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ABSTRACT

This report describes the results of a cost-effectiveness comparison of the alternative programs (education and non-education majors) available at Texas A&M University for students seeking certification as secondary education teachers. The two alternative programs leading to secondary teacher certification, the major costs associated with the two alternatives, the effects data from previous studies of these two alternatives, integration of the costs with the effects information, and a summary of the major findings with a consideration of their implications are discussed. The appendices include cost data summary tables, a checklist of cost categories, and a checklist of cost-effectiveness steps. (PN)

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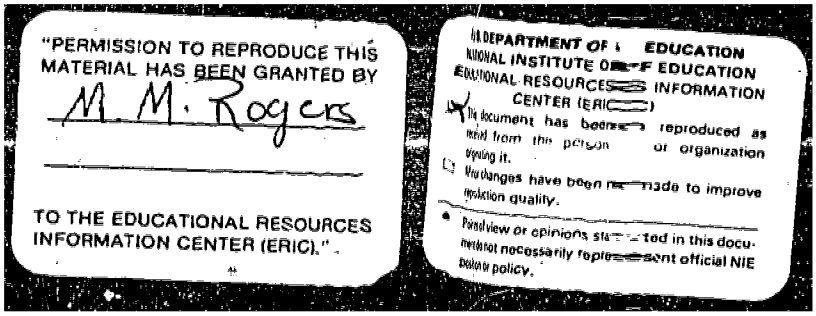
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No. 86 ALTERNATIVE TEACHER PREPARATION PROGRAMS: A COST-EFFECTIVENESS COMPARISON

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PREFACE

The Research on Evaluation Program is a Northwest Regional Educational Laboratory project of research, development, testing, and training designed to create new evaluation methodologies for use in education. This document is one of a series of papers and reports produced by program staff, visiting scholars, adjunct scholars, and project collaborators--all members of a cooperative network of colleagues working on the development of new methodologies.

Which of two existing secondary education teacher preparation programs is most effective in preparing students to teach? When program costs are considered, do the increased student performances warrant the differential increase in costs? This report describes the results of a cost-effectiveness comparison of the alternative programs available at Texas A&M University for students seeking certification as secondary education teachers. The study illustrates the additional insights provided when one adds cost information to existing data on program effectiveness.

Nick L. Smith, Editor
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CONTENTS

I. INTRODUCTION

This document reports on a cost-effectiveness analysis study of the two preparation programs available to Texas A&M University students seeking certification as secondary education teachers. By way of introduction, we would like to briefly describe the purpose and nature of cost-effectiveness studies, to discuss why the present study was undertaken, and to overview the following sections of this report.

Cost-Effectiveness Analysis

Such conditions as continued inflation and declining educational resources have resulted in economic considerations playing a much larger role than previously in the design and operation of educational programs. While program costs have always been of some interest, there is increasing concern with such questions as:

> Just how are we expending our resources?
> How much does the program cost per year for each student?
> How many resources is it taking to achieve results at X, Y, and Z levels?
> How does this program compare with others in terms of the money spent?

Traditionally, educational researchers and evaluators have studied only the effects of programs, with little attention to costs. Conversely, administrators have often examined costs without relating them to program effectiveness. The danger of such division of attention can be seen in an illustration provided by Levin and Seidman (1981, p. 5-6):

> In the sixties it was expected that such educational technologies as computer-assisted instruction and educational television would rapidly replace certain instructional functions in the schools. The view was that such functions could be performed 'better' or more inexpensively by technologies than by classroom teachers. In 1969 a study was published in one of the most prestigious science journals that found that the use

> of computer-assisted instruction (CAI) for providing just seven minutes of daily 'drill and practice' in arithmetic for disadvantaged youngsters would increase mathematics scores beyond those attainable with standard classroom instruction... Given the difficulty in finding compensatory educational interventions that promised success in improving the learning of the disadvantaged, the finding was impressive. Indeed, the article concluded that computer-assisted instruction had come of age, and it was time for compensatory educational programs to consider the CAI alternative.
>
> But the article said nothing about the costs of the CAI or other alternatives for obtaining similar results. An investigation of the costs of CAI at that time found that seven minutes a day of 'drill and practice' for each pupil would have required an increase in the school budget of at least 25 percent... In contrast, it was found that 25 minutes a day of classroom drill and practice could produce a similar learning effect for an increase in the school budget of only 6 percent. That is, on a cost-effectiveness basis, the new technology was at least four times as costly per gain as was the more traditional approach. Clearly, a school that used the more traditional approach would have been able to have saved considerable resources over one that had adopted CAI, resources that could be used for other educational functions or to reduce the tax burden.

Most studies to date of educational programs have considered separately either program costs or program outcomes, but usually not both within the same analysis. Treating costs without consideration of outcomes results in knowing which of several alternatives are least expensive, without knowing whether any of them produce the desired outcomes. Treating outcomes without attention to costs can result in selecting program alternatives that are only marginally more effective, but exorbitantly more expensive than other alternatives. Only by incorporating both costs and outcomes within comparative studies of program alternatives can one reliably determine which alternative is most effective for a given cost, or how much it would cost to obtain a desired level of effect.

There are three primary techniques which enable one to combine both costs and outcomes in a single study: cost utility analysis, cost benefit analysis, and cost effectiveness analysis.

Cost-utility analysis involves the subjective measure of probable outcomes. One can integrate multiple outcome measures into a single value, but because the measures and analysis are highly subjective, the results are generally not replicable. This form of analysis is useful as a planning tool for administrators, or as a device to aid in group discussion of possible program effects, but provides a weak basis for making programmatic decisions.

Cost-benefit analysis provides replicable results and enables one not only to compare alternatives for a given program, but to compare across programs which have different classes of outcomes. Because all outcomes are expressed in terms of dollar benefits, one can compare reading programs with counseling programs with athletic programs. The major problem with using cost-benefit analysis in programmatic evaluations is that it is frequently very difficult to assign monetary values to program outcomes. Since any dollar value assigned to such outcomes as increased music appreciation, reading comprehension, self-confidence, and computer literacy are highly questionable, cost-benefit studies frequently have little credibility with local administrators.

Cost-effectiveness analysis consists of representing program outcomes not in terms of monetary units, but in terms of other effectiveness units such as reading scores, attitude scale scores, and behavioral rates. Effectiveness units consist of the standard outcome measures currently used in educational evaluation. Because one does not convert all outcomes to the same unit (dollars) one cannot use cost-effectiveness analysis to compare across programs (e.g., to compare reading programs to athletic programs). Comparability across programs is not usually problemmatic, however, since such comparisons have historically been of less interest in educational evaluation than comparisons within program alternatives, such as which of two instructional strategies most effectively improve reading scores. Of the

available techniques, therefore, cost-effectiveness analysis would seem to be the treatment of choice for use in educational program evaluation at the managerial or administrative level.

A few writings designed to help researchers use cost-effectiveness analysis in program evaluation do exist. Alkin (1970) provided an early chapter advocating its use in the evaluation of instructional programs. Levin (1975) provided a sound general introduction to the topic, followed by an instructional analysis of specific applications in educational evaluation (Levin, 1981). Thompson (1980) also discusses the use of cost-effectiveness in his volume on benefit-cost analysis in evaluation.

A cost-effectiveness analysis thus involves the comparison of two or more program alternatives which can be compared on similar outcome or effects measures such as test scores, performance ratings, and so on. The incorporation of cost data enables one to consider the interplay of both costs and effects in reviewing program operations.

The Present Study

While there have been a number of studies of the effects of the two Texas A&M alternative programs leading to secondary teacher certification (cf. Denton and Morris, 1981; Denton 1980, 1981; Denton and Norris 1979, 1980, 1981; Denton, Morris and Tooke 1982; Denton and Lacina, 1983), there has, as yet, been no attempt to combine this effects information with program costs. That was the intent of this study.

The present investigation seemed warranted for several reasons. First, previous effects studies have suggested that important differences exist between the two alternative preparation programs. Having more professional education courses seems to improve a student's teaching ability, but how expensive is the increased performance to the student, the department, and the college? Second, there is currently an ideal opportunity available to study the relative costs and effects of the two

programs since there exist "natural" comparison groups which have participated in the in-place and stable program alternatives. In other words, a natural comparative design already exists. Finally, since future changes to the teacher preparation program are being contemplated, including the possibility of an extended program, the time is right to do some preliminary study of the costs of the existing alternatives. Although the present study does not address the potential effects or costs of possible future alternatives, the results of this investigation should provide useful background, and possibly suggestive, information for use in designing future alternatives.

The purpose of the study reported here was to conduct an exploratory investigation into the major costs to the college of education in providing the "education-major" alternative to obtaining teacher certification. The present work does not represent a complete, definitive study of all program costs and effects. It provides information that we believe to be sound, but at this point only suggestive. We anticipate that programmatic questions may arise that would require a more detailed analysis than we have been able to provide here.

The study reported here was conducted between May and July of 1983. The basic procedures consisted of identifying appropriate cost categories and gathering the required cost information. Major effects data from previous studies were reviewed, summarized for inclusion in this report, and then the relationships between program costs and program effects were investigated.

Report Overview

The remainder of the report consists of the following sections. In the next section we briefly describe the two alternative programs leading to secondary teacher certification; these are the two programs whose effects and costs we are attempting to compare. Next, we describe the major costs associated with the two program alternatives. In Section IV, we briefly review the effects data from previous studies of the two

alternatives and then in Section V we integrate the costs with the effects information. Finally, in Section VI we briefly summarize the major findings of this work and consider their implications for possible changes in the two program alternatives. Some limitations of the present study are also discussed in this section.

The appendices contain additional material that may be of interest to the reader, including a more detailed summary of program costs (Appendix A), a checklist of possible cost categories as well as a checklist for doing a more complete cost-effectiveness investigation (Appendices B and C respectively).

II. Description of the Alternative Programs

Program Rationale

This investigation was conducted under the auspices of an educational curriculum and instruction (EDCI) department at a land grant university. The teacher preparation programs which were studied in the investigation are competency based programs for secondary level teachers fashioned around a diagnostic prescriptive model of instruction (Armstrong, Denton, Savage, 1978). This model conceptualizes teaching as a series of events requiring five distinct sets of instructional skills, that is: Specifying Performance Objectives, Diagnosing Learners, Selecting Instructional Strategies, Interacting with Learners, and Evaluating the Effectiveness of Instruction.

Specifying Performance Objectives - The decisions inherent in this element of the instructional model are instrumental in determinining whether the entire instructional process can be successful in producing student learning. Restated, this idea becomes performance objectives determine the direction and focus of instruction. When performance objectives are selected and sequenced according to a logical plan, teachers are in a position of leadership and can justify their program to responsible critics.

Diagnosing Learners - Teachers need information regarding a learner's readiness to begin a proposed new instructional sequence. Bypassing this step in an effort to save instructional time is false economy, since the result may well be frustrated, bored, and unmotivated learners. When adequate diagnostic information is available, instructional plans can be developed that meet the informational and emotional needs of the learners.

Selecting Instructional Strategies - In selecting instructional strategies, teachers should structure activities that are consistent with the identified performance objectives, the entry levels of the learners, and the events of instruction implied by Carroll (1963). In a sense, selecting instructional strategies is analogous to generating directional research hypotheses. A strategy is created from a wide range of possible approaches which, in the teacher's mind, will likely bring about learner attainment of the performance objectives. The appropriateness of this strategy is "tested" during the implementation and evaluation phases of instruction.

Interacting with Learners - This component represents the "doing" phase of the instructional model. The elegance of the instructional plan becomes unimportant if the timing and continuity of the classroom activities are interrupted, creating disorder and predictable management problems. Thus, learning how to interact with learners is, perhaps, the most difficult set of skills for new teachers to attain. Mastering these skills requires considerable practice in actual classroom settings, and serves to justify the emphasis on student teaching experiences in teacher preparation programs.

Evaluating the Effectiveness of Instruction - This component serves to gather evidence during and after the teaching of an instructional plan to determine whether the plan "worked." Evaluation should prompt a review of each component in the instructional model. Representative questions to illustrate this review include: Were the performance objectives appropriate? Were the pretests really diagnostic tools? Did the instructional strategies incorporate the events of instruction? Was classroom

management sufficient to maintain a favorable learning environment? Were the evaluation tools valid for assessing learner growth and program effectiveness?

This model provides a framework that encourages the development of individual teaching styles. Individualized styles are encouraged because evaluation of instruction is based on learner attainment of performance objectives. Given this operating principle, teachers in preparation are free to choose procedures from their own repertoires that they believe will result in high levels of learner performance. Further, teacher responsibility is well served by this model. This responsibility comes not because of the teaching candidate's adherence to a set of "ideal role behaviors," but rather in adapting instructional practice, as necessary, to help learners achieve performance objectives that have been selected.

Program Course Offerings

In contrast to the commonalities among the two teacher preparation programs in teacher education, the most pronounced differences between individuals majoring in education and non-majors seeking teacher certification while completing degree requirements in agriculture, liberal arts, or science is the required semester hours of professional education coursework. Non-majors complete 22 semester hours of professional education coursework, while majors complete 34 semester hours. In addition, each program requires a minimum of 48 semester hours of teaching field coursework. The following table illustrates the professional education coursework required for both programs.

The primary cost analysis question in this inquiry is the cost effectiveness of the additional 12 semester hours required of education majors. On the cost side, because 5 additional courses are required, offering this program is more expensive for the college than providing the certification program. On the effects side, the education major program is more effective in producing pupil cognitive gains during student teaching than is

Table 1
Professional Education Coursework Required by Secondary Teaching Candidates in Alternate Preparation Programs

Semester	Major in Education Program		Certification Program	
Second	EDCI 120 Introduction to Teaching	(1 hr)	-----	
Third	EDCI 220 Early field experience	(2 hr)	-----	
Fourth	EDCI 301 Subject Matter of Teaching	(3 hr)	-----	
Fifth	EPSY 301 Educational Psychology	(3 hr)	EPSY 301 Educational Psychology	(3 hr)
Sixth	EDCI 323 General Methods of Teaching	(3 hr)	EDCI 323 Gen. Meth. of Teaching	(3 hr)
	EDCI 321 Adolescent Psychology	(3 hr)	-----	
Seventh	EDCI 401-7 Teaching Field Meth.	(4 hr)	EDCI 401-7 Teaching Field Methods	(4 hr)
	EDTC 405 Preparation of Instructional Materials	(3 hr)	-----	
Eighth	EDCI 425 Student Teaching	(12 hr)	EDCI 425 Student Teaching	(12 hr)

the certification program, yet supervisor ratings and self-report morale ratings of student teachers are essentially equal across the two programs.

Since the argument in favor of the additional 12 semester hours of professional education coursework is that the additional coursework is worth the additional cost, let us review the differences in methods and field experiences between these two programs.

All students in both secondary education programs are required to successfully complete the following courses:

> EPSY 301: Educational Psychology (3 sem. hrs.) This course examines the role of psychology in addressing problems of teaching. Topics include: nature and operation of principles of learning; transfer of training; nature, measurement and significance of individual differences; and conditions influencing efficiency of learning.
>
> EDCI 323: General Methods of Teaching: (3 sem. hrs.) This course focuses on planning and directing instructional activities, through emphasis on classroom management; development of performance objectives; techniques of presentation; instructional diagnosis; and evaluation and marking.

EDCI 401-7: Teaching Field Methods (4 sem. hrs.) These courses address the scope and sequence of contemporary junior and senior high school language arts, social studies, science and mathematics. General principles and methods of teaching these content areas are addressed and practiced through micro-teaching experiences.

EDCI 425: Student Teaching (12 sem. hrs.) Supervised teaching experience for a full semester in a junior high school or senior high school.

In addition, students majoring in secondary education complete the following courses and resulting experiences:

EDCI 120: Introduction to Teaching (1 sem. hr.) This course is devoted to the discussion of the purposes of education including the contributions of the social sciences to education. Further, basic concepts for curriculum and instruction are addressed as well as the requirements for entering the profession.

EDCI 220: Early Field Experience (2 sem. hrs.) This course examines various aspects of teaching and teacher roles. Weekly classroom observation and participation in laboratory periods are central components of this course as well as on-campus lecture periods which are devoted to teacher values, personality, student learning problems, and teacher involvement in professional organizations.

EDCI 221: Subject Matter of Teaching (3 sem. hrs.) This course addresses the structure and transmission of knowledge. Approaches to providing definitions, explanations and justifications for a content field are addressed in this course.

EDCI 321: Adolescent Psychology (3 sem. hrs.) This course examines adolescent growth and development, placing special emphasis on adolescent behavior in secondary schools. Influences of prior development, home, family, community, and peer groups are examined in relation to their influence on the adolescents' adjustment.

EDTC 405: Preparation of Instructional Material (3 sem. hrs.) The course provides theoretical and practical aspects of the study of communication with emphasis on technological aids. Laboratory experiences in the selection, preparation, use and evaluation of instructional materials are provided by this course.

While the number of hours of coursework obviously differ, the sequencing of courses also differs. Education majors are engaged in professional education coursework over seven semesters, while teaching candidates in the certification program complete the professional education sequence in four semesters. Faculty in secondary education are cautious but willing to venture that it is the sequence of the professional education coursework over an extended period of time that is influencing the effects outcomes. Only through protracted contact with pedagogical knowledges and skills do teaching candidates come to consider such knowledges and skills to be vital and worthy of serious consideration. Often students in their initial education courses resort to "memorizing" principles of teaching with little thought about these principles guiding their behavior as teachers. Yet this thought does occur somewhere during the program, and substantially different strategies appear to be practiced by candidates who have come to realize that principles of teaching may actually be of value to them as teachers. It may be that, due to the increased time of contact with pedagogical content; education majors do internalize more of the principles of teaching than candidates completing the briefer certification program.

III. Description of Costs

Since the nature of this evaluation involved the cost-effectiveness of two secondary teacher education programs at Texas A&M University leading to certification, a series of cost questions were phrased to guide the effort. Because effects data were gathered from 1978-1980, it was felt the comparable cost data spanning 1976-1980 would be appropriate. Thus, cost data over a period of eight semesters were gathered. These evaluation questions phrased from the college's perspective include:

a. What are the administrative costs associated with the alternate secondary teacher preparation programs?

b. What are the management costs associated with the alternate secondary teacher preparation programs?

c. What faculty resources, in terms of cost of teaching coursework, are needed for the alternate secondary teacher preparation programs?

d. What are the costs of materials provided by the college for the alternate secondary teacher preparation programs?

e. What are the equipment costs associated with the alternate secondary teacher preparation programs?

f. What are the costs for the facilities in which the alternate secondary teacher preparation programs are held?

g. What are the costs of services (copy center, computer, mail, telephone) associated with the alternate secondary teacher preparation programs?

Thus, the major cost categories for the evaluation become administration, management, faculty, materials, equipment, facilities, and services. The following paragraphs delineate how the data were gathered and analyzed for each of these categories.

Administration

Two cost items were identified for this category; that is, dean's staff and department head. The dean's staff cost contribution was based on the total budget value multiplied by two ratios. First, total budget allocations for the dean's staff for the period between 1976 and 1980 were obtained from the business affairs official within the college. Second, the ratio of tenure track faculty in EDCI to the total number of tenure track faculty in the college was determined to be .228. This ratio value is thought to represent the contribution of the dean's staff to EDCI departmental affairs. Another ratio used in the calculation was the number of secondary education majors to the total number of undergraduate and graduate majors in EDCI for each semester (fall 1976 - spring 1980). The resulting values, while conservative because they do not take into account the secondary certification students, ranged from a minimum value of

.192 to a maximum of .284. These latter ratio values are thought to represent the departmental contribution to the secondary program in teacher education. Finally, the respective values were combined in accordance with the following equation to yield cost estimates for the dean's staff/semester.

Dean's staff costs = .5 total budget x .228 x (.284-.192)

Cost contributions of the department head in EDCI to the operation of the secondary teacher preparation programs were determined by multiplying the semi-annual salary of the department head by the ratio of secondary students to the total number of undergraduate and graduate students majoring in EDCI. The salary values and student enrollment figures were obtained from the EDCI secretary for business affairs and the assistant department head, respectively. Cost estimates of the department head for the educational technology course (EDTC 405) were obtained from the department head in Industrial Education. Costs per course were then calculated by dividing the administrative cost by the total number of semester hours in secondary education offered that semester then multiplying the quotient by the semester hours offered for a particular course (number of sections multiplied by semester hours of course). In the case of Educational Psychology, administrative and management costs were combined, thus values for department head costs for the two Educational Psychology courses (EPSY 301 and EPSY 321) are reported under the management category.

Additional administrative costs of supervising the secondary level student teaching program were determined from EDCI operating expense allocations 1976-80 (example provided as Table 1 in Appendix A). Specifically, values from the line item student teaching supervision and coordinator of field experiences were summed and multiplied by the ratio of secondary students to the total number of undergraduate and graduate students in EDCI. The resulting values from this myriad of calculations are reported in tables 2 to 9 in Appendix A.

Management

Cost items obtained for this category include salaries of secretarial and program coordinators whose work and supervision directly influenced secondary teacher education information regarding faculty and staff salaries were obtained from the EDCI secretary for business affairs, while enrollment figures were obtained from the assistant department head in EDCI. Secretarial support for the secondary program was calculated by summing the salary of the secondary records analyst with adjusted salary values for the certification secretary and field experiences secretary. The adjusted salary figures were determined by multiplying their salary values by the ratio of secondary students to the total number of students in EDCI.

Cost values for coordinators in secondary education and field experiences were determined by adjusting their faculty salaries in terms of the contribution their management function influenced their semester teaching loads. Typically, the teaching load of program coordinators is reduced by three semester hours or one course. Semester values resulting from these calculations are provided in tables 2 to 9 in Appendix A.

Faculty

Cost data for faculty teaching the required coursework in secondary education were obtained from the department head's office in educational curriculum and instruction (EDCI), educational psychology (EPSY) and industrial education (educational technology EDTC). Actual salary figures for individuals teaching in the undergraduate program during 1976-80 were obtained from EDCI and EPSY. These data were subsequently transformed to program costs by applying the following equation:

$$\text{faculty costs to secondary education program} = \frac{\text{annual salary of professor}}{\text{number of semester hrs. required for full-time position}} \times \text{number of semester hrs. taught in secondary education}$$

Resulting values from these computations were recorded in tables 2 to 9 of Appendix A reflecting the semester costs per major cost category. Conversely, faculty costs for the course EDTC 405 were determined from current estimates of faculty involvement by the department head in Industrial Education. The current cost estimate for teaching EDTC 405 was subsequently converted to cost estimates for the semesters between fall 1976 semester and spring semester 1980. The conversion of current costs to historical costs were determined by multiplying cost ratios of total departmental costs in EDCI (e.g., $\frac{\text{1976 operating costs}}{\text{1983 operating costs}}$) with the current estimated expense of teaching EDTC 405. This procedure was repeated for each of the semesters addressed in this evaluation.

Materials

Operating expenses were obtained from departmental operating expense allocations from 1976-1980 in EDCI. Material costs on EDTC 405 are passed on to the student as laboratory fees, thus the department does not reflect an expenditure for materials for that course. Cost estimates for materials in EPSY for the courses EPSY301 and EPSY321 were obtained from the department head, material costs per course reflected in the tables 2 to 9 of Appendix A were calculated by dividing the cost of materials by the total number of semester hours for secondary education offered during that semester and then multiplying the quotient by the semester hours offered for a particular course (number of sections multiplied by semester hours of course).

Equipment

Costs for equipment outlay were estimated by the department heads in EPSY and EDTC respectively. These values are presented in tables 2 to 9 of Appendix A. For EDTC, current equipment costs for EDTC 405 were provided. These estimates were converted into historical cost estimates for the same manner as faculty costs discussed previously. In the case of EDCI, equipment

allocations were not included as a line item in the departmental operating expense allocations (Table 1 in Appendix A), thus the cost category was not completed.

Facilities

Cost of facilities were determined by the "shadow cost" technique, that is, the expense of renting space at the Brazos Center for holding class was computed. This technique was used because information on room rent or facility use was not available from departmental, college, or office of university planning sources. The following values were used to determine facility costs.

Credit hour of course	Number of Sessions	Cost/ Section
1 hr	15	$ 150
3 hr	30	300
4 hr	30	300

Additional facility costs were obtained for maintenance of facilities for the coursework offered by EDCI. For EDCI, maintenance values were obtained from departmental operating expense allocations from 1976-1980. The allocated values were then adjusted to reflect the secondary program costs by multiplying the cost by the ratio of secondary students to the total enrollment. Costs per course were then calculated by dividing the maintenance cost by the total number of semester hours in secondary education offered that semester, then multiplying the quotient by the semester hours offered for a particular course (number of sections multiplied by semester hourse of course). As with the other categories, costs per semester are provided in tables 2 to 9 of Appendix A.

Services

Operating expenses, including costs of telephone, printing, mail, and computer, were obtained from departmental operating expense allocations for secondary education in EDCI from

1976-80. Corresponding values for the secondary field experience were obtained by multiplying the allocated values for field experiences by the ratio of secondary students to total enrollment in field experience. Service costs per course were then calculated in the same manner as described in the preceding section for facility costs per course. Cost of services were not provided by EPSY or EDTC, thus entries for this major cost category were not provided in tables 2 to 9 of Appendix A.

Table 2 presents a summary of total costs over an eight semester period (fall 76-spring 80) for the two programs in secondary teacher education. From the perspective of the College of Education, the certification option is less costly than the program for education majors, i.e., $47,913, compared with $79,935. Ironically, the total costs during the fall semester of 76 and the spring semester 80 are not too different for secondary majors, yet larger fluctuations occurred during this time period, e.g., spring 78 - $98,594 to $68,147 - fall 79. This larger variation in costs during the eight semester period reflects the fluctuations in undergraduate enrollment in secondary education in comparison to total enrollment in EDCI.

Table 2

Semester Cost Comparisons of Two Programs in Secondary Teacher Education

Semester	Majors	Non-Majors
Fall 76	70,337	48,625
Spring 77	85,113	56,728
Fall 77	79,734	47,290
Spring 78	98,594	49,562
Fall 78	78,329	49,522
Spring 79	83,288	48,718
Fall 79	68,147	39,448
Spring 80	75,938	43,411
Total	$639,480	$383,304
	Average $79,935	Average $47,913

IV. Description of Effects

As described in Section II, two alternative programs exist for students desiring to obtain secondary teacher certification. How do these alternatives compare in terms of instructional effects? Is one alternative more effective in producing the desired student gains than another? These are the basic effects questions.

The culminating experience for both preparation programs is a full-semester, full-day student teaching program with twelve semester hours being awarded for successful completion of the experience. During this course, each student teacher is required to develop and implement two instructional units, each requiring approximately two weeks to complete. The instructional units are to include: performance objectives, a diagnostic pretest to determine if prerequisite knowledges and skills are present, instructional strategies addressed to each performance objective, and criterion-referenced instruments. These units must be approved by the classroom supervising teacher and the university supervisor prior to the implementation. Some time ago, a multi-stage evaluation system was established to monitor the development and implementation of these competency-based programs (Denton, 1977). Evaluation of student teachers in this system includes supervisor ratings based on in-class observations and ratings of instructional materials produced by the student teacher. Generally, six supervisor visits are completed during a semester. These visits are recorded as ratings on an Evaluation Profile instrument. It may be of significance that the final evaluation for each student teacher recorded on this instrument represents a consensus rating resulting from a three-way conference between the student teacher, the classroom supervisor, and the university supervisor. In addition, a Curriculum Context Checklist for rating the components of each instructional unit is completed by the university supervisor. Two of these forms are completed during the field experience. These rating scales provided effects data for this inquiry. In addition, summative

procedures are conducted by student teachers at the conclusion of each unit, and summaries of learner performances are recorded on Summary Evaluation of Unit Forms. Values for this form are obtained as student teachers retain the unit test responses of learners after providing feedback to them regarding their performances. Copies of these instruments are available in ERIC (Denton & Norris, 1979).

The aforementioned learner performance data were subsequently used to develop a criterion-referenced summary on each learner and summarized as group values for each student teacher. Subsequent analysis of these data revealed differences in performance among learners depending on the major of the student teacher (Denton & Norris, 1979; Denton & Tooke, 1982) which in turn, stimulated this inquiry.

Sample

Information from 82 secondary-level student teachers and 9001 learners taught by these student teachers comprised the total sample for the effects data base. Fifty-five of these student teachers were education majors, while the remaining 27 candidates were teacher certification students majoring in other colleges. The student teachers were supervised by five university supervisors over the course of five semesters (i.e., Spring 1978 - 7 student teachers; Fall 1978 - 18 student teachers; Spring 1979 - 19 student teachers; Fall 1979 - 9 student teachers; Spring 1980 - 29 student teachers). The total number of secondary-level student teachers numbered 291 during this period (Spring 78 - 68; Fall 78 - 64; Spring 79 - 52; Fall 79 - 52; Spring 80 - 55). Participation of student teachers in this inquiry was based on whether their university supervisors were actively involved in the research program.

It is important to note that the major of the student teacher was not known by the university supervisor during the field experience. In addition, a contingency table was developed and statistically tested to determine whether student teachers were evenly distributed across university supervisors with respect to

their academic majors. This comparison was not statistically significant, indicating expected numbers of student teachers of each category (majors and non-majors) were, in reality, assigned to each university supervisor. Even though these precautions were taken, certainly no claim can be made that educational effects from this inquiry will generalize to other settings.

Upon checking transcripts of this sample, it was determined that the average number of semester hours of former education majors and former certification-seeking students were 144 and 151 respectively. Further, education majors completed 34 semester hours in professional education, while certification students completed 27 semester hours in education. These values roughly correspond to the requirements presented in Table 1. A complete listing of official transcript hours for each individual in the sample is provided in Appendix A (Table 10). In addition, each of the individuals in the sample did receive certification to teach in secondary schools in Texas.

Instrumentation

A variety of scales and criterion-referenced instruments were used in obtaining measures of the various independent variables and the dependent variable in this investigation. The following briefly describes these instruments. An Evaluation Profile was employed to obtain the independent variable, instructional effectiveness of the student teacher as perceived by the university supervisor. This instrument is completed on a biweekly basis by the university supervisor. The scale consists of twenty-eight Likert type items divided into two categories, i.e., instructional competencies (21 items), and personal and professional competencies (7 items). Supervisory ratings for the items under the heading, instructional competencies are summed together to provide the values for the instructional effectiveness variable. Each item on the scale is referenced to a performance objective in the student teaching program. Further, the instructional skills addressed on this instrument are compatible with the skills and knowledges stressed in the

diagnostic-prescriptive model of instruction, on which this program is based. The supervisor has the choice of marking one of five categories ranging from excellent = 1, to inadequate = 5. If the skill is not observed or not applicable to the classroom situation, the supervisor has the option of marking N/A. The alpha coefficient for this instrument (.94) suggests a high degree of internal consistency among responses.

A second rating scale, the Curriculum Context Checklist, is used to provide university supervisor ratings of the curricular units developed by the student teacher. Values from this scale provide data for the variable, planning effectiveness of the student teacher. This instrument contains a 5-choice scale identical to the scale of the evaluation profiles. Individual items of this instrument identify components of the curriculum unit, e.g., general goals, focusing generalizations, concept list, diagnostic component. Values for the planning effectiveness variable are determined by summing together the component ratings registered for each item on this checklist.

Teaching candidates contribute to the data base by completing two instruments which serve formative evaluation functions for the candidate and provide time ordered data for programmatic research. One of these instruments, the Weekly Reflection Sheet requests the student teacher to estimate the percent of time s/he has spent during the preceding week observing, planning, assisting, team teaching, and/or assuming full responsibility. In addition, the candidates assess their morale and provide a written rationale for the rating. These instruments are submitted to the university supervisor at the end of each week throughout the semester.

The second instrument, Summary Evaluation of Unit, is completed by the teaching candiate immediately after completing the instruction associated with each unit. This form requires an estimate of the achievement level and socio-economic level of the learners in addition to the actual number of class periods required to teach the unit. Perhaps the most significant information collected among all data is recorded on this form by

the student teacher; this data being achievement information (learner attainment of individual unit objectives, pretest scores, and unit post-test scores). Criterion-referenced tests developed by the student teacher are used to provide these learner attainment data. These instruments, unique for each unit and each student teacher, represent a strength yet potential limitation in the design of this investigation. As a strength, the student teacher, with guidance from classroom and university supervisors, develops tests related directly to the outcomes established for the performance objectives in each unit. Prior learning, extenuating classroom situations, and the abilities of the learners are taken into account in establishing both the objectives and the corresponding criterion tests. Under these conditions, the cognitive attainment measure indeed should sample the behaviors called for by the performance objectives of the unit.

A potential limitation of candidate-developed criterion-referenced tests stems primarily from the lack of information on the reliability and validity of the respective instruments. Conventional reliability procedures appropriate for norm-referenced tests are not determined on the various criterion-referenced tests because the function of these tests (to determine an examinee's level of functioning with respect to a stated criterion) is not consistent with the function of norm-referenced tests (to determine an individual's performance with respect to the performance of others in the group) (Millman, 1974). Thus, although we are concerned, we are not unduly alarmed by the absence of these values. Validity of criterion-referenced instruments on the other hand, can be assessed by determining the logical relation of the performance objectives and the individual test items. Fortunately, this validity check was conducted by the classroom and university supervisors on each candidate's test before the instrument was administered to the learners.

While the preceding remarks are reasonable, we do realize measurement concerns regarding the equivalence of the criterion-referenced tests have not been addressed. Certainly no claim can be made that all of these instruments were designed to measure attainment of identical content; however, it was possible to determine whether the levels of cognitive functioning (knowledge and application) addressed in the tests were nearly uniform. In nearly all instances, a preponderance of objective type test items designed to measure the knowledge level of functioning occurred. Application level test items occurred on five examinations, but invariably these questions represented only a small portion of items on the examination. This finding isn't too surprising, since lower level objectives are more reliably measured by objective-type test items. Further, the candidates in this investigation tended to require extensive products, such as, term papers and comprehensive laboratory reports when higher order cognitive objectives were included in the units.

Results

Because of the numerous comparative studies already conducted of the effects differences between education and non-education majors in these programs, no attempt will be made here to review in-depth all the past research. Instead, we will simply restate the major findings from these studies and refer the reader to the existing technical reports for further details.

One major criterion used to assess the relative performance of the education and non-education majors was the cognitive gain made by their pupils during the student teaching experience. An unexpected finding from this research has been the phenomenon that the academic major of the student teacher appears to account for variation in cognitive attainment of learners of those student teachers. To illustrate, a modest correlation (r_{pbi} = .23) was determined between the academic major of the student teacher and cognitive attainment values of their learners on the second unit taught by the student teachers. Further examination

of the data revealed that learners of education-majors attained higher average cognitive attainment values (x = 69.0) than learners of non-education majors (x = 58.9). These values were somewhat surprising because cognitive attainment means associated with unit one for the two groups of learners were nearly equivalent, 67.6 and 67.3 for learners of education majors and non-majors, respectively (Denton & Norris, 1979).

An examination of grade point ratios in professional education coursework and teaching fields was addressed in an investigation by Denton, Morris and Tooke (1982). Specifically, the effect of academic achievement of student teachers on learner cognitive attainment was examined. Zero-order correlations of learner cognitive attainment with student teacher grade point ratios ranged from -.03 to .06 indicating virtually no relation between grade point ratios of the student teacher and the cognitive attainment of their learners. Moreover, gradepoint ratios over all college coursework completed by the teaching candidates were found to differ only slightly between education majors (GPR = 3.00) and non-majors (GPR = 2.89) (Denton, Norris 1979).

Another variable, time-allotted-for-instruction, was examined by Denton and Norris (1979) with respect to the major of the student teacher. They report student teachers who were education majors allotted 621 minutes for teaching their initial instructional unit, while student teachers who were non-majors allotted 657 minutes for their first unit. In the case of the second instructional unit presented by the student teachers, education majors allotted 547 minutes to 408 minutes for non-majors. While the allotted time in the first unit was greater for student teachers who were non-majors (approximately a half-period longer), the situation was reversed for the second unit with student teachers who were majors planning longer units (approximately 2 periods longer). The findings for unit two are consistent with the teacher-effectiveness research literature

because learners of education majors, who attained higher cognitive values, were provided a greater amount of time for direct instruction.

Differences in supervisor ratings of instructional skills between the two groups have also been examined (Denton and Lacina, 1983). For three of six evaluations, ratings by university supervisors during the student teaching experience were found to be significantly different. Ratings of student planning effectiveness showed little variation across the student teaching period regardless of major, although, without exception, the non-majors received higher ratings on the initial instruction unit they presented, while education majors received higher ratings on their second unit. In terms of instructional competence, the differences in ratings between education majors and non-education majors have tended to be small. Non-majors consistently obtained higher ratings on the use of duplicating and audiovisual equipment, while majors attained uniformly higher ratings on introducing and concluding lessons. Thus, although the ratings in some cases show differences between the two groups, the results are mixed. The supervisory ratings do not uniformly favor one program alternative over the other in terms of instructional skills.

A fifth variable used to study the effects of the alternative programs has been the morale of students during the student teaching process (Denton and Lacina, 1983). In this case, no significant differences have been found between education and non-education majors, suggesting that the programs are equally effective in influencing student morale.

In summary, it appears from previous studies that the education major alternative is more effective in producing pupil cognitive gains during student teaching than is the non-major alternative, that the alternatives are differentially effective in influencing instructional skills as measured by student teaching supervisors, and result in no discernible morale differences during student teaching. In terms of effects, then,

the results are mixed, except that the education major alternative seems clearly more effective in producing pupil cognitive gain.

V. Combining Cost and Effects Data

Costs Per Student

At first glance, it may appear that the education major alternative is 66.8 percent more expensive than the non-education major alternative ($79,935 average cost per semester compared with $47,913). However, these figures need to be adjusted for the number of students enrolled in the two alternatives to give the average cost per student per semester--a more accurate indication of instructional costs. Table 3 contains these average costs per student for each of the eight semesters.

Table 3
Cost Per Student Comparisons for the Two Programs

	Majors			Non Majors		
	Cost	Students	Cost/Student	Cost	Students	Cost/Student
Fall 76	$ 70,337	508	$ 138.46	$ 48.625	79	$615.51
Spring 77	85,113	582	146.24	56,728	102	556.16
Fall 77	79,734	485	164.40	47,290	55	859.82
Spring 78	98,594	379	260.14	49,562	79	627.37
Fall 78	78,329	459	170.65	49,522	65	761.88
Spring 79	83,288	381	218.60	48,718	54	902.19
Fall 79	68,147	385	177.01	39,448	45	876.62
Spring 80	75,938	323	235.10	43,411	68	638.40
Total	$630,480	3502		$383,304	547	
Average	$ 79,935	437.8	$ 182.58	$ 47,913	68.4	$ 700.48

Over the eight semesters, it cost an average of $182.58 per semester for each student enrolled in the education major program, but $700.48 per semester for each non-major student enrolled. Thus it might appear that the non-major program is 3.8

times more expensive than the major program. This is not the case, of course. What these figures represent is the average cost per student for each program if the courses included were offered only to those students in the program. In other words, it would cost $700.48 per student to train the non-majors if an average of only 68.4 students took the courses each semester.

In practice, these courses are not taught independently for the two alternative programs. One could assume that the 68.4 non-major students were simply joining the 437.8 major students each semester in courses already being offered for the education majors. This would amount to a 15.6 percent increase in the number of students taking the courses. Such an increase might be viewed as sufficiently minimal as to cause no real increase in the costs to the department. Under that view, the non-major program could be seen as costing the department nothing. The total education major program cost of $79,935 could then be allocated across a total of 506.2 students, for an average cost per student per semester of $157.91.

One needs to be careful in comparing program costs. Depending on the point of view, one can say that the education major program is 66.8 percent more expensive, that the non-major program is 3.8 times more expensive, or that the non-major program is in fact free.

Costs and Effects

Obviously the university could certify secondary teachers at an average cost of only $47,913 per semester. It is currently spending an additional $32,022 average ($79,935-$47,913) per semester to prepare secondary education teachers within an education major. With an average of 437.8 students per semester, this amounts to an additional $73.14 per student per semester to train secondary teachers with an education major.

Is the additional $73.14 per student per semester being well spent? The effects data reveal no differences in student morale and mixed differences in supervisor ratings of instructional skills across the two programs. The education majors do score 10

percent higher, however, on measures of teaching performance based on pupil cognitive attainment data. (Majors have an average score of 69, non-majors an average of 58.9). One view of this question is that for education majors, an expenditure of $79,935 results in a score of 69, or $1158.48 per percent per student. For non-majors, an expenditure of $47,913 brings a score of 58.9 or $813.46 per percent per student.

The analyses performed within this study do not enable us to say whether a 10 percent improvement in teaching ability is worth an additional $73.14 per student per semester. We currently lack comparable information on which to base a comparison. At this point the subjective judgments of experienced faculty are probably the best guide.

VI. Conclusions

Summary

Recounting significant costs and effects of the two preparation programs available to Texas A&M University students seeking certification as secondary teachers leads us to the following observations. Costs of the programs expressed in terms of total costs/semester revealed that the education majors program was 1.67 times more expensive than the certification alternative, that is, $79,935/semester compared with $47,913/semester. Yet when the number of students enrolled in the different options were factored into the costs, a substantial shift occurred, with the education major program being one-fourth as expensive as the certification program, i.e., $182.58 per sem/student majoring in education -vs- $700.48 per sem/student enrolled in certification program. Certainly these variations in costs reveal the impact of the number of students enrolled in the two program alternatives. In one sense, the certification option could be considered a "free-program," since all course requirements of this program are included in the secondary majors program for teacher education, and the required coursework must be provided to the student regardless of the program in which she/he is enrolled. Yet, the number of students completing secondary teaching certificate requirements as non-majors has influenced costs to the College of Education through increased sections of courses, additional advisement and additional supervisory expenses. Thus, the logic of comparing total program costs/semester factoring in the number of students being served provides useful information, especially when the effects findings are taken into account.

The finding that learners of education-majors attained higher average cognitive attainment values ($\bar{x}$ = 69.0) than learners of non-education majors ($\bar{x}$ = 58.9) during the second unit taught by the student teachers, suggests the program alternatives are producing quantitatively different teachers, at least through the student teaching experience. Expressed differently, it appears

that a 10 percent difference in learner cognitive attainment is associated in some fashion with the type of teacher preparation program completed by the student teacher. However, other "effects," such as supervisor skill ratings of instructional planning and implementation were mixed, with differences in ratings between education majors and non-majors being small. The supervisory ratings simply do not uniformly favor one program alternative over the other in terms of instructional skills. In the case of morale ratings of student teachers, no significant differences were found between student teachers enrolled in the alternative programs, suggesting that the programs are equally effective in influencing student teacher morale.

Combining the cost and effects findings in this investigation yields the observation that it cost an additional $73.14/semester for a student teacher in secondary education to increase the cognitive attainment of their learners by 10 percent in their second unit of instruction. Is this cost/effect ratio reasonable? Answering this question assumes that comparative costs from other programs are available. Unfortunately such cost-effectiveness information is not available, at least not to our knowledge! However, a conjecture about the reasonableness of spending $73 to positively affect a 10 percent gain in cognitive performance will be made. Given the difficulty in identifying methods and techniques of instruction, as well as curricular organizations which have been found to produce cognitive gains in learner performance, the effects of this line of inquiry are encouraging. Since the 10 percent value is an average of a class of learners, not a single learner, this yield should be multiplied by the learners taught by the student teacher. Under these conditions, spending an additional $73 per semester in the preparation of a teacher becomes a modest cost item.

Limitations

The focus of this investigation has been in the cost-effectiveness of alternate teacher preparation programs in secondary education. Structuring decisions made at the outset of

this effort materially affected which program costs and effects would be included. Another cost-analysis studying the same programs for different purposes could employ considerably different costs and effects estimates. For example, the costs in our investigation were calculated on the basis of costs to the College of Education, yet costs from different perspectives, such as states, the university, participating school districts or the student teacher, could have been selected. Further, costs were delineated into seven cost categories, i.e., administration, management, faculty, materials, equipment, facilities and services, as each impacted the College of Education. Other costs, such as intercollege expenses in negotiating various curricular changes throughout the University's multi-layered committee structure, were not considered.

From the student's perspective, total semesters in attendance, fees/semester, transportation, room and board, laboratory fees, books, and equipment represent but a few of the costs associated with the teacher preparation programs in this investigation. Orienting a cost-effectiveness evaluation to students' costs would have dramatically altered the variables of interest as well as possible policy implications resulting from this inquiry.

Effects data in this investigation were limited to variables and data sets previously compiled on the alternate programs. Other effects of interest which have not been examined include: current employment status of former teacher education students, current supervisor ratings of former teacher education student's teaching ability, tenure in teaching of former education majors/non-majors. Each of these "effects" could provide valuable insights into judging whether the additional costs for providing the secondary education-major are worthwhile.

Decisions made at the outset of this inquiry enabled this study to be complete, but at the same time potentially biased the results. Whenever possible, it would be advisable to (a) incorporate other audience costs and effects in the analysis, (b) broaden the scope of the study, and (c) include the difficult-to-assess costs and effects.

Implications

This investigation has linked "program effects" with cost data for alternate programs in secondary teacher preparation. This linkage represents a significant relationship which department heads and Deans in Colleges of Education are sensitive to in these times of financial shortfalls and press releases on quality deficiencies in teacher preparation. Results from this inquiry can be applied as baseline indicators of cost/effect units when future program revisions are being considered, and as a means of comparing start-up costs -vs- operational costs for a program. In particular, the outcomes of this inquiry, i.e., a 10 percent increase in learner cognitive attainment costs an additional $73 a semester per student, may have direct implications for whether teacher education programs should consider extending their preparatation period for teachers. If the press is for quality, with costs being secondary, these findings provide encouraging information to program developers. However, if costs are primary, and quality effects are secondary, these findings should serve as caution indicators to the development team. At the very least, integrating costs with effects provides additional information for program decision-makers to use in reaching summative decisions about their teacher education program.

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APPENDIX A

Cost Data Summary Tables

Table 1
Example of EDCI Operating Budget

1976-77 Operating Expense Allocations

Item	Instr.	Dept.	Fld. Exp.	Sec. Ed.	Elem Ed.	Grad. Proj.	Certif.	Lab. Exper.	Total
Stores	2500	900	400	300	300	100	200	50	4750
Misc. Off.	200	500							700
Misc. On		400							400
Centrex		5300	100	200	200	100	100		6000
Faculty Mail		400	200	200	200	100	100		1200
Copy Center		200	200	300	300	300	200		1500
Printing Ctr.				300	300				600
Xerox		500	50	100	100	100	100		950
Maintenance		1000						300	1300
Phys. Plant		700							700
Computer (Instr. Asst.)				500	100				600
Travel									
Dept. Bus.		250							250
St. Tchr. Sup.			1800						1800
Coord. Fld. Exp.			300						300
Satellite Ch. Div.		600							600
Conference	2000								2000
Reserve	1000								1000
Total	2700	13750	3050	1900	1500	700	700	350	24650

Table 2

Cost Summary for Secondary Teacher Preparation Programs

Fall 1976

Operational Costs	EDCI 120	EDCI 220	EDCI 221	EDCI 323	EDCI 401-7	EDCI 425	EDTC 405	EPSY 301	EPSY 321	Subtotals
Administration										
Dean's Staff	112	224	336	672	447	672	672	672	336	4143
Department Head	205	409	614	1228	819	1093	744	---	---	5112
Management										
Secretarial Time	284	569	853	1706	1137	1706	297	480	240	7272
Coordinator of Field Exp/ Coordinators of Program	92	184	277	553	369	2053	---	---	---	3528
Program Teaching/Services										
Faculty	1500	1967	---	4837	5452	14014	4464	6533	3200	41,967
Materials	7	14	20	41	27	121	---	120	60	410
Equipment	---	---	---	---	---	---	744	20	10	774
Facilities										
Cost of Rooms	300	300	600	1200	600	---	1200	1200	600	6000
Maintenance	10	20	30	61	40	61	---	---	---	222
Services	36	73	109	218	145	328	---	---	---	909
Subtotals	2546	3760	2839	10516	9036	20048	8121	9025	4446	70,337

Table 3
Cost Summary for Secondary Teacher Preparation Programs

Spring 1977

Operational Costs	EDCI 120	EDCI 220	EDCI 221	EDCI 323	EDCI 401-7	EDCI 425	EDTC 405	EPSY 301	EPSY 321	Subtotals
Administration										
Dean's Staff	109	217	326	814	435	651	814	814	326	4506
Department Head	204	417	626	1564	834	1549	930			6124
Management										
Secretarial Time	274	548	823	2057	1097	1645	372	600	240	7656
Coordinator FE, E, S Prgm.	86	172	258	645	344	2016	---	---	---	3521
Program Teaching/Service Faculty	1500	2704	4250	6711	5664	14990	5580	9500	2932	53,831
Materials	6	12	19	48	26	28	80	200	60	489
Equipment	---	---	---	---	---	---	930	25	10	965
Facilities										
Cost of Room	300	300	600	1500	600	---	1500	1500	600	6900
Maintenance	9	19	28	71	28	57				212
Services	34	68	102	255	136	314	---	---	---	909
Subtotals	2522	4457	7032	13665	9164	21260	10206	12639	4168	85,113

Table 4
Cost Summary for Secondary Teacher Preparation Programs

Fall 1977

Operational Costs	EDCI 120	EDCI 220	EDCI 221	EDCI 323	EDCI 401-7	EDCI 425	EDTC 405	EPSY 301	EPSY 321	Subtotals
Administration										
Dean's Staff	180	360	540	810	720	1080	810	810	270	5580
Department Head	194	388	583	874	777	335	2684			5855
Management										
Secretarial Time	289	578	867	1300	1156	1733	374	360	120	6777
Coordinators	85	171	256	384	341	2103	---	---	---	3340
Program Teaching/Service Faculty	1749	2932	4425	4417	5280	9535	5604	11788	5300	51030
Materials	5	10	15	22	20	109	---	90	30	301
Equipment	---	---	---	---	---	---	934	15	5	954
Facilities										
Cost of Rooms	300	300	600	900	600		900	900	300	4800
Maintenance	11	22	33	50	44	66				226
Services	37	73	110	165	146	340	---	---	---	871
Subtotals	2850	4834	7429	8922	9084	15321	11306	13963	6025	79,734

Table 5
Cost Summary for Secondary Teacher Preparation Programs

Spring 1978

Operational Costs	EDCI 120	EDCI 220	EDCI 221	EDCI 323	EDCI 401-7	EDCI 425	EDTC 405	EPSY 301	EPSY 321	Subtotals
Administration										
Dean's Staff	106	213	319	478	425	638	478	478	319	3454
Department Head	182	364	546	818	727	1423	700	---	---	4760
Management										
Secretarial Time	284	567	851	1276	1134	1701	280	360	240	6693
Coordinators	291	583	875	1312	1166	3340	---	---	---	7567
Program Teaching/Services										
Faculty	1166	1466	4425	4866	5280	13451	4203	7321	6788	48966
Materials	5	10	15	22	20	109	---	90	60	331
Equipment	---	---	---	---	---	---	700	15	10	725
Facilities										
Cost of Rooms	300	300	600	900	600		900	900	600	5100
Maintenance	11	22	33	50	44	66				226
Services	37	73	110	165	147	240	---	---	---	772
Subtotals	2382	3598	7774	9887	9543	20968	7261	9164	8017	98,594

Table 6
Cost Summary for Secondary Teacher Preparation Programs

Fall 1978

Operational Costs	EDCI 120	EDCI 220	EDCI 221	EDCI 323	EDCI 401-7	EDCI 425	EDTC 405	EPSY 301	EPSY 321	Subtotals
Administration										
Dean's Staff	139	278	416	625	555	833	625	625	208	4304
Department Head	223	445	668	1001	890	1718	832	---	---	5777
Management										
Secretarial Time	305	610	914	1371	1219	1828	333	360	120	7060
Coordinatorts	94	187	281	421	374	2243	---	---	---	3600
Program Teaching/Services Faculty	1214	1534	4592	5068	5616	12136	4995	9314	5648	50117
Materials	4	8	13	19	17	65	---	90	30	246
Equipment	---	---	---	---	---	---	832	15	5	852
Facilities										
Cost of Rooms	300	300	600	900	600		900	900	900	5400
Maintenance	13	26	40	60	53	80	---	---	---	272
Services	29	59	88	132	117	277	---	---	---	701
Subtotals	2321	3446	7612	9597	9441	19180	8517	11304	6911	78,329

Table 7
Cost Summary for Secondary Teacher Preparation Programs

Spring 1979

Operational Costs	EDCI 120	EDCI 220	EDCI 221	EDCI 323	EDCI 401-7	EDCI 425	EDTC 405	EPSY 301	EPSY 321	Subtotals
Administration										
Dean's Staff	120	245	367	551	489	734	551	551	184	3794
Department Head	196	393	589	883	785	1559	832	---	---	5237
Management										
Secretarial Time	293	587	880	1320	1173	1760	333	360	120	6826
Coordinatorts	94	187	281	421	374	2243	---	---	---	3600
Program Teaching/Services Faculty	1214	3068	4592	5985	5616	10180	4995	10436	10900	56982
Materials	4	8	13	19	17	60	---	90	30	241
Equipment	---	---	---	---	---	---	832	15	5	852
Facilities										
Cost of Rooms	300	300	600	900	600		900	900	300	4800
Maintenance	13	26	40	60	53	80	---	---	---	272
Services	30	59	89	133	118	257	---	---	---	686
Subtotals	2264	4873	7451	10272	9221	16873	8443	12352	11539	83,288

Table 8
Cost Summary for Secondary Teacher Preparation Programs

Fall 1979

Operational Costs	EDCI 120	EDCI 220	EDCI 221	EDCI 323	EDCI 401-7	EDCI 425	EDTC 405	EPSY 301	EPSY 321	Subtotals
Administration										
Dean's Staff	153	306	459	689	612	918	689	689	230	4745
Department Head	225	449	673	1010	898	1789	913	---	---	5957
Management										
Secretarial Time	307	614	922	1382	1229	1843	365	360	120	7142
Coordinatorts	99	198	297	445	396	2410	---	---	---	3845
Program Teaching/Services										
Faculty	1334	3188	2396	7482	3876	6821	5481	3382	5700	39660
Materials	5	10	15	22	20	72	---	90	30	264
Equipment	---	---	---	---	---	---	913	15	5	933
Facilities										
Cost of Rooms	300	300	600	900	600		900	900	300	4800
Maintenance	8	16	23	35	31	46	---	---	---	159
Services	26	52	78	118	105	263	---	---	---	642
Subtotals	2457	5133	5463	12083	7767	14162	9261	5436	6385	68,147

Table 9
Cost Summary for Secondary Teacher Preparation Programs

Spring 1980

Operational Costs	EDCI 120	EDCI 220	EDCI 221	EDCI 323	EDCI 401-7	EDCI 425	EDTC 405	EPSY 301	EPSY 321	Subtotals
Administration										
Dean's Staff	129	259	388	582	517	776	582	582	388	4203
Department Head	199	397	596	895	795	1585	913	---	---	5380
Management										
Secretarial Time	297	593	890	1334	1186	1779	365	360	240	7044
Coordinatorts	99	193	297	445	396	2410	---	---	---	3840
Program Teaching/Services										
Faculty	1334	3088	2396	6400	5972	10787	5488	3431	9480	48376
Materials	5	10	15	22	20	67	---	90	60	289
Equipment	---	---	---	---	---	---	913	15	10	938
Facilities										
Cost of Rooms	300	300	600	900	600	46	900	900	600	5146
Maintenance	8	16	23	35	31	---	---	---	---	113
Services	26	52	78	118	104	231	---	---	---	609
Subtotals	2397	4908	5283	10731	9621	17681	9161	5378	10778	75,938

Table 10

Total number of transcript hours and professional education semester hours of former students in the sample:

	Majors		Non-Majors
	Total hrs/Prof. Ed. hrs.		Total hrs/Prof. Ed. hrs.
1.	144/34	1.	146/22
2.	144/35	2.	157/22
3.	136/30	3.	145/25
4.	141/34	4.	174/31
5.	130/31	5.	168/22
6.	144/31	6.	143/34
7.	183/34	7.	159/22
8.	141/34	8.	160/22
9.	135/34	9.	176/32
10.	133/36	10.	154/34
11.	140/36	11.	138/30
12.	147/34	12.	157/22
13.	137/34	13.	137/65
14.	146/34	14.	142/22
15.	135/34	15.	131/31
16.	174/32	16.	155/22
17.	137/34	17.	156/22
18.	134/34	18.	166/22
19.	145/34	19.	143/22
20.	133/34	20.	142/22
21.	140/37	21.	160/22
22.	145/36	22.	144/22
23.	137/34	23.	144/25
24.	134/34	*24.	141/34
25.	144/34	*25.	139/24
26.	148/34	26.	147/34
27.	163/34	27.	151/34
28.	138/34		
29.	151/34		
30.	140/37		
31.	169/39		
32.	144/34		
33.	133/34		
34.	133/31		
35.	162/34		
36.	145/34		
37.	143/34		
38.	134/34		

39.	151/34
40.	143/34
41.	145/34
42.	174/34
43.	134/34
44.	144/34
45.	143/34
46.	145/34
47.	134/34
48.	182/34
49.	134/34
50.	135/34
51.	150/34
52.	137/34
53.	146/34
54.	139/34
55.	141/46
*56.	
*57.	
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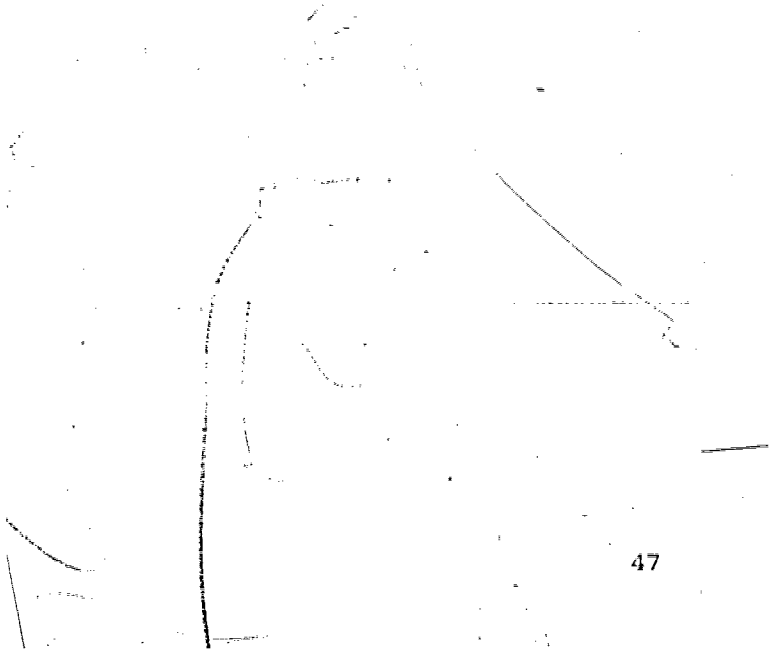
*58.	
*59.	
*60.	
*61.	

*unable to include in study



APPENDIX B

Checklist of Cost Categories

Cost items for cost analysis evaluation

University Costs

1. classrooms and furniture
2. travel for field experiences
3. office space for faculty
4. counseling time on part of faculty
5. counseling time on part of staff
6. teaching time on part of faculty
7. field trip expenses
8. special consultant expenses
9. paper for class handouts
10. office supplies—pencils, pens, staplers, notepads, tape, typewriter ribbon, etc.
11. duplicating costs—copy center, machines in Harrington, mimeograph, stencils, transparencies
12. special forms and bulletins—sec. handbook, degree plan, teaching field plan, etc.
13. equipment costs—overhead projectors, microcomputers, movie projectors, slide projectors, typewriters, peripheries for micros, software (books, journals, computer programs)
14. utilities and phone costs
15. recruitment of students
16. building maintenance
17. equipment maintenance
18. secretarial support for secondary program (records analyst, secondary program secretary, student teaching secretary, certification secretary)
19. administrative costs
    - Dean, COE
    - Assoc. Dean Student Affairs
    - Assistant Dean
    - Dean's Staff
    - Department Head, EDCI
    - Secondary Program Coordinator
    - Certification Officer
    - Coordinator of Field Experiences
    - Staff for field experiences (graduate assistants, lecturers, tenure track faculty)

Learner Costs

1. total hours in degree program
2. fees/semester
3. semesters in attendance (food, rent, books, miscellaneous)
4. transportation costs (to campus, to student teaching site)
5. time costs in attending classes, preparing for class, preparing for teaching, teaching

6. clothing for student teaching
7. interest on student loans
8. special equipment needs (calculators, apartment furniture, microcomputers and accessories)

School District Costs

1. Administrative Costs
   Superintendent
   Assistant Superintendent
   Principal
   Administrative Staff
2. Supervising teacher
   time instructing student teacher
   time counseling student teacher
   time observing student teacher
   time attending student teaching meetings
   travel to campus for student teacher seminars
   time preparing classes for student teacher
3. Materials especially required for field experiences (copies of school policies, student teaching handbook published by district, etc.)
4. Release days for supervising teachers to attend supervising conferences (hiring of substitutes)
5. Space for student teacher (desk or locker, or room)

APPENDIX C

Checklist of Cost-Effectiveness Steps

Checklist of Cost-Effectiveness Steps

I. Determine if a cost effectiveness study is desirable and feasible.

A. Determine if a cost effectiveness study is desirable.

1. What decision problem is to be solved?

2. What kinds of information will influence the decisions to be made?
   a. political influences: faculty, administrator, teachers, etc.
   b. standard practice, custom, history
   c. ideology, values, philosophies
   d. certification, licensure, legal
   e. financial

3. How will cost information help solve the problem?

4. Is cost effectiveness analysis the best method to use (instead of, e.g., cost benefit, cost utility, cost feasibility, or simple cost summary)?

5. Are the results of the cost effectiveness study likely to be seen as valid and useful by key audiences?

6. How will the cost effectiveness information be used?
   a. to change current program operations
   b. to increase efficiency
   c. to select among program alternatives
   d. to modify long-range plans
   e. to provide external accountability

B. Determine if a cost effectiveness study is feasible.

1. Are the key decision makers, policy makers, and program managers supportive of doing a cost effectiveness study?

2. Which individuals or groups support or resist the use of a cost effectiveness study?

3. Is the necessary expertise available to do a cost effectiveness study?

4. Are there sufficient resources to do a cost effectiveness study?

5. Is there time to do a cost effectiveness study?

6. Are the general cost data needed likely to be available?

7. Do the program alternatives indeed share similar outcomes that can be compared in a cost effectiveness study?

8. Are the general effects data needed likely to be available and standard across program alternatives?

9. Are the specific cost and effects data needed both available for the time period wanted, at the individual unit levels to be studied, and for the types of costs and effects needed for the analysis?

II. Describe the problem and its context.

1. What are the specific program decisions to be made?

2. What are the specific cost questions to be answered?

3. What program effects are of primary interest?

4. Who are the key audiences and what do they want from the analysis; how will they use the results?

5. What contextual factors (political, economic, social, historical, psychological, legal, geographic...) will influence the design, implementation, and the use of the cost effectiveness study results?

III. Describe the cost effectiveness study.

A. Describe the study's purpose and design.

1. What is the purpose of the analysis? (e.g., to select among program/course alternatives on the basis of economic efficiency--most outcomes for least cost?)

2. In general, which program alternatives are to be compared?

3. What is the timeline for the cost study activities?

4. What resources are available for the cost study?

5. What time period will be included in the cos effectiveness analysis? (a semester? a year ive years?)

6. Has the professional literature been reviewe o identify similar studies? (useful in identi ng cost items, pricing strategies, effects meas s, and cost-effect relationships.)

7. Have major audiences and decision makers rev ed and "approved" cost study design?

B. Describe the program alternatives being compared

1. What are the overall and specific purposes o: he alternatives?

2. What are the goals of the alternatives?

3. What inputs go into each alternative? (pers el, consumables, equipment, resources, etc., by rce of provider)

4. What processes, activities comprise each alternative?

5. What are the major outcomes resulting from ea alternative?

6. How are the alternatives different and simila

C. Describe the effects to be included in the analys

1. What are the intended outcomes of each alterr ive?

2. What are the unanticipated, unintended, or si effect outcomes of each alternative?

3. What data currently exist on each outcome and f what quality are they?

4. What instruments or measures of each outcome currently exist and what is their psychometri quality?

5. What will be the unit of analysis of effects? (program outcomes? district outcomes? course outcomes? student and/or faculty outcomes? a these?)

6. What will the sample size be? (all courses c only selected ones? all students or only a sample

7. What data need to be collected?

8. What data collection design will be employed? (will causal and/or comparative information on program effects be available? How will students be assigned to alternatives, etc.?)

D. Describe the costs to be included in the analysis.

1. What costs are associated with each alternative's inputs, activities, and effects?

2. What cost data currently exist and how complete/accurate are they?
3. What measures of cost currently exist and how reliable/accurate are they?

4. What will be the unit of analysis of costs? (departmental level? district level? course level? student and/or faculty level? all these?)

5. What cost data need to be collected?

6. How will the cost data be collected?

7. What shared items among the alternatives do not need to be costed out?

IV. Collect and summarize the needed effects and cost data.

A. Collect the needed effects data.

1. Have any needed additional effects measures been developed and piloted?

2. Has the effects design been implemented and the needed effects data collected?

3. Has the psychometric quality of the effects data been checked?

4. Have all the effects data been analyzed descriptively and comparatively using comparable units of analysis?

5. Have the data from the lowest unit of analysis been aggregated to the desired higher units of analysis?

B. Collect the needed cost data.

1. Have all direct and indirect cost data been collected for the given time period at the desired program levels?

2. Have the unit costs all been calculated?

3. Have the cost data been converted to appropriate values considering present versus annualized costs, total versus per student cost, years of annualization, discount rates, etc.?

4. Have the data from the lowest unit of analysis been aggregated to the desired higher units of analysis?

Analyze and interpret the cost-effectiveness information.

A. Analyze the cost and effects data.

1. What are the cost-effectiveness ratios for the alternatives?

2. What is the distribution of costs across all individuals supporting the alternatives?

3. What is the distribution of effects across all participants in the alternatives?

B. Interpret the cost effectiveness information.

1. What implications do the results have for selections among the alternatives?

2. What ethical concerns need to be considered in interpreting the information (side effects, equity, withholding of services, etc.)?

3. What additional questions does the analysis raise that need answering before definitive conclusions can be reached?

4. What additional information needs to be considered in making pertinent decisions?

5. What additional effects and cost impacts might occur as a result of decisions contemplated based on this analysis?

VI. Critique the study and report its results.

A. Review the quality of the study.

1. How sensitive is the analysis to different technical assumptions, e.g., cost estimates, discount rates, years of depreciation, etc.? (e.g., consider doing a series of sensitivity analyses)

2. What shortcomings are there in the analysis?

3. How biased may the results be due to inadequate design conditions such as non-random treatment assignment, missing data, poor cost data, inadequate effects data, bias in response rate?

4. How biased may the results be due to the cost models employed, poor conceptualization of alternatives, use of administrator perspective versus "all social costs" perspective, etc.?

5. Has an independent review been done to check the adequacy of the problem definition, cost categories and estimates, effects results, and interpretation of findings?

B. Report results.

1. Have the study design, activities, and results been informally shared with pertinent audiences for feedback and revision?

2. Has a complete report been prepared including a description of the study purpose, design, activities, results, and limitations been prepared?

3. Has a brief executive summary of study procedures and findings been prepared for use by decision makers?

4. Have possible implications of decisions made on the basis of the formal study been shared with pertinent decision makers, including a list of pros and cons for each alternative decision option and an assessment of non-cost implications (i.e., second order instructional effects, etc.)?