DOCUMENT RESUME

ED 253 513 SP 025 665

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TITLE A Cost-Effectiveness Evaluation in Teacher Education.
PUB DATE 84
NOTE 17p.; In: Denton, Jon, Ed.; Peters, William, Ed. and Savage, Tom, Ed. New Directions in Teacher Education: Foundations, Curriculum, Policy. See SP 025 564.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cost Effectiveness; Educational Finance; Expenditure per Student; Higher Education; Input Output Analysis; Operating Expenses; *Program Costs; *Program Development; *Program Effectiveness; Program Evaluation; *Teacher Education Programs

ABSTRACT

An exploratory investigation was conducted of a college of education's major costs in providing the "education major" alternative to obtaining teacher certification. Basic procedures consisted of identifying appropriate cost categories and gathering the required cost information. Major effects data from previous studies were reviewed and summarized, and the relationships between program costs and program effects were investigated. The investigation linked "program effects" with cost data for alternate programs in secondary school teacher education. Results from the inquiry can be applied as base-line indicators of cost/effect units when future program revisions are being considered. In particular, the outcomes of the 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 teacher preparation period. Integrating costs with effects provides additional information for program decision-makers to use in reaching summative decisions about their teacher education programs. (JD)

A COST-EFFECTIVENESS EVALUATION IN TEACHER EDUCATION

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Traditionally, educational researchers and evaluators have examined only the effects of programs, with little attention to cost. Conversely, administrators have often examined costs without relating them to program effectiveness. Treating outcomes without attention to costs can result in decision makers selecting program alternatives that are only marginally more effective, but exorbitantly more expensive than other alternatives. However, treating costs without consideration of outcomes results in knowing which of several alternatives is least expensive, without knowing whether that alternative produces the desired outcomes. Only by combining both costs and outcomes 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 (Denton & Smith, 1983).

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 evaluation of alternatives through a comparison of their costs and the estimated value of their outcomes. One can integrate multiple outcome measures into a single value, but because the measures and analysis are hypothetical, 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 (Levin, 1983).

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 (Levin, 1981).

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 problematic, however, since such comparisons have historically been of less interest in educational evaluation than

comparisons within program alternatives, such as which of two instructional stategies most effectively improve reading scores. Of the available techniques, therefore, cost-effectiveness analaysis would seem to be the treatment of choice for use in educational program evaluation at the managerial or administrative level (Levin, 1981).

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 prgorams. Levin (1975) provided a sound general introduction to the topic, followed by an instructional analysis of specific applications in educational evaluation (Levin, 1981, 1983). 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 two Texas A&M alternative programs leading to secondary teacher certification (cf. Denton, 1980, 1981; Denton & Lacina, 1984; Denton & Morris, 1981; Denton, Morris & Tooke, 1982; Denton & Norris 1979, 1980, ! ◊) there has, as yet, been no attempt to combine these 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.

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 investigtation 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 Effectivenss of Instruction.

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

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 221 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)
	EPSY 321 Adolescent Psychology (3 hr)	-----
Seventh	EDCI 401-7 Teaching Field Meth. (4 hr)	EDCI 401-7 Teaching Field Meth. (4 hr)
	EDTC 405 Preparation of Instructional Materials (3 hr)	-----
Eighth	EDCI 425 Student Teaching (12 hr)	EDCI 425 Student Teaching (12 hr)

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 to the college, 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.

EPSY 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.

DESCRIPTION OF EFFECTS

As described previously, two alternative programs exist for students desiring to

obtain secondary teacher certification. How do these alternatives compare in terms of instruction 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 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 *Curriculm 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, simulated 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 155 respectively. Further, education majors completed 34 semester hours in professional education, while certification students completed 24 semester hours in education. These values roughly correspond to the requirements presented in Table 1.

Results

Because of the numerous comparative studies already conducted on 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 ($r_{phi} = .23$) 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 ($\bar{x} = 69.0$) than learners of non-education majors ($\bar{x} = 58.9$). 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).

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 & Lacina, 1984). 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 instructional 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 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 revealed differences between the two groups, the results were mixed. The supervisory ratings did 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 & Lacina, 1984). In this case, no significant differences have been found between education and non-education majors, suggesting that the programs were 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 learner cognitive gain.

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 became 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 × .228 × (.284 [illegible] .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 administrative assistant to the department head, respectively. Cost estimates of the department head for the education 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 and 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, 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. Specifically, values for 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. An example of the resulting values from this myriad of calculations are reported in Table 2.

Management

Cost items obtained for this category include salaries of secretaries 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 administrative assistant to the 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 experience 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. An example of one semester values resulting from these calculations are provided in Table 2.

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 1976-1980 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 similar to Table 2 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 Semester 1976 and Spring Semester 1980. The conversion of current costs to historical

Table 2

COST SUMMARY FOR SECONDARY TEACHER PREPARATION PROGRAMS

Operational Costs	Fall 1976 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

costs were determined by multiplying cost ratios of total departmental costs in EDCI (e.g., 1976 operating costs/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

Materials expenses were obtained from departmental operating expense allocations from 1976-1980 in EDCI. However, since material costs in EDTC 405 are passed on to the student as laboratory fees, the department does not reflect an expenditure for materials for that course. For EPSY, cost estimates for materials associated with courses EPSY 301 and EPSY 321 were obtained from the department head. Material costs per course reflected in Table 2 were calculated by dividing the cost of materials by the total number of semester hours offered during that semester. This quotient was then multiplied 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 for one semester in Table 2. For EDTC, current equipment costs for EDTC 405 are provided. These estimates were converted into historical cost estimates in 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, thus the cost category was not completed.

Facilities

Costs of facilities were determined by the "shadow cost" technique, that is, the expense of renting space at a community 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 from 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 hours of course). An example of the semester costs for facilities is presented in Table 2.

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 experiences. 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 Table 2.

Table 3 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, 1976 and the Spring Semester, 1980 are not too different for secondary majors, yet substantial fluctuations occurred during this time period, e.g., Spring 78 - $98,594 to $68,147 - Fall 79. This variation in costs during the eight semester period reflects the fluctuations in undergraduate enrollment in secondary education in comparison to total enrollment in EDCI.

COMBINING COST AND EFFECTS DATA

Costs Per Student

At first glance, it may appear that the education major alternative is 66.8 percent

Table 3

SEMESTER COST COMPARISONS OF TWO PROGRAMS IN SECONDARY TEACHER EDUCATION

Semester		Education Major Program		Certification Program
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

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 4 contains these average costs per student for each of the eight semesters.

Table 4

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	$639,480	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 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 non-major students were simply joining the 438 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 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 college of education 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 438 students per semester, this amounts to an additional $73.14 per student per semester to train secondary teachers with an educational 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 learner cognitive attainment data.

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.

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 preparation 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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