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AUTHOR Navaratnam, K. K.; And Others
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ABSTRACT

A major challenge confronting vocational educators is to justify programs in economic terms. The purpose of this study was to propose and implement a cost-benefit analysis model to determine the economic outcomes of secondary vocational education programs at the local level. For the study, a cost-benefit model for secondary vocational education was proposed, submitted to a panel of experts for revision, implemented, and evaluated. The model was implemented at a comprehensive high school and an area vocational center in the Roanoke County School Division, Virginia. Four visits were made by the researchers from December, 1984, to April, 1985, to the central administrative offices and to the school sites to gather data related to costs and benefits. Further, a follow-up survey was conducted to determine the monthly income earned and average number of hours worked per week by the graduates of each of four vocational programs. Based upon analysis of the data, the study concluded that the cost-benefit analysis model is usable and should be transportable to other secondary vocational settings. (In the specific implementation for this study, it was concluded that the trade and industrial program, the business education program, and the marketing and distributive education program were economically profitable, while the occupational home economics program was not economically profitable.) The field test of the cost-benefit analysis model of secondary vocational education programs with its findings and conclusions suggests that the Roanoke County model can be used to determine the economic outcomes of vocational programs and is transportable to other secondary vocational education settings. (KC)

USING COST-BENEFIT ANALYSIS TO DETERMINE PROFITABILITY OF SECONDARY VOCATIONAL PROGRAMS

K. K. Navaratnam
John Hillison
J. Dale Oliver

VTE Division
Virginia Tech
Blacksburg, VA 24061

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USING COST-BENEFIT ANALYSIS TO DETERMINE PROFITABILITY OF SECONDARY VOCATIONAL PROGRAMS

An economic recession in the early 1980s and increasing Federal budget deficits have caused public and private agencies to justify the dollars they spend on educational programs (Carr, Castilhos, Davis, Snyder, & Stecher, 1982; Wylie, 1983). Federal support for education has begun to decline and the economic forecast for educational agencies towards the 21st century appears to be quite bleak (Milbergs, 1981). Many educational agencies are beginning to look for programs they can cut in an effort to reduce expenses and increase the effectiveness of resource utilization. Evidently, many vocational education programs in the United States are under a considerable amount of fiscal pressure as well as being in the midst of a period of heightened debate on educational policies and the financing system (Feldman, 1981; Phelps, 1984). It should not be surprising that this debate is replete with references to cost-effectiveness. Vocational education needs a strong and sound basis to justify its profitability to its critics and to officials at all levels of government.

In the light of the above concerns, the profitability of vocational education must be demonstrated from the point of view of both school and society. This demonstration of profitability has to be done quickly, precisely, and clearly. Local school boards are interested to see the economic impact of vocational education in their communities as soon as possible. For this purpose, evaluation of vocational education should be viewed from the standpoint of cost-benefit analysis. The concept of cost-benefit analysis must emphasize the following:

1. Assessing of inputs,
2. Determining and measuring program outputs, and
3. Using evaluation findings for program revisions, organizational renewal, and accountability to public, funding sources, and to the profession (Mayeske, 1982).

Based on the above perspectives, the administration of vocational education must examine the costs of attaining benefits of programs. That is, efficiency of vocational education must be examined in terms of costs and benefits of individual programs. Suchman (1967) has defined program efficiency as "the capacity of an individual, organization, faculty, operation, or activity to produce results in proportion to the effort expended" (p. 9).

Statement of the Problem

A major challenge confronting vocational educators is to justify programs in economic terms (Bottoms, 1984; Milbergs, 1981). There has been mounting criticism regarding the accountability of vocational education. The most important part of this criticism is that accountability in vocational education has been primarily based on inputs, staff activities, and participant's information (Howell & Frankel, 1983). There is a need to relate inputs and outputs in terms of dollars. While some cost-benefit studies of vocational education have been completed, generally they have been conducted by economists or educators with major help from economists. Such studies were large scale in nature and primarily conducted for policy making at a higher level. No studies could be identified which were conducted only from the school's point of view and at the single program level within a service area. Thus, there is an absence of the use of a practical evaluation technique which considers both costs and benefits to determine the economic outcomes of secondary vocational education programs at the local level.

Purpose of this Study

The purpose of this study (Navaratnam, 1985) was to propose and implement a cost-benefit analysis model to deter-

mine the economic outcomes of secondary vocational education programs at the local level. Specifically, the objectives of this study were to:

1. Propose a cost-benefit analysis model to determine the economic outcomes of secondary vocational education.
2. Implement the model.
3. Gather feedback information on transportability of the model based on its use.
4. Make recommendations on the use of the cost-benefit analysis model for determining economic outcomes for secondary vocational education.

Methodology

The methodology for this study consisted of the following procedures:

1. Propose a cost-benefit analysis model for a secondary vocational education program.
2. Seek the opinion of a panel of experts relating to needed revision in the cost-benefit analysis model.
3. Implement the revised model to determine its feasibility.
4. Evaluate the cost-benefit analysis model.

5. Determine the transportability of the cost-benefit analysis model to other secondary vocational education settings.

The cost component of the model included items such as instructional personnel, buildings, equipment, materials and supplies, administration, travel, utilities, maintenance, and services. The benefits component consisted of economic earnings such as increased earnings from graduates' employment, earnings from cooperative placement, and earnings from provision of services.

Panel of experts' opinions and suggestions were used to refine and revise the cost-benefit analysis model. The panel of experts consisted of four members including a local vocational administrator, a teacher educator, an economist, and a state advisory council executive director. Members of the panel of experts were purposively selected. The panel of experts was given a brief outline of the model and the calculation procedure for their suggestions and opinions. Such input rendered by the experts was used to revise and refine the model.

The revised cost-benefit analysis model was then implemented. A comprehensive high school and an area vocational center in the Roanoke County School Division, Virginia were purposively selected for this study. Because of an agree-

ment with the school division, the specific titles of the service area programs and the schools represented in the study must remain anynomous. The four programs were purposively selected with the help of the vocational director for the school division. The criteria used for selecting the programs for the study were to have: (a) Compatible and similar objectives, (b) Teachers willing to participate in the study, (c) As many vocational service areas represented as possible within the financial constraints of the study, and (d) Programs located in both a comprehensive high school and a vocational school. All four programs had cooperatively placed students. The business education and marketing and distributive education programs were located in a comprehensive high school. The occupational home economics and trade and industrial programs were located in an area vocational center.

Data Collection

Four visits were made by the reseachers from December 1984 to April 1985 to the school division's central administrative office and to the school sites to gather data related to costs and benefits. Further, a follow-up survey was conducted to determine the monthly income earned and average number of hours worked per week by the graduates of each

program. A graduate follow-up questionnaire used by the Roancke County School Division was modified and used for the survey. A review of the questionnaire by the study's panel of experts, central office personnel, school principals, teachers, and other administrators indicated that it obtained the correct information and that graduates should be able to understand and complete the questions. Thus, content validity and reliability of the questionnaire were confirmed. The study operated under the assumption that a valid instrument was also a reliable instrument (Ary, Jacobs, & Razavieh, 1972). Because all 46 graduates in the four programs were considered for the study, sampling was not used. There was a 73.9% return obtained from the survey. Table 1 shows the questionnaires returned for each program area selected in this study.

Place table 1 about here

Calculation of Costs

Instructional personnel cost was prorated based on the percentage of instructional time spent in the specific program. Annual building space cost used for the program was prorated based on the current replacement square footage

cost of $50.00 for school buildings in Virginia with an anticipated life expectancy of 50 years. Both figures were approved by the panel of experts. Current value of equipment owned for each program was used to prorate the equipment cost. A lifespan of 5 to 20 years was selected, depending upon the size and cost of equipment to calculate its annual costs. Accordingly, larger and more expensive pieces of equipment were considered to have a longer lifespan and the smaller and less expensive pieces of equipment to have a shorter lifespan.

Costs incurred for materials, supplies and travel were considered as 100% vocational costs in the model. Administration, utilities, services, and maintenance costs were prorated for each program by using the proportion of students enrolled in a program compared to the total enrollment in the respective school. In prorating costs for each program area, total costs incurred in the fiscal year 1983/84 were attributed to the final year students. Because the selected four vocational education programs each consisted of two years of classes, it was decided to attribute the total costs of the fiscal year to the final year graduates instead of splitting them among each class and prorating them. This procedure saved having to determine fractional costs for the previous years when members of the current graduating class

were first year students. The total costs were not discounted because all the program costs occurred in one year.

Calculation of Benefits

Increased income of vocational graduates was determined by subtracting the Federal minimum wage of $3.35 per hour from the graduates' earnings per hour and multiplying by the average number of hours worked. The Federal minimum wage was used as a result of an assumption that any worker, regardless of training background, could make that amount in salary. Present value of increased income for five years was used in this study because there is no specified number of years of earning attributed as the benefits to the school. However, the panel of experts suggested the need to indicate the present value of the increased earning of students for five years as an attributable benefit to the school. Present value of increased income was determined after adjusting for an assumed 3% annual salary increase for the second through fifth years. Income earned from cooperative placement and provision of services were added to the first year income. The benefits of the second through fifth years valued in monetary terms were summed and discounted to the present value by a discount factor determined on the basis of a 6.5% interest rate. Because vocational education

uses public dollars to fund its programs, an average of both the state literary fund loan interest rate (4%) and current money market savings account interest rate (9%), was used determine the 6.5% interest rate used in discounting the benefits.

Useability and Transportability

Useability and transportability of the cost-benefit analysis model were determined by the panel of expert's opinions and suggestions during this study. Members of the panel of experts were contacted twice to help them evaluate the model. The first time an outline of the model was shared. The second time findings of the study were shared. Members of the panel of experts unanimously endorsed the model as useable and transportable.

Findings

The cost-benefit analysis model was field tested in four selected service area programs, namely trade and industrial (T&I), occupational home economics (OHE), business education (BUS), and marketing and distributive education (MD). Table 2 shows the total costs for 1983/84 of all four programs.

Place table 2 about here

Trade and industrial, business education, and marketing and distributive education programs all indicated greater economic benefits than costs. The occupational home economics program showed greater costs than economic benefits. Table 3 shows the present value of net profit that could be obtained from each of the four programs for five consecutive years. The relative benefits have exceeded the relative costs in three programs of the study.

Place table 3 about here

According to the obtained responses from the survey, one interesting finding was the difference in employment rates among the service area programs. The employment percentage reported for each program was based upon the graduates returning instruments and those in the subsequent telephone follow-up who indicated they were employed. Trade and industry had 10 graduates employed (100%), occupational home economics had two graduates employed (40%), business education had nine graduates employed (100%), while marketing and distributive education had 14 graduates employed (100%).

Another important finding is the role played by cooperative placement in determining the economic outcomes of vocational education. For example, 12 students in the trade and

industrial program made a total of $48,000.00, seven students in the occupational home economics program made a total of $4,592.72, 10 students in the business education program made a total of $41,077.75, while 17 students in the marketing and distributive education program made a total of $58,544.00.

Although the major purpose of the study was to use a cost-benefit analysis model to determine economic outcomes of secondary vocational education, a minor emphasis was placed on also collecting information on noneconomic benefits. All respondents were requested to indicate which of 11 noneconomic benefits they had obtained from their vocational program. The 11 benefits were established jointly by the researchers and the departmental advisory council. The noneconomic benefit reported by the largest percentage of graduates (79%) was "increased knowledge," the second largest percentage (77%) was the benefit of "positive work attitude," and the lowest percentage (10%) was reported on the benefit of "influence on family size." Other benefits were high job satisfaction, improved public speaking ability, care of child, improved communication ability, greater job opportunities, better citizenship, ability to make better decisions, and greater sense of well being.

Conclusions

Based upon the findings of the study the following conclusions were made:

1. The cost-benefit analysis model is useable.
2. The cost-benefit analysis should be transportable to other secondary vocational settings.

In the specific implementation for this study it was concluded that:

1. The trade and industrial program was economically profitable.
2. The occupational home economics program was not economically profitable.
3. The business education program was economically profitable.
4. The marketing and distributive education program was economically profitable.

Recommendations and Discussion

The field test of the cost-benefit analysis model of secondary vocational education programs with its findings and conclusions suggest that the Roanoke County model can be used to determine the economic outcomes of vocational programs and is transportable to other secondary vocational education settings. Obviously, the Roanoke County model has

helped to determine the economic outcomes of programs and eventually to differentiate the profitable and nonprofitable programs from the point of view of the school. Accordingly, the researchers argue that the proposed model has accomplished what it was intended to do. The success in using the model at the secondary level has led the researchers to recommend that the model be used to determine the economic outcomes of vocational education programs at the secondary level in other settings.

Low employment rates, lack of opportunities to earn income during cooperative placement, and a tendency to not be economically employed were reasons for the finding of nonprofitability of the occupational home economics program. Therefore, local administrators must be cognizant of all related factors while using cost-benefit analysis. It is not enough to simply examine net profit in making policy decisions about programs.

There are variations in the process of implementing vocational programs from one setting to another. Thus, the specific proration and calculation procedures used in this study may or may not be directly adaptable and acceptable to other vocational education settings. However, the researchers believe that the basis on which the costs and benefits were prorated could be serve as a guide for using the con-

cept of cost-benefit analysis as an evaluation procedure in vocational education.

Present values of future increased benefits were determined for five consecutive years based on using first year increased income as a factor. Although using increased income could be a debatable approach, the researchers believe there is no reasonable alternative method available to determine the actual benefits of the vocational program for this model. In this study, the Federal minimum wage of $3.35 per hour was used as a basis to determine the increased benefits attributable to vocational education programs. Any income earned more than the minimum wage was considered as the income obtained as a result of the enrollment in the vocational education program. Although income of comparable nonvocational graduates' could be used to determine the increased income, the limited feasibility of this approach exists in the problem of identifying and using an appropriate comparison group. There may be another debate that even the increased income is not totally attributable to vocational education. In fact it is more than the contribution of vocational education. However, vocational educators have the right to claim the increased income until a comprehensive research study accurately portions the benefits to all causes.

Finally, it is difficult to propose and use a unified cost-benefit analysis model which is acceptable to everyone in vocational education. Although the model developed here has been demonstrated to be useful as well as determined to be transportable to other secondary vocational settings, further research must be conducted to make appropriate changes in the model depending on the intended purpose. Until clear and verifiable research has been conducted, this model could be used to determine the economic outcomes of vocational programs. Moreover, the authors strongly believe that the cost-benefit analysis model will lead researchers in a new direction towards the application of cost-benefit analysis as an evaluation technique for secondary vocational education programs.

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Table 1
Questionnaires Returned by Program Area

Program area	Total n	Returned n	Percentage returned
Trade & indus.	12	10	83.3
Occ. home econ.	7	5	71.4
Business ed.	10	9	90.0
Mar. & dis. ed.	17	10	58.8
Total	46	34	73.9

Table 2
Summary Costs of Four Vocational Programs For 1983/84

Cost components	Annual costs			
	T & I (n=12)	OHE (n=7)	BUS (n=10)	MD (n=17)
Ins. personnel cost	$29314	$25588	$17213	$12645
Building	2583	1852	1200	650
Equipment				
Large	2886	346	-	-
Medium	1281	253	43	93
Small	300	93	256	24
Mater. & supplies				
Textbooks	331	500	52	460
Consumable	1194	47	470	1273
Administration				
Principal	1981	1156	903	1536
Secretaries	1285	750	525	893
Counselor	1255	732	274	467
Voc. admin	466	272	113	192
Custodial	723	421	740	1259
Teacher support	1141	666	516	878
Fringe benefits	1819	1048	762	1296
Sch. audit	13	8	6	11
Travel	1624	1464	277	607
Services	1146	668	981	1667
Utilities				
Electricity	499	291	585	995
Water	19	11	27	46
Telephone	132	77	38	64
Sewer	30	17	29	50
Gas	844	492	306	520
Fuel	346	202	-	-
Maintenance				
Cus. supplies	42	24	45	78
Other	55	32	35	60
Total cost for prog.	51322	37019	25407	25773
Students enrolled	12	7	10	17
Cost per student	4276	5288	2540	1516

Table 3

Present Value of Net Profit of Four Vocational Programs Based on Employed Graduates

Prog.	Yr.	Pres. value of benefits	Total costs for programs	Net Profit for programs
T	1	72218	51322	20896
&	2	94169	51322	42847
I	3	115495	51322	64173
	4	136137	51322	84815
	5	156035	51322	104713
O	1	7667	37019	(29352)
H	2	10310	37019	(26709)
E	3	12878	37019	(24141)
	4	15363	37019	(21656)
	5	17759	37019	(19260)
B	1	57114	25407	31707
U	2	71650	25407	46243
S	3	85771	25407	60364
	4	99440	25407	74033
	5	112616	25407	87209
M	1	73753	25773	47980
D	2	87538	25773	61765
	3	100931	25773	75158
	4	113894	25773	88121
	5	126390	25773	100617

Note: Total costs were determined based on the graduates enrolled in each program. Benefits were calculated based on the number of graduates employed among the respondents.