Continuing Professional Education for Teachers and its Relationship to Teacher Effectiveness

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CONTINUING PROFESSIONAL EDUCATION FOR TEACHERS AND ITS
RELATIONSHIP TO TEACHER EFFECTIVENESS

by

Gregory Allen Knoblock

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CONTINUING PROFESSIONAL EDUCATION FOR TEACHERS AND ITS
RELATIONSHIP TO TEACHER EFFECTIVENESS

Gregory Allen Knoblock, Ed.D.
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In this study, the relationship between continuing education for
the teacher and that teacher's effectiveness as measured by an
achievement test and an evaluative measure completed by the teacher's
students is investigated. The importance that number of hours,
currentness, and subject area has upon any relationship with effec-
tiveness, and the relationship between motivation for entry into and
satisfaction with graduate/postgraduate work are also studied.

Data necessary to test these relationships were obtained from
two sources: a survey of mathematics teachers in Macomb County,
Michigan, and the results from two student instruments randomly
administered to the classes of those teachers volunteering continued
participation.

Support for the hypothesized higher degree of effectiveness for
teachers recently enrolled in a continuing education program is
demonstrated by the achievement test results and two of the six
characteristics of the evaluative instrument: teacher subject matter
orientation and the teacher's ability to motivate students. Further-
more, this last characteristic is additionally affected if the gradu-
ate study corresponds to the subject matter taught by the teacher.
There is minimal support for the hypothesis that the degree of participation in a graduate program and teacher effectiveness are not related. A similar lack of support for the relationship between the currentness of such study and that teacher's effectiveness is demonstrated. Instead, it appears that participation or lack of participation in graduate education rather than the degree, subject area, or currentness of that participation has an influential effect on teacher effectiveness.

There is support for a hypothesized relationship between motivators for entry into and satisfaction with a continuing education program: the more intrinsic the motivators the greater the degree of satisfaction. The degree of intrincity for motivators is found to have no relationship to the recentness of the graduate experience. In fact, the motivation scores are skewed extrinsically.

Limitations and remedies for these limitations are included accompanying suggestions for future studies.
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Gregory Allen Knoblock
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CHAPTER I

INTRODUCTION

What motivates teachers to participate in a program of continuing education, how satisfactory are these participatory experiences, and are there any benefits for the students of those teachers participating in graduate and postgraduate programs? These questions and the existence of possible relationships between each of these queries must be investigated as millions of dollars are spent for continuing education activities despite the present scarcity of and competition for public education's dwindling financial resources (Berg et al., 1980; Florio & Koff, 1977).

Significance of the Problem

Although few quarrel with either Goodlad's (1969) contention of public education's uniqueness as the nation's only large-scale enterprise failing to provide both a periodic review of its employees' skills and abilities and the finances required to update those skills as necessary, or the resultant payment of graduate school tuition directly by the participating teachers; Berg et al. (1980) maintain that the majority of such funding is born by the teachers' employers either "directly as support for the activities or indirectly as increased salaries for teachers who successfully complete the activities" (p. 2) and similar "initiatives for increased education" (Florio & Koff, 1977, p. 4).
This view of continuing education for teachers as an "investment" by school boards strapped with declining enrollments and revenue closely parallels Florio and Koff's (1977) belief that school districts who "reward teachers for extending their professional training (or punish them for failing to do so) without regard to how that education relates to teaching" (p. 14) are making "chance" investments with little return in terms of client-centered achievement. As the rapid rise in per capita costs of schooling over the last 25 years turns school finance into a major political issue at local, state, and federal levels (Averch, Carroll, Donaldson, Kiesling, & Pincus, 1974), an investigation of the relationship between a district's "investment" in continuing education for its staff and the achievement level of those student/clients "serviced" by this staff becomes increasingly important.

Furthermore, if a relationship between a staffs' participation in a continuing education program and the achievement level of their students' does exist, does this relationship exist only if those subjects studied while participating in a program of continuing education are directly related to a professional's discipline? For the professional educator, there are those who favor graduate work only in a teacher's particular subject area (Berg et al., 1980; Gubser, 1981; Lisman, 1980; Statler, 1976) and those suggesting graduate education might very well initiate an examination of and preparation for entrance into another career or a "horizontal" movement within one's current profession (Markowitz, 1981; McElroy, 1979; Shein, 1972). Does the former benefit both teacher and student in
the classroom setting while the latter robs both of the previously described limited resources currently experienced in public education?

Interestingly, despite research that some consider "full of contradictory or inconsistent findings" forcing the educational policymaker to base his or her decisions on "controversial and disputed research results" (Averch et al., 1974, p. 10), the previously described "millions of dollars" continue to be spent. Perhaps this phenomenon can be better understood if two commonly held beliefs are reviewed. First, the belief that teaching in schools is "an activity of professionals" (Berg et al., 1980, p. 3) and, second, that "the most common criterion describing professions, beginning in their history and continuing into modern times, is the emphasis on an intensive education program" (Nyre & Reilly, 1979, p. 10). Axford (1980) explained this further as an "ever growing demand for continuing education opportunities for the professional" (p. iii) that must necessarily accompany the progressively upward level of education for the entire nation. Kuhlman (1979) believed that the current efforts within the education profession "to upgrade the quality of membership and the caliber of competence among teachers have supported the image of the teacher as a professional" (p. 463).

Perhaps it is the difficulty in defining or measuring professional competency that has permitted the ongoing financial support and demand for continuing education despite the absence of sufficient empirical evidence of a relationship between the two (Anderson, 1978; Florio & Koff, 1977; Pottinger, 1977; Selden, 1976). Instead of this
empirical evidence, there prevails in the literature statements of concern that the undergraduate experience must necessarily be supplemented by additional education after entry into the profession; the belief that continuing education aids in the acquisition and updating of job skills; the view that unplanned change of career assignment or area of specialization warrants additional educational experience; the contention that the effects of our recent history's knowledge explosion can only be combated with equal inputs of education; the opinion that continuing professional education goes "hand in hand" with the need for additional certification and licensing procedures for the professions; the decree by the private sector of citizen/client that the professional to whom they rely upon for competent service be deserving of continued deference; and finally, the accepted practice of improvement of financial status for the professional who pursues the continued education that will supposedly remedy all the preceding concerns and beliefs.

In addition to the views expressed above for professionals in general are two interesting beliefs that, although possibly included in one of the categories listed, are directed specifically at the teaching profession. First is Kohl's (1982, p. 33) belief that many teachers have "lost trust" in their ability to teach and, second, Smith's (1980) conjecture that the heavy pressures of day-to-day responsibilities leave little time for teachers to reflect on the major problems affecting their work. Since the professional educator's "work" is to "teach," these final two views expressing a concern for continuing education demonstrate the need to more closely
examine the finished product of the teaching profession—the student.

Consequently, the need for empirical evidence of a relationship between continuing professional education for the teacher and the achievement of his or her students is demonstrated. Such an investigation should include an examination of those factors motivating teachers to either pursue or deny themselves participation in a graduate education program. Do those concerns expressed in the literature prompting professional education appear as motivating factors? And finally, how satisfactory is the continuing education experience for those professional educators who pursue it for whatever reasons? Perhaps an investigation such as this will aid in avoiding one or both of the following: either "making continuing professional education mandatory without assurance of its validity . . . [which] may be like following Alice into wonderland where things are not what they seem" (Selden, 1976, p. 69) or attempting to save the rapidly diminishing educational dollar by ending support for graduate and post graduate education altogether.

The following four chapters include a review of literature pertinent to such an investigation and resultant hypotheses of this review; the methodology describing how the investigation was conducted and the necessary statistical analyses; a description of the results of these analyses; and finally, a discussion of and conclusions drawn from the entire study including the investigator's explanation of the findings as they relate to past, present, and future studies.
CHAPTER II

REVIEW OF THE LITERATURE

Once continuing education for the professional is defined, a review of those concerns prompting pursuit of this educational experience is examined followed by the implications for research that these concerns might suggest. Also included is an examination of the literature pertaining to investigations of the relationship between continuing education for the professional educator and the achievement level of that educator's students. At its conclusion are the six hypotheses designed to further investigate those relationships discussed in the review.

Definition of Continuing Education

Prior to examining the reasons for and possible benefits of continuing education for the professional educator, a definition of what is meant by this term is necessary. Although viewed by some as an "amorphous conglomerate because of the variety of definitions used to describe it and the rather irregular course of its historical and modern development" (Nyre & Reilly, 1979, p. 10), Trivett (1977) best defined continuing education for professionals as the "formal or informal training an individual professional undertakes after the end of his [or her] basic professional education" (p. 2). Florio and Koff (1977) considered this continuous development of skills and intellect to be a "fundamental tenet" (p. 1) of all professional
occupations. However, method of compliance of this "fundamental tenet" varies from profession to profession and within professions.

Of particular interest to this study is enrollment in graduate and postgraduate education ranging from individual courses "providing opportunities to try out methods and ideas in group or individual projects in a relatively nonthreatening environment" (Markowitz, 1981, p. 13) to a more closely planned and adhered to course of study culminating in a degree that might "compensate for the deficiencies and inconsistencies of the undergraduate experience" (Statler, 1976, p. 44). Master's degrees that are professionally or vocationally oriented occur in many fields and number in excess of 400 master's degree titles (Callan, 1978). With enrollment for master's and doctor's degree programs in education increasing 34% in the 5-year period from 1971 to 1975 ranging from a 23.9% increase in full-time enrollments to a 37.5% increase for part-time enrollments, graduate and postgraduate education merits particular interest in any investigation of continuing education for educators (Baker, 1977). Such course work takes on additional importance for the educator as well as other professionals when and if continuing education becomes mandatory.

**Mandatory Continuing Education**

Although relatively new to most professions, the idea of mandatory continuing education for professionals is well established in the teaching profession (Berg et al., 1980; Florio & Koff, 1977; Houle, 1976; Lisman, 1980; B. Watkins, 1979). Ownership of the
mandate ranges from individual school boards (Supreme Court Reporter, 1979); to professional associations requiring it for membership renewal (Nyre & Reilly, 1979); to many states enacting mandatory continuing education laws for professionals "whose work involves the public welfare" (Killian, Wood, & Bell, 1980, p. 221). Lisman (1980) considered mandatory continuing education for teachers a part of the so-called "accountability movement in education" (p. 126).

This accountability movement to "provide reasonable assurance of continuing competence of those who provide professional services" (Selden, 1976, p. 68) is quickly spreading to other professions as well including medicine, law, and accountancy (Berg et al., 1980). Presently, 16 different professions other than teaching are currently under regulation in states throughout the nation (Loring, 1980; B. Watkins, 1979). At the top of the list is Iowa, which recently drafted a relicensing requirement for all of its 23 professional licensing boards (Killian et al., 1980; Loring, 1980). The professional educator is presently required to participate in some form of continuing or in-service education in at least 28 states (Lisman, 1980). Those factors motivating this burgeoning call for continuing education for professionals are as varied as the professions to which they apply and warrant review in any examination of this phenomenon.

Concerns Prompting Continuing Education

Advocates of continuing education for professionals cite a myriad of reasons for their contentions of its importance ranging from Berg and his colleagues' conceptual goal of continued
"development of each individual professional . . . [where] the varieties of human development require similar varieties of experiences" (Berg et al., 1980, p. 6) to Lisman's (1980) more practical belief that continuing education is simply that course work necessary to retain one's certification or job. Careful examination enables one to reduce these far-ranging concerns found in the literature into approximately a half-dozen categories to be reviewed.

A Supplement to Initial Professional Experiences

Prior to the professional continuing the educational process that began during his or her preparation for the particular profession entered, the professional must do just that—enter and participate actively in the role of a professional. These initial years as a professional have varying degrees of importance dependent upon the particular profession. Schein (1972) described how in some professions the early years of practice might be characterized as "stultifying, unchallenging, and more like an initiation rite than an educationally useful apprenticeship" (p. 53) while in other professions it is only after the graduate is established in his or her career that many of the "insights into the role of the professional can be learned" (p. 126). The undergraduate study that through necessity included a wide variety of topics and consequently greater breadth than graduate and postgraduate work is succeeded by the higher degree of concentration and specialization permitted the established professional whose career experience, though often limited, has identified those areas of concern upon which graduate study might concentrate.
(Callan, 1978).

Statler (1976) described graduate school for professional educators as a "second chance to mold themselves into truly useful functionaries within the educational framework" (p. 44). The literature abounds with discussions of the professional narrowing his or her pursuit of additional knowledge and expertise only after the need for this distinct, more specialized body of knowledge is first identified during the professional's initial career experiences (Berg et al., 1980; Killian et al., 1980; Markowitz, 1981; Nyre & Reilly, 1979; Schein, 1972). However, in addition to this "identifying process" where the professional begins to better understand his or her career and those voids that precareer study had unavoidably permitted to exist, additional factors taking affect only after entry into the profession need to be investigated.

Maintenance of Professional Competency

Of approximately 10 reasons for continuing education for professionals discussed by Queeney and Manz (1979), two share frequent occurrence throughout the literature and warrant further description: (a) the acquiring and updating of job skills as innovative and new practice areas develop within established professions in an effort to avoid obsolescence and rigidity of practice and (b) the development of necessary job-related skills resulting from unplanned change of assignment or area of specialization (Averch et al., 1974; Berg et al., 1980; Champagne, 1980; Florio & Koff, 1977; Markowitz, 1981; Trivett, 1977; Watman, 1972b; Westbury, 1970).
Acquisition and Updating of Job Skills

Queeney and Manz (1979) spoke of the "half-life" measurement of change or decay of knowledge experienced by the professional during his or her tenure. This "half-life" is defined as the period of time during which approximately half of that knowledge obtained is lost. While an estimated half-life of 12 years for the 1940 engineering graduate had decreased to 5 years for the 1970 graduate and the medical internist's and dentist's half-life is only 5 years, Queeney and Manz pointed out that "mercifully" no one has yet calculated a half-life figure for educators.

Accompanying this loss of obtained knowledge by the professional is the development of new knowledge and techniques requiring continuous learning by each practicing professional, even as that practice is conducted. It is this coupling of new knowledge and awareness of scholarship in their field with that empirically derived knowledge arising from their own practice that continuing education hopes to promote (Berg et al., 1980; Trivett, 1977). Focusing upon the professional educator, Watman (1972b) and Averch et al. (1974) concurred that the educator must keep continually up-to-date on educational development and innovations if teachers truly hope to improve their effectiveness and avoid what is often perceived as a crisis in the classroom resulting from an inflexibility to the changing demands of students, parents, and the community.

Professional educators are too often supplied with the newest of textbooks, supplies, facilities, and programs with the belief that
they will automatically be used effectively. Unfortunately, it has been discovered that many educators simply are not always knowledgeable of the best way to utilize these resources or, for that matter, many educators fail to recognize the very existence of the resources (Champagne, 1980). That is, many new methods of instruction are being developed, tested, proved useful for the student, and marketed only to be misused or not used at all. Westbury (1970) cited a study by Heron demonstrating a relationship between the individual teacher's understanding of a specific program or curriculum and the success or failure of that program. In particular, a program or test's goals and objectives as planned by the developers of the materials are too often presented in a version quite different from that intended as they "filter down" through the teachers using those materials (p. 250). Berger (1982) recently warned that although many excellent teaching materials exist, particularly in the math and sciences, many of today's teachers simply are not prepared to use them. Consequently, without reeducation by the professional in an effort to acquaint him or her with the existence and proper use of these materials and programs, an important resource is wasted.

Unplanned Change of Assignment or Specialization

The decreasing enrollments in schools throughout the nation is having an effect on the education profession. The school closings and accompanying teacher layoffs that declining enrollments have created are resulting in fewer applications for the small number of job openings by the equally decreasing number of graduates from
colleges of education. Consequently, once employed, teachers are unlikely to leave their present positions resulting in low turnover that Sergiovanni and Starratt (1979) believed "poses a serious problem for schools . . . [as] instructional quality is endangered" (p. 3). Champagne (1980) elaborated in his description of an aging staff that had once counted upon new entrants into the profession to supply new and innovative ideas. Instead, the economic and social conditions necessitate continuing education for the present staff who are "likely to be with us for a long time" (p. 401). Dependence upon the "infusion of new talent" has clearly lost its viability (Florio & Koff, 1977, p. 4). This problem is further complicated by the need for "teaching adjustments" within a school district (Berg et al., 1980):

At present, many teachers are reassigned to junior high and middle schools from high schools as the population of school age children shifts to require more teachers in the middle grades. Continuing education of teachers in service is the only reasonable way in which teachers can prepare for teaching new subjects or new ages of students. (p. 4)

Berg et al. (1980) agreed that continuing education is "almost the only way in which such 'horizontal' movements of teachers can be affected without diminishing the quality of the educational programs" (p. 5).

Thus, there exist certain economic and demographic conditions in our society that demonstrate the urgency for continuing education of teachers in addition to the need for all professionals to stay abreast of continual change, innovation, and new technology. Any discussion of the latter most often includes mention of the
"knowledge explosion," so much in fact that this phenomenon will be discussed more fully.

The Knowledge Explosion

In discussion of the need to maintain a certain level of competence in an effort to avoid the increasing likelihood of early obsolescence, the existence of a "knowledge explosion" during the past several decades is evident (Axford, 1980; Berg et al., 1980; Lisman, 1980; Loring, 1980; Queeney & Manz, 1979; Schein, 1972; Trivett, 1977). In fact, Queeney and Manz (1979) extended this concern that new knowledge is being "spewed forth at an unprecedented rate...[and is] raising very real, very serious questions" (p. 3) about the requirements to remain in professional practice to concerns of its effects upon requirements to enter professions in the first place. For the professional educator, this means that quality teacher training "cannot be done in less than five or six years. Four years of college are barely enough" (Brandt & Gunter, 1981, p. 149). However, it is most often the four-year undergraduate education that is first examined in the certification and/or licensing procedure required of most professions.

Certification and Licensing

As previously demonstrated, certification laws in an ever-increasing number of states mandate continuance of graduate and postgraduate programs of professional studies for relicensure (Kuhlman, 1979; Nyre & Reilly, 1979). While it is the concern of the
licensing boards to promote continuing education for all the reasons previously discussed--maintenance of competence, avoidance of obsolescence, coping with unplanned change, tempering the effects of the knowledge explosion, etc.—Berg et al. (1980) pointed out that "even well-intended teachers sometimes see continuing education as an irksome duty, performed only to maintain their certification to teach" (p. 5). Thus, despite Vidler and Wood's (1981) findings that graduate students offered a wider variety of motivation factors than undergraduates including a greater tendency toward intrinsically motivated considerations, many educators might more readily agree with Corbally (1976) in his description of the 45 hours he took to convert his temporary teaching certificate to a permanent certificate: "[The course work] did neither me nor my students much good. Had I [Corbally] been required to work out a program which met my deficiencies, the results might have been different" (p. 10).

Whatever the true motivator, continuing education remains and becomes increasingly important for relicensure and certification for the professional whether the professional desires to remain in his or her present profession or change to another profession. In fact, "job change" is becoming a frequent reason for reentry into professional training.

Job-Change

For the professional desiring a change of position or specialization within his or her present profession or the professional seeking a second career, continuing education is a necessity (Florio

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The previously described knowledge explosion with its rapidly changing technologies and the resultant creation of new fields is bringing an ever-increasing number of people back to the universities for graduate education in preparation for new careers. For the professional educator wishing to remain in the profession, continuing education is a method of preparation for "horizontal" changes into principalships, counselor positions, and other nonclassroom assignments (Berg et al., 1980).

In addition to the person in this period of professional transiency is the professional steadfast in a career who hopes to lessen what the consumer perceives as a "widening gap between what the professional can deliver and what the public wants him to deliver" (Loring, 1980, p. 12). Perhaps continuing education will narrow this chasm.

The Public As the Consumer/Client

There have always been a few "sacred callings" to which we have generally assigned the term "professional"—the ministry, the law, teaching, the health professions, the science professions, to name a few. The calling, however, today seems less and less sacred. Members of these professions strike, they engage in jurisdictional disputes, they make mistakes—their "feet of clay" seem almost more visible than their loftier features. (Corbally, 1976, p. 8).

Although possibly accused as a bit glib in his portrayal of the professional, Corbally (1976) skillfully depicts a growing concern by the public for those services rendered by the professional community. As part of an increasingly popular consumer advocacy movement, there
has been a significant loss of public faith and trust in the capability of the current licensure system and of professional organizations in their ability to maintain the high quality of service expected by the public (Axford, 1980; Loring, 1980). Callan (1978) concurred with his belief that there is a growing trend toward a "general decline in the once traditional deference" paid to professionals who are now being viewed with "less awe and more skepticism" (p. 4). Thus, the consumer/client insists that the professional "earn" the public's respect and have consequently demanded of state legislatures that they assure their constituencies of professional maintenance of a high quality of service. The legislatures have responded to this request through their previously described structuring and strengthening of licensing and certification procedures. It is through such a legislated licensing/certification process that the consumer/client's concerns are answered. "No longer satisfied by assurances that improvements from within [the professions] are forthcoming, the public is saying, 'Since you won't put your house in order, we'll do it for you'" (Kilian et al., 1980, p. 222).

**Improvement of Financial Status**

A final concern prompting continuing education for the professional lacks most of the more intrinsic considerations of both professional and public yet merits the consideration granted it through the literature: the advancement of a professional on a salary schedule (Berg et al., 1980; Florio & Koff, 1977; Vidler & Wood, 1981). Although garnering only 10% of the total of "motivational
determinants" for graduate education in a recent survey, "to improve
one's financial status" is a factor that cannot be ignored in any
investigation of concerns prompting continuing education for the

Implications for Research

Despite our readily admitted inability to prove beyond
reasonable doubt that continuing educational participation
does improve professional practice, a number of profes­
sional associations, individual practitioners, licensing
bodies, and educators strongly believe that continuing
education offers an individual the best opportunity to keep
abreast of current knowledge in a given field; it may not
be ideal, but it's the best we've got. (Queeney & Manz,
1979, p. 7)

The preceding statement both summarizes the conclusions drawn
from the just completed perusal of concerns prompting continuing
education for professionals and the yet to be examined plea for
research to verify that "keeping abreast of current knowledge" is in
any way related to "improved professional practice." That is, de­
spite the existence of the approximately half dozen concerns that are
inherent in a study of the current literature's description of the
need for continuing education for the professional and exhortations
that "teachers and administrators have to admit they cannot survive
professionally without continuing education" (Killian et al., 1980,
p. 223), there appear accompanying claims that research findings do
not show a clear relationship between education and improved compe­
tence (Apps, 1980; Callan, 1978; Florio & Koff, 1977; Queeney & Manz,
1979).
Such claims most often follow a description of the escalating costs of continuing education for: (a) the individual professional, (b) the institution or firm for whom the professional is employed, and (c) society in general. Callan (1978) viewed this failure to adequately demonstrate the relationship between continuing education and improved professional competence as detrimental in its effects upon both continued patronage by "the society which is going to have to support [graduate education]" (p. 3) and also the entry into these programs by individual professionals who no longer "are easily able to decide whether or not the degree helps them to achieve their goals" (p. 18). Thus, despite the claims by some educators that they have a "very strong story to tell . . . [of] bountiful examples of how investments in graduate education have returned many times their value to the public" (McElroy, 1979, p. 34), Berg and his colleagues (1980) bemoan the fact that the accelerating costs of continuing education for teachers and their school systems are supported by a limited number of thorough studies relating these costs to the improvement of teacher performance. Averch et al. (1970) stated that educational research is seriously deficient in terms of size, scope, and focus of research efforts, and in the integration of research results. Unless this deficiency is remedied and the increasing expenditures for teachers' advanced degrees and experience—the two basic factors determining salary—are shown to improve educational outcomes, there exists instead "opportunities for significant reduction or redirection of educational expenditures without [proven] deterioration of educational outcomes" (Averch et al., 1970, p. 173).
Holt and Peterson (1981) believed that one method of assisting with the necessary evaluation of teacher effectiveness that might help to avoid Averch's scenario is to encourage teachers to become "partners" in research projects (p. 67). Such research projects could be designed to include investigation of some of the following relationships.

**Continuing Education and Student Achievement**

Until now, the review of the literature has included a broader investigation of continuing education for many professions as compared to the narrower investigation of continuing education for the professional educator which is to follow. Part of this investigation must necessarily include an examination of the use of student achievement to measure the success or failure of the professional educator's efforts in the classroom.

**Student Achievement**

In their review of 21 different studies attempting to establish the relationship between input and output (school resources and educational outcomes, respectively), Averch et al. (1974) usually defined output in terms of cognitive achievement as measured by standardized achievement tests. Although admitting that such tests present a number of liabilities including the danger of "suppressing desirable outcomes that are not conventionally measured by standardized tests" (p. 27), Averch and his colleagues explained that research of educational effectiveness most often is directed entirely
toward explaining cognitive achievement as measured by standardized achievement tests. Absent from most, if not all, research studies is that measure most often used by teachers to measure student achievement and quite possibly their own (teachers') success—teacher grades of student performance. Cronbach (1970) stated that this absence of teacher grades in the research is advisable inasmuch as such measures are extremely unreliable and do not always correlate with standardized test scores assigned to the same students.

Averch et al. (1974) made mention of an increase in the number of studies employing students' attitudes as an additional measure of educational outcomes. Included in many of these attitudinal surveys are questions about how effective the students' teacher is. Although Watman (1972a) warned that some students will not reply in an honest or serious manner to such surveys, he went on to attest to the reliability of such surveys in most experiences.

It is now necessary to examine what are appropriate measures of "input" in the educational process once a satisfactory measure(s) of "output" has been determined.

**Continuing Education As an Educational Input**

The use of continuing education by the professional educator is frequently demonstrated in the review of studies compiled by Averch et al. (1974), as are warnings of the analytical problems that have plagued many of these studies. However, accompanying these warnings is the emphasis that "these results should not be interpreted as indicating that school resources do not affect student outcomes"
A closer investigation of some research studies include that of Coleman (cited in Averch et al., 1974).

Of the approximately 20 independent variables in Coleman's study (cited in Averch et al., 1974) that were used to measure some aspect of "input" characteristic of the classroom teacher, 6 were found to contribute some explanatory power to student output including a measure of the teachers' experience, localism, and degree level.

Two additional studies demonstrated some evidence for those previously examined concerns prompting continuing education. In a study by Michelson (cited in Averch et al., 1974), 9 of approximately 33 variables used to measure input pertained directly to the classroom teacher. Of particular interest was the finding that a measure of whether or not the teacher taught the subject that was his major in college was significant in the mathematic's portion of the dependent measurement (not in verbal or reading). Similarly, Perl (cited in Averch et al., 1974) found that although the percentage of teachers certified had no significant effect on student output as measured by two independent variables, the average percentage of teachers' time spent in their area of specialization did. This discovery of the importance of a teacher instructing either in or out of his or her specialty and a tabulation of the number of years that this is done closely parallels another "in or out of" argument currently in the literature that must be discussed if continuing education is to be accepted as an educational input.
Continuing Education: What Subjects?

If an investigation of the literature demonstrates acceptance of standardized achievement test scores as an appropriate measure of educational output and continuing education/teaching experience as an appropriate measure of educational input, this same literature testifies to two additional problems that must be included if the possibility of a relationship between these inputs and outputs is to be determined. Both of these problem areas hinge upon what subjects are to be studied in the professional educator's quest for continuing education.

The first of these two problem areas concerns itself with the increasing evidence that some colleges and universities are not exercising "appropriate control of quality over activities for which they award academic credit" (Berg et al., 1980, p. 7). Gubser (1981) warned of educational institutions selling anything from a few credits to entire degrees for minimal or no academic work. Due to credit arrangements that are "nothing more than incentives by travel agencies" or "diploma mills that turn quickie degrees for those who want instant credentials" (p. 29), Gubser believed that continuing education's honor system has broken down resulting in the victimizing of school boards and a loss of professional credibility. This disagreement over which credits are to be assigned to continuing educational activities has an effect in the "real world" of professional licensure/certification practices and in the researcher's "world" that hopes to sample those participating in what is a
difficult-to-label continuing education experience. Callan (1978) elaborated:

The requirement in many states that teachers have a post-baccalaureate degree for permanent certification has encouraged the lowering of admission requirements from the traditional B average to a C, excessive use of undergraduate courses, and a superficiality engendered by programs including unrelated courses from several departments. Many so-called master's degree programs should be designated as a second baccalaureate or as a fifth-year certification program for teachers.... [Such] programs leading to certificates would serve some students better than master's programs and would assist institutions in imposing controls essential for acceptable master's study. (p. 23)

The lack of validity that Berg et al. (1980) fear such uncontrolled and unregulated continuing education activities invite has similar consequences for the researcher investigating continuing education.

Assuming that the continuing education courses a professional educator decides to participate in are of adequate standards, the appropriateness of the subject area to the teacher's specialty is now being questioned. Some authors list wide parameters to include any college or university course that permits contact and experience "with new developments in philosophy, methodology, planning, evaluation, and technology" (Watman, 1972b, p. 511). Brandt and Gunter (1981) presented a list of 21 concepts and skills they considered an incomplete indication of topics included in professional education courses and research. They stated that each of the topics "has made a difference in classroom instruction for some teachers; each offers promise for improving classroom teaching and pupil learning" (p. 151). However, the parameters are quickly diminished as an
increasing number of school districts begin to specify that the course work in which a teacher participates is relevant to the teacher's subject area (Berg et al., 1980; Gubser, 1981, Lisman, 1980; Statler, 1976). Gubser stated that many school boards are "clamping down" by permitting their staff to enroll in courses only in subjects they teach or in areas related to special needs of the district (p. 31). Such policies reflect Statler's (1976) fear that "school boards are paying for waste" when they reward teachers for graduate activities that concentrate upon "readying teachers for administrative duties rather than upon revving them up to be more productive and proficient in the art of educating students" (p. 44). The implication of what some school administrators label as "cheap credits" must be included in any hypothesized relationship between continuing education for the professional educator and the adequacy of this preparation as measured by the achievement level of his or her students.

**A Research Question and Hypotheses**

Having defined continuing education for the professional, examined those concerns prompting participation in such programs, and specified the relationship between continuing education to the measurable inputs/outputs of the educational system; the following question acts as a catalyst prompting further conjecture: What relationships either exist or fail to exist between the degree of participation, currentness, and subject area of a teacher's participation in a program of continuing education and that teacher's effectiveness as
measured by his or her students' scores on both a standardized achievement test and also a teacher evaluation scale?

While acknowledging the arguments previously presented on the importance of subject area and its relevance to the professional educator's current assignment, an investigation of the benefits of continuing education might better focus upon what Berg et al. (1980) and Luke (1976) believed to be a fundamental benefit of such endeavors: the transformation of the teacher into the student's role providing the teacher with a means of examining what activities of teachers are seen as affective by students. This opportunity to experience valuable "insights by changing the teacher into a learner in an organized learning environment not unlike that of the teacher's own classroom" (Berg et al., 1980, p. 8) is granted to all those who participate in continuing education regardless of subject area and degree of participation. Instead, only the currentness of participation in such an experience is relevant. Therefore, the following hypotheses are presented:

Hypothesis 1: There exists a direct relationship between a teacher's participation in a continuing education program and that teacher's effectiveness.

If such a relationship is found to exist, the previously examined impact upon such participation by school districts requiring that such course work be relevant to the teacher's subject area (Berg et al., 1980; Gubser, 1981; Lisman, 1980; Statler, 1976) poses the need for validity of such school board demands. The following hypothesis is designed to meet this need.
Hypothesis 1a: There exists no relationship between the subject area of a teacher's program of continuing education and the hypothesized relationship between this participation and that teacher's effectiveness.

Furthermore, if the initial hypothesized relationship is to aid in the answering of the question regarding "the degree to which exposure to continued education for professionals changes knowledge, the extent to which knowledge affects competence, and how much competence affects practice" (Trivett, 1977, p. 4), the following additional hypothesis must also be tested:

Hypothesis 1b: There exists no relationship between the degree of participation in a program of continuing education and the hypothesized relationship between this participation and that teacher's effectiveness.

These two hypotheses are thus stating that the relationship initially hypothesized between participation by a teacher in a continuing education program and that teacher's effectiveness is to be dichotomous. That is, the teacher either is a participant, regardless of degree of participation and subject area, or is not a participant. However, the currentness of participation in such a program will not be as simple a dichotomous measure prompting the next hypothesis:

Hypothesis 1c: There exists a direct relationship between the currentness of a teacher's participation in a program of continuing education and that teacher's effectiveness.
Although not meant to refute the importance of those concerns prompting continuing education for the professional listed in the preceding review of the literature, the absence of these concerns are instead evidence of the truly elementary need by the professional educator to simply remember what it is like to be a student. Had they not addressed themselves specifically to the professional educator, the hypotheses might very well have necessarily been expanded to include some of these broader concerns.

Motivators for Continuing Education

Pierce (1973) stated, "The weight of the responsibility for continued improvement after graduation rests on the teacher himself; we assume that he will seriously attempt to improve" (p. 184). If this "serious attempt at improvement" includes participation in some form of continuing education, the previous review of literature has listed possible motivators for such participation ranging from the basically extrinsic motivation of salary advance and certification to the more intrinsic desire of professional self-improvement. While many agree with the former extrinsic motivators as characterized by Anderson's (1978) belief that graduate and postgraduate education "is more a tribute to [teachers'] perseverance than to their intellectual inquisitiveness or professional commitment" (p. 4); others concur with the latter more intrinsic motivators agreeing with Champagne (1980) that personally directed growth can be expected on the part of some employees although such expectations of all employees is "patently unrealistic" (p. 400). Furthermore, it is the belief of
many that the majority of continuing education being done only within the confines of certification requirements testifies to the extrinsic values often attached to it. Based on these findings, the following two hypotheses are presented.

**Additional Hypotheses**

Remembering the unpleasantness of legislatively mandated continuing education typified by Corbally's (1976) rather caustic appraisal of his unsatisfying efforts to convert his temporary teaching certification to a permanent certificate as opposed to Killian et al.'s (1980) belief that all teachers and administrators instead readily admit that they cannot survive professionally without continuing education, the following is hypothesized:

**Hypothesis 2a:** The more intrinsic (versus extrinsic) motivators for participation in a program of continuing education a teacher identifies, the greater the degree of satisfaction experienced during the teacher's educational pursuit.

A closer examination of the literature's concerns prompting continuing education and their chronological placement ranging from the pre- and early-employment educational pursuits necessitated by certification/licensure requirements to the mid and late career entry into educational programs necessary to remain knowledgeable in one's teaching discipline, this final relationship is hypothesized:

**Hypothesis 2b:** The more intrinsic (versus extrinsic) motivators for participating in continuing education a teacher identifies, the more recent the participation in a program of continuing education.
Summary

Following an introductory definition of continuing professional education as the formal or informal training an individual professional undertakes after the end of his or her basic professional education, approximately a half dozen concerns prompting such an endeavor are investigated ranging from the intrinsic desire to maintain one's awareness of scholarship in their field to the extrinsic desire for advancement on the salary schedule.

No matter which of these concerns are being examined, there appears to be agreement, specifically for the professional educator, with Anderson's (1978) contention that "not even the most naive person would accept the notion that once a person has completed a program of teacher preparation, he or she would be sufficiently equipped for the duration of a career" (p. 9). However, accompanying these concerns in the literature is a plea for documentation of something other than a "supposed" relationship between teachers' varying degrees of entry into continuing professional education and their ability to teach effectively. That is, despite what Pierce (1973, p. 184) labeled a "tacet assumption" that teachers will continue to work at improving themselves by gaining and organizing their academic subject matter while simultaneously increasing their ability to "transmit" that particular area's knowledge, concepts, and skills to their students; whether or not graduate and postgraduate education is an advantageous avenue to follow in this quest for improvement is an area the hypotheses stated above hope to investigate.
CHAPTER III

METHODOLOGY

Subjects

The population for this study consisted of all "college preparatory" Modern Geometry classes and the instructors of these classes in the 21 public school districts in Macomb County, Michigan (see Appendix A). In a recent survey of mathematics curriculum conducted by the Macomb County Mathematics Council (Capoferi, 1983), the Modern Geometry course was listed as one of four mathematics courses pursued by students enrolled in a "college bound curriculum." The geometry course is the second of a four-course sequence beginning with algebra and including advanced algebra/trigonometry and introductory analysis/pre-Calculus. Of the approximately 150,000 school-age children in the county's schools, approximately 4,000 were currently enrolled in a Modern Geometry class taught by 71 individual teachers in the 29 high schools in this southeast Michigan county located just north of Detroit. Predominantly Caucasian and Black-American, the students in these classes were primarily in the 10th grade. However, a small percentage of 9th, 11th, and 12th grade students were included in the total enrollment.

Unlike the other three courses in this college preparatory sequence, Modern Geometry contains subject material that is essentially new to the incoming student. Although there is some
carry-over from other mathematics coursework, much of the material presented is being experienced by the students for the first time in the mathematics curriculum. It is usually in geometry that the mathematics student is first formally introduced to the concept of deductive proof, a concept that will be used in geometry, as well as in future mathematics courses.

As required by teacher certification laws in the state of Michigan, all 71 teachers in the study possessed either a major or minor in mathematics. In addition, all teachers with the exception of those few who have just entered the profession had participated in graduate studies as mandated by the state to maintain their teaching certification.

Instruments

Data for the study were collected using three instruments: the Teacher Survey of Continuing Professional Education (herein after referred to as the teacher survey), the Purdue Teacher Evaluation Scale, and the Modern Geometry Test: Content Evaluation Series. A description of each follows.

The teacher survey (see Appendix B) is a 30-minute, 7-item mail survey. In addition to several introductory free-response questions designed to enlist data characterizing each respondent's participation in a program of continuing professional education (last semester and date of attendance, average number of semester hours and subject area, and willingness to participate further in the study), the teacher survey requests rankings of degree of agreement with and
importance of two lists of 10 phrases each characterizing two aspects of continuing education for the professional respectively. The first list of phrases to be ranked describe those factors motivating entry into a graduate or postgraduate educational program while the second concerns itself with phrases describing the graduate/postgraduate experience. A split-half reliability was obtained for both sets of phrases following administration of the survey. These two figures, corrected using the Spearman-Brown prophecy formula, will be reported in the results.

The Purdue Teacher Evaluation Scale (PTES) (see Appendix C) is a 60-item, 20-minute evaluation instrument "capable of producing useful behaviour-specific information regarding students' perceptions of a teacher's instructional strengths and weaknesses" (Scott, 1978, p. 522). The instrument permits teachers to be rated by their students in six categories including the teacher's ability to motivate students, ability to control students, subject orientation, student-teacher communication, teaching methods and procedures, and fairness. A score ranging from 1 to 4 is computed for each of these categories. Although both reviewers in The Eighth Mental Measurement Yearbook (Buros, 1978) concur that the reported split-half reliability of .895 using the Spearman-Brown formula is relatively high, they also agree on the lack of sufficient validity for the instrument. However, J. R. Watkins (1978) believed that this lack of empirical validity simply imposes the task of judgment upon those using the instrument and its related usefulness to their intent. Scott (1978) stated that although supportive data is still in the developmental stage, "the
content appears to be valid and in harmony with generally accepted student rating practice" (p. 524).

The Modern Geometry Test: Content Evaluation Series is a 48 question multiple-choice test taking approximately 50 minutes to administer. Viewed as a "highly valid instrument for assessing student achievement at the end of a two-semester, secondary school course which includes both Euclidean and coordinate geometry . . . [composed of] a comprehensive sampling of both content and processes taught in an average or above-average geometry course" (Len Pikaart, 1978, p. 453), the eight-page Modern Geometry Test was judged to have a very high overall face and content validity (Buros, 1978). While the test's author listed a split-half reliability coefficient of .85 (Hanna, 1971), Len Pikaart (1978) calculated a K-R 20 estimate of .89 and a K-R 21 estimate of .87. However, Len Pikaart's description of the ease of test administration, scoring, and interpreting of the results must necessarily be amended to include the fact that the test has recently gone out of print. Although an ample supply of tests exists, the scoring service has been eliminated. Consequently, permission was requested and granted from the Riverside Publishing Company to print a sufficient number of tests for this study. This printing included acknowledgment of "permission to reprint" and amended instructions to the student explaining that answers were to be written directly on the test booklets.
Procedure

Instrument Design

In spring 1983, three high schools in Oakland and Wayne Counties sharing demographic characteristics with the neighboring county of Macomb were randomly chosen to receive a total of 100 questionnaires that aided in the construction of the teacher survey to be administered in the fall. A sampling of the neighboring counties' high schools rather than any of the 29 in the fall sample eliminated the possibility that a teacher sampled in the spring would be sampled again in the fall. Such a "double-sampling" might alter the reliability of the replies since phrases found on the fall teacher survey were derived from the spring questionnaire. The purpose of the spring survey (see Appendix D) was to establish some degree of validity for the fall instrument. The investigator desired to obtain from this survey two 10-item lists of phrases measuring both the intrinsic/extrinsic motivators for entry into and the degree of satisfaction with a program of continuing professional education by the professional educator. The spring survey included two lists of phrases from which the final lists of 20 were to be taken. The decision to include a phrase on the fall teacher survey was made as described below.

The 100 teachers sampled in the spring were asked to rank a list of 18 phrases describing "motivators prompting entry into graduate or postgraduate study" on a scale from 1 to 7 where a ranking of 1 reflected a highly intrinsic motivator and a rank of 7 reflected a
highly extrinsic motivator with intermediate rankings of 2 to 6
describing the range of motivators between these two extremes. A
mean ranking of intricacy/extricnity was then calculated for each
phrase upon return of the surveys. The 18 phrases on this portion of
the spring survey typified the approximately half-dozen concerns
prompting entry into a program of continuing education described in
the review of the literature.

This process was then repeated for a second set of 22 phrases
describing the continuing professional education experience on a
similar scale of 1 to 7 where a ranking of 1 reflected a highly
unsatisfactory experience and a ranking of 7 reflected a highly
satisfactory experience with intermediate rankings of 2 through 6
describing the range of experiences between these two extremes. As
before, a mean ranking of degree of satisfaction was calculated for
each phrase upon return of the surveys. These 22 phrases describing
the graduate/post-graduate professional education experience typified
those received by the investigator from area educators following a
request for "short descriptive phrases of your graduate and post-
graduate educational experience."

The questionnaire described above was personally placed in each
of the sampled teacher's mailboxes and included a stamped self-
addressed envelope for return to the investigator. Questionnaires
not received within 2 weeks of delivery were considered "lost" and an
additional number of questionnaires sufficient in number to approxi-
mate the 100 originally desired were distributed to a fourth randomly
chosen high school.
Having completed the calculation of the two mean rankings described above for both degree of intricacy/extrincity and degree of satisfaction for each of the phrases on the spring survey, the fall teacher survey was finalized (see Appendix B). This survey included an introductory cover letter describing the purpose of the survey, a description of the survey's confidentiality, an explanation of the study of which the survey was an integral part, and an invitation to request a report of the study's findings once completed.

The survey itself consisted of seven items, the first three and final two of which were requests for information concerning the recentness, subject area, and degree of participation in graduate/postgraduate study and the willingness of the teacher to participate further in the study. It is in the formation of Items 4 and 5 that the previously explained spring survey played an important role. The 10 phrases that were used in each of these two questions were those whose mean rankings on the spring questionnaire were at the two extremes of the 1-7 range. That is, in choosing 10 phrases for Item 4 (factors motivating entry into graduate and postgraduate education), the five phrases receiving the lowest mean rank and therefore characterizing an intrinsic motivator were included as were the five phrases receiving the highest mean rank and therefore characterizing an extrinsic motivator. The order of these 10 phrases on the teacher survey was random.

The 10 phrases that were used in Item 5 (a description of the graduate and postgraduate education experience) were similarly chosen from the five highest and five lowest mean rankings representing
satisfactory and unsatisfactory experiences, respectively. As in Item 4, the 10 phrases were randomly ordered on the teacher survey.

A split-half reliability coefficient corrected by the Spearman-Brown formula computed after the survey's administration and collection during fall 1983 is reported in Table 5 of "Results."

The Teacher Survey

During the last 2 weeks of September and first 2 weeks of October 1983, the principals of all 29 high schools in the 21 school districts in Macomb County were personally telephoned by the investigator. Appointments were made for visits to each principal by the investigator during the first week of November. During these visits, a brief description of the study was presented and permission requested to survey each district's Modern Geometry teachers. The principals were asked at this time if it would be permissible in June 1984 to administer both the Modern Geometry Test: Content Evaluation Series and the Purdue Teacher Evaluation Scale to those geometry students whose teachers agreed and were randomly chosen to continue in the study. A positive reply to this latter request was necessary and included as an endorsement in the cover letter included with the teacher survey.

An appropriate number of teacher surveys were left with each principal during this visit to be distributed to all teachers of Modern Geometry in each of the participating high schools. As described in the cover letter accompanying the survey (see Appendix B), the surveys were to be returned by the end of November using the
attached stamped envelope.

Although no assurance of anonymity could be made for the teacher survey, confidentiality was clearly insured. Confidentiality rather than anonymity was necessary to assist in the process of random assignment to the several groups to be described. Once received, the surveys were initially perused in an effort to divide the population into the various subgroups to be sampled (sampling process to be explained below). Consequently, the surveyed teachers were each assigned a three-digit code ranging from 001 to 071 to be used in all future tabulations and computations of data. This confidential matching of teacher to code was completed and recorded by the investigator at the time of presentation of the surveys to the 29 building principals.

Any teachers who failed to return their completed questionnaire by the end of 1983 were sent an additional copy of the questionnaire accompanied by a letter requesting the prompt return of the teacher survey (see Appendix E).

Selection of the Sample

During February 1984, the subgroups of teachers and their students necessary to test Hypotheses 1, 1a, 1b, and 1c were formed based on information received on the 65 returned teacher surveys. An explanation of the creation of these subgroups follows and is summarized in Table 1 through Table 4 to assist in understanding the sampling process. Only the 43 teachers who answered "yes" on Item 6 which asked if they "would be willing to participate in the
administration of both a standardized achievement test and teacher evaluation scale at the end of this academic year" were included in this process.

Table 1

Subgroup Membership of Participating Teachers Dependent Upon Date and Program Area of Continuing Education

<table>
<thead>
<tr>
<th>Sample group</th>
<th>Continuing education completed prior to '76</th>
<th>Continuing education completed after '76</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In subject area taught</td>
<td>Out of subject area taught</td>
</tr>
<tr>
<td>Group N</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Group Y₁</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 2

Teacher Subgroup Membership Dependent Upon Average Semester Hours in Attendance

<table>
<thead>
<tr>
<th>Semester hours</th>
<th>1-4 hours</th>
<th>5-8 hours</th>
<th>9+ hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample group</td>
<td>Group P</td>
<td>Group H</td>
<td>Group F</td>
</tr>
<tr>
<td>21</td>
<td>13</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

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Table 3
Teacher Subgroup Membership Dependent Upon Term and Date of Most Recent Graduate/Postgraduate Attendance Since Winter Term 1976

<table>
<thead>
<tr>
<th>Semesters last attended</th>
<th>Winter '82+</th>
<th>Winter '80 - fall '81</th>
<th>Winter '78 - fall '79</th>
<th>Winter '76 - fall '77</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>3</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 4
Teacher Subgroup Membership Dependent Upon Date and Term of Most Recent Graduate/Postgraduate Education Since Entry Into Profession

<table>
<thead>
<tr>
<th>Semesters last attended</th>
<th>Winter '80+ - fall '79</th>
<th>Winter '76 - fall '75</th>
<th>Winter '68 - fall '71</th>
<th>Prior to winter '68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>65</td>
<td>21</td>
<td>20</td>
<td>8</td>
<td>12</td>
</tr>
</tbody>
</table>

It had been the intent of the investigator to create four subgroups of 10 teachers each, dependent upon the teachers' responses to Items 1 and 2 of the teacher survey. A review of these two items follows to aid in an understanding of how the teachers were to be
placed into the four subgroups:

1. Last semester of attendance in a graduate or postgraduate college program:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>WINTER</th>
<th>SPRING/FALL</th>
<th>SUMMER</th>
</tr>
</thead>
</table>

2. Program Area:

Would you please describe the overall program of study, of which this last semester was part, as being either "out of the realm of the professional educator," "in the realm of education and in the discipline to which you are currently assigned teaching responsibilities," or "in the realm of education and out of the discipline to which you are currently assigned teaching responsibilities." As an example, a mathematics teacher who is currently enrolled in a business administration, law, or medical technician program would choose the "out of education" classification while mathematics teachers enrolled in a mathematics education or guidance and counseling program would choose the "in education/in discipline" and "in education/out of discipline" classifications respectively.

<table>
<thead>
<tr>
<th>OUT OF EDUC.</th>
<th>IN EDUC.</th>
<th>IN EDUC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN DISCIPLINE</td>
<td>OUT OF DISCIPLINE</td>
<td>CIPLINE</td>
</tr>
</tbody>
</table>

These four subgroups were to include: Group N composed of those teachers who have not participated in a program of continuing professional education since fall 1975; Group $Y_0$ composed of those teachers whose professional education had taken place since winter 1976 "out of the realm of the professional educator"; Group $Y_1$ composed of those teachers whose professional education had taken place since winter 1976 "in the realm of education and in the discipline to which [they] are currently assigned teaching responsibilities"; and finally Group $Y_2$ composed of those teachers whose professional education had taken place since winter 1976 "in the realm of education and out of
the discipline to which [they] are currently assigned teaching responsibilities."

However, of the 43 teachers willing to participate further in the study, none qualified for Group Y₀, that is, teachers who have participated in a program of continuing education since winter 1976 but "out of the realm of the professional educator." Consequently, a random assignment of 10 out of 18 possible teachers to Group N was made; 11 out of 14 possible teachers to Group Y₁; and 10 out of 11 possible teachers to Group Y₂. These assignments are summarized in Table 1.

The 21 teachers now belonging to Groups Y₁ and Y₂ were further categorized as belonging to Subgroups P, H, and F dependent upon the teacher's response to the query, "When last attended, what were the average number of semester hours for which [they] were enrolled" in Item 3 of the teacher survey where P, H, and F represent semester-hour enrollment of 1-4, 5-8, and 9+, respectively. Although it was the investigator's hope that the distribution of the teachers into the three subgroups would be approximately equal, it was expected that the last group would include a small number of respondents or possibly be empty. Since enrollment totaling nine or more semester hours represented attendance in more than two courses per semester, response to this category was expected to be minimal. Membership in the subgroups based on the number of semester hours attended is summarized in Table 2.

Next, the 21 teachers belonging to Groups Y₁ and Y₂ were placed into one of the four Subgroups A, B, C, or D dependent upon the
individual teacher's "last semester of attendance" on Item 1 on the
teacher survey. Group A were those teachers who attended sometime
since winter 1982; Group B attended sometime between winter 1980 and
fall 1981; Group C attended sometime between winter 1978 and fall
1979; and Group D attended between winter 1976 and fall 1977. The
four categories used in this ranking were necessarily designated
after return and perusal of the incoming data of the teacher survey.
Table 3 illustrates membership in these four subgroups.

All 65 survey respondents were assigned an additional ranking
from 1 to 5 for use in the statistical analysis of data in support of
Hypothesis 2b. Once again, Item 1 of the teacher survey was used to
place teachers into one of the following five groups: Group 1 con-
sisted of teachers who attended graduate or postgraduate programs
since winter 1980, Group 2 attended between winter 1976 and fall
1979, Group 3 attended between winter 1973 and fall 1975, Group 4
attended between winter 1968 and fall 1971, and Group 5 attended
prior to and including fall 1967. This final grouping of all 65
teachers who returned their surveys is described in Table 4.

It was next necessary to form 31 groups of students correspond-
ing to the 31 teachers whose group assignments were explained above.
Included in the teacher survey was a question requesting the number
of and period-assignment for the Modern Geometry courses taught by
each individual teacher. Each teacher was teaching at least one and
possibly as many as five sections. Since only one class per sampled
teacher was to be administered both the Modern Geometry Test and the
Purdue Teacher Evaluation Scale, it was necessary to randomly choose
which of the teacher's classes would participate in the study.

The 31 teachers and their classes were not notified of their selection until the second week in April 1984. This strategy was used in an attempt to avoid input of "special" teaching methods during the months between completion by the teachers of the teacher survey at the beginning of the school year and administration of the remaining two instruments in May/June to the students. The April notification of selection to the sample (see Appendix F) included a self-addressed stamped postcard to be returned to the investigator with information including the number of students in each sampled teacher's class.

Teacher Interaction

The approximately 8 months between the beginning of the school year and administration of the two student-instruments permitted the sampled teachers an opportunity for teacher/student interaction.

Testing and Evaluation

Thirty-one packets containing an appropriate number of Modern Geometry Tests and Purdue Teacher Evaluation Scales (PTES) were delivered by the investigator to the schools of all 31 sampled teachers. These coded packets also included a letter to the teacher thanking him or her for their continued participation and directions for administration of the two instruments (see Appendix G). At the time of delivery, all teachers were requested to stress to their students the importance of each of the two instruments and the need
for a sincere effort in completion of both. Assurance of anonymity, especially as it pertained to the responses on the Purdue Teacher Evaluation Scale, was most important. To aid in the anonymous nature of the PTES, the appropriate three-digit teacher code had already been placed on both instruments. Furthermore, the teachers were requested to permit a student volunteer to collect the completed scales and seal them in an envelope. The two instruments were then to be sealed in an additional envelope supplied by the investigator and left with the building principal. The envelopes were personally picked up by the investigator once completed. All envelopes were secured by the second week of June 1984.

Once collected, the 769 completed Purdue Teacher Evaluation Scale response sheets were sent for scoring and reporting to Purdue University's Center for Instructional Services. The 750 Modern Geometry Test sheets were corrected while awaiting the return of the PTES results.

Data Analysis

The data analysis will be explained by first reviewing each of the hypotheses to be tested, then describing the measures that were interpreted, and finally stating the appropriate analysis that was performed.

Hypothesis 1: There exists a direct relationship between a teacher's participation in a continuing education program and that teacher's effectiveness.
Two sets of mean scores were calculated for the students of the two sampled groups of teachers: The 10 teachers who have not participated in any type of continuing education since fall 1975 (Group N) and the 21 teachers who have participated in some type of continuing education since winter 1976 (Group Y₁ and Group Y₂). The first mean test score was computed from the 750 students' performance on the 48-item Modern Geometry Test. A second set of median ratings for each of the six categories regarding students' perceptions of their teacher's instructional strengths and weaknesses ranged from 1 to 4 where a rating of 4.0 is labeled the best possible rating for a characteristic and a rating of 1.0 is labeled the poorest possible rating for a characteristic on the Purdue Teacher Evaluation Scale (Bently & Starry, 1975). The mean rating for each teacher was then used to calculate a mean rating of each characteristic for each of the teacher subgroups. A one-tailed t test on independent means was employed to examine the hypothesized relationship between these two sets of student means and their teachers' participation or lack of participation in a continuing education program.

Testing of the three subhypotheses of Hypothesis 1 was dependent upon support of the hypothesized relationship at an alpha level equal to .10. That is, only those measures significant at the .10 level were to be used to test the three subhypotheses. Had none of the measures—the Modern Geometry Test or any of the six categories on the Purdue Teacher Evaluation Scale—demonstrated the existence of the hypothesized relationship between a teacher's participation in a continuing education program and that teacher's effectiveness, the
three subhypotheses would not have been tested.

Consequently, following the statistical analysis of Hypothesis 1, a similar analysis was conducted to test the first of three subhypotheses using the same data but limited to Groups $Y_1$ and $Y_2$ only. That is, only teachers who have participated in a continuing professional education program since winter 1976 and their students were used in a test of the following:

Hypothesis $\text{la}$: There exists no relationship between the subject area of a teacher's program of continuing education and the hypothesized relationship between this participation and that teacher's effectiveness.

Since the students tested were taught by two groups of teachers dependent upon the subject area of the teachers' programs of continuing education, the two sets of means were compared using one-way analysis of variance. Furthermore, in an effort to decrease the possibility of a Type II error (the error of accepting a false null hypothesis), an alpha level equal to .25 was used in the ANOVA.

The test of Hypothesis $\text{lb}$ was identical to that just described with the exception of the regrouping of those teachers actively pursuing graduate/post graduate education. Instead of the "subject area" grouping, the three Subgroups $P$, $H$, and $F$ dependent upon the teacher's number of hours in attendance was used. As before, only those measures demonstrating a significant relationship as defined in Hypothesis 1 were used in the ANOVA with an alpha level of .25. Although no significant difference in the mean scores was predicted for the data gathered for these three groups, a Scheffé pairwise
comparison was to be employed when necessary in examination of the following:

**Hypothesis 1b:** There exists no relationship between the degree of participation in a program of continuing education and the hypothesized relationship between this participation and that teacher's effectiveness.

A final analysis of the two sets of student means was used to test Hypothesis 1c, the last of three subhypotheses following Hypothesis 1. As in the previous two analyses, only those measures supporting the hypothesized relationship defined in Hypothesis 1 were used in analysis of the following:

**Hypothesis 1c:** There exists a direct relationship between the currentness of a teacher's participation in a program of continuing education and that teacher's effectiveness.

Once again limited to only the students of teachers active in a program of continuing education, the four Subgroups A, B, C, and D were now dependent upon the individual teacher's last semester of attendance as defined earlier (see Table 3). An alpha level equal to .10 required of the four groups tested using an ANOVA would also be required of any post hoc Scheffé pairwise comparison.

The final two hypotheses tested used data gathered from the teacher survey: the intrinsic/extrinsic and satisfactory/unsatisfactory ratings gathered from Items 4 and 5. As explained earlier in "Instrument Design," of the 10 phrases in each of these two items, half were previously designated by the investigator as characteristic of "intrinsic" or "extrinsic" motivators for Item 4 and
"satisfactory" or "unsatisfactory" experiences for Item 5. These
designations were not known by those teachers completing the survey.
The teachers simply marked what each considered an appropriate desig-
nation of either their agreement with the motivators or importance of
those phrases characteristic of the graduate/postgraduate experience.
A mean intrinsic/extrinsic and satisfactory/unsatisfactory score
ranging from 1.0 to 5.0 was then computed for each teacher responding
to the survey as follows:

Strong agreement with a phrase coded "intrinsic" in Item 4
received a score of 5, while a neutral response was scored as a 3,
and a strong disagreement was scored as a 1. Similar responses to
phrases coded as "extrinsic" received inverse scores of 1 for strong-
agreement to 5 for strong disagreement. Thus, the higher the total
mean ratings assigned a teacher, the greater the "degree of intrin-
city" assigned that teacher's motivation for pursuing graduate/post-
graduate education.

A similar rating was assigned responses for each teacher sur-
veyed in Item 5. For this item, however, the higher the score the
greater the degree of "satisfaction" and the lower the score the
lower the degree of "satisfaction" experienced in a continuing educa-
tion program. Thus, mean ratings ranged from a "low satisfaction"
rating of 1.0 to a "high satisfaction" rating of 5.0. A coded "key"
illustrating the above is included in a reproduction of pages 2 and 3
of the teacher survey in Appendix H. Replacing the unmarked descript-
tive graduations for each of the 10 statements in Items 4 and 5 are
the above ratings used in the tabulation of the degree of
"intrinsicity" and "satisfaction" scores.

In addition to the mean ratings that were calculated for each of the 65 surveyed respondents, one of five rankings were assigned dependent upon the teacher's last year of attendance. These are Groups 1 through 5 as previously explained in "Selection of the Sample" (see Table 4).

Having explained what data were used, the testing of the final two hypotheses can now be adequately explained.

**Hypothesis 2a:** The more intrinsic (versus extrinsic) motivators for participation in a program of continuing education a teacher identifies, the greater the degree of satisfaction experienced during the teacher's educational pursuit.

A median intrinsic/extrinsic rating was calculated thereby dividing the total number of teachers surveyed into two groups: (a) those scoring above the median who were designated as being intrinsically motivated and belonging to Group IN and (b) those scoring below this median who were designated as being extrinsically motivated and belonging to Group EX. Teachers belonging to both Groups IN and EX had also been assigned a mean "satisfaction" rating. From these individual ratings, a mean "satisfaction" rating was computed for each group. With these computations completed, an ANOVA for these two groups or t test for independent means was employed to test Hypothesis 2a.

The five rankings into Groups 1-5 dependent upon a teacher's last date of attendance in a program of continuing education aided in the testing of the final hypothesis.
Hypothesis 2b: The more intrinsic (versus extrinsic) motivators for participating in continuing education a teacher identifies, the more recent the participation in a program of continuing education.

This analysis investigated the mean degrees of intrincity/extrincity for each of the five levels of currentness using an ANOVA. If a relationship was found to exist at the .10 level, a Scheffé pairwise comparison was conducted to aid in identifying the hypothesized direction.

This concludes an examination of the data analyses to be used to test the six hypotheses. It is next necessary to describe the results of these analyses.
CHAPTER IV

RESULTS

The Teacher Survey

After receiving 65 of the 71 teacher surveys distributed, a reliability coefficient for each of Items 4 and 5 was calculated. The 10 "intrinsic/extrinsic motivation" statements of Item 4 had a split-half reliability of 0.904 corrected to 0.949 using the Spearman-Brown prophecy formula. A similar computation for the 10 "satisfactory/unsatisfactory experience" statements of Item 5 yielded a split-half reliability of 0.852 corrected to 0.920. These reliability coefficients are summarized in Table 5.

Table 5
Corrected Split-Half Reliability for Teacher Survey

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Split-half reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Even items</td>
<td>3.083</td>
<td>0.532</td>
<td>0.949(^{a})</td>
</tr>
<tr>
<td></td>
<td>Odd items</td>
<td>2.898</td>
<td>0.501</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Even items</td>
<td>3.646</td>
<td>0.456</td>
<td>0.920(^{a})</td>
</tr>
<tr>
<td></td>
<td>Odd items</td>
<td>3.662</td>
<td>0.506</td>
<td></td>
</tr>
</tbody>
</table>

\(^{a}\)Corrected using Spearman-Brown formula.
The Hypotheses

The following describes the results of the statistical analyses completed on the data to test Hypothesis 1 and each of the six subhypotheses. Discussion of these results will follow their presentation.

Hypothesis 1: Continuing Education and Teacher Effectiveness

Employing a one-tailed $t$ test on independent means for the data collected from 750 students of the 31 teachers in Groups Y and N, a difference in test scores on the Modern Geometry Test at an alpha level equal to .10 was found to exist between the two groups: Group Y's 21 teachers (522 students) who had participated in some type of continuing education since winter term 1976 and Group N's 10 teachers (228 students) who had not participated in any type of continuing education since winter term 1976. These findings in support of the hypothesized relationship between a teacher's participation in a continuing education program and that teacher's effectiveness are summarized in Table 6.

The same $t$ test, when performed on each of the six items of the Purdue Teacher Evaluation Scale completed by 769 students of the same 31 teachers (541 Group Y and 229 Group N students), demonstrated differences at an alpha level equal to .10 for only two of the six items—Items 1 and 3. A discussion of this combined support and rejection of the hypothesized relationship dependent upon the PTES

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Table 6

Summary of t Test: The Modern Geometry Test for Students of Teachers Enrolled in Continuing Education Before and After Winter Term 1976

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>One-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y (Enrolled post-1976)</td>
<td>21</td>
<td>24.95</td>
<td>3.72</td>
<td>.0115*</td>
</tr>
<tr>
<td>N (Enrolled pre-1976)</td>
<td>10</td>
<td>21.22</td>
<td>4.81</td>
<td></td>
</tr>
</tbody>
</table>

*p < .10.

A summary of the findings for all six items can be found in Table 7.

Hypothesis 1a: Subject Area of Continuing Education and Teacher Effectiveness

The students of the 21 teachers in Hypothesis 1's Group Y (teachers participating in a program of continuing education since winter term 1976) were then tested as members of either Group Y₁ whose teachers' most recent course work was in the mathematical discipline or Group Y₂ composed of those teachers whose most recent course work was outside the mathematical discipline. However, unlike Hypothesis 1, only data obtained from the Modern Geometry Test and Item 1: the ability to motivate students, and Item 3: the subject matter orientation of the teacher, in the Purdue Teacher Evaluation Scale were included in the analyses of all three subhypotheses. That is, only those measures previously demonstrating support of the
Table 7

Summary of t Test: The Purdue Teacher Evaluation Scale for Students of Teachers Enrolled in Continuing Education Before and After Winter Term 1976

<table>
<thead>
<tr>
<th>Group</th>
<th>Item number &amp; description</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>One-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>#1: Ability to motivate students</td>
<td>21</td>
<td>3.029</td>
<td>0.444</td>
<td>.0625*</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>10</td>
<td>2.732</td>
<td>0.591</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>#2: Ability to control students</td>
<td>21</td>
<td>3.468</td>
<td>0.424</td>
<td>.4358</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>10</td>
<td>3.494</td>
<td>0.473</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>#3: Teacher subject matter orientation</td>
<td>21</td>
<td>3.741</td>
<td>0.180</td>
<td>.0161*</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>10</td>
<td>3.543</td>
<td>0.319</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>#4: Student-teacher communication</td>
<td>21</td>
<td>3.343</td>
<td>0.349</td>
<td>.3491</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>10</td>
<td>3.288</td>
<td>0.400</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>#5: Teaching methods and procedures</td>
<td>21</td>
<td>3.232</td>
<td>0.347</td>
<td>.1509</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>10</td>
<td>3.086</td>
<td>0.391</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>#6: Fairness of teacher to students</td>
<td>21</td>
<td>3.381</td>
<td>0.300</td>
<td>.2142</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>10</td>
<td>3.285</td>
<td>0.313</td>
<td></td>
</tr>
</tbody>
</table>

*p < .10.

The hypothesized relationship in the testing of Hypothesis 1 at an alpha level equal to .10 were used to test the three subhypotheses.

As illustrated in Tables 8 and 9, an ANOVA performed on the 522 students of these 21 teachers (266 Group 1 and 256 Group 2 students)
failed to reject at an alpha level equal to .25 the hypothesized lack of relationship between the subject area of a teacher's program of continuing education and Hypothesis 1's relationship between this participation and that teacher's effectiveness as measured by scores obtained on the Modern Geometry Test.

Table 8
Summary of ANOVA: The Modern Geometry Test Data for Teachers Educated Both In and Out of Math Discipline

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>0.01</td>
<td>0.00</td>
<td>1.000*</td>
</tr>
<tr>
<td>Within</td>
<td>19</td>
<td>14.54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p > .25.

Table 9
Descriptive Summary of Data: The Modern Geometry Test for Teachers Educated Both In and Out of Math Discipline

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1: In math discipline</td>
<td>11</td>
<td>24.971</td>
<td>2.543</td>
</tr>
<tr>
<td>#2: Out of math discipline</td>
<td>10</td>
<td>24.937</td>
<td>4.849</td>
</tr>
</tbody>
</table>

However, similar support for this hypothesized lack of relationship was not shared by both Items 1 and 3 of the Purdue Teacher Evaluation Scale. Instead, there was a failure to reject a
relationship at an alpha level equal to .25 between the subject area of a teacher's continuing education and that teacher's "ability to motivate students" as measured by PTES Item 1. However, as with the data obtained from the Modern Geometry Test, no relationship was found to exist at the .25 level between subject area and the "subject matter orientation" of the teacher as measured by PTES Item 3. These findings are summarized in Tables 10 through 13.

Table 10
Summary of ANOVA: PTES Item 1 Data, the Ability to Motivate Students by Teachers Educated Both In and Out of the Math Discipline

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>0.37</td>
<td>1.99</td>
<td>.172*</td>
</tr>
<tr>
<td>Within</td>
<td>19</td>
<td>0.19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .25.

Table 11
Descriptive Summary of Data: PTES Item 1, the Ability to Motivate Students by Teachers Educated Both In and Out of the Math Discipline

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1: In math discipline</td>
<td>11</td>
<td>2.902</td>
<td>6.745</td>
</tr>
<tr>
<td>#2: Out of math discipline</td>
<td>10</td>
<td>3.169</td>
<td>7.142</td>
</tr>
</tbody>
</table>

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Table 12

Summary of ANOVA: PTES Item 3 Data for Subject Matter Orientation of Teachers Educated Both In and Out of the Math Discipline

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>0.03</td>
<td>0.83</td>
<td>.387*</td>
</tr>
<tr>
<td>Within</td>
<td>20</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p > .25.

Table 13

Descriptive Summary of Data: PTES Item 3, Subject Matter Orientation of Teachers Educated Both In and Out of the Math Discipline

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1: In math discipline</td>
<td>11</td>
<td>3.707</td>
<td>0.116</td>
</tr>
<tr>
<td>#2: Out of math discipline</td>
<td>10</td>
<td>3.779</td>
<td>0.232</td>
</tr>
</tbody>
</table>

Hypothesis 1b: Degree of Participation in a Program of Continuing Education and Teacher Effectiveness

To test the hypothesized lack of relationship between the degree of participation in a program of continuing education and the hypothesized relationship between these varying levels of participation and those teachers' effectiveness, the 21 teachers were next placed in one of three Subgroups P, H, and F dependent upon whether

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the teachers' number of hours of attendance were between 1 and 4, 5 and 8, or more than 8, respectively. As with Hypothesis 1a, an alpha level equal to .25 was employed with each ANOVA to avoid a Type II error. This led to rejection of the hypothesized lack of relationship when measured by the 522 student scores on the Modern Geometry Test and support when measured by the 541 student responses on the Purdue Teacher Evaluation Scale. Tables 14 and 15 illustrate those findings demonstrating the existence of a relationship and consequential rejection of the hypothesis when employing data gathered from the Modern Geometry Test.

Table 14

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2</td>
<td>37.95</td>
<td>3.41</td>
<td>.054*</td>
</tr>
<tr>
<td>Within</td>
<td>18</td>
<td>11.14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .25.

Although a study of Table 15 reveals a higher mean score for students of the two teachers whose last enrollment exceeded 8 semester hours (Group F), a post hoc multiple comparison test was performed to verify exactly where the differences in scores existed. The results of the Scheffé pair-wise comparison demonstrated support for the hypothesized lack of relationship between scores and hours of
Table 15

Descriptive Summary of Data: The Modern Geometry Test for Teachers With Varying Semester Hours of Attendance

<table>
<thead>
<tr>
<th>Group (hours of attendance)</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P (1-4 hours)</td>
<td>13</td>
<td>24.450</td>
<td>3.228</td>
</tr>
<tr>
<td>H (5-8 hours)</td>
<td>6</td>
<td>24.102</td>
<td>3.053</td>
</tr>
<tr>
<td>F (9+ hours)</td>
<td>2</td>
<td>30.795</td>
<td>5.367</td>
</tr>
</tbody>
</table>

attendance for the two groups enrolled for fewer than 9 hours (Groups P and H) but rejection at the .25 level for scores between each of these two groups and those teachers attending more than 8 hours (Groups P and F and Groups H and F). These results are illustrated in Table 16.

Table 16

Multiple Comparisons: Scheffé Matrix of Probabilities for Teachers With Varying Semester Hours of Attendance

<table>
<thead>
<tr>
<th>Group (hours of attendance)</th>
<th>H (5-8 hrs.)</th>
<th>F (9+ hrs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P (1-4 hours)</td>
<td>0.979*</td>
<td>0.067</td>
</tr>
<tr>
<td>H (5-8 hours)</td>
<td>0.073</td>
<td></td>
</tr>
</tbody>
</table>

*p > .25.

However, support for the hypothesized lack of relationship between effectiveness and degree of participation was demonstrated by the two PTES items measuring the teachers' ability to motivate
students and the subject matter orientation of the teacher (Items 1 and 3, respectively). Neither measure had a difference for the three varying enrollment groups at an alpha level equal to .25 as shown in Tables 17 through 20.

Table 17
Summary of ANOVA: PTES Item 1 Data, the Ability to Motivate Students by Teachers With Varying Semester Hours of Attendance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2</td>
<td>0.07</td>
<td>0.32</td>
<td>.732*</td>
</tr>
<tr>
<td>Within</td>
<td>18</td>
<td>0.19</td>
<td>0.19</td>
<td></td>
</tr>
</tbody>
</table>

*p > .25.

Table 18
Descriptive Summary of Data: PTES Item 1, the Ability to Motivate Students by Teachers With Varying Semester Hours of Attendance

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P (1-4 hours)</td>
<td>13</td>
<td>3.048</td>
<td>0.732</td>
</tr>
<tr>
<td>H (5-8 hours)</td>
<td>6</td>
<td>2.927</td>
<td>0.844</td>
</tr>
<tr>
<td>F (9+ hours)</td>
<td>2</td>
<td>3.215</td>
<td>2.338</td>
</tr>
</tbody>
</table>

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Table 19
Summary of ANOVA: PTES Item 3 Data, Subject Matter Orientation of Teachers With Varying Semester Hours of Attendance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2</td>
<td>0.01</td>
<td>0.26</td>
<td>.773*</td>
</tr>
<tr>
<td>Within</td>
<td>18</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p > .25.

Table 20
Descriptive Summary of Data: PTES Item 3, Subject Matter Orientation of Teachers With Varying Semester Hours of Attendance

<table>
<thead>
<tr>
<th>Group (hours of attendance)</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P (1-4 hours)</td>
<td>13</td>
<td>3.753</td>
<td>0.266</td>
</tr>
<tr>
<td>H (5-8 hours)</td>
<td>6</td>
<td>3.700</td>
<td>0.323</td>
</tr>
<tr>
<td>F (9+ hours)</td>
<td>2</td>
<td>3.800</td>
<td>1.245</td>
</tr>
</tbody>
</table>

Thus concludes a summary of the findings as they pertain to Hypothesis 1b. The last of Hypothesis 1's three subhypotheses is next.
Hypothesis 1c: Currentness of Enrollment in Continuing Education and Teacher Effectiveness

Once again, the same 21 teachers, their students, the Modern Geometry Test, and PTES Items 1 and 3 were examined to find support for the hypothesized relationship between the currentness of a teacher's participation in a program of continuing education and that teacher's effectiveness. For this examination, Subgroups A, B, C, and D were the four groups into which the 21 teachers were placed dependent upon whether their last semester of attendance was after winter 1982 or between the winter and fall terms of 1980-81, 1978-79, and 1976-77, respectively (see Table 3). As with the previous hypothesis, the findings both supported and rejected the hypothesized relationship dependent upon the measure used.

An ANOVA performed on the data from the Modern Geometry Test failed to support the hypothesized relationship at the .10 alpha level as illustrated in Tables 21 and 22.

Table 21
Summary of ANOVA: The Modern Geometry Test Data for Teacher Groupings Dependent Upon Currentness of Education

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>3</td>
<td>8.87</td>
<td>0.60</td>
<td>.625</td>
</tr>
<tr>
<td>Within</td>
<td>17</td>
<td>14.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .10.
Table 22

Descriptive Summary of Data: The Modern Geometry Test for Teacher Groupings Dependent Upon Currentness of Education

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Winter '82+</td>
<td>5</td>
<td>26.664</td>
<td>4.640</td>
</tr>
<tr>
<td>B: Winter '80 - fall '81</td>
<td>3</td>
<td>24.200</td>
<td>0.408</td>
</tr>
<tr>
<td>C: Winter '78 - fall '79</td>
<td>7</td>
<td>25.163</td>
<td>4.123</td>
</tr>
<tr>
<td>D: Winter '76 - fall '77</td>
<td>6</td>
<td>23.665</td>
<td>3.553</td>
</tr>
</tbody>
</table>

Although an ANOVA performed on the data gathered from the PTES Item 1 measuring a teacher's ability to motivate students supported the hypothesized relationship at an alpha equal to .10, a Scheffé pair-wise comparison failed to demonstrate a similarly significant difference between any of the six possible pairings of the four groups. Tables 23 through 25 illustrate these findings.

Table 23

Summary of ANOVA: PTES Data for Item 1, the Ability of Teachers to Motivate Students Dependent Upon Currentness of Continuing Education

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>3</td>
<td>0.43</td>
<td>2.75</td>
<td>.074*</td>
</tr>
<tr>
<td>Within</td>
<td>17</td>
<td>0.16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .10.
Table 24

Descriptive Summary of Data: PTES Item 1, the Ability of Teachers to Motivate Students Dependent Upon Currentness of Continuing Education

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Winter '82+</td>
<td>5</td>
<td>3.472</td>
<td>2.197</td>
</tr>
<tr>
<td>B: Winter '80 - fall '81</td>
<td>3</td>
<td>2.910</td>
<td>2.763</td>
</tr>
<tr>
<td>C: Winter '78 - fall '79</td>
<td>7</td>
<td>2.883</td>
<td>1.779</td>
</tr>
<tr>
<td>D: Winter '76 - fall '77</td>
<td>6</td>
<td>2.890</td>
<td>2.010</td>
</tr>
</tbody>
</table>

Table 25

Multiple Comparisons: Scheffé Matrix of Probabilities for Teacher Groupings Dependent Upon Currentness of Education

<table>
<thead>
<tr>
<th>Group</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.318</td>
<td>0.130</td>
<td>0.156</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
</tbody>
</table>

Finally, an ANOVA performed on the data gathered from the PTES Item 3 measuring the subject orientation of the teacher demonstrated support for the hypothesized relationship at a .10 alpha level. However, this support for a difference in a teacher's subject matter orientation as measured by PTES Item 3 scores is limited by the findings of the Scheffé pair-wise comparison where scores for only

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Groups A and D supported the hypothesized relationship at the .10 level. That is, while a direct relationship does exist, it exists only at the two extremes of the "currentness" continuum. This finding will be discussed more thoroughly following the results of all analyses in Chapter V. A summary of the PTES Item 3 ANOVA and Scheffé is illustrated in Tables 26 through 28.

Table 26
Summary of ANOVA: PTES Data for Item 3, Subject Matter Orientation for Teachers Dependent Upon the Currentness of Continuing Education

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>3</td>
<td>0.08</td>
<td>3.18</td>
<td>.050*</td>
</tr>
<tr>
<td>Within</td>
<td>17</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .10.

Table 27
Descriptive Summary of Data: PTES Item 3, Subject Matter Orientation of Teachers Dependent Upon the Currentness of Continuing Education

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Winter '82+</td>
<td>5</td>
<td>3.908</td>
<td>2.041</td>
</tr>
<tr>
<td>B: Winter '80 - fall '81</td>
<td>3</td>
<td>3.753</td>
<td>2.963</td>
</tr>
<tr>
<td>C: Winter '78 - fall '79</td>
<td>7</td>
<td>3.723</td>
<td>1.651</td>
</tr>
<tr>
<td>D: Winter '76 - fall '77</td>
<td>6</td>
<td>3.618</td>
<td>1.828</td>
</tr>
</tbody>
</table>
Table 28

Multiple Comparisons: Scheffé Matrix of Probabilities
for Teacher Groupings Dependent Upon
Currentness of Education

<table>
<thead>
<tr>
<th>Group</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.619</td>
<td>0.286</td>
<td>0.053*</td>
</tr>
<tr>
<td>B</td>
<td>0.994</td>
<td>0.692</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>0.702</td>
<td></td>
</tr>
</tbody>
</table>

*p < .10.

Hypothesis 2a: Motivation for and Satisfaction With a Program of
Continuing Education

After computing a median extrinsic/intrinsic motivation score of
3.016 for the 65 respondents, all were placed into the two groups as
defined earlier: Group IN composed of 30 teachers whose score ex­
ceeded the median and were labeled as intrinsically motivated and
Group EX composed of 35 teachers whose score was equal or below the
median and labeled as extrinsically motivated. An ANOVA performed on
the two groups with respect to their mean satisfaction scores demon­
strated support for the hypothesized directional relationship between
degree of intrincity for entry into and satisfaction with a program
of continuing education at an alpha level equal to .10. These find­
ings are summarized in Table 29 and Table 30.
Table 29
Summary of ANOVA: Degree of Satisfaction With Educational Program for Teachers Grouped by Intrinsic/Extrinsic Motivators

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>1</td>
<td>2.604</td>
<td>14.49</td>
<td>.001*</td>
</tr>
<tr>
<td>Within</td>
<td>63</td>
<td>0.180</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .10.

Table 30
Descriptive Summary of Data for the Degree of Satisfaction With Continuing Education by Intrinsically and Extrinsicly Motivated Teacher Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean degree of satisfaction</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group IN</td>
<td>30</td>
<td>3.870</td>
<td>0.481</td>
</tr>
<tr>
<td>(intrinsic motivators)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group EX</td>
<td>35</td>
<td>3.469</td>
<td>0.368</td>
</tr>
<tr>
<td>(extrinsic motivators)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 2b: Motivators for and Recentness of a Program of Continuing Education

Although those teachers whose participation in a program of continuing education was most recent had the highest mean extrinsic/intricincty motivation score, the ANOVA rejected the hypothesis at the .10 alpha level when performed on the five groups of teachers grouped according to whether their last enrollment date was since

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winter 1980 or between winter 1976 and fall 1979, winter 1972 and fall 1975, winter 1968 and fall 1971, or prior to winter 1968 (see Table 4). In fact, a Scheffé pair-wise comparison computed despite the rejection of the hypothesized relationship found only two of the five groups having a measurable difference below the .50 level (Groups 1 and 3, \( p = .215 \)). These final data analyses are presented in Table 31 and Table 32.

Table 31

Summary of ANOVA: Extrinsic/Intrinsic Motivation
Scores for Teachers Grouped by Their Last Dates of Enrollment

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean square</th>
<th>F ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>4</td>
<td>0.456</td>
<td>1.82</td>
<td>.135</td>
</tr>
<tr>
<td>Within</td>
<td>60</td>
<td>0.250</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .10.

This completes the presentation of the results of the statistical analyses completed on the six hypotheses. A discussion of these findings and conclusions drawn as to how the study pertains to past, present, and future research follows.
Table 32

Descriptive Summary of Data: Extrinsic/Intrinsic Motivation Scores for Teachers Grouped by Last Date of Enrollment

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Motivation Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Winter '80+</td>
<td>21</td>
<td>3.195</td>
<td>0.515</td>
</tr>
<tr>
<td>2: Winter '76 - fall '79</td>
<td>20</td>
<td>2.920</td>
<td>0.472</td>
</tr>
<tr>
<td>3: Winter '72 - fall '75</td>
<td>8</td>
<td>2.688</td>
<td>0.464</td>
</tr>
<tr>
<td>4: Winter '68 - fall '71</td>
<td>12</td>
<td>2.992</td>
<td>0.454</td>
</tr>
<tr>
<td>5: Prior to winter '68</td>
<td>4</td>
<td>2.825</td>
<td>0.750</td>
</tr>
</tbody>
</table>

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Prior to a discussion of the findings as they relate to each of the six hypotheses, the "randomness" of the sampling process must be examined. During the preparation for and the conducting of the actual research, the investigator was often warned by colleagues of the problem of gaining cooperation from those subjects requested to participate in the study. Since only 71 teachers were to be included and a total of 40 (10 in each of four groups) was desired to test all hypotheses, the need for cooperation on the teacher survey and continued cooperation the next spring was a major concern. However, cooperation never surfaced as a problem. Unfortunately, the speculative reasons for elimination of one research problem—response rate and cooperation—might be the same reasons for placement of limitations on the findings. Consequently, an examination of these probable reasons for cooperation/limitations follows.

Sample Bias

The group that was studied, mathematics teachers, might possibly themselves be biased in their analytic and cooperative nature toward research and the scientific method employed to study phenomenon. Their understanding of the statistical need for a suitable response rate may have had an effect on the 92% return of the teacher surveys.

Two additional factors affecting this initial response rate must also
be examined because they may have had a more serious effect not only on the number of responses but also the nature of the responses as well.

First is the possible familiarity of the subjects or the subjects' colleagues and department chairmen with the investigator. All of the above individuals had had the opportunity to make an acquaintance as members of the Macomb County Mathematics Council. Although regular participation in the council is usually limited to approximately 20 mathematics teachers from across the county each month, familiarity with a teacher might have led to sampling bias as the respondent replied to the teacher survey knowing that, despite the teacher code, the investigator necessarily knows the identity of the respondent. Furthermore, the investigator's familiarity with several department chairmen and their possible desire to aid in completion of the study may have created administrative "prodding" to comply. Similar administrative requests for cooperation are the second source of possible sample bias.

As explained in the "Procedure," the teacher surveys were distributed after the investigator met with each of the 29 principals. It had been the investigator's intent to meet with each principal, explain the nature of the study, receive approval, and place the surveys in the mailboxes of the sampled teachers. However, with the exception of only one of 29 principals, cooperation was more than expected. Not only did 28 administrators approve of the study but all 29 insisted that they personally deliver the teacher survey to their sampled teachers. In fact, one request by a principal that the
investigator meet with the three Modern Geometry teachers in his building was politely refused. Although the only negative "note" attached to a returned (but noncompleted) survey mentioned that teacher's refusal to "participate in this or any other survey," the possibility of sample bias must be considered. Such bias would itself be random and not systematic throughout the study. A final source of bias is, however, of more concern when examining the findings.

Gay (1981) explained that volunteers "are bound to be different from nonvolunteers . . . [leading to] a major source of bias" (p. 99). Consequently, all 65 "volunteer" respondents to the teacher survey may have shared a special motivation or interest in the study that has biased the results, particularly those findings dependent upon the responses to Item 4's request to "check the appropriate blank that best describes [the teacher's] degree of agreement/disagreement with each of the following phrases describing those factors motivating [the teacher's] entry into graduate or postgraduate education" and Item 5's request to "characterize [the teacher's] graduate or postgraduate education experience . . . [by describing] the degree of importance [the teacher] would assign each of the following phrases in such a characterization." That is, perhaps some "special trait" possessed by all 65 teachers willing to "volunteer" their time to complete the survey prejudiced their responses to these two items.

More important is the possible bias introduced by the 43 teachers who were willing to include their students in the study.
Although only 31 of the 43 were randomly assigned to the various subgroups, all 31 were indeed volunteers. Two examples of this possible bias are demonstrated below. First is the failure of one particular group of teachers to respond. Of the 65 respondents, the graduate/postgraduate work of only five was outside the realm of professional education. Might all six of the remaining nonrespondents also be teachers in this group? Furthermore, of the five who did respond, four did not desire to continue in their participation and the one who said he or she might warned that they "would probably be out of teaching by spring." While the small percentage of such teachers is quite possibly representative of teachers in general and mathematics teachers in particular justifying the failure to include this subgroup in the sample, it nonetheless focuses attention to the problem of such volunteer sampling.

Second, additional reasons for "failure to volunteer" might have excluded necessary input to the study and consequently biased the results. An example is an apologetic note from one teacher following the investigator's second request for return of the teacher survey. This teacher explained how she did not feel "qualified" to answer the questions on the teacher survey because it had been "such a long period of time since [she had] been in school." The teacher went on to explain that "being a mother, a wife, and a teacher" left little room for graduate study. Consequently, instead of this teacher's responses becoming an important part of my "random" sampling, they were instead "unvolunteered" out of the study and data analysis.
Remembering these problems and their significance on the findings, a discussion of the results as they pertain to each hypothesis is next.

Discussion of Hypotheses

**Hypothesis 1:** There exists a direct relationship between a teacher's participation in a continuing education program and that teacher's effectiveness.

Support for this hypothesis as measured by the Modern Geometry Test was at a level greater than that anticipated by the investigator. Unlike earlier studies that included a much wider range of educational inputs (Averch et al., 1974; Coleman, cited in Averch et al., 1974; Michelson, cited in Averch et al., 1974; Perl, cited in Averch et al., 1974), the current study's admittedly myopic focus on continuing professional education only, to the exclusion of additional variables, had resulted in an expectant fear that the presence or absence in varying degrees of only one variable might prove insufficient in discerning measurable differences on the achievement test. Consequently, despite the successful support of the hypothesis as measured by the achievement instrument, the careful choice of a subject containing material relatively "new" to all students coupled with an instrument designed to concentrate on this new material must be given credit. That is, equal success might not be granted achievement measures in more general topics such as general or consumer's math, English composition, or American history.

The combined support and rejection of the hypothesis as measured by the Purdue Teacher Evaluation Scale requires closer examination.
Any discussion of this combined support/rejection must first include the list of the six specific behavioral characteristics each of the PTES items were designed to measure:

Item 1. The teacher's ability to motivate students.
Item 2. The teacher's ability to control students.
Item 3. The teacher's subject matter orientation.
Item 4. Student-teacher communication.
Item 5. Teaching methods and procedures.
Item 6. Teacher fairness (Bently & Starry, 1975).

As illustrated in Table 7's description of the t test completed on each of the six items for teachers enrolled before and after the winter term 1976, there was support for the hypothesis on Items 1 and 3 and rejection of the hypothesis on the remaining four items at the .10 alpha level. The measurable difference in a teacher's subject matter orientation dependent upon the teacher's participation in a program of continuing education as demonstrated by Item 3 on the PTES supports both the hypothesis and the literature's demand for a continual acquisition and updating of job skills (Averch et al., 1974; Berg et al., 1980; Queeney & Manz, 1979; Trivett, 1977).

The teacher's ability to motivate his or her students dependent upon participation in a continuing education program was similarly supported by Item 1's differences in scores obtained by the two groups of teachers. Perhaps this ability to motivate is the result of the teacher being transformed into a student and consequently being reminded of what activities students find most motivating (Berg et al., 1980; Luke, 1976; Trivett, 1977). Jackson (1979) found
similar support employing the PTES in his examination of student perceptions of the effectiveness of professional development.

However, Jackson's (1979) study shared both this investigation's and Evans's (1979) additional desire to discover measurable differences in teaching methods and procedures dependent upon a program of continuing education. Jackson noted the difficulty of students in perceiving differences in teaching techniques and methods that may have been shared by students in this study. Instead, the probability level of .15 for Item 5 suggests the need for additional documentation of the various tasks and methods that a teacher performs and which can be improved by participation in a program of continuing professional education.

The rejection of the hypothesis as measured by Items 2, 4, and 6 measuring the teacher's ability to control students, student-teacher communication, and teacher fairness, respectively, can be interpreted as both a failure to support the overall hypothesis of the need for continuing professional education to improve effectiveness and as an indication that these three (or four if Item 5 is included) particular areas of a teacher's behavior are not measurably affected by such an educational program. Investigative hindsight prompted by the PTES findings contributed additional information that should have been examined prior to administration of the PTES and might help explain the results of the statistical analysis.

In their manual explaining the technical data of the PTES, Bently and Starry (1975) presented data demonstrating the highest degree of interscale correlations to exist between Item 1 and Item 3.
These two items also share a split-half correlation coefficient of .90, surpassed only by Item 2's coefficient of .91. This strengthens the decision to use only these two items in a test of the remaining three subhypotheses of Hypothesis 1.

**Hypothesis la:** There exists no relationship between the subject area of a teacher's program of continuing education and the hypothesized relationship between this participation and that teacher's effectiveness.

As the group of teachers examined excluded those not participating in some type of graduate/postgraduate educational program since winter term 1976 and instead concentrated on only those who had recently taken course work in a program of continuing professional education, their dichotomous grouping dependent upon whether or not that course work was in or out of the mathematical discipline resulted in support for the hypothesized lack of relationship between this grouping of teachers and their students' performance on the Modern Geometry Test. Furthermore, as examination is focused upon these teachers' ability to motivate students and the teachers' subject matter orientation (Items 1 and 3 of the PTES) and the alpha level expanded to .25, a breach from the hypothesized lack of relationship would be expected in the area of "subject matter orientation." That is, this recent upgrading of professional education "in" as opposed to "out" of the math discipline would predictably strengthen the latter item's behavioral characteristic.

However, Table 12 supports the hypothesized lack of relationship with regard to subject matter orientation, while Table 10

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demonstrates instead a relationship between the subject area of a teacher's program of continuing education and that teacher's ability to motivate students. The fact that those teachers educated outside the mathematics discipline were more successful in motivating their students does not necessarily conflict with the practice of an increasing number of school districts requiring that course work be "relevant" to the teacher's subject area (Berg et al., 1980; Cubser, 1981; Lisman, 1980; Statler, 1976). Instead, this finding should demonstrate that "relevancy" to the subject area does not necessarily imply that the course work be only in the subjects they teach!

**Hypothesis 1b:** There exists no relationship between the degree of participation in a program of continuing education and the hypothesized relationship between this participation and that teacher's effectiveness.

As predicted at the onset of the study, the placing of 21 teachers into three subgroups dependent upon semester hours of their last attendance in a program of continuing education was difficult, especially for the group containing teachers with 9 or more semester hours in a single term (Group F in Table 15). Since this would require enrollment in more than two classes, inclusion of only two teachers in this subgroup was predictably low. This low membership must be kept in mind since the only measurable differences in achievement test scores at alpha equal to .25 are found not between those teachers attending 1 to 4 hours and 5 to 8 hours (Group P and Group H) but instead between each of these two groups when compared with Group F. Unlike most of the remaining subgroups in the study

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where larger membership somewhat insured an equal distribution of unaccounted for intervening variables, Group F had only two members. Thus, possession of an unmeasured behavioral characteristic having extreme effects on the measures by either one or both of the two group members could greatly bias the analyses. This is true of both the rejection and support of the hypothesis. Though the results are not to be ignored, the possibility of this bias and the need to expand on the size of experimental groups in future studies must be noted.

**Hypothesis 1c:** There exists a direct relationship between the currentness of a teacher's participation in a program of continuing education and that teacher's effectiveness.

Once again, while the geometry test proved to be a most affective instrument for measuring differences in effectiveness between teachers who had or had not participated in a program of continuing education since winter term 1976, it failed to detect any measurable differences for teachers in the former category when grouped by attendance since winter 1982, between winter 1980 and fall 1981, between winter 1978 and fall 1979, or between winter 1976 and fall 1977 (see Table 3).

When measuring differences at an alpha level equal to .10 in both the ability of teachers to motivate students and subject matter orientation of teachers (Items 1 and 3 of the PTES), only limited support for the hypothesis was demonstrated. That is, although there was a measurable difference in overall scores when comparing all four groups on Item 1, a similar difference at the .10 level was not
demonstrated when each of the four groups were examined two-by-two using a Scheffé post hoc comparison. A less conservative statistical method might reveal differences between scores obtained by teachers attending since winter 1982 when compared with teachers attending either between winter 1978 and fall 1979 or between winter 1976 and fall 1977 (Groups A and C and Groups A and D, respectively) but would still fail to support a pure directional increase in ability to motivate students with the degree of currentness of graduate/post-graduate education. Instead, it appears from the mean scores of Table 24 that the results of the Scheffé reinforce the contention that it is the teacher who is presently or most recently participating in a program of continuing education who demonstrates increased ability to motivate.

The Scheffé performed on PTES Item 3 further supports this contention with the only measurable difference in subject matter orientation between teachers at the two extreme positions of the grouping—those attending since winter 1982 and those attending between winter 1976 and fall 1977 (Groups A and D).

An overall review of Hypothesis 1 and its three subhypotheses supports Kuhlman's (1979) reporting of studies demonstrating that "teachers who taught but undertook no program of graduate studies were not afforded the opportunity for interaction with instructors, a strong commitment to professional norms, and to communicate this commitment to their students" (p. 437). That is, it appears that it is not so much what or how much is learned during the course of such studies but instead the act of learning itself that improves the
teacher's effectiveness in the areas measured. If this is true, then teachers need to seek a more meaningful voice on the development and analysis of methods to pursue continued staff development, an area given low priority at the collective bargaining table (Florio & Koff, 1977). As suggested in Brick's (1978) study of attitudes toward continuing professional development, those who argue whose responsibility it is to pay for such development might be satisfied with a scheme where teachers pay for programs designed for general personal growth, a professional move, and to obtain certification while the employing district pays when the purpose of the program is to teach skills, to keep the teacher current about educational matters, and whenever in-service is required by the district. Add to this scheme the support, though limited at this time to a select group of teachers, for the contention that any program of continuing professional education improves teaching effectiveness and there exists a strong argument for continued support of such programs.

Hypothesis 2a: The more intrinsic (versus extrinsic) motivators for participation in a program of continuing education a teacher identifies, the greater the degree of satisfaction experienced during the teacher's educational pursuit.

Support for this hypothesis as demonstrated in Table 29 might aid both teacher and administrator in understanding why there are always one group of teachers complaining of the wasted time they spend in either graduate/postgraduate classes or similar staff development sessions and another group of teachers who derive a great deal of satisfaction from similar experiences. If it is indeed the
intricacy of the motivators for pursuit of such continuing programs of professional education that result in a high degree of satisfaction, then "intrinsic ownership" of such programs—whether it be in the form of a more personal individualizing of course work to be taken, an active role in design and implementation of staff in-service, or similar strategies—must be examined and utilized. Though once again limited to the small and rather specialized "volunteer" sample group of this study, these findings—suggesting that "money isn't everything" as extrinsic motivators prove less satisfying than intrinsic—should be examined more closely in future studies across a greater spectrum of disciplines and demographic areas.

Hypothesis 2b: The more intrinsic (versus extrinsic) motivators for participating in continuing education a teacher identifies, the more recent the participation in a program of continuing education.

Contrary to the just completed suggestion that truly satisfying continuing education programs result when motivated by intrinsic needs and desires, an examination of Table 32's mean extrinsic/intrinsic motivation scores when compared for teachers attending graduate school since winter 1980 or between winter 1976 and fall 1979, winter 1972 and fall 1975, winter 1968 and fall 1971, or prior to winter 1968 displays motivators well below the 3.016 extrinsic/intrinsic mean for all but a few of the 65 teachers. That is, not only does this data lead to rejection of Hypothesis 2b (see Table 31), but also it illustrates that if teacher complaints of graduate/postgraduate education are going to accompany extrinsic motivation for entry into such programs, such complaints can be expected to

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continue! Apparently, although "money isn't everything," the majority of those teachers sampled would rather be dissatisfied with the course work that got them a raise, job change, or promotion than be satisfied with the course work that appears to have made them more effective teachers.

Limitations of the Study

In addition to the limitations placed upon the study by the sampling bias discussed earlier, additional limitations must be examined. Although 71 teachers were initially surveyed, 65 responded, and 31 continued to participate along with their approximately 750 students, the restraints on subject area and demographics necessary to make it financially and physically possible to conduct the study severely limit the ability to generalize the findings to larger populations. Instead, the findings suggest relationships in a particular group which might be expanded to include larger populations in future studies. Such studies may want to expand the size of the sampled groups while simultaneously limiting themselves to the number of instruments employed and characteristics measured. Instead of using both an achievement test and a teacher effectiveness scale, one or the other could be chosen dependent upon the investigation to be completed.

The possible sampling bias due to familiarity with the investigator is most interesting because of the dichotomous nature of such familiarity. That is, the same familiarity that may have prompted the teachers' initial agreement to participate and therefore
contributed to a favorable response rate may have simultaneously resulted in the previously discussed bias of their responses. Thus, if this dichotomous relationship does exist, a replication of the study in a locale foreign to the investigator in an effort to decrease such bias could possibly result in an accompanying decrease in participation. Endorsement of the study by professionally accepted teacher organizations would be an acceptable substitute for the undesirable investigator/subject familiarity.

Future studies hoping to expand the reported findings to other grade levels and subject areas might also aid in solving the relationship between all six of the characteristics measured by the Purdue Teacher Evaluation Scale's six items and educational inputs other than continuing education for the professional. Whether it be a related input such as subscription to and reading of a variety of professional journals in an effort to enlarge the knowledge and understanding of the subject taught (Berg et al., 1980; Houle, 1976; Watman, 1972b), years of teaching experience, age of instructor, or similar measurable inputs; a better understanding of the relationships between these inputs and the six PTES characteristics—a teacher's ability to motivate, control, communicate, and be fair to students as well as that teacher's subject matter orientation and methods and procedures—can only benefit the teaching profession as it improves upon the effectiveness of educators.
Summary

The purpose of this study was to investigate the relationship between continuing education for the professional educator and that educator's effectiveness as measured by both an achievement test, the Modern Geometry Test: Content Evaluation Series, and an evaluative measure completed by the educator's students, the Purdue Teacher Evaluation Scale. Included were additional investigations of motivation for and satisfaction with graduate/postgraduate work and the importance that number of hours, currentness, and subject area of such programs has upon any hypothesized relationships with effectiveness.

A total of 65 of 71 teachers comprising the total number of Modern Geometry instructors in Macomb County, Michigan, replied to a fall survey requesting information about the number of hours, last date of attendance, and subject area of the teacher's most recent enrollment in a program of continuing education. Also included were two questions used to obtain a measure of the degree of intrincity/extrincity for motivators prompting entry into the program and the degree of satisfaction/dissatisfaction with the program. Those surveyed could volunteer to administer the achievement and evaluative instruments to their class in June. Of the 43 teachers willing to participate, 31 were randomly assigned membership in various groups from which their survey data and their students' Modern Geometry Test and PTES evaluative data were used to test the six hypotheses.
Support at an alpha level equal to .10 for the hypothesized higher degree of effectiveness for teachers enrolled in a continuing education program since winter 1976 was demonstrated by the Modern Geometry Test results and two of the six characteristics measured by the PTES: the ability for the teacher to motivate students and teacher subject matter orientation. However, only two of these same three measures supported the hypothesized lack of relationship between the subject area of the program of continuing education and the proven effectiveness of those teachers enrolled since winter 1976. While the geometry test found no measurable difference in scores at the .25 level, a difference in the ability to motivate students was demonstrated for those teachers whose graduate work was either in or out of the mathematical discipline.

There was minimal support for both a hypothesized lack of relationship between the degree of participation in a graduate program and teacher effectiveness, and a hypothesized relationship between the currentness of such study and that teacher's effectiveness. Instead, it was concluded that teacher effectiveness as measured by the achievement test and evaluative instrument was measurably affected not so much by the degree, subject area, or currentness of graduate education but simply by the active or inactive enrollment in such a program of continuing education.

There was support for a hypothesized directional relationship between motivators for entry into and satisfaction with a continuing education program. It was demonstrated that the more intrinsic the motivators the greater the degree of satisfaction. However, this
degree of intricacy for motivators was found to have no relationship to the recentness of the graduate experience. In fact, the motivation scores were skewed extrinsically.

The findings in support of continuing education despite the subject area or motivational factors were tempered by the investigator's warnings of sampling bias due to possible familiarity of subjects with the investigator and the small number of "volunteer" subjects. Remedies for these limitations were included accompanying suggestions for future studies.
Appendix A

Population
Population: High Schools in Macomb County

The following are the names and addresses of those participating high schools in Macomb County, Michigan. The schools are grouped by school district. Also included are the number of Modern Geometry teachers and sections taught as of the second semester of the 1983-84 academic year.

<table>
<thead>
<tr>
<th>School District Name:</th>
<th>Geometry Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. Teachers</td>
</tr>
<tr>
<td>Anchor Bay District</td>
<td></td>
</tr>
<tr>
<td>Anchor Bay Senior High School</td>
<td>2</td>
</tr>
<tr>
<td>48650 Sugarbush Road</td>
<td></td>
</tr>
<tr>
<td>New Baltimore 48047</td>
<td></td>
</tr>
<tr>
<td>Armada Area Schools</td>
<td></td>
</tr>
<tr>
<td>Armada Area High School</td>
<td>1</td>
</tr>
<tr>
<td>23655 Center Road</td>
<td></td>
</tr>
<tr>
<td>Armada 48005</td>
<td></td>
</tr>
<tr>
<td>Centerline Public Schools</td>
<td></td>
</tr>
<tr>
<td>Centerline Senior High School</td>
<td>3</td>
</tr>
<tr>
<td>23600 Arsenal</td>
<td></td>
</tr>
<tr>
<td>Centerline 48015</td>
<td></td>
</tr>
<tr>
<td>Chippewa Valley Schools</td>
<td></td>
</tr>
<tr>
<td>Chippewa Valley High School</td>
<td>4</td>
</tr>
<tr>
<td>18300 Nineteen Mile Road</td>
<td></td>
</tr>
<tr>
<td>Mt. Clemens 48044</td>
<td></td>
</tr>
</tbody>
</table>
Clintondale Public Schools

Clintondale Senior High School
35200 Little Mack
Mt. Clemens 48043

East Detroit Public Schools

East Detroit Senior High School
15501 Couzens
East Detroit 48021

Fitzgerald Public Schools

Fitzgerald Senior High School
23200 Ryan
Warren 48091

Fraser Public Schools

Fraser Senior High School
34270 Garfield
Fraser 48026

Lake Shore Public Schools

Lake Shore Senior High School
22980 13 Mile Road
St. Clair Shores 48082

Lakeview Public Schools

Lakeview Senior High School
2110 11 Mile Road
St. Clair Shores 48081

L'Anse Creuse Public Schools

L'Anse Creuse High School
38495 L'Anse Creuse
Mt. Clemens 48043
L'Anse Creuse High School-North
46333 Fairchild Road
Mt. Clemens 48043

Mt. Clemens Community School District

Mt. Clemens Senior High School
155 Cass Avenue
Mt. Clemens 48043

New Haven Community Schools

New Haven High School
57700 Gratiot
New Haven 48048

Richmond Community Schools

Richmond High School
35320 Division
Richmond 48062

Romeo Community Schools

Romeo Senior High School
11091 W. 32 Mile Road
Romeo 48065

Roseville School District

Carl Brablec Senior High School
17855 Common Road
Roseville 48066

Roseville Senior High School
16250 Martin Road
Roseville 48066

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<table>
<thead>
<tr>
<th>School Name</th>
<th>Grade</th>
<th>Zip Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Lake Senior High School</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>21900 Nine Mile Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Clair Shores 48083</td>
<td></td>
<td></td>
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<tr>
<td>Utica Community Schools</td>
<td></td>
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</tr>
<tr>
<td>Adlai Stanenson Senior High School</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>39701 Dodge Park Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sterling Heights 48078</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utica Community Senior High School</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>47255 Shelby Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utica 48087</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwight D. Eisenhower Senior High School</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>6500 25 Mile Road</td>
<td></td>
<td></td>
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<tr>
<td>Washington 48094</td>
<td></td>
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</tr>
<tr>
<td>Ford II Senior High School</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>11911 Clinton River Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sterling Heights 48078</td>
<td></td>
<td></td>
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<tr>
<td>Van Dyke Public Schools</td>
<td></td>
<td></td>
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<tr>
<td>Lincoln Senior High School</td>
<td>2</td>
<td>3</td>
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<tr>
<td>22900 Federal</td>
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<tr>
<td>Warren 48089</td>
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<tr>
<td>Warren Consolidated Schools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paul K. Cousino Senior High School</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>30333 Hoover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warren 48093</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mott Senior High School</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3131 12 Mile Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warren 48092</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sterling Heights Senior High School</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>12901 15 Mile Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sterling Heights 48077</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School / Address</td>
<td># of Black Students</td>
<td># of Hispanic Students</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Warren Senior High School</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5460 Arden</td>
<td></td>
<td></td>
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<tr>
<td>Warren 48092</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warren Woods Public Schools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warren Woods/Tower High School</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>27900 Bunert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warren 48093</td>
<td></td>
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</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>71</strong></td>
<td><strong>150</strong></td>
</tr>
</tbody>
</table>
Appendix B

The Teacher Survey
Dear Fellow Mathematics Educator,

The questionnaire that follows is one of three instruments used to collect data for a doctoral dissertation completed in fulfillment of degree requirements of the Department of Educational Leadership, Western Michigan University. The confidential replies to this questionnaire will aid in a study of the degree of participation, subject area, and currentness of continuing professional education for teachers and its relationship to those teachers' effectiveness. Confidentiality of all responses is facilitated through the use of the three digit code found at the top of each survey. This code will permit data from this survey to be analyzed and the analysis discussed without revealing the identity of those participating teachers.

Of the 90+ teachers receiving the questionnaire, approximately 40 will be randomly chosen to have their students participate in an end-of-the-year achievement test and survey. Your permission to be included in this sample is requested. Permission from your principal has already been received. However, the data gathered from this questionnaire, regardless of your future participation, is necessarily included in the study prompting a request for its immediate completion and return. It is the intent of the investigator to receive all questionnaires by the end of November, 1983. The completed questionnaire may be returned using the attached stamped envelope.

Any questions concerning the instrument can be answered by calling 779-4956 evenings. A summary report of the findings may be obtained after August, 1984. Requests should be sent to 17126 Sprenger, East Detroit, Michigan 48021.

Thank you very much for your participation.

Respectfully yours,

Greg Knoblock

Approved by:

Uldis Smidchens
Department of Educational Leadership
Western Michigan University
TEACHER SURVEY
OF
CONTINUING PROFESSIONAL EDUCATION

Thank you for participating in this survey. With the exception of only two items, all replies on the survey can be completed by placing an "X" in the appropriate blank. All replies on the survey concern themselves with graduate and post-graduate education only, not undergraduate education. Confidentiality of all replies is assured.

1. Last semester of attendance in a graduate or post-graduate college program:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>WINTER</th>
<th>SPRING/FALL</th>
<th>SUMMER</th>
</tr>
</thead>
</table>

2. Program Area:

Would you please describe the overall program of study, of which this last semester was part, as being either "out of the realm of the professional educator," "in the realm of education and in the discipline to which you are currently assigned teaching responsibilities," or "in the realm of education and out of the discipline to which you are currently assigned teaching responsibilities." As an example, a mathematics teacher who is currently enrolled in a business administration, law, or medical technician program would choose the "out of education" classification while mathematics teachers enrolled in a mathematics education or guidance and counseling program would choose the "in education/in discipline" and "in education/out of discipline" classifications respectively.

<table>
<thead>
<tr>
<th>OUT OF EDUC.</th>
<th>IN EDUC.</th>
<th>IN EDUC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN DISCIPLINE</td>
<td>OUT OF DISCIPLINE</td>
<td></td>
</tr>
</tbody>
</table>

3. When last attended, what were the average number of semester hours for which you were enrolled?

SEM. HRS.

(OVER)
4. For each of the following, check the appropriate blank that best describes your degree of agreement/disagreement with each of the following phrases describing those factors motivating your entry into graduate or post-graduate education.

a. Assures the educator of continuing competence in the profession.

<table>
<thead>
<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>AGREE</td>
<td></td>
<td>DISAGREE</td>
<td></td>
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</table>

b. Qualifies the educator for career advancement whether it be in or out of the realm of the professional educator.

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<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>AGREE</td>
<td></td>
<td>DISAGREE</td>
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</table>

c. Increases the teacher's knowledge of the subject taught.

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<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>AGREE</td>
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<td>DISAGREE</td>
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</table>

d. Advances the teacher on his or her salary schedule.

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<tr>
<th>STRONGLY AGREE</th>
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<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>AGREE</td>
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<td>DISAGREE</td>
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</table>

e. Fulfills certification/licensure requirements mandated by the State.

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<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>AGREE</td>
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<td>DISAGREE</td>
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</table>

f. Promotes job stability by expanding the parameters of the educator's certification and resultant job qualifications.

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<thead>
<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>AGREE</td>
<td></td>
<td>DISAGREE</td>
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</tbody>
</table>

g. Satisfies the desire to initiate contact with a professional reference group similar to that experienced in undergraduate study.

<table>
<thead>
<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td></td>
<td>DISAGREE</td>
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</tr>
</tbody>
</table>

h. Helps the recently reassigned educator to cope with his or her new assignment and/or subject area.

<table>
<thead>
<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
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<tbody>
<tr>
<td>AGREE</td>
<td></td>
<td>DISAGREE</td>
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</tr>
</tbody>
</table>

i. Increases one's ability to transmit academic knowledge to students.

<table>
<thead>
<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td></td>
<td>DISAGREE</td>
<td></td>
</tr>
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</table>

j. Furnishes an environment promoting intellectual inquisitiveness.

<table>
<thead>
<tr>
<th>STRONGLY AGREE</th>
<th>NEUTRAL</th>
<th>DISAGREE</th>
<th>STRONGLY AGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGREE</td>
<td></td>
<td>DISAGREE</td>
<td></td>
</tr>
</tbody>
</table>
5. It asked to characterize your graduate or post-graduate educational experience, describe the degree of importance you would assign each of the following phrases in such a characterization.

a. Sense of accomplishment achieved through course work.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

b. The demeaning of grades due to "grade guarantee" or "blanket assignment" of a particular grade.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

c. The level of competition among graduate students.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

d. Feeling that graduate student success/failure was often subject to the whimsey of the instructor.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

e. Interaction with fellow educators/graduate students.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

f. Financial costs of graduate education for the professional educator.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

g. The impersonality of the graduate school environment.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

h. Provides an opportunity for professional growth.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

i. Course work within area of specialization and/or subject area.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT

j. Lectures that supplement rather than simply restate the text.

MOST IMPORTANT IMPORTANT IMPORTANT IMPORTANT LEAST IMPORTANT IMPORTANT IMPORTANT IMPORTANT
6. If randomly chosen, would you be willing to have one of your geometry classes participate in the administration of both a standardized achievement test and teacher evaluation scale at the end of this academic year? The achievement test is a 48 question multiple-choice instrument taking no more than 50 minutes to administer. The teacher evaluation would be completed two weeks prior to the last day of school and takes approximately 20 minutes to complete. If you agree to participate and are chosen as a random participant, you will be notified of this decision next semester.

\[
\begin{array}{c|c}
\text{YES} & \text{NO} \\
\end{array}
\]

7. What period(s) of the day is your geometry class(es) taught?

Periods: 1 2 3 4 5 6 7

Thank you very much for the time you have taken to complete this survey. The completed survey may be returned using the stamped envelope provided. Once again, thank you for your participation.
Appendix C

The Purdue Teacher Evaluation Scale
The Purdue Teacher Evaluation Scale may be obtained from:

The University Book Store
360 State Street
West Lafayette, Indiana 47906
Appendix D

The Spring Survey
Dear Fellow Educator,

I am requesting your anonymous participation in a study examining the factors motivating teachers to participate in a program of continuing professional education, the degree of satisfaction experienced during this participation, and the benefits derived from such experiences for the students of those participating teachers.

The attached survey will aid in the development of content validity for an additional instrument to be administered this fall. Both instruments and the study of which they are a part constitute partial fulfillment of degree requirements set forth by the Department of Educational Leadership, Western Michigan University. Since the anonymous replies to this initial survey are necessary prior to construction of the fall instrument, your prompt reply will be therefore greatly appreciated.

Questions concerning the survey can be answered by calling 313-779-4956 any evening. A summary report of the findings of the completed study may be obtained after August, 1984. Requests should be sent to 17126 Sprenger, East Detroit, Michigan 48021.

The completed survey can be returned using the attached envelope. It is my desire to gather all data prior to the end of this month. Thank you for the time you have taken to complete this survey.

Respectfully yours,

Greg Knoblock

Approved by:

Uldis Smidchens
Department of Educational Leadership
Western Michigan University

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CONCERNS PROMPTING CONTINUING PROFESSIONAL EDUCATION

The following is a list of statements that might be given as reasons for entry into a graduate/post-graduate program of continuing education for the professional educator. It is the purpose of this survey to establish a degree of *intrincity/extrincity* for each of the statements where an *intrinsic* concern or motivator is defined to be one originating from or belonging to the essential nature of the individual while an *extrinsic* concern or motivator is defined to be one whose origin is external from that of the individual.

For example, one might investigate those factors motivating entry into a program of current interest to many—dieting. While one dieter insists that it is "his or her desire to improve their self-image or personal esteem" acting as an intrinsic motivator, two additional dieters describe the extrinsic motivators of either financial savings due to food reduction or a decree from an employer to "lose weight or else!" These three responses would then be recorded as demonstrated below. An explanation of this ranking procedure follows the three examples.

Example 1. A desire to improve one's self-image or personal esteem.

```
INTRINSIC  1  2  3  4  5  6  7  EXTRINSIC
(Internal)  (External)
```

Example 2. The financial savings due to decrease in food purchases.

```
INTRINSIC  1  2  3  4  5  6  7  EXTRINSIC
(Internal)  (External)
```

Example 3. A decree from an your employer that you either lose weight or have your employment terminated.

```
INTRINSIC  1  2  3  4  5  6  7  EXTRINSIC
(Internal)  (External)
```

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The three examples demonstrate the desired categorization of the three statements as to their degree of intrincity/extrincity with regard to dieting. A similar ranking of the following list of motivators prompting entry into graduate or post/graduate study would be appreciated. As in the three examples above, a ranking of 1 represents a highly intrinsic or internal motivator and a ranking of 7 represents a highly extrinsic or external motivator with intermediate rankings of 2 through 6 describing the range of motivators between these two extremes.

I. Aids in the evaluation of one's teaching experiences.

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<tr>
<th>INTRINSIC</th>
<th>1 2 3 4 5 6 7</th>
<th>EXTRINSIC</th>
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II. Increases the teachers' knowledge of the subject taught.

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<th>EXTRINSIC</th>
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III. Satisfies the desire to initiate contact with a professional reference group similar to that experienced in undergraduate studies.

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<th>EXTRINSIC</th>
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IV. Stimulates the innovation necessary to make one responsible to the increasingly complex problems inherent in the teaching profession.

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V. Fulfills certification/licensure requirements mandated by the State.

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VI. Serves as a forum for professional exchange.

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</table>
VIII. Increases one's ability to transmit academic knowledge to students.

INTRINSIC 1 2 3 4 5 6 7 EXTRINSIC

IX. Provides the remedial work necessary to develop work-related skills not gained through previous training or education.

INTRINSIC 1 2 3 4 5 6 7 EXTRINSIC

X. Helps the recently reassigned educator to cope with his or her new job assignment and/or subject area.

INTRINSIC 1 2 3 4 5 6 7 EXTRINSIC

XI. Increases the teacher's professional orientation.

INTRINSIC 1 2 3 4 5 6 7 EXTRINSIC

XII. Advances the teacher on his or her salary schedule.

INTRINSIC 1 2 3 4 5 6 7 EXTRINSIC

XIII. Furnishes an environment promoting intellectual inquisitiveness.

INTRINSIC 1 2 3 4 5 6 7 EXTRINSIC

XIV. Improves the teacher's professional image.

INTRINSIC 1 2 3 4 5 6 7 EXTRINSIC

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XV. Promotes job stability by expanding the parameters of the educator's certification and resultant job qualifications.

INTRINSIC \[\begin{array}{ccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{array}\] EXTRINSIC

XVI. Provides the academic setting necessary by which a Veteran is permitted payment of educational assistance.

INTRINSIC \[\begin{array}{ccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{array}\] EXTRINSIC

XVII. Assures the educator of continuing competence in the profession.

INTRINSIC \[\begin{array}{ccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{array}\] EXTRINSIC

XVIII. Qualifies the educator for career advancement whether it be in or out of the realm of the professional educator.

INTRINSIC \[\begin{array}{ccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{array}\] EXTRINSIC
Having just completed an examination of reasons for entry into graduate/post-graduate education, the survey now focuses upon this educational experience and attempts to describe what aspects of it are most and least satisfying. To accomplish this task, the investigator would appreciate your ranking of the following list of graduate/post-graduate experiences as either most satisfactory with a ranking of 7 or most unsatisfactory with a ranking of 1. The rankings of 2 through 6 describe the intermediate range of satisfaction/unsatisfaction between these two extremes.

<table>
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<tr>
<th>Experience Description</th>
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<tr>
<td>I. The number of new and varied professional experiences.</td>
<td>1 2 3 4 5 6 7</td>
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<tr>
<td>II. Course work outside assigned area of study or specialty.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>III. Sense of accomplishment achieved through course work.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>IV. Caliber of instruction, and the instructors' qualifications and abilities.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>V. Interaction with fellow educators/graduate students.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
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</tbody>
</table>
VI. Acquisition of empathy for your own students as you once again become a student.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

VII. Course work applicable to teacher's own classroom setting.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

VIII. Course work within area of specialization and/or subject area.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

IX. Feeling that graduate student success/failure was often subject to the whimsey of the instructor.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

X. Provides an opportunity for professional growth.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XI. Lectures that supplement rather than simply restate the text.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XII. Quick and adequate feedback on assigned course work.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XIII. Instructors who take a personal interest in their students' progress.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

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XIV. Degree of "individualization" of assignments permitting adaptation of course-work to career setting more readily.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XV. Instructors' acknowledgement of graduate-student thought and input.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XVI. The requirement to conduct research whether it be for an assignment, project, thesis, or dissertation.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XVII. The demeaning of grades due to a "grade guarantee" or "blanket assignment" of a particular grade.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XVIII. The degree of definition shown course goals and criteria.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XIX. The impersonality of the graduate school environment.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XX. The level of competition among graduate students.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING
XXI. Financial costs of graduate education for the professional educator.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

XXII. The reintroduction to current literature pertinent to the professional educator.

UNSATISFYING 1 2 3 4 5 6 7 SATISFYING

Thank you very much. The time and consideration granted this survey is greatly appreciated. Your anonymous replies are anxiously awaited.
Appendix E

Teacher Survey Follow-Up
Dear __________:

During a November visit with (your principal) at (your high school), I briefly described and requested permission to distribute the attached survey. Permission was granted and an appropriate number of confidential surveys were to be given to all teachers of college-preparatory geometry classes.

If your failure to respond was due to an unintentional oversight or failure to receive the initial survey, I would be very grateful if you would complete the attached copy of this questionnaire.

However, __________, if your failure to respond was intentional, further consideration would be deeply appreciated and aid in the completion of my research.

As before, thank you for your participation.

Respectfully yours,

Greg Knoblock

Approved by:

Uldis Smidchens
Department of Educational Leadership
Western Michigan University
Appendix F

Notification of Sample Selection
April 10, 1984
17126 Sprenger
East Detroit, Michigan 48021

Mr. John Doe
County Senior High School
12345 County Road
Simpson, Michigan 48091

Dear Mr. Doe,

Thank you for your positive response to my survey last fall. Your decision to participate in the final stages of my research is appreciated. As part of my random sample, it will be necessary for your second hour geometry class to complete two instruments as described in my fall survey. To aid in the distribution of these instruments, I would appreciate your completing the enclosed postcard. This will enable me to prepare the packets of the necessary testing materials to be personally delivered to those participating teachers during the first two weeks of May.

These packets will include all necessary instructions and testing materials. Once completed, these materials can be left with your building principal. I will retrieve the completed materials the week of June 11th.

I will be awaiting your response. Please telephone me any evening at 779-4956 if there are any questions. Once again, thank you for your continued cooperation.

Respectfully yours,

Greg Knoblock

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GREG KNOBLOCK
17126 SPRENGER
EAST DETROIT, MI 48021

TEACHER NUMBER #

NUMBER OF STUDENTS IN YOUR ######

HOUR GEOMETRY CLASS IS .........

Thank you for your continued participation in my research study.
Appendix G

Cover Letter and Instructions for Administration of Geometry Test and PTES
Dear Mr. Doe,

Thank you once again for your continued cooperation. Included in this packet are 25 copies of both the Modern Geometry Test booklets and the Purdue Teacher Evaluation Scale forms to be administered to your fourth hour geometry class. Instructions for administration of both forms are also included. However, some additional instructions are necessary.

The Modern Geometry Test booklets were reprinted by permission of the Riverside Publishing Company for the exclusive use in my study. Consequently, student answers will be recorded DIRECTLY in the test booklets, NOT on answer forms. Your class's test booklets have each been identified with your teacher code number. Therefore, it is not necessary for the students to place any additional identification on them.

Similarly, the PTES forms have the necessary identification placed on them. The students need only complete the 60 items by marking the most appropriate of the four responses. It is important that the PTES forms be completed with a soft lead (No. 2) pencil.

Once completed, both instruments can be returned to the folder in which they were delivered. This sealed packet can then be left with your building principal. I will personally retrieve all packets during the week of June 11.

If you have any questions concerning administration of these two instruments, please telephone me any evening at 779-4956. Once again, thank you for your continued cooperation without which my research could not be completed.

Respectfully yours,

Greg Knoblock
PURDUE TEACHER EVALUATION SCALE

DIRECTIONS FOR ADMINISTRATION

Total administration time for the PTES, including distribution of materials, is about 20 minutes. The person administering the instrument should make certain that students do not talk, use a soft (No. 2) lead pencil when indicating their responses, put their marks in the appropriate spaces, and give only one response per item. Students should be assured that their responses will remain anonymous. Instructions for completion of the PTES are found printed directly on the rating form and should be read prior to completion of the instrument. The "TEACHER NUMBER" has been previously placed on all forms. Therefore, it is necessary for the students to complete the scale items only! NONE of the other information is necessary.

Scheduling of teacher evaluations is rather critical. Ideally, the PTES should be administered during the final two weeks of a course to insure that students have as much information as possible on which to base their judgments. Administration should be scheduled during a "normal" class period rather than at a time when special events (e.g. giving a major test, announcing or cancelling a major assignment, handing back graded term papers, etc.) are planned which might create temporary biases of a negative or positive nature.

Once completed, the PTES forms should be collected and placed in the provided folder.
DIRECTIONS FOR ADMINISTRATION

On the day of the test, before class begins, write the words "START" and "STOP" on the board for timing the test. Next, comment as follows:

"Today you are going to take the Modern Geometry Test. It is designed to tell us how well you are developing your abilities and skills in geometry. When you get your test booklet, please do not open it until I ask you to do so."

Distribute the test booklets. At the same time, distribute scratch paper. When the test booklets have been distributed, say:

"Please turn to page 1 of your test booklet. Note the section headed TO THE STUDENT. Please read that section."

(TO THE STUDENT: This is a 45-minute geometry test. You may find that some of the phrases and symbols used in this test are slightly different from those used by your textbook or teacher, but you should be able to understand them without difficulty. For example in this test, "m\(\angle A = 30\)" means the "degree measure of \(\angle A\) is 30." \(\angle 1 \cong \angle 2\) means "\(\angle 1\) and \(\angle 2\) are congruent;" they therefore have equal measures.

You will mark your answers DIRECTLY in the test booklet. For Questions 1-13, place the letter that best justifies each statement next to the statement number. For all other questions, simply circle the letter for the correct answer. If you wish to change an answer, completely erase your original choice and enter the answer you now prefer. You may do your calculations on either the test booklet or on separate scratch paper.

You are not expected to be able to answer all of the questions correctly. If you cannot decide on an answer, pick the most reasonable answer you can and move along to the next question. If you have time at the end of the test, go back and check the more difficult questions. Your score will be the number of questions you answer correctly; therefore, it is to your advantage to answer every question.

Do not assume anything about a figure that is not explicitly given.

When your teacher gives the signal, turn the page and begin the test. Keep going until you see the words END OF TEST or until you are told to stop."
After a 2-minute pause while the students read the directions, say:

"I will warn you when 35 minutes have elapsed so that you know you have 10 minutes left to complete the test."

Ask whether the students have questions. Then say:

"If you change your mind about the answer to a question, completely erase your original choice and enter the answer you now prefer. Now, turn to page 2 of your test booklet and begin the test."

On the board, after the word START, write the exact time that students begin the test. Add 45. Then after the word STOP, write down the time when students will be told to stop their work.

After 35 minutes have elapsed say:

"You now have 10 minutes before the end of the test."

At the end of EXACTLY 45 MINUTES, say:

"STOP! Put your pencils down." (Collect the test booklets and place them in the folder provided)
Appendix H

Coded Responses for Teacher Survey
4. For each of the following, check the appropriate blank that best describes your degree of agreement/disagreement with each of the following phrases describing those factors motivating your entry into graduate or post-graduate education.

a. Assures the educator of continuing competence in the profession.

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b. Qualifies the educator for career advancement whether it be in or out of the realm of the professional educator.

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c. Increases the teacher's knowledge of the subject taught.

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d. Advances the teacher on his or her salary schedule.

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e. Fulfills certification/licensure requirements mandated by the State.

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f. Promotes job stability by expanding the parameters of the educator's certification and resultant job qualifications.

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g. Satisfies the desire to initiate contact with a professional reference group similar to that experienced in undergraduate study.

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h. Helps the recently reassigned educator to cope with his or her new assignment and/or subject area.

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i. Increases one's ability to transmit academic knowledge to students.

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j. Furnishes an environment promoting intellectual inquisitiveness.

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5. If asked to characterize your graduate or post-graduate educational experience, describe the degree of importance you would assign each of the following phrases in such a characterization.

a. Sense of accomplishment achieved through course work.

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b. The demeaning of grades due to "grade guarantee" or "blanket assignment" of a particular grade.

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c. The level of competition among graduate students.

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d. Feeling that graduate student success/failure was often subject to the whimsey of the instructor.

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e. Interaction with fellow educators/graduate students.

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f. Financial costs of graduate education for the professional educator.

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g. The impersonality of the graduate school environment.

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h. Provides an opportunity for professional growth.

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i. Course work within area of specialization and/or subject area.

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j. Lectures that supplement rather than simply restate the text.

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Kohl, H. (1982). What does it take to be a real teacher? Learning, 10(8), 30, 33-34.


