been suggested to this writer by Albert H. Yee of the University of Wisconsin. The three versions of the MTAI could be administered in varying sequences to each subject selected at random from the various subpopulations of student teachers. This design would serve to make "... each person his own control in other competing factors" (Albert H. Yee, personal communication, 1972).

Yee and Kriewall's "pentachotous-logical" scoring key for the MTAI employs scoring weights which are more psychologically interpretable than those of the "empirical" scoring key. The "empirical" key tends to produce distributions which are flat-topped, whereas the "pentachotomous-logical" key tends to produce distributions with greater spreads among extreme positive and negative scores (Yee and Kriewall, 1969, p. 13). The foregoing two considera-

tions suggest that possibly greater and more meaningful differences between groups would appear if Yee and Kriewall's key were used to score inventories in a future test of the hypotheses of this paper.

One approach to further separating and understanding the sources of variance within and between the distributions of MTAI scores of student teachers may be to investigate each subject's subscale scores on factor analytically established dimensions of the MTAI. Such an approach may reveal that significant differences between elementary and secondary student teachers exist on only certain unitary traits.

Differences between mean scores of elementary and secondary student teachers have been observed during various stages of their professional training. Attempts should be made to determine how these differences are influenced by the separate factors of "specialty experience" and "subject's selection of specialty". Such attempts would involve administration of the inventories to subjects prior to the outset of their professional course work and student teaching. If significant differences appeared only after some period of training and student teaching, there would be basis for a hypothesis that secondary student teacher develop attitudes towards adolescent pupils and generalize these attitudes to children, whereas elementary student teachers develop attitudes towards pupils who

are children and generalize these attitudes to pupils who are adolescents.

#### 4. CONCLUSION

The purpose of this study was to empirically test a rationally developed major hypothesis that differences between MTAI mean scores of elementary and secondary student teachers are a reflection of the different attitudes with which student teachers as a group regard "pupils" of different age and grade levels. The data supported the hypotheses that elementary subjects tend to regard their responses to the standard MTAI as being more appropriate for grade four pupils than for grade eight pupils, and that secondary subjects tend to regard their responses to the MTAI as being more appropriate for grade eight pupils than for grade four pupils. The data, however, contradicted the hypothesis of no differences between elementary and secondary subjects responding to inventories which specify that grade four pupils are to be considered; similarly, no grounds were found for the hypothesis that no differences exist between elementary and secondary subjects responding to inventories which specify that grade eight pupils are to be considered. The results indicated that elementary subjects under the MTAI (MOD 4) condition obtained a mean score not significantly different from that obtained by elementary subjects under the MTAI (MOD 8) condition.

The same observation was made for groups of secondary subjects. Finally, the outcomes of this study failed to support the hypothesis that elementary and secondary one-year graduate transfer students, combined, obtain a significantly higher MTAI mean score with reference to grade four "pupils" than they do with reference to grade eight "pupils".

This study showed that the most significant source of variance in inventory responses was the "specialty" of the respondents; elementary subjects tended to obtain significantly higher MTAI mean scores than did secondary subjects ( $P = .00002$ ). Similar "specialty" differences have occurred in the results of several researches, with subjects at different stages of professional training, under different administrative conditions, in widely separate settings and over the space of two decades. Campbell and Stanley have written, "the goal of science includes not only generalization to other populations and times but to other non-identical representations of the treatment" (1963, p. 202). In this study, the standard and two slightly modified forms of the MTAI were used. The finding of higher elementary performances emerged particularly from the MTAI (MOD 4) and MTAI (MOD 8) conditions.

The other significant source of variance was the "sex" of respondents; female subjects tended to obtain higher scores than male subjects ( $P = .037$ ). This tend-

ency appeared to be particularly strong within the elementary specialty.

Sandgren and Schmidt concluded that, "Elementary curriculum student teachers have more favorable attitudes towards school work and children as expressed by their MTAI scores than do student teachers following other curricula" (1956, p. 679). They wrote this generalization after studying "senior students at a midwestern state teachers college" (1956, p. 673). The objective of the present study was to cast doubt upon Sandgren and Schmidt's generalization without questioning their implicit assumption that relatively high MTAI scores reflect "favorable" attitudes in student teachers. In this research, it was hypothesized that the MTAI mean scores of elementary and secondary student teachers in one-year graduate transfer programmes would not be significantly different if the grade levels of "pupils" to be considered were specified. As it is, Sandgren and Schmidt's conclusion has survived the empirical tests of this study; other studies may demonstrate that elementary and secondary student teachers do not have different attitudes towards children.

Sandgren and Schmidt's assumption that high MTAI scores reflect "favorable" attitudes does not lend itself to empirical testing. Its acceptance or rejection depends on the philosophy and value preferences of those who use

the MTAI, and, according to Yee and Fruchter, the Inventory "... continues to be a popular research and screening tool ... " (1971, p. 131).

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## APPENDIX

## APPENDIX A

## LETTER REQUESTING ASSISTANCE FROM SEMINAR ADVISERS

Dear \_\_\_\_\_,

I am a public school teacher completing a thesis for an M.Ed. degree at U.B.C. My advisers are Dr. W. Schwahn, Dr. S.F. Foster and Dr. B.C. Munro. Also assisting me are Dr. J.R. Mitchell and Mr. Robert F. Conry.

Dr. J.R. McIntosh (or Dr. F.H. Johnson) has granted me permission to proceed with a study which requires a single administration of an attitude inventory to a random sample of the one-year secondary transfer graduates (or one-year elementary transfer graduates) who complete the November practice teaching session.

Please, would you permit randomly selected students of your Education 499 (or 497) class to complete anonymously the attitude inventory shortly after their November school experience? The time usually required to complete the inventory is twenty to thirty minutes.

With your consent, I would send you envelopes, each labelled with the name of a randomly selected student in your charge. Each envelope contains instructions, an attitude inventory and an IBM answer sheet.

The instructions ask the student to complete the inventory, to place materials in the envelope, to remove his name label and to return the envelope to you.

The planned study could be of interest to you and your students. When it is complete, I shall give you a summary of the results.

Please, may I include your one-year transfer graduates in a pool from which will be drawn a random sample? If you give me permission, please correct any errors and/or omissions in the accompanying list and send it to me in the addressed envelope.

I appreciate your help.

Sincerely,

Colin Rollins

## APPENDIX B3

## LETTER REQUESTING ASSISTANCE FROM STUDENT TEACHERS

Dear \_\_\_\_\_,

Please, will you assist in the completion of a survey by frankly marking your position on each statement in the following "Inventory"?

Your name was one of 300 selected at random from pools of the names of graduate students in the one-year elementary and secondary transfer programs.

By removing your name card which is stapled to the brown envelope, you can become an "anonymous respondent". (It is not necessary that you write your name anywhere on the booklet or answer sheet.)

When the planned survey is completed, copies of a summary of its results will be sent to your seminar adviser.

Please, will you participate in the survey by:

1. responding to all statements and questions.
2. replacing the completed booklet and answer sheet in the envelope.
3. removing your name card.
4. returning the sealed envelope to your seminar adviser.

Your help is sincerely appreciated.

Colin Rollins

## APPENDIX C

## LETTER THANKING SEMINAR ADVISERS FOR THEIR COOPERATION

Dear \_\_\_\_\_,

Thank you for returning the list of names of the one-year elementary transfer graduates in your Education 497 (or 499) seminar.

The accompanying envelopes are labelled with names of your students who were randomly selected. Each envelope contains a request for assistance (please see the following page).

Please, will you give these envelopes to your students? Envelopes returned to you may be placed in the large brown envelope.

When you have as many envelopes as your students are willing to return, please leave the large brown envelope in the mail room for Dr. Schwahn or Dr. Stephen Foster.

Again, I am grateful for your help.

Sincerely,

Colin Rollins



## APPENDIX D

## LETTER THANKING SEMINAR ADVISERS FOR COLLECTING RETURNS

Dear \_\_\_\_\_,

Thank you for helping me to collect the data required for a study with the "Minnesota Teacher Attitude Inventory".

I shall be able to send you a summary of the data when I have received more returns.

Please find attached to this page notes to your 497 (or 499) seminar members who received the questionnaire.

I appreciate your assistance.

Sincerely,

Colin Rollins

## APPENDIX E

## LETTER THANKING STUDENT TEACHERS FOR THEIR RESPONSES

Dear \_\_\_\_\_,

Thank you for providing the data which will make it possible to complete a study with the "Minnesota Teacher Attitude Inventory". If, in future, I can help you as you have helped me, please phone \_\_\_\_\_.

I shall be able to send you a statement of the study's purpose and a summary of the data when more completed questionnaires and answer sheets have been returned.

Again, thank you for your assistance.

Sincerely,

Colin Rollins

## APPENDIX F

A REPORT TO PARTICIPANTS IN THE STUDY INVOLVING  
THE "MINNESOTA TEACHER ATTITUDE INVENTORY"

## INTRODUCTION

Several researchers have reported that groups of secondary student teachers obtained significantly lower mean MTAI scores than did groups of elementary student teachers. If, as some writers suggest, the MTAI may be used as an indicator of a respondent's "democratic" attitudes towards children, then the foregoing findings possibly could be interpreted to mean that, for various reasons, elementary student teachers tend to hold more "democratic" attitudes towards the education of students in general than do secondary student teachers.

To investigate the plausibility of an interpretation which disputes the previous interpretation, the writer arranged the present study as a test for three major hypotheses:

1. Secondary student teachers completing the MTAI read such general words as "pupil" and express attitudes which they consider "to apply more appropriately" to grade VIII students than to grade IV students. The opposite is true of elementary student teachers.
2. Secondary and elementary student teachers obtain higher scores when they respond to the MTAI with reference to grade IV students than they do when they respond to the MTAI with reference to grade VIII students.
3. There is no significant difference between the mean scores of elementary student teachers and secondary student teachers when both groups respond to the MTAI with reference to students of the same specified grade level (either grade IV or grade VIII)

## POPULATION

Students invited to participate in this study were randomly selected graduates in the elementary and secondary one-year-transfer programs at U.B.C.

## SAMPLES AND RETURNS

Item	Group			
	Elem. Males	Elem. Females	Sec. Males	Sec. Females
Approximate total No. of grad. trans. students in Faculty of Education U.B.C. 71-72	57	86	222	155
Total simple random sample	57(100%)	69(80%)	90(40%)	78(50%)
Number of completed and unspoiled returns and this number as a percentage of total simple random sample	$\frac{38}{57}=67\%$	$\frac{42}{69}=61\%$	$\frac{70}{90}=78\%$	$\frac{64}{78}=82\%$

## DESIGN AND RESULTS

Group	Instructions accompanying MTAI		
	The Standard MTAI (at the end of this inventory, subjects are asked to indicate whether their expressed attitudes apply most appropriately to grade IV or grade VIII students).	The MTAI modified with instructions to make responses with reference to grade IV students.	The MTAI modified with instructions to make responses with reference to grade VIII students.
Elem. Male student teachers	N=15 $\bar{X}=31.07$ SD=31.86	N=11 $\bar{X}=57.91$ SD=25.55	N=12 $\bar{X}=62.58$ SD=27.45
Elem. Female student teachers	N=14 $\bar{X}=67.86$ SD= 18.86	N=13 $\bar{X}=69.54$ SD=18.60	N=15 $\bar{X}=62.47$ SD=23.58
Second. Male student teachers	N=24 $\bar{X}=38.67$ SD=31.98	N=23 $\bar{X}=37.86$ SD=33.45	N=25 $\bar{X}=37.06$ SD=26.34
Second. Female student teachers	N=20 $\bar{X}=33.60$ SD=26.54	N=22 $\bar{X}=41.50$ SD=40.04	N=22 $\bar{X}=44.23$ SD=40.48

Subjects completing the standard form of the MTAI only were instructed to think in terms of the "general situation" when responding to items.

GRADE LEVEL OF PUPILS TO WHOM SUBJECTS CONSIDERED THEIR  
RESPONSES TO APPLY MOST APPROPRIATELY

Group	Grade Choices	
	Subject considered his responses to apply most appropriately to grade IV students.	Subject considered his responses to apply most appropriately to grade VIII students.
Elem. st. teachers (Standard MTAI)	Number of completed returns = 18	Number of completed returns = 6
Second. st. teachers (Standard MTAI)	Number of completed returns = 1	Number of completed returns = 37

Elementary and Secondary student teachers were significantly different ( $P < .01$ ) in their choice of a grade level to which they considered their responses to apply most appropriately. This finding tends to support hypothesis I.

Evidence from the study does not support hypotheses II and III. If the MTAI is considered as an indicator of "democratic" attitudes towards students, then it would appear that, for as yet undetermined reasons, the randomly selected elementary student teachers from the one-year-transfer program tended to be more "democratic" in their expressed attitudes towards children and early adolescents than did the randomly selected secondary student teachers from the one-year-transfer program. (Anova  $F = 20.57$ ;  $P = .00002$ )

## APPENDIX G

## NOTES ON STATISTICAL PROCEDURES

1 THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN  
ELEMENTARY AND SECONDARY RETURN RATIOS.

A test for the significance of the difference between two independent proportions is defined in Ferguson (1971) as

$$Z = \frac{P_1 - P_2}{\sqrt{Pq \left[ \frac{1}{N_1} + \frac{1}{N_2} \right]}}$$

where

$Z$  = A unit-normal-curve deviate.

$P = \frac{f_1 + f_2}{N_1 + N_2}$  = Estimate of a proportion based on the two samples combined.

$f_1$  = Number of returns for sample 1.

$f_2$  = Number of returns for sample 2.

$N_1$  = Number in sample 1.

$N_2$  = Number in sample 2.

$q = p-1$

$$P_1 = \frac{f_1}{N_1}$$

$$P_2 = \frac{f_2}{N_2}$$

For elementary return ratio = .634

and secondary return ratio = .798

$$Z = 2.203$$

In a two-tailed test, the critical value required for significance at the .05 level is 1.96; hence, we reject the null hypothesis of no significant difference between the elementary and secondary return ratios.

## APPENDIX G (continued)

## 2 THE SIGNIFICANCE OF DEPARTURE FROM PROPORTIONALITY OF CELL FREQUENCIES

A test for proportionality of cell frequencies is defined in Ferguson (1971) as

$$\chi^2 = \sum_{r=1}^R \sum_{c=1}^C \frac{(n_{rc} - \bar{n}_{rc})^2}{\bar{n}_{rc}} \quad df = (R-1)(C-1)$$

where

$$\bar{n}_{rc} = \frac{n_{r.} n_{.c}}{N} = \text{the expected frequency of cell in } r\text{th row and } c\text{th column.}$$

$n_{r.}$  = marginal frequencies for rows.

$n_{.c}$  = marginal frequencies for columns.

$N$  = total frequency of cells.

$n_{rc}$  = frequency of cell in  $r$ th row and  $c$ th column.

$R$  = number of rows.

$C$  = number of columns.

## APPENDIX G (continued)

## 3 THE SIGNIFICANCE OF THE DIFFERENCES IN SIX PLANNED COMPARISONS

Bonferroni's  $t$ -statistic test is defined in Kirk (1968) as

$$d = t' D^{\alpha/2} ; c, v \sqrt{MS_{ERROR} \left[ \frac{(C_j)^2}{n_j} + \frac{(C_j')^2}{n_{j'}} + \dots + \frac{(C_j'')^2}{n_{j''}} \right]}$$

where

$d$  = the difference that a comparison must exceed in order to be declared significant.

$t' D^{\alpha/2}$  is obtained from a table (D.16 in Kirk) which indicates the value of a significance level  $\alpha$  evenly divided among  $c$  comparisons.

$c$  = the number of comparisons that are to be made among means.

$v$  = degrees of freedom for experimental error.

$C_j$  = the coefficient for the  $j$ th mean.

$n_j$  = the number of scores in the  $j$ th treatment level.

"primes" are used to designate different levels of the treatment.

$MS_{error}$  = population error variance.



## APPENDIX G (continued)

## 4 THE CHI-SQUARE TEST OF THE INDEPENDENCE OF CATEGORICAL VARIABLES.

This test is defined in Runyon and Haber (1967) as

$$\chi^2 = \sum_{r=1}^R \sum_{c=1}^C \frac{(|f_o - f_e| - 0.5)^2}{f_e} \quad df = (R-1)(C-1)$$

where

R = number of rows

C = number of columns

$f_o$  = observed frequency of cell

$f_e$  = expected frequency of cell

(In the one-degree-of-freedom situation, a correction for continuity is required to obtain a closer approximation of the obtained  $\chi^2$  values to the theoretical distribution. The correction consists of subtracting 0.5 from the absolute difference  $|f_o - f_e|$  for each cell.)

## APPENDIX G (continued)

- 5 THE SPEARMAN-BROWN FORMULA (USED TO CORRECT THE ODD-EVEN CORRELATION COEFFICIENTS FOR ATTENUATION)

This test is defined in Ferguson (1971) as

$$r_{xx} = \frac{2 r_{hh}}{1 + r_{hh}}$$

where

$r_{xx}$  = An estimate of the reliability coefficient for the whole test.

$r_{hh}$  = The split-half reliability coefficient.

- 6 THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN TWO CORRELATION COEFFICIENTS FOR INDEPENDENT SAMPLES

This test is defined in Ferguson (1971) as

$$Z = \frac{Z'_{r_1} - Z'_{r_2}}{\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}}$$

where

$Z$  = A Unit-Normal-Curve deviate.

$Z'_{r_1}$  = Fisher's transformation of  $r_1$ .

$Z'_{r_2}$  = Fisher's transformation of  $r_2$ .

$N_1$  = Number of subjects in independent sample 1.

$N_2$  = Number of subjects in independent sample 2.

## APPENDIX H

TOTAL, EVEN AND ODD SCORES OF SUBJECTS  
IN SPECIALTY-SEX-CONDITION GROUPS

[illegible]

## APPENDIX H (continued)

TOTAL, EVEN AND ODD SCORES OF SUBJECTS  
IN SPECIALTY-SEX-CONDITION GROUPS

[illegible]

## APPENDIX H (continued)

TOTAL, EVEN AND ODD SCORES OF SUBJECTS  
IN SPECIALTY-SEX-CONDITION GROUPS

S No.	Groups								
	Secondary Male (Stand.)			Secondary Male (MOD 4)			Secondary Male (MOD 8)		
	Total	Even	Odd	Total	Even	Odd	Total	Even	Odd
01	-56	-24	-32	-44	-28	-16	-26	-14	-12
02	-5	-1	-4	-20	-12	-8	-14	-11	-3
03	9	6	3	-9	4	-13	8	6	2
04	12	12	0	1	11	-10	9	13	-4
05	18	15	3	10	9	1	15	13	2
06	24	14	10	31	22	9	23	10	13
07	25	20	5	32	15	17	23	18	5
08	26	20	6	34	25	9	27	16	11
09	30	12	18	35	27	8	28	24	4
10	31	18	13	40	26	14	30	14	16
11	35	29	6	46	23	23	33	25	8
12	37	31	6	48	33	15	37	29	8
13	44	32	12	51	34	17	40	18	22
14	47	27	20	55	31	24	40	25	15
15	49	30	19	56	37	19	40	26	14
16	50	35	15	65	33	32	43	31	12
17	52	28	24	68	42	26	43	34	9
18	54	32	22	69	40	29	56	33	23
19	54	36	18	72	35	37	58	39	19
20	58	40	18	76	42	34	62	43	19
21	71	32	39	79	56	23	63	37	26
22	75	49	26				69	42	27
23	88	49	39				73	42	31
24	100	53	47				74	41	33
25							75	41	34

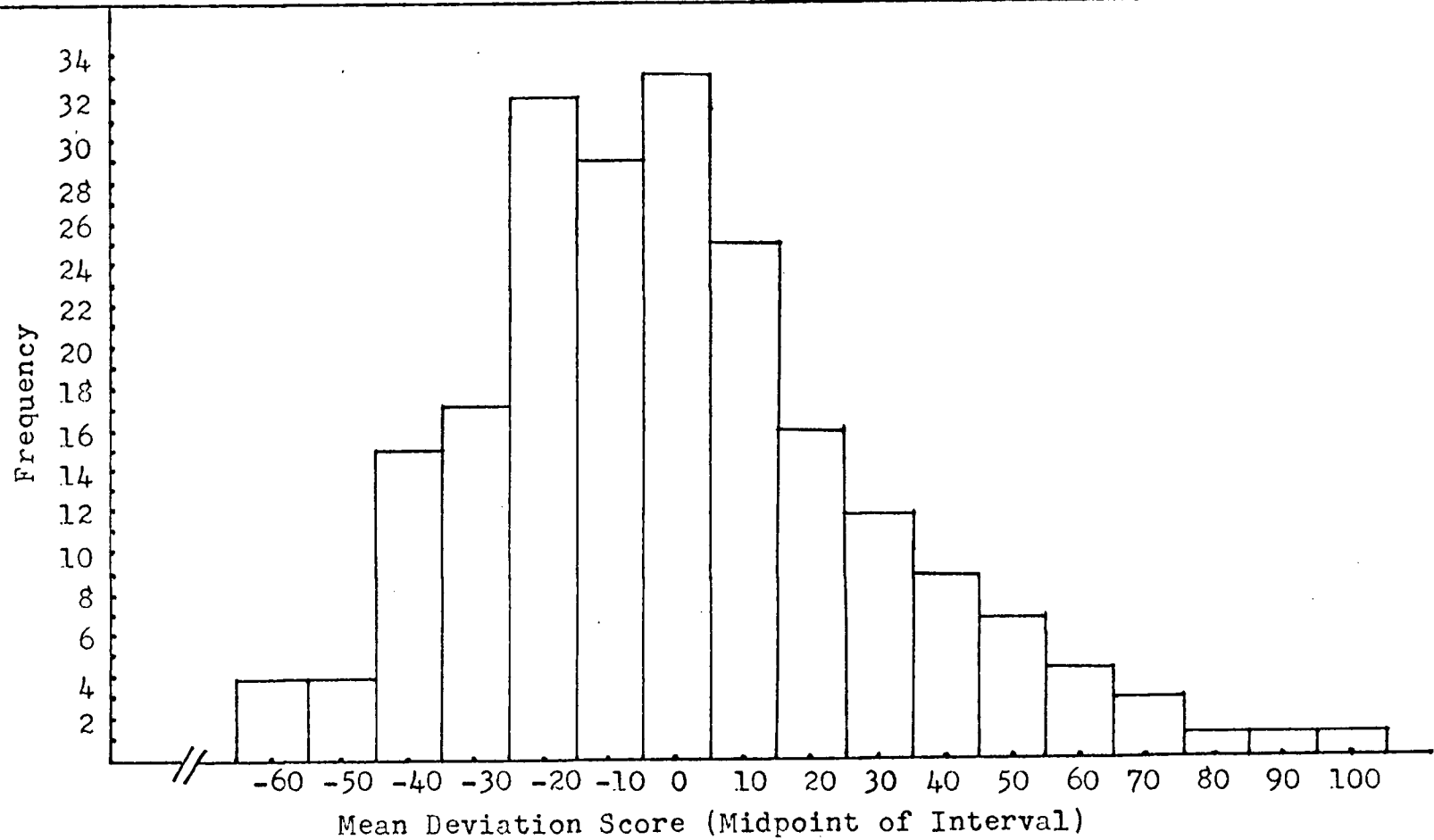
## APPENDIX H (continued)

TOTAL, EVEN AND ODD SCORES OF SUBJECTS  
IN SPECIALTY-SEX-CONDITION GROUPS

S No.	Groups								
	Secondary Female (Stand.)			Secondary Female (MOD 4)			Secondary Female (MOD 8)		
	Total	Even	Odd	Total	Even	Odd	Total	Even	Odd
01	-56	-24	-32	-44	-28	-16	-26	-14	-12
02	-5	-1	-4	-20	-12	-8	-14	-11	-3
03	9	6	3	-9	4	-13	8	6	2
04	12	12	0	1	11	-10	9	13	-4
05	18	15	3	10	9	1	15	13	2
06	24	14	10	31	22	9	23	10	13
07	25	20	5	32	15	17	23	18	5
08	26	20	6	34	25	9	27	16	11
09	30	12	18	35	27	8	28	24	4
10	31	18	13	40	26	14	30	14	16
11	35	29	6	46	23	23	33	25	8
12	37	31	6	48	33	15	37	29	8
13	44	32	12	51	34	17	40	18	22
14	47	27	20	55	31	24	40	25	15
15	49	30	19	56	37	19	40	26	14
16	50	35	15	65	33	32	43	31	12
17	52	28	24	68	42	26	43	34	9
18	54	32	22	69	40	29	56	33	23
19	54	36	18	72	35	37	58	39	19
20	58	40	18	76	42	34	62	43	19
21	71	32	39	79	56	23	63	37	26
22	75	49	26				69	42	27
23	88	49	39				73	42	31
24	100	53	47				74	41	33
25							75	41	34

APPENDIX I

FREQUENCY DISTRIBUTION OF 214 MEAN DEVIATION SCORES  
GROUPED IN CLASS INTERVALS OF TEN



## APPENDIX J

MODIFICATIONS TO THE MINNESOTA TEACHER  
ATTITUDE INVENTORY\* FOR EACH OF THE  
THREE CONDITIONS

## I THE "STANDARD CONDITION"

A request for information was glued to the bottom of the last page of the MTAI booklet:

PLEASE INDICATE THE GRADE LEVEL OF THE "STUDENTS" TO WHOM YOU CONSIDER YOUR EXPRESSED OPINIONS TO APPLY MOST APPROPRIATELY.

GRADE 4 OR GRADE 8

☐
☐

## II THE "MOD 4 CONDITION"

An instruction was glued to the top of each page of the MTAI booklet:

NOTE:

PLEASE CONSIDER ALL STATEMENTS TO BE MADE WITH REFERENCE TO GRADE 4 PUPILS (AGES 9 to 11).

## III THE "MOD 8 CONDITION"

An instruction was glued to the top of each page of the MTAI booklet:

NOTE:

PLEASE CONSIDER ALL STATEMENTS TO BE MADE WITH REFERENCE TO GRADE 8 PUPILS (AGES 13 to 15).

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\* The Minnesota Teacher Attitude Inventory and Scoring Sheet may be purchased from

The Guidance Center  
1000 Yonge Street  
Toronto 289, Ontario  
Canada