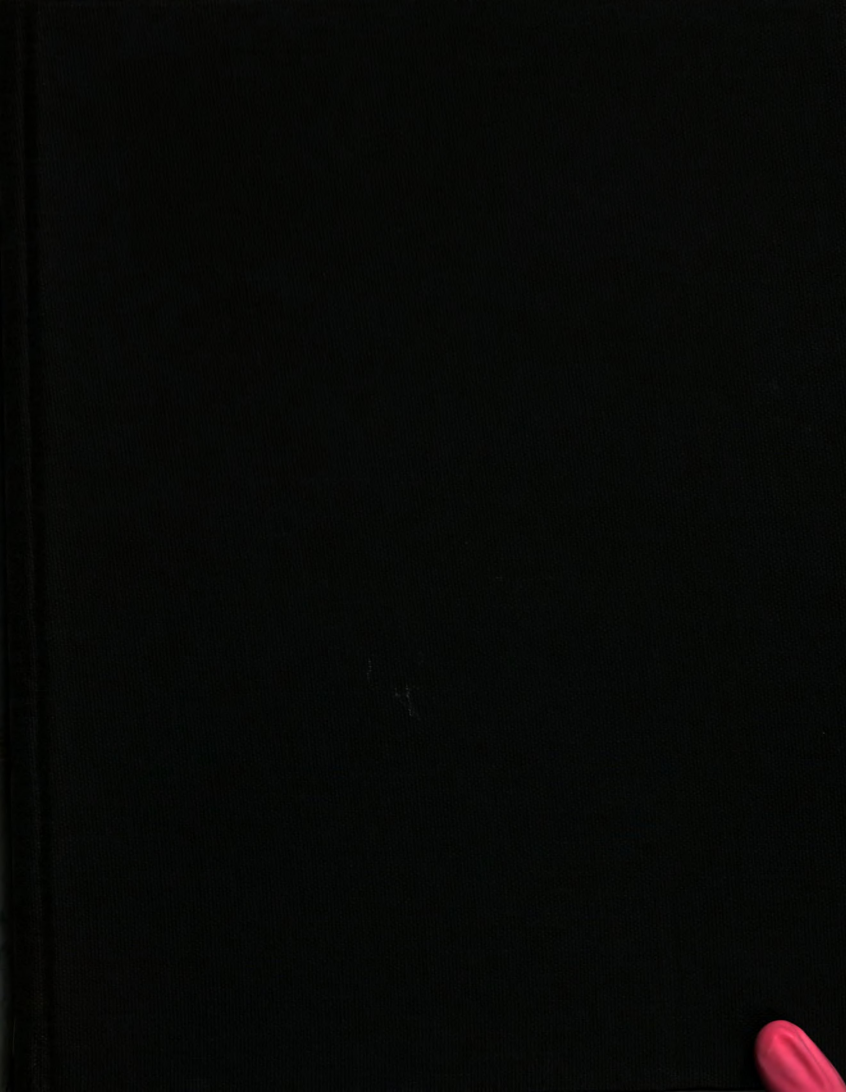




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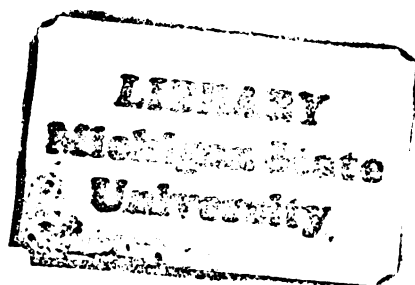
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A STUDY OF THE RELATIONSHIPS BETWEEN
PERCEIVED BENEFITS FROM GRADUATION PROGRAMS
AND GRADUATION PROGRAM COSTS

By

Michael King Marshall

A THESIS

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ABSTRACT

A STUDY OF THE RELATIONSHIPS BETWEEN PERCEIVED BENEFITS FROM GRADUATION PROGRAMS AND GRADUATION PROGRAM COSTS

By

Michael King Marshall

This study was designed to test the relationships between high school graduation program benefits and their production costs. The approach is from a "product" perspective and relies on techniques drawn from Systems Analysis, Marketing Research, Economics, and Finance. Schools are considered to be similar in many respects to factories and service-producing enterprises that are also comprised of workers, buildings, equipment and materials. The study assumed a multi-faceted educational product composed of further education benefits, job benefits, and personal benefits. Production costs were determined by using cost accounting methods.

Sixty graduates from the 1979 graduating classes at each of seven Okanagan high schools were randomly selected as a survey sample to determine their perceived benefits from each course completed during their senior high school years. Three hundred and thirty-one usable responses were then costed on a course-by-course basis according to the

categories of instructional personnel costs, materials costs, and overhead costs. Benefits and costs for each course and graduate were then aggregated.

The four major hypotheses developed and tested were:

- I. Total Educational Benefits are positively related to senior high school program costs.
- II. Total Further Education Benefits are positively related to senior high school program costs.
- III. Total Job Benefits are positively related to senior high school program costs.
- IV. Total Personal Benefits are positively related to senior high school program costs.

Tests of significance using Correlation Analysis and Analysis of Variance techniques showed that the educational product is composed of differing educational benefits and these are related in positive ways to production costs and specific cost categories. The study also established that different groups of consumers have varying cost-benefit relationships. The disaggregation approach employed in this study made it possible to link some of the educational benefit components to specific educational costs.

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The writer acknowledges with thanks the support and encouragement given by Mr. Murli Pendharkar, superintendent of schools in the Central Okanagan School District. His cooperation and that of his staff including central office personnel, principals, and teachers was essential to the study.

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This study is dedicated to my wife Anne and children, Melanie, Tony, and David, without whose patience and understanding this study could not have been undertaken and completed.

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CHAPTER I

THE PROBLEM

Need

David Churchman in a paper presented to the American Educational Research Association made the statement that "educators object to thinking of people as 'products,' preferring to speak in terms of the 'full potential of the individual.'"¹ Today, as education searches for better and less costly ways to deliver its product, there is an increasing need to develop a more specific understanding of that product and the costs incurred in its production. Any implied dangers of dehumanizing education, while inherent to some extent in adopting a product orientation, are probably outweighed by not utilizing available techniques to better understand education as a product. The school system with all of its complexities as a socio-technical system,² is as Johns and Morphet point out similar

¹David Churchman, A Cost-Benefit Methodology for Summative Evaluation, paper presented at the Annual Meeting of the American Educational Research Association (64th, Boston, April 7-11, 1980), p. 1.

²E.L. Trist, "On Socio-Technical Systems" in Warren G. Bennis et al., The Planning of Change--2nd Edition (New York: Holt, Rinehart, and Winston, 1969), pp. 268-82.

in many respects to a factory.³ According to them, the school system may be usefully conceptualized as a "processor" consisting of workers, buildings, equipment, and materials, with inputs of money and raw material in the form of students, and with output in the form of human capital that has been developed and improved by the educational services provided by the processor.

It is important to consider that education is by definition⁴ both a product as well as a process. This conceptual distinction is not commonly made by most educators who as a result of their training and experience tend to be preoccupied with the process of developing the full potential of each child. These are the same individuals who would be most inclined to totally reject any comparison of a school to a factory, even if such a comparison might benefit their clients. Some business techniques and perspectives can be applied to help identify and accommodate the very product needs that are served by so many process-centered educators. In addition, an education product focus brings with it an implied cost dimension at a time when educational costs are extremely high.

During the past twenty years there have been developments in several disciplines including Systems Analysis,

³Roe L. Johns and Edgar L. Morphet, The Economics and Financing of Education Third Edition (Englewood Cliffs: Prentice-Hall, 1975), p. 41.

⁴Henry Bosley Woolf, Ed. Webster's New Collegiate Dictionary (Springfield, Mass: G & C Merriam Co., 1976), p. 361.

Marketing Research, Economics, and Finance that should have contributed to the understanding of educational products. An understanding of the potential benefits that come from viewing education as another service-producing industry would have necessitated a greater dependence on the knowledge accumulated in these related fields, and probably would have been accompanied by product improvements in educational services. The accountability movement that began in the late sixties with its focus on standards of achievement, educational outcomes, and financial responsibility has now created a situation where as Sciara and Jantz point out, "education must begin to borrow from the 'factory' model whether it wants to or not."⁵

Whatever else, the educational product is at the very least under close public and professional scrutiny. Thompson, addressing the Association for Institutional Research, states that educational institutions can no longer afford to ignore public concerns about what is taught, how much is learned, and who is enrolled.⁶ He advocates that quality must be defined in terms of the benefits and costs as perceived by consumers of educational products. Leon Lessinger

⁵Frank J. Sciara and Richard K. Jantz, Accountability in American Education (Boston: Allyn and Bacon, 1972), p. 3.

⁶Fred Thompson, "The Cost and Value of Marketing Analysis," Paper presented at the 18th Annual Association for Institutional Research Forum (Houston, May 21-25, 1978), p. 1.

uses the term Caveat Emptor to describe what he believes as the best attitude in a situation where the producer's interest has been confused with the user's needs.⁷

Education it seems, unlike industry, does not have to do what survival demands. Or at least it has not had to be nearly so competitive in the past, both in terms of funding as well as public support, for its secure monopoly position in the education market. It has never really had to adapt its product to the rigorous requirements of free competition.⁸ Service industries such as airlines, television networks, restaurants, and hotel chains just to mention a few, conduct extensive research on the services they produce. They recognize the value of product feedback in remaining competitive by adjusting their services to better fit the needs of their marketplace. Ultimately it is the consumer of a meal, television show, or film who will determine and internalize the value of that particular product relative to its cost.

Most educators and school boards could generally agree that high school programs are to a large extent designed, developed, and offered to facilitate students' preparation for activities beyond graduation. This product of education

⁷Leon M. Lessinger, "Quality Control and Quality Assurance in Education," Journal of Education Finance (Spring, 1976), p. 514.

⁸Theodore Levitt, "Marketing Myopia" in Modern Marketing Strategy (Cambridge: Harvard University Press, 1964), p. 48.

could be perceived as investment in human capital.⁹ Benson differentiates this product from education as a consumption commodity where students consume education for enjoyment only. Education costs, according to Benson, can only be justified for investment products and not for the rather immediate consumption products.

Education is a service industry having much in common with other service producing enterprises such as museums, theatres, private clubs, and amusement parks. While these may tend to focus on a consumption product rather than investment, they are similar to education in that they produce a service for a cost. However, unlike education they must be preoccupied with an emphasis on their product. In competitive industry the prime focus is on a market need and the product is designed to satisfy potential consumers. Only after the need-oriented product has been identified, are the means or processes of production determined, always with an essential consideration of production costs. Simply put, the product dictates the process.

Education on the other hand has traditionally not focused on its product. Rather, it has grown naturally as an important social institution, remaining basically unchanged over the years as new programs and new materials have

⁹Charles B. Benson, Education Finance in the Coming Decade (Bloomington: Phi Delta Kappa, 1975), pp. 5-8.

come and gone.¹⁰ The history of American public schooling does not give rise to confidence that the schools will change their processes quickly and adopt a new focus in educating masses of young people. Writing on the evolution of organizations, Kotler and Levy state that many organizations in the course of evolving, lose sight of their original mandate, grow hard, and become self-serving.¹¹ In American schools, the process dictates the product.

If the public school system and more specifically the high school system is perceived as an educational producer for society, then several questions central to this study require answering. First of all, what is the educational product? What are those affective, skill, or cognitive learnings that can be related to an educational product?¹² Once identified, how do these learnings as part of a product become measurable? And once it is possible to identify and quantify the educational product in whole or part, how does the product relate to specific costs of production? These are some of the obvious and substantive questions that are

¹⁰Robert G. Owens and Carl R. Steinhoff, Administering Change in Schools (Englewood Cliffs: Prentice-Hall, 1976), p. 2.

¹¹P. Kotler and S.J. Levy, "Broadening the Concept of Marketing," Journal of Marketing, (January, 1969), p. 10.

¹²W. Georgiades, How Good Is Your School? (Reston: NAASP, 1978), p. vi.

appropriate to ask in a product-oriented business of education.

As an important service institution now under pressure, schools should begin an intensive examination of their product relative to its production costs. The underlying fabric for such an analysis can be based on product definition in terms of specified output criteria, a means of product assessment or measurement, and production costing using a cost accounting approach. These elements, while commonly applied in goods' manufacturing and some service industries, have only seen limited use in education. It is hoped that this study will contribute substantially to understanding the educational product as it relates to its production costs.

Purpose

Education in North America is a giant service industry catering to the needs of society, individuals, and its own bureaucratic structure. In often little-understood ways, high schools graduate ill-defined products amidst increasing public outcry and increasing costs. This study centers on the product and cost dimensions of high school education. The main purpose is to study the relationships between those benefits that constitute the educational product and their production costs as determined using cost accounting methods. For the purpose of this study

high school graduates are examined as members of subgroups according to their graduation program, post-high school activity, or the number of courses included in their program. This subgrouping has been included in an attempt to link specific cost relationships within each subgroup; relationships that would be averaged out and hidden within the sample as a whole. By adopting this product approach and using appropriate methodologies¹³ for identifying benefits and costs, this study is intended to test the relationships between program benefits and their production costs.

Hypotheses

The central hypothesis being tested in this study is that educational benefits are positively related to their production costs. The significance of the relationships will be tested within a range of $p < .05$ to $p < .001$ depending on the specific sub-hypothesis. Because Total Educational Benefits as a dependent measure is determined by summing benefits in the categories of Further Education, Job, and Personal Benefits, the central hypothesis stated above is broken into four research hypotheses:

¹³Greg Kearsley and Terry Compton, "Assessing Costs, Benefits, and Productivity in Training Systems," Training and Development Journal (January, 1981), p. 52.

1. Total Educational Benefits are positively related to senior high school program costs.
2. Total Further Education Benefits are positively related to senior high school program costs.
3. Total Job Benefits are positively related to senior high school program costs.
4. Total Personal Benefits are positively related to senior high school program costs.

These hypotheses are tested within the overall sample and three major sub-groupings. Each graduate is classified according to the specific graduation program chosen, post-high school activity, and the number of electives chosen for graduation. Through an analysis of overall and sub-group results, it is hoped that distinct product-related benefits can be linked to production costs.

Theory

The fundamental question of identifying critical relationships and links between educational products and their production costs will be researched using an input-process-output concept and model. This systems approach is advocated by Dyer,¹⁴ Banghart and Trull,¹⁵ and Johns

¹⁴Henry S. Dyer, "Toward Objective Criteria of Professional Accountability in the Schools of New York City" in G.D. Borich and K.S. Fenton, The Appraisal of Teaching: Concepts and Process (Reading: Addison-Wesley Publishing, 1977), p. 241.

and Morphet.¹⁶ As illustrated in Figure 1.1, it allows a clear distinction to be made between the more easily measurable input-output dimensions and the considerably more complex production processes.

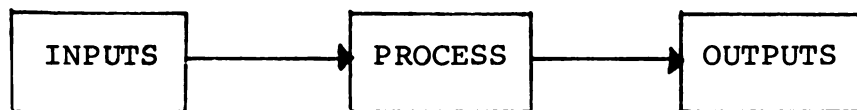


Figure 1.1
Input-Output Model

Tanner suggests that the systems approach particularly lends itself to analysis of complex systems. Even the most complicated school system can be viewed as consisting of a conversion process by which certain inputs are transposed or converted into outputs.¹⁷ As shown in Figure 1.2, this

¹⁵F.W. Banghart and A. Trull, Educational Planning (New York: Macmillan Company, 1973), pp. 112-3.

¹⁶Roe L. Johns and Edgar L. Morphet, The Economics and Financing of Education--Third Edition (Englewood Cliffs: Prentice-Hall, 1975), p. 41.

¹⁷C.K. Tanner, Designs for Educational Planning, (Lexington: Heath Lexington Books, 1971), p. 3.

study will test those relationships between educational costs as input and educational benefits as output. The processes whereby these inputs are transposed into outputs are totally disregarded for the purposes of this study.

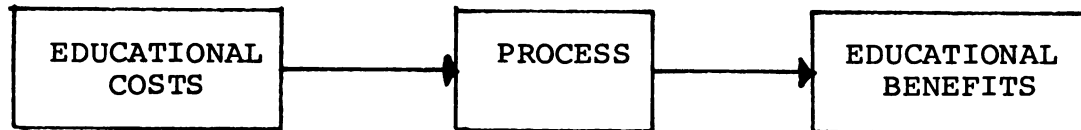


Figure 1.2

Educational Cost-Benefit Model

By only focusing on the input and output dimensions of this model, it is possible to test the theory that educational products are positively related to their production costs. As cost inputs for a Mercedes-Benz, a Metropolitan Opera production, or a gourmet meal for example would be reasonable predictors of the product, this study will search for similar cost predictors that bear on the educational product.

Historical Measures of Educational Output

The traditional measure of educational output has been achievement. According to Holtzman and Brown, it has been customarily defined operationally by citing a standardized test of achievement, by grade-point averages, or

by teacher judgement.¹⁸ As a measure of short-term progress for a particular course or as a cumulative grade-point score for an educational program, achievement is undergoing an increasing amount of scrutiny. This disenchantment is reflected in a paper by Guba where he put forward the case that traditional achievement scores have failed educators and these should be replaced by a new means of assessment.¹⁹

At the classroom level Tanner argues that there is a vast gap between what a student learns in a given course and what the instructor thought he learned as measured by an achievement test.²⁰ He views these commonly used achievement measures as having limited use for classroom teachers and guidance counsellors, but condemns their usage as long-range program effectiveness measures.²¹ In spite of the opposition lodged against the use of achievement grades or scores, they continue to be widely applied in situations ranging from the classroom to the international testing arena. Narrow and wide generalizations are made on these

¹⁸W. Holtzman and W. Brown, "Evaluating the Study Habits and Attitudes of High School Students," Journal of Educational Psychology, LIX (1968), pp. 404-409.

¹⁹Egon G. Guba, The Failure of Educational Evaluation," in The Educational Technology Review Series #11--Evaluation of Education (Englewood Cliffs: Educational Technology Publications, 1973), pp. 1-2.

²⁰Tanner, op. cit., pp. 68-69.

²¹Ibid., p. 64.

scores. Writers such as Cassidy continue to draw conclusions regarding the performance of American students relative to their counterparts from previous decades and in other countries based on achievement scores.²²

More recently, in response to growing concerns for "quality" and effectiveness, researchers are seeking to provide better ways of measuring educational outputs and outcomes. The first benefit analysis is traced back to an 1844 publication that dealt with the utility of public works.²³ Early education economists viewed benefits purely in monetary terms and their studies sought to link wage or salary income to the level of education attained. During the 1970's, educational benefits were increasingly considered in a broader context. Carpenter and Rapp argue that any assessment of benefit should consider all major benefits including those that are not grossly quantifiable, such as enjoyment and appreciation that an education can bring to everyday life.²⁴ This new dimension to educational benefits

²²Jack Cassidy, "Forum: Is Anyone Out There Learning? Some Positive Ammunition," Teacher (August, 1980), p. 23.

²³Scarvia B. Anderson and Samuel Bell, The Profession and Practice of Program Evaluation (San Francisco: Jossey-Bass Publishers, 1978), p. 25.

²⁴Margaret B. Carpenter and Marjorie L. Rapp, "The Analysis of Effectiveness" in Sue A. Haggart, Ed., Program Budgeting for School District Planning (Englewood Cliffs: Educational Technology Publications, 1972), p. 151.

paralleled a general recognition that schools were now serving a range of concerns beyond the narrow academic goals once attributed to the institution.²⁵ Curricula now reflect liberal education objectives focusing on the development of a whole person who understands and can function well in the world.²⁶ All initiatives at measuring the "hard-to-measure"²⁷ are drawn together in Ruth's proposed taxonomy of educational benefits.²⁸ He categorizes several kinds of beneficiaries, in addition to distinguishing between various types and forms of benefit. Ruth's work and taxonomy in particular cast an enlightening perspective on the concept of an educational product.

Benefits as a Measure of Educational Output

Educational benefits are defined as "anything that promotes or enhances well-being of a group or individual and that is produced by an educational delivery system."²⁹

²⁵Marten Shipman, In School Evaluation (London: Heinemann Educational Books, 1979), p. 101.

²⁶Iris Varner and Carson H. Varner, "Liberal Education and Marketability," Journal of Educational Thought (December, 1980), p. 220.

²⁷Edward H. Loveland, Ed., "The Student, Evaluative Data, and Secondary Analysis," New Directions for Program Evaluation, 1980, p. vii.

²⁸Lester R. Ruth, Jr., "A Proposed Taxonomy of Educational Benefits," A paper presented to the Ninth Annual Conference Southeastern Association of Community College Researchers, San Antonio, Texas, July 23, 1980, pp. 12-13.

²⁹Ibid., p. 12.

This study is concerned with only one of three recipient categories, namely, the private consumer or school graduate. The two that are not part of this study are the general public and the educational system itself.

Ruth's conceptual approach to educational benefits as multifaceted outcomes for the graduate recipient, with "products" identified in several categories, has the potential to resolve many of the present difficulties encountered in defining and measuring educational output. While the graduate can be considered as a unit of "human capital" by education economists, it may be shown to be more appropriate for them to consider the graduate as a composite of many quite different "products." One of the keys to enhancing the understanding of educational productivity may be found in what economists and logicians refer to as the Fallacy of Composition.³⁰ Parts of the overall educational product may simply not equal a total product.

Through a more disaggregated consideration of the educational product, with a specific focus on further education benefits, job benefits, and personal benefits, education can, according to Anderson and Bell, be promised something beyond the fairly simple economic functions and

³⁰Paul A. Samuelson and Anthony Scott, Economics--Fourth Canadian Edition (Toronto: McGraw-Hill Ryerson, 1975), p. 12.

relationships evaluators have tried to use in the past.³¹ Historically, education has been viewed as a single entity or product, when thought of as a product at all. Van Gigch and Hill recognize a more complex educational product; one that they believe would be difficult if not impossible to define.³² Alluding to the complexity of the educational product, Benson makes the further point that the complete nature may not be revealed for many years.³³ While still at a formative stage, the view of education as a complex, multi-dimensional product is becoming more prevalent and accepted than the traditionally narrow view of education as "human capital."

Perceived benefits from education programs, analyzed in different categories such as further education or job benefits, could help to resolve some of the difficulties associated with defining and measuring educational output. Traditionally, earnings have been used by economists and educators as one of the most common measures of educational

³¹Scarvia B. Anderson and Samuel Bell, The Profession and Practice of Program Evaluation (San Francisco: Jossey-Bass Publishers, 1978), p. 24.

³²J.P. Van Gigch and R.E. Hill, Using Systems Analysis to Implement Cost Effectiveness and Program Budgeting in Education (Englewood Cliffs: Educational Technology Publications, 1971), p. 41.

³³Benson, op. cit., p. 55.

benefit. An example of this is Paul Taubman's study of educational benefits in terms of higher earnings and greater longevity.³⁴ In a similar way, David Churchman addresses the difficulty of translating educational benefits into purely financial variables.³⁵ Some educational benefits may not easily lend themselves to conversion into monetary terms. Wick and Beggs see this stress on multiple output measures as being critical to an improved understanding of the product and better decision-making as it affects the production function.³⁶

Measuring the Educational Product

A basic problem in evaluating the educational product has been the inexactitude of educational measurement.³⁷ This has been further complicated when educators have tried to measure the product as a composite entity, rather than viewing the product in terms of several quite dissimilar components. Morris and Fitz-Gibbon argue that each program

³⁴Paul Taubman, "Measuring Educational Benefits," A Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco: April 8-12, 1979), p. 22.

³⁵Churchman, op. cit., p. 2.

³⁶John W. Wick and Donald L. Beggs, Evaluation For Decision-Making in the Schools (Boston: Houghton-Mifflin, 1971), p. 15.

³⁷Walter I. Garms et al., School Finance (Englewood Cliffs: Prentice-Hall, 1978), p. 255.

being evaluated should be supported by evidence that the measure used is sensitive to the program's objectives.³⁸

In a similar way, when considering several categories of educational benefit, the measures applied should be sensitive to the type of benefit. Carpenter and Rapp make the point that any assessment of program benefits should take into account all major benefits even if some are not grossly quantifiable.³⁹ When all benefits are to be examined, Sturges⁴⁰ concurs with a marketing approach and presents a case for having students, as "consumers," judge the quality of their education. He believes that they are the best source of information. Their perceptions of educational benefits and relative ratings of each could constitute according to Tanner both a measure of program effectiveness as well as a valid output measure.⁴¹ He further holds that student judgement, coupled with achieved behavioral objectives, is a progressive step toward future assessment, and

³⁸Lynn Lyons Morris and Carol Taylor Fitz-Gibbon, How to Measure Achievement (Beverly Hills: Sage Publications, 1978), p. 8.

³⁹B. Carpenter and Marjorie L. Rapp, "The Analysis of Effectiveness" in Sue A. Haggart, Ed., Program Budgeting For School District Planning (Englewood Cliffs: Educational Technology Publications, 1972), p. 151.

⁴⁰Jack Sturges, "How to Make the Most Out of Course Evaluation Forms," Paper presented at the Educational Innovations Exchange, Council on Social Work Education Annual Program Meeting (New Orleans, 1978), p. 3.

⁴¹Tanner, op. cit., pp. 68-69.

is more valuable than traditional measures of student achievement.⁴² His position is supported by Wick and Beggs who believe that the approach of surveying attitudes toward programs and converting this into hard output data offers a means of identifying strong or weak programs.⁴³ If the local decision-makers wish to develop an accountability management system,⁴⁴ feedback from graduates can be obtained using the follow-up study. Herman points out that this opinion can prove to be both useful and easy to obtain. There is evidence of continued growing interest in the use of follow-up studies for testing the adequacy of institutional programs and practices.⁴⁵ This study will make use of graduate opinion obtained through a follow-up instrument to measure the degree of benefits obtained from high school courses.

⁴²Tanner, op. cit., p. 64.

⁴³Wick and Beggs, op. cit., p. 15.

⁴⁴Jerry J. Herman, School Administrator's Accountability Handbook (West Nyack, New York: Parker Publishing, 1979), p. 43.

⁴⁵Using Student Follow-Up Surveys to Improve College Programs--A Staff Report (Atlanta: Southern Regional Education Board, 1980), p. iii.

Educational Cost

Having laid the theoretical framework for determining educational benefits through the use of follow-up studies, there remains the area of educational costing that must be addressed. Costing in education is viewed as an extremely difficult business requiring technical skills that have not been a part of the traditional training of educational evaluators.⁴⁶ This point is emphasized by Borich who claims there are plenty of CPA's who are quite incompetent at estimation of costs of educational products of a rather non-standard kind.⁴⁷ Most of the difficulty arises from the aggregation of cost data, which according to several writers on this subject, render the cost information all but useless for program analysis.^{48,49} Some new formats have been suggested that would display functional detail by individual schools⁵⁰ and facilitate accounting by areas

⁴⁶W.I. Garms, et al., op. cit., p. 248.

⁴⁷G.D. Borich, Ed., Evaluating Educational Programs and Products (Englewood Cliffs: Educational Technology Publications, 1974), p. 13.

⁴⁸R.A. Rossmiller and T.G. Geske, "Toward More Effective Use of School Resources," Journal of Education Finance (Spring, 1976), pp. 494-495.

⁴⁹Stephen J. Knezevich, Program Budgeting (Berkeley: McCutchan Publishing, 1973), p. 167.

⁵⁰James W. Guthrie, School Site Budgeting Report to Oakland Public Schools (Oakland: Master Plan Citizen's Committee, 1973).

and activities.⁵¹ Simply stated, what education costing needs is more of a cost accounting approach.

Cost accounting is the process of determining, reporting, and interpreting the cost of manufactured products, or of rendering services, or of performing any function or operation in an enterprise.⁵² Costing within this framework is extended to a point where the cost of labour, materials, and other expenses is determined for each unit and each type of product manufactured and for each type of service rendered. Education has almost universally used a general or financial accounting approach to summarize those operations and transactions involving public school funds.

General accounting tends to emphasize over-all or aggregate figures; its limitation is that the financial and operating statements presented to school boards and senior district administrators tend to be highly summarized and condensed. These statements are periodic and therefore relatively infrequent. They are statements rendered at regular intervals, but nevertheless they present data "after the fact."

On the other hand, cost accounting can provide detailed and specific information to aid education decision-makers

⁵¹J.E. Mitchell et al., MSEIP Documentation of Project Development and General Systems Design, Midwestern States Educational Information Project, (Des Moines: State of Iowa Department of Public Instruction, 1969).

⁵²Robert H. Van Voorhis et al., Using Accounting in Business (Belmont, CA: Wadsworth Publishing, 1962), p. 160.

in determining whether certain curricula or programs are too costly or less efficient than they should be. The goal of cost accounting is to help management to operate its enterprise as efficiently as possible.⁵³

In this study, cost is considered from a cost accounting perspective. Where most manufacturing companies convert certain basic materials through the use of labour and the utilization of overhead costs into finished products, education is to a large extent more labour intensive. As such, the typical "cost elements" of materials, labour, and overhead can be appropriately designated as instructional materials, personnel, and overhead. No one cost system can be used without variation by all types and sizes of enterprises, and there is likewise no universal method of classifying costs for all purposes.⁵⁴ The cost information required by managers of an airline company, a golf and country club, a car assembly plant, and a school district could be well-accommodated by a cost accounting format.

This chapter section began with a generic model depicting educational inputs, processes, and outputs. Through adopting cost accounting methods, it is possible to classify educational costs as those that relate to

⁵³Robert H. Van Voorhis et al. Using Accounting in Business (Belmont, CA: Wadsworth Publishing, 1962), p. 162.

⁵⁴Ibid., p. 166.

instructional personnel, instructional materials, or instructional overhead. These costs can then be studied to determine relationships with specific educational outputs defined for purposes of this study as further education benefits, job benefits, and personal benefits. The underlying theory being tested in this study is that for certain educational products such as academic or vocational graduation from high school, different output benefits will be positively related to and effected by expenditures in specific cost categories. This can be illustrated by expanding the Educational Cost-Benefit Model to include the specific variables that are central to this study. This more detailed model is shown in Figure 1.3

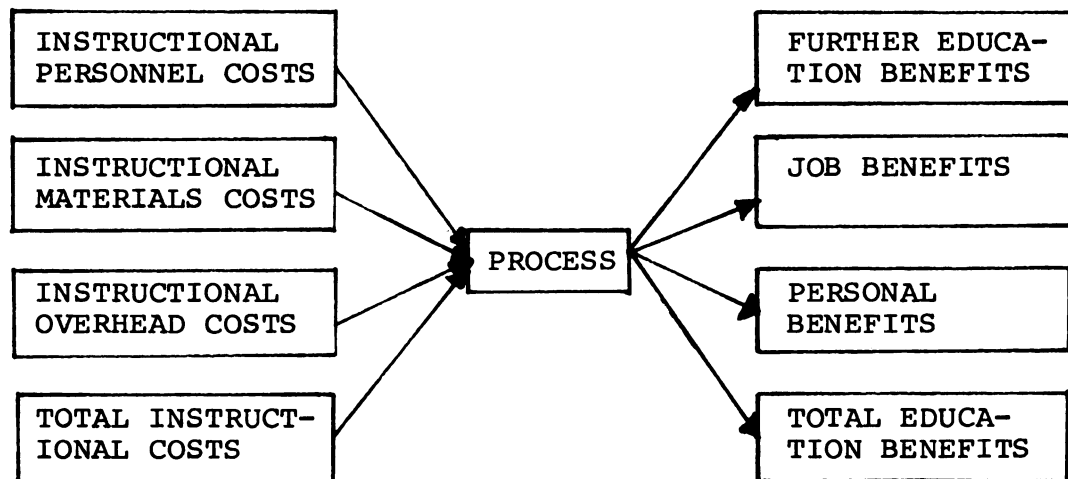


Figure 1.3
Educational Cost-Benefit Components Model

Overview

This study recognizes a real and growing need to view education from a "product" perspective. In industry, the product has traditionally dictated the process; in American education, process has more commonly dictated the product. Schools and school systems with all their complexities as socio-technical systems are similar in many respects to factories. Even the most complicated school system can be thought of as consisting of a conversion process by which certain inputs are transposed or converted into outputs. Like other goods and services industries, schools are comprised of workers, buildings, equipment and materials with inputs of resources and outputs of products. This study centers on the product dimension of high school education.

The main purpose of the study is to test the relationships between high school graduation program benefits constituting an important, measurable component of the high school "product" and their production costs. Developments during the past twenty years in several disciplines including Systems Analysis, Marketing Research, Economics, and Finance now contribute to a better understanding of the educational product. While the high school graduate has been considered as a unit of "human capital" by education economists, this study employs some other business techniques in considering the graduate as a composite of many

quite different "products."

Chapter II is organized in four sections; each reviewing literature pertinent to product identification, product measurement, product costing, and cost-benefit analysis, respectively. These areas provide the conceptual framework and techniques that are essential to understanding and developing this study.

Chapter III contains the specific design for testing the relationships between educational benefits and their associated production costs. The sample is comprised of three hundred and thirty-one graduates chosen randomly from the 1979 graduating classes in seven Okanagan schools. Each of the graduates responding will have their unique course program costed using cost accounting methods. In addition, their course benefits and actual grades will be obtained and aggregated for analysis. The design has been set up to facilitate testing various benefits for their individual or overall relationships with component costs of production. The central hypothesis is further elaborated into four general hypotheses and sub-hypotheses in this Chapter that is concluded with a section on Analysis.

Chapter IV is concerned with the analysis of cost and benefit data obtained for each graduate and aggregated into overall and sub-group totals. The final chapter includes a collation of all previous chapters, conclusions arising out of the study, discussion, and implications for future research.

CHAPTER II

RELATED LITERATURE

The literature related to this study is drawn from four areas that contribute to a better understanding of the relationship between high school course or program benefits and their associated course or program costs. The four contributing areas pertinent to this study are product identification, product measurement, product costing, and cost-benefit analysis. The latter area to a large extent involves interaction between the first three.

Product Identification

Garms has stated that objectives held for schools are nowhere clear and simple, and that educators cannot agree on desirable educational outcomes.¹ However, within the overall school curriculum, individual courses do have quite specific objectives delineated. Consequently, the school product is not surprisingly more ambiguous than the course product. According to Rodriguez and Davis, schools have assumed increasing responsibility for functions

¹Garms et al., op. cit., p. 255.

formerly the domain of other social institutions.² Concurrently, as the schools broadened their scope beyond the basic, traditional, course-centered curricula, the product took on an almost undefinable character. And as if aggregation of all the myriad outputs into one perceived product was not misleading enough, the whole matter is further complicated when the uniqueness of each student's program and experiences are taken into account. To speak of school products, or worse still system products, would be an even greater exaggeration or misrepresentation of the product concept. What the literature increasingly points toward is the importance of directing any product analysis as close as possible to the individual student level.

The well-known work of Coleman et al.,³ Jensen,⁴ and Jencks et al.⁵ suggested that schools were relatively ineffective and had little influence on educational production.

²L.J. Rodriguez and D.D. Davis, The Economics of Education (Lincoln: Professional Educators Publications, 1974), p. 84.

³J.S. Coleman et al., Equality of Educational Opportunity (Washington: Government Printing Office, 1966).

⁴A.R. Jensen, "How Much Can We Boost I.Q. and Scholastic Achievement?" Harvard Educational Review, Winter, 1969.

⁵C. Jencks et al., Inequality: A Reassessment of the Effects of Family and Schooling in America (New York: Basic Books, 1972).

Averch et al.⁶ concludes that "the best information we have . . . is that schools do not now have a tremendous impact on the achievement that does occur." With some cumulative force, these studies repeatedly indicate that schools totally or in part have no significant effect on the product. Consistently, the important factors that influence the educational outcomes are related to the student's background, such as family income and race.

In addition to the previous studies which attempted to link output to aggregate inputs or school attributes measured as central tendencies of schools, a fairly small set of studies shows positive effects on the school product when the level of aggregation is closer to the student. Alexander and McDill⁷ and Alexander et al.⁸ found moderate to strong additive effects on the educational product as the result of track or stream factors, while Summers and Wolfe^{9,10} found similar results from classroom resources.

⁶H.A. Averch et al., How Effective is Schooling: A Critical Review and Synthesis of Research Findings (Santa Monica, CA: Rand, 1972), p. x.

⁷Karl L. Alexander and Edward L. McDill, "Selection and Allocation Within Schools: Some Causes and Consequences of Curriculum Placement," American Sociological Review (1976), pp. 963-980.

⁸Karl L. Alexander et al., "Curriculum Tracking and Educational Stratification: Some Further Evidence," American Sociological Review, (1978), pp. 47-66.

⁹A.A. Summers and B.L. Wolfe, "Which School Resources Help Learning? Efficiency and Equity in Philadelphia Public

The earlier studies had used aggregated data and this was obscuring student specific growth. In discussing the Summers and Wolfe studies, Rossmiller and Geske attribute their success and important findings to the fact that Summers and Wolfe painstakingly tied data to specific students.¹¹

Further support for the concept of identifying educational products at a level near to or equivalent to that of the individual student is given by Barr and Dreeben.¹²

Also, Burnstein concludes that those school effects studies using the student gains or specific educational outputs as the unit of analysis are more likely to yield accurate estimates of the factors influencing individual student achievement.¹³ What is clearly emerging from the more recent school effects studies is the importance of directing the level of analysis at the consumer of the product, who

Schools," Federal Reserve Bank of Philadelphia Business Review, February, 1975.

¹⁰A.A. Summers and B.L. Wolfe, "Do Schools Make a Difference?" American Economic Review, September, 1977.

¹¹R.A. Rossmiller and T.G. Geske, "Toward More Effective Use of School Resources," Journal of Education Finance, (Spring, 1976), pp. 494-495.

¹²R. Barr and R. Dreeben, "Instruction in Classrooms" in Lee S. Shulman, (Ed.), Review in Research in Education--5 (Itasca, Ill.: Peacock, 1977).

¹³L. Burnstein, "The Role and Levels of Analysis in the Specification of Educational Effects," (Chicago: University of Chicago, 1978).

for the most part is the individual student. Aggregation in the earlier school effects studies has, as Bidwell and Kasarda¹⁴ argue, probably contaminated most of the findings. These studies purported to identify variables that affected individual student output as measured by achievement. However, these variables were not specifically attributed to each student, rather they were apportioned on the basis of overall school or school district data.

The school effects literature has a fundamental implication for this and future studies of educational outputs or products. Disaggregation of data is essential to identify and understand educational outputs as well as inputs. The initial and well-recognized studies on school effects indicated, using aggregated data, that schools had little or no influence on student attainment. More recent school effects studies, where input variables have been disaggregated and targeted to classrooms or curricular streams, are showing increasingly that schools have moderate to strong influences on achievement. This study has gone one step further by first of all disaggregating the product into three categories of benefit; second, further disaggregating curricular tracks or streams into their component subject areas and courses; and third, through a cost accounting approach, overall course-related costs

¹⁴Charles E. Bidwell and John D. Kasarda, "Conceptualizing and Measuring the Effects of School and Schooling," American Journal of Education (August, 1980), p. 425.

will also be disaggregated.

Educational product identification is dependent on the concept and techniques of disaggregation. When education as an industry is better able to identify its products and their components, and then relate these to specific inputs, it will as Levin points out be better able to draw valid conclusions about the business of education.¹⁵ A very critical step has been taken toward identifying the product of education by Lester Ruth.¹⁶

Ruth, by defining the term "educational benefits" and the categories of benefits in his taxonomy, hopes to assist in better evaluation of education programs and to stimulate research projects. He believes that emphasis in the Eighties will be on concerns for "quality" and effectiveness, and research must seek to provide better ways of measuring outputs and outcomes.¹⁷ Implied in his work is the essential premise that something must be defined or identified before it can be measured.

His major categories are based on kinds of beneficiaries, since what may benefit one individual or group may not

¹⁵H.M. Levin, "Cost-Effectiveness Evaluation of Instructional Technology: The Problems" in S.G. Tickton (Ed.), To Improve Learning: An Evaluation of Instructional Technology Vol. II (New York: Bowker, 1971), p. 20.

¹⁶Lester R. Ruth, op. cit.

¹⁷Ibid., p. 15.

benefit, and could actually cost, another. The major divisions he proposes are: consumers, private; consumers, public; and producers, educational delivery system. By differentiating the beneficiaries, Ruth seems to articulate a solution to the concerns of Psacharopoulos,¹⁸ Carpenter and Rapp,¹⁹ and Johns and Morphet²⁰ who all state a need to view a wider range of benefits than just those accruing to the graduate. The product of education is in reality a composite of many outputs, most of which benefit the student, but some benefits or parts of the overall product are directed to others.

Under Ruth's Private Beneficiaries Category he lists Students/Graduates as the prime recipients, followed by Employees, Families of Students and Employees, and finally other organizations such as clubs and associations. He identifies the educational product from the high school graduate's perspective as being further divided into six major benefits including personal benefits, academic benefits, career benefits, cultural benefits, social benefits, and community-related benefits. These are broken down

¹⁸George Psacharopoulos, "Spending on Education in an Era of Economic Stress: An Optimists View," Journal of Education Finance (Fall, 1980), p. 163.

¹⁹Carpenter and Rapp, op. cit., p. 151.

²⁰Johns and Morphet, op. cit., p. 104.

into long- and short-range as well as direct and indirect benefits.

School effects studies that are increasingly pointing toward the value of disaggregating data, and the work of Ruth in clarifying the many different possible segments to the educational product, represent current and practical approaches to identifying the product of education.

Product Measurement

Chambers is one of many contemporary writers who underscore the difficulties associated with assessing and measuring the outputs of education.²¹ Traditionally, educational achievement has been measured by standardized test scores and letter grades. When the output is aligned to a fairly clear-cut, well-defined objective within quite narrow curricular parameters, a single measure such as the letter grade may be appropriate. However, as one moves from a precise objective to a broader, more encompassing one, there is a corresponding increase in the difficulty of assigning a single symbol to represent accomplishment of the objective. Where, as previously shown, the educational product is viewed as a multifaceted composite of many educational benefits, the use of letter grades and achieve-

²¹Jay G. Chambers, "The Development of a Cost of Education Index: Some Empirical Estimates and Policy Issues," Journal of Educational Finance (Winter, 1980), p. 263.

ment scores is not only an oversimplified approach, but also misleading to interpretation. When viewing a composite symbol, there is an inclination to assume the measure accurately describes some single characteristic in an overall sense, where in fact the grade or score may not accurately portray any part of some characteristic. The difficulty reflected by Anderson and Bell²² in the assignment of values to educational output, could be attributed to trying to cover several quite different educational outcomes with a single symbol.

According to Tanner, the opinion of students is a valuable measure of program effectiveness, and a representative sample of student opinion is considered a valid source of output measure.²³ Furthermore, he adds that this judgement would be a progressive step toward future assessment, potentially more valuable than the traditional measures of student achievement. Most of the research done on student opinion as it pertains to specific courses, has been conducted at the college or university level. And while the findings cannot be unreservedly applied to the high school situation, it does give some credibility to the potential value of the student perceptions. Student opinion as a measure of course effectiveness is most commonly

²²Anderson and Bell, op. cit., p. 24.

²³Tanner, op. cit., pp. 64-69.

solicited through the "course evaluation form" or CEF.

Sturges²⁴ points out that the literature concerning course evaluation provides some information suggesting that data obtained from students about the quality of courses are as accurate and dependable as data obtained from other sources. Costin et al.²⁵ report that if course evaluation forms are well-constructed, there is increasing evidence that students are capable of making fair and informed judgements. Additional evidence concerning the validity of student responses to CEF's is provided by Aleamoni and Yimer²⁶ and Faia.²⁷ McKee²⁸ recognizes a paucity of studies that attempt to differentiate between the attitude a student holds toward a course and the student ratings of the course.

²⁴Sturges, op. cit., p. 3.

²⁵R. Costin et al., "Student Ratings of College Teaching: Reliability, Validity, and Usefulness," Review of Educational Research (1971), pp. 511-533.

²⁶L.M. Aleomoni and M. Yimer, "An Investigation of the Relationship Between Colleague Rating, Student Rating, Research Productivity, and Academic Rank in Rating Instructional Effectiveness," Journal of Educational Psychology (1973), pp. 272-277.

²⁷M.A. Faia, "How-And Why-To Cheat on Student Course Evaluations," Liberal Education (1976), pp. 133-119.

²⁸Barbara C. McKee, "Student's Course-Oriented Attitude Change and Student Ratings of Instruction: A Canonical Variate Analysis," Presented at the Annual Meeting of the American Educational Research Association (Boston: April 1980), p. 4.

McKee's own research indicates that students can and do make a distinction between a course and the instructor of a course.²⁹ It is probably too early to make a definitive comment on the ultimate usefulness of student opinion. Kulik and Kulik believe that "student ratings may be irrelevant and misleading, or they may be useful, convenient, reliable, and valid."³⁰ Whatever else, the evidence seems to be growing in support of student opinion as a measure of the educational product.

One area where high school graduate opinion has been widely sought, is in follow-up studies of vocation program graduates. In the United States, for school districts to continue receiving state and federal vocational education funds, they are required to conduct specific follow-up studies. Guidelines for these projects are delineated by the United States Office of Education, and those districts offering and funded for career education programs must comply to the follow-up requirements. This initiative has resulted in numerous studies being undertaken involving students who have graduated from vocational and technical schools. In a

²⁹Barbara G. McKee, "The Influence of the Course Vs. the Instructor in Student Rating of Instruction: A Multiple Group Discriminant Analysis," Paper presented at the Annual Meeting of the American Educational Research Association (63rd, San Francisco, April 8-12, 1979), p. 50.

³⁰I.A. Kulik and C.C. Kulik, "Student Ratings of Instruction," Teaching of Psychology (December, 1974), p. 51.

few instances some studies were expanded to include graduates from other than vocational programs.

Wasil³¹ has made extensive use of the follow-up model in education and is of the opinion that this vehicle is particularly valuable in providing course or program feedback. Follow-up information or indicators can serve as gauges or trouble signals to flag those courses or programs that are in need of review.³² They can show where and when to pursue in-depth analysis aimed at program improvement.

The literature revealed three studies that solicited student opinion using a follow-up survey to understand their recent high school experience.^{33,34,35} The more

³¹Raymond A. Wasil, "Model for Implementation of School Follow-up System" in Follow-up Survey 1975 Graduates (Sedalia: State Fair Community College, 1974), p. 12.

³²Using Student Follow-Up Surveys to Improve College Programs--A Staff Report (Atlanta: Southern Regional Education Board, 1980), p. iii.

³³An Analysis of the Evaluation of High School Experiences in Reference to the Personal and Educational Characteristics of the Graduating Classes of 1973 and 1969 (Salinas: Salinas Union High School District, 1974).

³⁴Phoenix Union High School System Follow-Up Study of 1972 Graduates (Phoenix: Phoenix Union High School District, 1974).

³⁵Marie J. Abram, The Perceptions of 1978 and 1979 Graduates (Bowling Green: Professional Development Center Network, West Kentucky University, Spring/Summer, 1980).

recent Abram study was designed specifically to find indicators of how well the high schools were serving their clientele, the students. Student judgements were used to identify the areas of the course curriculum that were in greatest need according to the perceptions of the respondents.

The educational product, traditionally measured by grades and standardized scores, is increasingly being subject to measurement by student opinion. Follow-up studies offer a practical and useful way to obtain ratings based on the perceptions of education's "consumers."

Product Costing

Early 20th Century efforts by some educators to apply an industrial approach and techniques to schools to make them more efficient, did recognize the cost factor as an essential element. From the beginning, education has adopted a general or financial accounting philosophy and format, with only a rather recent focus on the possibilities implicit in a cost accounting framework.

In 1948, the generally recommended main headings for K to 12 expenditure accounts were:³⁶

Administration (formerly "general control")

Instruction

Auxiliary Services

³⁶Knezevich, op. cit., p. 149.

Operation of Plant

Maintenance of Plant

Fixed Charges

Capital Outlay

Debt Servicing

By 1957, the Office of Education had revised these major expenditure account classifications to:^{37,38}

Administration

Instructional Salaries

Other Instructional Expenditures

Plant Operation

Plant Maintenance

Attendance Services

Health Services

Transportation Services

Food Services

Miscellaneous Services

Community Services

Summer Schools

Adult Education

³⁷ P.L. Reason and A.L. White, Financial Accounting for Local and State School Systems, Standard Receipt and Expenditure Accounts Bulletin 1957, United States Office of Education Handbook II (Washington: Government Printing Office, 1957).

³⁸ United States Department of Health, Education and Welfare, Office of Education, Statistics of State School Systems 1959-60 (Washington: Government Printing Office, 1963), pp. 57-73.

Community Colleges

Fixed Charges

Capital Outlay

Interest

TOTAL

Benson lists these headings in the somewhat consolidated form that he was using in the early Sixties.³⁹

Instructional Salaries

Capital Outlay

Operation of Plant

School Services (cafeteria, health, attendance, etc.)

Fixed Charges (teacher retirement, social security,
etc.)

Instructional Supplies and Services

Administration

Interest

Maintenance of Plant

Community Services (extension, summer school, etc.)

TOTAL

By the mid 1960's, interest in applying PPBS to education had started and it grew substantially in the late 1960's. With its stress on objectives or purposes to be fulfilled by the investment of public funds,⁴⁰ there was an

³⁹ Charles S. Benson, The Economics of Public Education (New York: Houghton Mifflin Company, 1968), p. 14.

⁴⁰ Knezevich, op. cit., p. 156.

increased need for accounting information that could show expenditures aggregated around program elements and categories. This need was reflected by Mitchel et al. in 1969 when they recommended accounting by area of responsibilities, subject area, activities, and object expenditures.⁴¹ The previous year, Lindeman had proposed a "three-dimensional accounting classification system" for public schools.⁴² According to Knezevich, the 1972 Office of Education's Revised Handbook also encouraged reporting by major functions, grade levels, organizations, and objects.⁴³ He goes further in suggesting that while accounting by purpose demands designation by programs and expenditures clustered around functions, most current program accounting efforts in education fail to meet these tests.⁴⁴

The literature on education accounting shows evidence of a trend toward the increased implementation of a cost accounting approach to supplement the traditional methods of financial or general accounting. The more systematic analy-

⁴¹J.E. Mitchell, et al., MSEIP Documentation of Project Development and General Systems Design, Midwestern States Educational Information Project (Des Moines: State of Iowa Department of Public Instruction, 1969).

⁴²E.L. Lindemann, A Three-Dimensional Program Account Classification System for Public Schools, Working Paper No. 6, (Los Angeles: UCLA Center for the Study of Evaluation and Instructional Programs, 1968).

⁴³Knezevich, op. cit., p. 156.

⁴⁴Charles S. Benson, Education Finance in the Coming Decade (Bloomington: Phi Delta Kappa, 1975), p. 59.

sis of resource allocations that PPBS in principle implies, has been associated with general improvement in budget documents. Presently, one is increasingly likely to find instructional budgets broken down to reveal expenditure by level of school program and by type of instruction offered. These expenditures are in greater detail and are directly associated with the distribution of resources to specific school functions.⁴⁵ Tanner suggests that direct and indirect costs be apportioned to subject areas such as Language Arts, Science, Mathematics, Social Studies, and so on.⁴⁶ He also elaborates additional cost categories such as administration, instruction, materials, maintenance, and others common to all educational institutions.

Rossmiller and Geske show that disaggregated data concerning the various school inputs is virtually nonexistent and state that "very few school systems are able to provide data on the cost of operation of individual schools, much less the fiscal inputs to various curricular programs within schools."⁴⁷ Other writers concerned with the practical aspects of implementing PPBS recognize the paramount importance of a better financial accounting classification

⁴⁵Tanner, op. cit.

⁴⁶Ibid., p. 167.

⁴⁷Rossmiller and Geske, op. cit., pp. 494-495.

system.⁴⁸ The decision-maker needs information, and demands that it be organized in a particular way to facilitate selection of the most prudent course of action. This emphasis, incorporating the concept and techniques of cost accounting, is essential to a full understanding of the educational product.

Cost-Benefit Analysis

The final area examined in the literature is that which attempts to link the product of education to its production costs. Cost-benefit analysis and its modern off-shoots endeavours to identify and to measure the benefits and costs that would result from alternative courses of action.⁴⁹ Man has always weighed the pros and cons, the advantages and disadvantages, of alternative actions. As indicated previously, cost-benefit analysis can be traced back to an article written in the middle 19th Century. However, with relatively recent improvements and refinements to techniques, it has only really come into its own in the past twenty years.

Originally, the term and concept "benefit-cost analysis" was associated with and applied to natural resource projects, but its most popular use probably has been in

⁴⁸Knezevich, op. cit., p. 148.

⁴⁹Davis and Morrall, op. cit., p. 37.

national defense planning. In the late 1940's, the Rand Corporation used "costing" methods in determining for the United States Air Force, the best strategic bomber for development. During the 1950's, full-fledged cost-benefit analysis was used widely for the first time in water resource studies.

In a 1959 report done by Kershaw and McKeon for the Rand Corporation, they suggest that it is not only desirable but also possible for school districts to compare the marginal benefits of one type of expenditure over another and to merge the benefit comparison with cost estimates to choose the budgetary option that gives the most return for the dollar spent.⁵⁰ As a technique and methodology of evaluation, cost-benefit analysis has been used increasingly in the 1960's and 1970's to judge the effectiveness of educational programs.⁵¹

Anderson and Bell provide an overview of some contemporary thinking on cost-benefit analysis and two of its off-shoots, namely cost-effectiveness and cost utility.⁵² According to them, the term cost-effectiveness is often not distinguished in the literature from cost-benefit, and

⁵⁰ Joseph A. Kershaw and Roland N. McKeon, Systems Analysis and Education (Santa Monica: The Rand Corporation, 1959), Ch. V.

⁵¹ Davis and Morrall, op. cit., pp. 38-39.

⁵² Anderson and Bell, op. cit., pp. 24-25.

usually is simply subsumed under the umbrella of the latter. Cost-effectiveness allows the "benefit" to be expressed in terms of its actual physical or psychological outcome rather than its monetary value; on the other hand, cost-benefit analysis usually assigns monetary values to both the benefits and costs.

Quade defines cost-effectiveness as a "comparison of alternate courses of action in terms of their costs and their effectiveness in attaining some specific objective."⁵³ Goldstein states that two of the major distinguishing points of cost-effectiveness analysis over cost-benefit analysis are: first, the goals and objectives must be explicitly articulated; and second, all degrees of quality of information on "benefits" are allowed in the analysis.⁵⁴ Thus the analyst does not have to compress all the "benefits" into a single number expressed in dollars, but effectiveness is considered in terms of possibly several dimensions and non-ordinal measures can be used in these dimensions.

Conceptually, cost-benefit analysis employing a systems approach to education offers a practical means of evaluating the educational product. Defined objectives can be evaluated using cost-benefit analysis to determine if

⁵³Edward S. Quade, Cost Effectiveness Analysis (Washington: Praeger, 1967), pp. 1-2.

⁵⁴Harvey Goldstein, Cost-Benefit and Cost-Effectiveness Analysis (Washington: The National Training and Development Service, February 1981), p. 4.

they are efficiently or effectively met. This product information can then be fed back and the original objectives or program reviewed, in turn perhaps initiating appropriate modifications to either the objectives or the educational delivery system. While cost-benefit analysis has been fairly widely used in the former sense relating to objectives, Cafferella points out a specific need to expand research on the impact of this analysis on instructional technology.⁵⁵

Summary

To test the relationships between educational benefits and their production costs requires the clearest possible understanding of what the product or benefit is, how it can be measured, how it can be costed, and how these three considerations are drawn together traditionally through cost-benefit analysis. Consequently, Chapter II focuses on these four areas and includes a review of recent trends documented in the literature.

First of all, what is the educational product? The literature shows that objectives held for schools are nowhere clear and simple, and that educators cannot agree on desirable educational outcomes. Further, as schools have broadened their scope beyond the basic, traditional,

⁵⁵E.P. Cafferella, "How Little Do We Know About the Cost-Effectiveness of Instructional Technology?" Educational Technology (January, 1975), pp. 57-58.

course-centered curricula, the product has taken on an almost undefinable character. Given the complexity and vagueness of the product, and the fact that most of the well-recognized school effects studies of the Sixties and early Seventies were contaminated by using aggregated data, the literature increasingly points toward the importance of directing any product analysis as close as possible to the individual student level. A small but important set of studies clarify the school product when the level of aggregation is closer to the student or consumer. What is clearly emerging from the more recent school effects studies is the importance of directing the level of analysis at the consumer of the product, who for the most part is the individual student. With analysis of the educational product placed at this level, Lester Ruth's seminal work on defining a taxonomy of educational benefits affords a legitimate base for defining the educational product at a consumer level. He identifies the educational product from the high school graduate's perspective as being divided into categories of direct and indirect benefits.

Once identified, how can the product be measured? The literature underscores difficulties associated with assessing and measuring the outputs of education. When output is aligned to a fairly clear-cut, well-defined objective within quite narrow curricular parameters, a single measure such as a letter grade may be appropriate. However, the literature

cautions against the use of letter grades and achievement scores as an oversimplified approach to a multi-faceted educational product. Examining this more complex product at the student or school graduate level is being accomplished more and more through the use of follow-up studies and student opinion. The literature shows that these methods offer a practical and useful way to obtain ratings based on the perceptions of education's "consumers."

For costing the educational product, the literature on education accounting shows evidence of a trend toward the increased implementation of a cost accounting approach to supplement the traditional methods of financial or general accounting. From the early 20th Century efforts by some educators to apply an industrial approach and techniques to schools, education adopted a general or non-specific accounting philosophy and format. The current literature reveals that one is increasingly likely to find instructional budgets broken down to reveal expenditures in greater detail and directly associated with the distribution of resources to specific school functions. This new emphasis incorporating the concept and techniques of cost accounting is essential to a full understanding of the educational product.

The final area examined in the literature is that which attempts to link the product of education with its production costs. Cost-benefit or cost-effectiveness

analysis requires that goals and objectives are explicitly articulated, that outcomes be measured, and that production costs assessed. Conceptually, a cost-benefit analysis employing a systems approach to education offers a practical means of evaluating high school education and understanding its various products.

CHAPTER III

DESIGN OF THE STUDY

Sample

The sample for this study consisted of three hundred and thirty-one graduates from the 1979 graduation class in School District #23 (Central Okanagan), British Columbia. These graduates were selected randomly from each of the seven high schools that enrolled graduating students in 1979. The district, located in the interior of B.C. and shown in Figure 3.1, contains urban and rural schools.



Figure 3.1
Location of School District #23

Serving a population of approximately sixty thousand, Central Okanagan School District's schools are representative of those found throughout the province. Table 3.1 provides school data on enrolments and timetable organization, illustrating the diversity of size and structure in the schools from which the sample was drawn.

Table 3.1: Summary of 1979 Senior Grade Enrolments and Timetable Organization in School District #23

Secondary School	Senior Enrolment Gr 11	Gr 12	Periods Per Day	Timetable
George Elliot	119	110	6	Quarter
George Pringle	118	99	5	Yearly
KLO	140	136	6	Semester
Kelowna	482	506	6	Semester
Mount Boucherie	138	158	5	Yearly
Okanagan Mission	117	94	6	Semester
Rutland Senior	177	252	5	Trimester

Originally, sixty graduates' names were selected randomly from each of the seven high school's graduating class of 1979. Mail surveys were sent to these individuals, soliciting their perceived benefits from specified graduation courses and asking them to rate these benefits, using a six-point Likert scale, in three distinct categories. Graduates were also asked to indicate their present activity as work, school, and/or other. The initial mail survey was in all cases followed-up by two additional letters if a

response was not forthcoming. Table 3.2 summarizes the response from each school's graduates.

Table 3.2. Summary of School Response Rate to the Graduate Benefit Survey

Secondary School	Responses	Percent
George Elliot	49	82
George Pringle	49	82
KLO	51	85
Kelowna	51	85
Mount Boucherie	43	72
Okanagan Mission	38	63
Rutland Senior	50	83
TOTAL	331	79

School profiles of the 331 graduate respondents indicate that in terms of ability characteristics, average achievement, and choice of graduation program, differences are minimal. The average number of courses completed for graduation is somewhat more variable between schools, reflecting differences between school's timetable organization. Sex was almost balanced in the sample with 166 males graduates and 165 female graduates responding to the benefit survey.

In summary, the graduates whose perceptions on educational benefits form the basis for "product" evaluation in this study, appear to be representative of the population of high school graduates in British Columbia.

Measures

Educational benefits are defined according to Ruth as "those things that promote or enhance well-being of a group or individual and that are produced by an educational delivery system."¹ This study is limited to those benefits derived specifically from courses taken in Grade 11 or Grade 12 and counted for graduation from high school. Using Ruth's Taxonomy as a basis, three categories of benefits were identified for the purposes of this study,² namely, Further Education Benefits, Job Benefits, and Personal Benefits. Graduates were instructed to indicate by checking the degree of benefit obtained from each course completed in Grade 11 and 12. The survey form listed each graduate's specific course program to facilitate their response and help remind them of all graduation courses.

The three categories of benefit employed a six point Likert Scale³ allowing responses from "No" to "Great." Graduate benefits were then aggregated for both the Core as well as the Flexible components of each student's program. In British Columbia, students must graduate on either an

¹Ruth, op. cit., p. 12.

²Ibid., p. 17.

³J.W. Wick, Educational Measurement (Columbus: Charles E. Merrill, 1973), p. 267.

Academic, Combined, or Vocational program. By aggregating course benefits for the flexible or elective portion of each program, it was possible to obtain a product measure in terms of benefits. For each graduate it was a relatively straightforward process to determine benefit scores for their unique elective program.

Course costs are determined using a cost accounting approach to categorize and allocate course-specific expenditures. The traditional education finance or general accounting format used by the British Columbia Ministry of Education and School Boards in the Province, does not lend itself to specific course or program costing. However, many of the costs subsumed under old headings can be reassigned under Course Account Headings. The course headings adopted for this study are:

Instructional PERSONNEL

Instructional MATERIALS

Instructional OVERHEAD

These are further broken down to include:

PERSONNEL

Instructional Salary
Fixed Charges

Aides
Allocation, percent of administration
Allocation, percent of Co-ordinator

MATERIALS

Texts
Miscellaneous Supplies

OVERHEAD

Facilities Pro-rate
 Equipment Pro-rate
 Facility Operation
 Facility Maintenance

Most high school teachers in School District #23 are assigned seven courses or seven classes per school year. This study assumes that the teacher's salary will be divided or apportioned to each class on an equal basis. For example, if a teacher earns twenty-one thousand dollars per year and carries the regular class load, this would work out to three thousand dollars per course. The study further assumes that the course cost for "Instructional Salary" will be determined by dividing the teacher's salary for a particular course by the class enrolment.⁴ For example, if the class size was twenty-five, using the previous illustration of three thousand dollars per course, the instructional cost per student would be one hundred and twenty-five dollars. On the other hand, if the class was a small senior elective with only ten class members, the cost for each student would rise to three hundred dollars for instruction.

Aides are available in some schools for some subject areas such as Science, English and Home Economics. Where applicable, these were added to the Instructional Personnel costs.

⁴Ministry of Education Form "K," Province of British Columbia (1979).

School administration costs, including the counselling component, were apportioned on a percentage basis to each course.

Some subject areas such as Physical Education and French have District Coordinators to help the classroom teachers. Where these were employed, their salaries were pro-rated and partially assigned as additional course costs.

The final entry under Personnel Costs was made for Fixed Charges that included such items as Teachers' Pensions and Medical/Dental Benefits paid on behalf of these District employees.

The Materials Account Heading for each course included all prescribed textbooks and a portion of the authorized textbooks and materials used in the course. These were given a four year life for depreciation purposes. The Materials heading also covered any miscellaneous supplies that were required for the course. For example, supplies for Chemistry and Art as well as food for Home Economics were included in this category.

Overhead Costs included all of the costs of production other than direct personnel or direct materials costs. This study depreciated building facilities and equipment on a course-specific basis. For instance, the classrooms, laboratories, or other teaching areas were valued and depreciated according to their useable lives, and this depreciation was charged to the courses requiring the

specific facility. Costs for course equipment were assigned in a similar manner. Various sources were used in accumulating depreciation cost data; these included insurance valuations, taxation valuations, replacement estimates, and actual purchase costs.

Facility Operation and Maintenance costs were also pro-rated for each course. These figures were readily obtained from the School District records.

Educational achievement in this study is determined for each graduate by reviewing the Permanent Record Cards⁵ (PR-1) on file in the School District Central Office and assigning Grade Points for each course completed. These Cards only show letter grades by course and do not contain any information on cumulative standings. During the Senior years of high school in British Columbia, students in 1979 were required to complete a minimum of twelve courses including English 11 (En 11), English 12 (En 12), Social Studies 11 (SS 11) and Physical Education 11 (PE 11). These would almost always be taken in the Grade 11 and Grade 12 years and several students would choose as many as fifteen or sixteen courses. Apart from the four required courses, students could also choose the program concentration of courses with an emphasis on the Academic Area, Vocational Area, or Combined Studies Area. The latter simply

⁵ Ministry of Education Permanent Record Form, Province of British Columbia (1979).

representing a combination of Academic and Vocational courses.

The following equivalencies are used to convert British Columbia Final Course Grades to Grade Points:

A = 5.0

B = 4.0

C+ = 3.0

D = 2.0

P = 1.0

F = 0.0

School graduates were also asked to respond to a question on their post-high school activities. By indicating whether they have been working or in school, part- or full-time since graduation, it is possible to categorize six major post-high school activities. These are:

School Full-Time	S
School Full-Time, Work Part-Time	SW
School Full-Time, Work Full-Time	SW
School Part-Time, Work Full-Time	SW
Work Full-Time	W
Other	0

The follow-up survey form was designed to encourage graduates to make written comments pertaining to their high school courses.

Design

The design of this study is essentially predictive, employing an input-output model to test cost-benefit relationships. Correlation statistics and analysis of variance techniques are used to examine and test the relationships between education costs and program benefits. Total Education Benefits, Further Education Benefits, Job Benefits, and Personal Benefits are all treated as dependent variables. Total Costs, Instructional Personnel Costs, Materials Costs, and Overhead Costs are used in this study as independent variables.

Graduate programs consist of two parts: the core courses are compulsory for all students and constitute between one quarter to a maximum of one third of the total program; the elective courses form the largest part of any graduate's program. This study is primarily concerned with testing the cost-benefit relationships in the elective program. This is also the portion of the graduation program that determines whether a student is classified as academic, vocational, or combined. These core and elective components are shown in Figure 3.2.

A second approach to considering the high school product is to focus on the actual post-high school activity of each graduate. Here, the educational product is defined by the reality of the graduate's personal situation two years

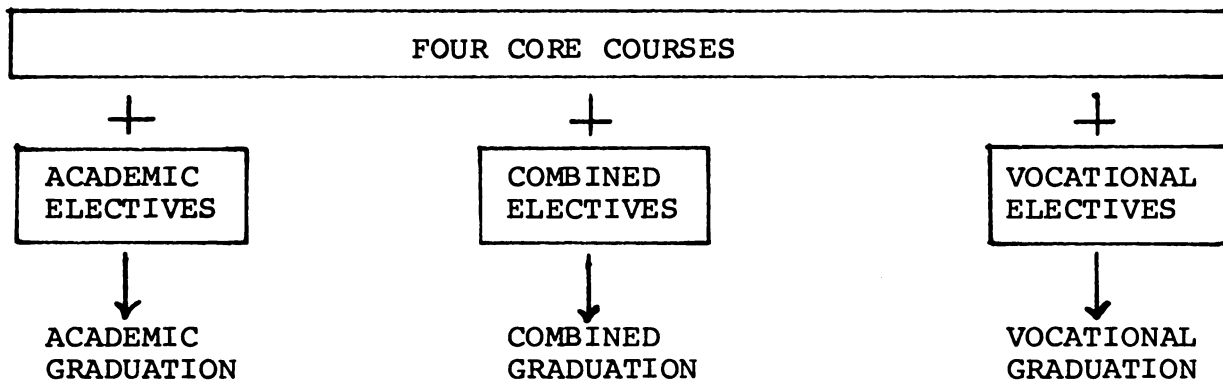


Figure 3.2

Graduation Program Components

after graduation. Depending on whether a graduate is attending school or working, full- or part-time, or in fact doing something else, these activities by their functional nature are used to classify graduates. These activity groups are examined for cost-benefit relationships.

A final subgrouping that is built into the research design is determined by the number of courses selected in the graduation program. To some extent at least, the number of courses comprising a vocational, combined, or academic program can be used to categorize products as a minimal or extended graduation. These subgroups are examined for relationships between benefits and their associated costs of production.

To summarize this section on design, Figure 3.3 illustrates the three main groups with their respective subgroups that will be tested for relationships between benefits and

program costs.

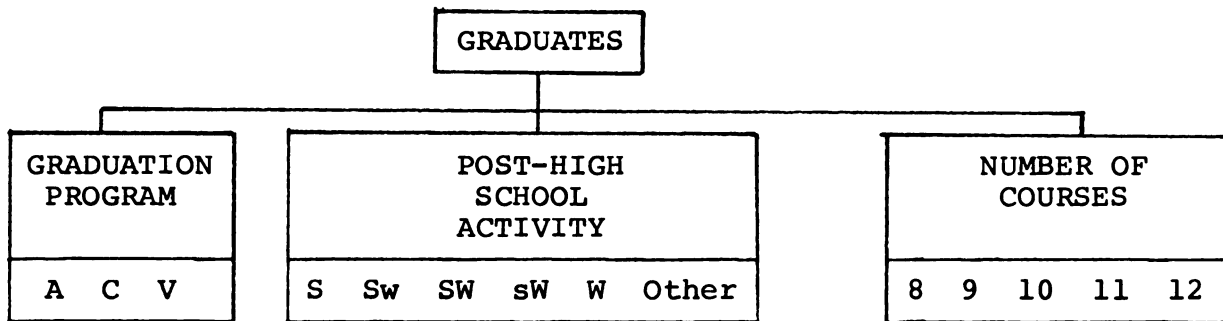


Figure 3.3

Graduate Subgroups Tested For Cost-Benefit Relationships

Hypotheses

General Hypothesis 1.--Total Educational Benefits are positively related to senior high school program costs.

Operational H1

The variable, Total Benefits will be positively and significantly related to the variable, Total Educational Costs.

Operational H1.1

The variable, Total Benefits will be positively and significantly related to the variable, Total Instructional Personnel Costs.

Operational H1.2

The variable, Total Benefits will be positively and significantly related to the variable, Total Materials Costs.

Operational H1.3

The variable, Total Benefits will be positively and significantly related to the variable, Total Overhead Costs.

General Hypothesis 2.--Total Further Education Benefits are positively related to senior high school program costs.

Operational H2

The variable, Further Education Benefits will be positively and significantly related to the variable, Total Educational Costs.

Operational H2.1

The variable, Further Education Benefits will be positively and significantly related to the variable, Total Instructional Personnel Costs.

Operational H2.2

The variable, Further Education Benefits will be positively and significantly related to the variable, Total Materials Costs.

Operational H2.3

The variable, Further Education Benefits will be positively and significantly related to the variable, Total Overhead Costs.

General Hypotheses 3.--Total Job Benefits are positively related to senior high school program costs.

Operational H3

The variable, Job Benefits will be positively and significantly related to the variable, Total Educational Costs.

Operational H3.1

The variable, Job Benefits will be positively and significantly related to the variable, Total Instructional Personnel Costs.

Operational H3.2

The variable, Job Benefits will be positively and significantly related to the variable, Total Materials Costs.

Operational H3.3

The variable, Job Benefits will be positively and significantly related to the variable, Total Overhead Costs.

General Hypothesis 4.--Total Personal Benefits are positively related to senior high school program costs.

Operational H4

The variable, Personal Benefits will be positively and significantly related to the variable, Total Educational Costs.

Operational H4.1

The variable, Personal Benefits will be positively and significantly related to the variable, Total Instructional Personnel Costs.

Operational H4.2

The variable, Personal Benefits will be positively and significantly related to the variable, Total Materials Costs.

Operational H4.3

The variable, Personal Benefits will be positively and significantly related to the variable, Total Overhead Costs.

Analysis

The purpose, design, and analysis of this study focus on testing for positive and significant relationships between senior high school program benefits and their production costs. Each graduate's perceived benefits, as reported on the graduate benefit survey, were totalled overall and under the headings of Further Education Benefits,

Job Benefits, and Personal Benefits. Costs were determined using a cost accounting method and were categorized under Total Costs, Instructional Personnel Costs, Materials Costs, and Overhead Costs. These eight variables were analyzed for cost-benefit relationships using the Pearson product-moment correlation coefficient to test for relationships between cost and benefit variables and also using an analysis of variance to specifically test the effects of cost variables on the four benefit variables. Both the correlation analysis and the analysis of variance were carried out on the complete sample of 331 graduates as well as three sub-groupings of the sample according to graduation program completed, post-high school activity, and the number of courses taken for graduation.

The Pearson correlation coefficient r is used to test the relationships between benefit and cost variables using a one-tailed t -test with $N-2$ degrees of freedom at a significance level less than .05. The assumptions for this model are essentially that scores are randomly sampled from normal populations with equal variances and the samples are independent.

The analysis of variance was used to assess any significant effects of the cost variables, Total Cost, Instructional Personnel Costs, Materials Costs, and Overhead Costs on the dependent variables. Each of the cost variables were quartiled into categories ranging from low cost to

high cost. According to values for cost variables, graduates were assigned to one of the four categories thereby enabling cost effects of the independent variable to be tested against the dependent variable, benefits. This one-way, fixed effects analysis of variance model assumed that the distribution of the dependent variable was normal and that population variances in the samples were equal. An advantage in employing the analysis of variance model is that reasonable departures from the assumptions of normality and homogeneity may occur without seriously affecting the validity of the inferences drawn from the data.

Summary

This study was designed to test the relationships between educational benefits and their specific production costs. A sample of three hundred and thirty-one graduates from the 1979 graduating class in British Columbia's Central Okanagan School District responded to a graduate benefit survey. These were drawn randomly from the seven senior high schools and represent a good cross-section of the district school population.

The graduates were asked to indicate for each course completed during their senior high school years what their perceived benefits were. Their responses could be checked off in three categories, Further Education Benefits, Job Benefits, and Personal Benefits. Each of these also allowed

the graduate to express the degree of benefit on a six-point Likert Scale ranging from "No Benefit" to "Great Benefit." For the purpose of this study, totals were calculated for the three categories of benefit and these were then summed to give a grand total, referred to in the study as the variable, Total Benefits.

For each graduate respondent, course costs were determined using cost accounting methods. These costs were classified as instructional personnel, materials, and overhead. These costs were then aggregated by course to arrive at total costs in each of the three categories, and these were also combined into a total program cost.

This study is only concerned with that portion of the graduate's program termed elective. While graduates in British Columbia high school require four core subjects, the elective group of courses are actually those that are student-specific and determine their unique program. The term Total Benefits and Total Costs have been calculated by subtracting both the core benefits as well as the core costs from the complete graduate program.

The four general hypotheses and their many operational hypotheses were tested using Pearson correlation analysis and analysis of variance employing significance levels of .05. The correlation analysis tested for significant and positive relationships between cost and benefit variables; the analysis of variance tested the effects of cost variables

on the dependent benefit variables. The analyses were employed with the total sample of graduates and three sub-groups determined according to the graduation program, post-high school activity, and number of courses completed for graduation.

CHAPTER IV

ANALYSIS OF RESULTS

Total Benefits and Costs

Total benefits and total costs were examined for the overall sample of three hundred and thirty-one graduates. In addition, total benefits and costs were determined for three groupings of the sample according to graduation program, post-high school activity, and number of elective graduation courses. The overall and group values are shown in Table 4.1. Academic program benefits were the greatest, 96.7, and the total production costs highest at \$2,592. Vocational graduates reported the least total benefits, 79.7, while their costs, \$2,423., were slightly more than the Combined program graduate whose costs were \$2,404. and benefits, 86.6.

An analysis of post-high school activity indicates that graduates who are neither working nor going to school reported the lowest benefits, 77.6, and had the lowest program production costs, \$2,293. These low scores contrast with those of graduates attending school full-time, whose costs were \$2,627. and benefits, 95.5. These represent

Table 4.1. Means for Total Benefits and Total Costs

Groups	Total Benefits Mean	SD	Total Costs Mean	SD
Overall Sample (n=331)	89.0	26.4	\$2,487	\$365
Graduation Program				
Academic (n=138)	96.7	25.3	2,592	292
Combined (n=106)	86.6	25.8	2,404	357
Vocational (n=87)	79.7	25.5	2,423	436
Post-High School Activity				
School Full-Time (n=57)	59.5	2.30	2,627	297
School Full-Time and Work Part-Time (n=34)	95.5	20.1	2,492	321
School and Work (n=75)	91.5	25.6	2,554	364
Full-Time Work and Part-Time School (n=20)	100.1	26.6	2,553	437
Work Full-Time (n=118)	83.2	26.8	2,410	367
Other (n=27)	77.6	31.9	2,293	351
Number of Graduation Electives				
8 Courses (n=57)	71.5	23.5	2,120	315
9 Courses (n=61)	81.0	23.0	2,314	278
10 Courses (n=79)	88.7	25.1	2,545	276
11 Courses (n=104)	97.4	23.5	2,667	306
12 Courses (n=27)	112.4	26.2	2,841	252

percentage differences of 15 and 25, respectively. The group of graduates with the highest benefits were those working full-time and attending school part-time. The large group of graduates who were working full-time had a relatively low benefit score of 83.2 and program costs of \$2,410.

As expected, both program benefits as well as program costs increased as the number of graduation electives went up from eight to twelve. The range of benefits was from 71.5 to 112.4 and costs went from \$2,120. to \$2,841. The maximum means represented increases of fifty-seven and thirty-four percent, respectively, for benefits and costs.

Total Costs

In testing the hypothesis that the variable, Total Benefits will be positively and significantly related to the variable, Total Educational Costs, it was determined by correlation analysis and analysis of variance that such a significant relationship does exist. The Pearson product-moment correlation coefficient for these two variables was $r = .2975$, $p < .001$; analysis of variance performed on the dependent variable, Total Benefits, identified a Total Cost effect, $F(3,327) = 9.344$, $p < .001$. Clearly, graduates who had higher perceived total benefits also were the ones who had the higher program production costs, while those whose benefits were the least had the lowest total program costs. A more detailed analysis of the correlational relationship between these variables shows that 85.3 percent of the variance of total benefits attributable to total costs is accounted for by instructional costs. Materials costs and overhead costs are responsible for 6.0 and 8.7 percent,

respectively.

Correlation analysis applied to the three graduation programs showed that significant benefit and cost relationships existed for all: Academic, $r = .2679$, $p < .001$; Combined, $r = .2842$, $p < .01$; and Vocational, $r = .2256$, $p < .05$. Only three of the six post-high school activity groups showed significant relationships between total benefits and total costs. Graduates who were attending school full-time and working part-time, attending school and working equally, or working full-time had total benefit-cost relationships of $r = .4313$, $p < .01$; $r = .3263$, $p < .01$; and $r = .2955$, $p < .001$, respectively. The final grouping, by number of graduation electives, had positive and significant relationships between total benefits and total costs for those graduates who completed either eight or ten elective courses. The former sub-group of fifty-seven graduates had relationships with $r = .3274$ and $p < .01$. For those with ten courses, $r = .1856$ and $p < .05$. While all hypotheses were directional and therefore tested with one-tail, it was interesting to note that a significant, but negative relationship existed for graduates who had completed eleven electives at $r = -.1646$, $p < .05$.

Analysis of variance performed on the dependent variable, Total Benefits, for each of the sub-groupings of graduation program, post-high school activity, and number of elective graduation courses found significant total

cost effects for the Academic program, $F(3,134) = 3.957$, $p = .010$; graduates attending school full-time and working part-time, $F(3,30) = 3.001$, $p = .046$; graduates working full-time, $F(3,114) = 4.816$, $p = .003$; graduates who completed eight elective courses, $F(3,53) = 2.913$, $p = .043$; and graduates who completed ten elective courses, $F(3,75) = 3.419$, $p = .022$.

For the variables Total Benefits and Total Cost, the significant relationships are summarized in Table 4.2.

Table 4.2. Summary of Relationships, Total Benefits and Total Costs

Groups	Level of Significance	
	Correlational	Anova
Overall Sample (n=331)	$p < .001$	$p < .001$
Graduation Program		
Academic (n=138)	$p < .001$	$p = .010$
Combined (n=106)	$p < .01$	
Vocational (n=87)	$p < .05$	
Post-High School Activity		
School Full-Time (n=57)		
School Full-Time and Work Part-Time (n=34)	$p < .01$	$p = .046$
School and Work (n=75)	$p < .01$	
Full-Time Work and Part-Time School (n=20)		
Work Full-Time (n=118)	$p < .001$	$p = .003$
Other (n=27)		
Number of Graduation Electives		
8 Courses (n=57)	$p < .01$	$p = .043$
9 Courses (n=61)		
10 Courses (n=79)	$p < .05$	$p = .022$
11 Courses (n=104)		
12 Courses (n=27)		

Total Instructional Personnel Costs

Approximately eighty percent of total educational costs are instructional personnel costs. This section of the analysis is concerned with identifying and testing for positive and significant relationships between the variables Total Benefits and Total Instructional Personnel Costs. The means for these variables are given in Table 4.3.

Table 4.3. Means for Total Benefits and Total Instructional Personnel Costs

Groups	Total Benefits		Total Instruction Personnel Costs	
	Mean	SD	Mean	SD
Overall Sample (n=331)	89.0	26.4	\$1,975	\$286
Graduation Program				
Academic (n=138)	96.7	25.3	2,103	233
Combined (n=106)	86.6	25.8	1,917	277
Vocational (n=87)	79.7	25.5	1,841	290
Post-High School Activity				
School Full-Time (n=57)	95.5	23.0	2,136	236
School Full-Time and Work Part-Time (n=34)	95.5	20.1	2,043	265
School and Work (n=75)	91.5	25.6	2,033	296
Full-Time Work and Part-Time School (n=20)	100.1	26.6	2,026	287
Work Full-Time (n=118)	83.2	26.8	1,871	252
Other (n=27)	77.6	31.9	1,799	272
Number of Graduation Electives				
8 Courses (n=57)	71.5	23.5	1,644	193
9 Courses (n=61)	81.0	23.0	1,853	217
10 Courses (n=79)	88.7	25.1	2,025	214
11 Courses (n=104)	97.4	23.5	2,117	217
12 Courses (n=26)	112.4	26.2	2,287	244

The highest cost program for expenditures on instruction was the Academic program at \$2,103. and the lowest was Vocational at \$1,841. The Combined graduation program at \$1,917. was between the other two graduation options. Those graduates who were attending school two years after high school had the most expensive instructional costs, \$2,136. This amount decreased proportionately as the degree of work increased. For a graduate working full-time, instructional costs were \$1,871. The lowest instructional personnel costs were for the group of graduates who were neither working nor attending school. Based on post-high school activity, the percentage difference between the lowest instructional costs and the highest was nineteen percent. Depending on the number of courses elected for graduation, the instructional costs ranged from a low of \$1,644. to a high of \$2,287. There was a direct relationship between elected courses and instructional costs.

An analysis of the relationships between total benefits and total instructional costs, using Pearson correlation coefficients, indicated that several were significant at a level of $p < .05$. First of all, for the overall sample of graduates, $r = .3242$, $p < .001$. Total benefits for graduates of all three program options were significantly related to their program production costs for instruction: Academic, $r = .2125$, $p < .01$; Combined, $r = .3017$, $p < .001$; and Vocational, $r = .2336$, $p < .05$. Two relationships between

total benefits and instructional costs were identified for graduates who were working and attending school equally, as well as those who are working full-time two years after graduation. These were the only post-high school activity groups whose cost-benefit relationships were significant at or beyond the .05 level. Their respective coefficients were $r = .3138$, $p < .01$ and $r = .3442$, $p < .001$. Analysis of the groups of graduates who elected from eight to twelve courses showed that significant relationships could be identified for those who took eight and ten courses for their graduation programs. The eight course graduates had $r = .3888$, $p < .01$ and ten course graduates had $r = .2012$, $p < .05$.

Analysis of variance performed on the dependent variable, Total Benefits, for sub-groupings of graduate programs and number of graduation electives identified only two significant Instructional Personnel Costs effects. These were for the Academic program, $F(3,134) = 2.792$, $p < .05$ and for graduates who completed eight elective courses, $F(3,53) = 3.211$, $p < .05$.

For the variables, Total Benefits and Total Instructional Personnel Costs, the significant relationships are summarized in Table 4.4.

Table 4.4 Summary of Relationships, Total Benefits and Total Instructional Personnel Costs

Groups	Level of Significance	
	Correlational	Anova
Overall Sample (n=331)	$p < .001$	-
Graduation Program		
Academic (n=138)	$p < .01$	$p < .05$
Combined (n=106)	$p < .001$	
Vocational (n=87)	$p < .05$	
Post-High School Activity		
School Full-Time (n=57)		-
School Full-Time and Work Part-Time (n=34)		-
School and Work (n=75)	$p < .01$	
Full-Time Work and Part-Time School (n=20)		-
Work Full-Time (n=118)		
Other (n=27)	$p < .001$	
Number of Graduation Elec- tives		
8 Courses (n=57)	$p < .01$	$p < .05$
9 Courses (n=61)		
10 Courses (n=79)	$p < .05$	
11 Courses (n=104)		
12 Courses (n=26)		

Materials Costs and Overhead Costs

The variables, Materials Costs and Overhead Costs account for about eight and twelve percent of total production costs, respectively. This section is concerned with the analysis of these variables and possible positive relationships with the variable, Total Benefits. The means

for the component cost variables are presented in Table 4.5. As could be expected, the vocational program costs for materials and overhead at \$252. and \$330. are higher than the respective costs for either academic or combined program graduates. Academic graduates had the least expensive materials costs and Combined program graduates had the lowest overhead costs. The Vocational program graduates' standard deviations for both materials costs as well as overhead costs were notably higher than any other subgroup, and are indicative of a wide range of costs associated with specific vocational programs. An analysis of the post-high school activity groups show that those graduates who working two years after graduation appear to have had higher materials and overhead costs. Lower costs seem to be associated with either attending school or being involved in some activity other than school or work. Generally, materials and overhead costs increased with the number of courses elected for graduation. The slight dip in average costs for those graduates who chose nine courses might be attributed to the mix of academic and vocational courses chosen by this subgroup.

Analysis of the relationships between the variable, Total Benefits, and the variables, Materials Costs and Overhead Costs, identified five that were significant beyond the $p = .05$ level. Pearson correlation coefficients were obtained on the dependent variable, Total Benefits, for

Table 4.5. Means for Total Materials and Overhead Costs

Groups	Total Materials Costs		Total Overhead Costs	
	Mean	SD	Mean	SD
Overall Sample (n=331)	\$217	\$88	\$296	\$95
Graduation Program				
Academic (n=138)	198	59	291	68
Combined (n=106)	212	75	275	80
Vocational (n=87)	252	123	335	134
Post-High School Activity				
School Full-Time (n=57)	201	69	289	64
School Full-Time and Work Part-Time (n=34)	173	44	276	75
School and Work (n=75)	220	80	301	88
Full-Time Work and Part-Time School (n=20)	227	90	300	119
Work Full-Time (n=118)	235	105	304	115
Other (n=27)	209	76	286	80
Number of Graduation Electives				
8 Courses (n=57)	205	94	271	115
9 Courses (n=61)	194	82	266	85
10 Courses (n=79)	222	95	298	82
11 Courses (n=104)	229	83	321	100
12 Courses (n=26)	232	75	322	58

the sub-groupings of graduate programs and number of courses elected for graduation. The correlation analysis did not identify a significant relationship between Materials costs and Total Benefits for the overall sample, however, two of the sample sub-groups did register significant relationships. These sub-groups were Academic program graduates,

$r = .1812$, $p < .05$, and graduates attending school full-time, $r = .2268$, $p < .05$. An analysis of variance performed on the dependent variable, Total Benefits, identified a materials cost effect, $F(3,102) = 2.885$, $p = .043$, for the combined program graduate. For overhead costs, the two relationships with Total Benefits that were identified by correlation analysis were for the overall sample, $r = .1002$, $p < .05$, and the academic program graduates, $r = .2607$, $p < .001$. Significant relationships between total benefits and the variables, Materials Costs and Overhead Costs are summarized in Table 4.6.

Further Education Benefits

The variable, Further Education Benefits, was determined by aggregating graduates' responses in this category for all elective graduation courses. Graduates were asked to indicate on a six-point Likert scale the extent to which they received benefits related to further studies at college, university, trade school, or other post-high school situation. The second major section in this chapter will identify those positive and significant relationships existing between the variable, Further Education Benefits and senior high school program costs.

Table 4.6. Summary of Relationships, Total Benefits and the Variables Materials Costs and Overhead Costs

Groups	Level of Significance			
	Materials Costs Corr.	Costs Anova	Overhead Costs Corr.	Costs Anova
Overall Sample (n=331)		-	p < .05	-
Graduation Program				
Academic (n=138)	p < .05		p < .001	
Combined (n=106)				p=.043
Vocational (n=87)				
Post-High School Activity				
School Full-Time (n=57)	p < .05	-		-
School Full-Time and Work Part-Time (n=34)		-		-
School and Work (n=75)		-		-
Full-Time Work and Part-Time School (n=20)		-		-
Work Full-Time (n=118)		-		-
Other (n=27)		-		-
Number of Graduation Electives				
8 Courses (n=57)				
9 Courses (n=61)				
10 Courses (n=79)				
11 Courses (n=104)				
12 Courses (n=26)				

Total Costs

The Total Cost variable was determined by adding three component costs, and this variable was studied for positive and significant relationships with the variable Further Education Benefits. Applying Pearson product-moment correla-

tion analysis to these two variables resulted in an $r = .2888$, $p < .001$ for the overall sample of three hundred and thirty-one graduates. Analysis of variance carried out on the dependent variable, Further Education Benefits, identified a total cost effect, $F(3,134)$, $p = .005$. Further education benefits are related to total elective program costs; those graduates who have the highest level of further education benefits are also the graduates whose total costs are the greatest.

Total costs and further education benefits are presented in Table 4.7 for the overall sample and three groupings of the graduate respondents. Not surprisingly, there is a dramatic decline in further education benefits from the academic program to the vocational program and also from the school oriented post-high school activity to the more work-centered activity. In contrast, Table 4.7 shows a marked increase in further education benefits as the number of graduation electives goes up from eight to twelve. The percentage difference between further education benefits as reported by academic and vocational graduates is seventy-one percent, while the total costs are only seven percent more for the academic program graduates. The low level of these benefits for vocational graduates is not surprising as relatively few would probably continue with their schooling. This was also apparent for the sub-groups of graduates who were attending school

Table 4.7. Means for Further Education Benefits and Total Costs

Groups	Further Education Benefits		Total Costs	
	Mean	SD	Mean	SD
Overall Sample (n=331)	26.6	13.2	\$2,487	\$365
Graduation Program				
Academic (n=138)	32.8	11.6	2,592	292
Combined (n=106)	24.5	12.4	2,404	357
Vocational (n=87)	19.2	12.1	2,423	436
Post-High School Activity				
School Full-Time (n=57)	34.3	9.8	2,627	297
School Full-Time and Work Part-Time (n=34)	31.1	7.8	2,492	321
School and Work (n=75)	29.8	12.0	2,554	364
Full-Time Work and Part-Time School (n=20)	31.2	12.5	2,553	437
Work Full-Time (n=118)	20.3	13.3	2,410	367
Other (n=27)	19.6	13.3	2,293	351
Number of Graduation Electives				
8 Courses (n=57)	17.0	11.2	2,120	315
9 Courses (n=61)	24.7	11.8	2,314	278
10 Courses (n=79)	25.9	11.8	2,545	276
11 Courses (n=104)	30.4	12.0	2,667	306
12 Courses (n=26)	39.3	13.8	2,841	252

full-time and those graduates who were working full-time, as reported for post-high school activity. The former indicated further education benefits at a level sixty-nine percent above the latter group, while their total costs were just nine percent more. For students electing a full course load, there were almost two and a half times as many further

education benefits than those taking a minimum eight electives. The equivalent increase in costs was only thirty-four percent. Understandably, these benefits are clearly related to graduation programs and post-high school activity.

A correlation analysis of the three graduation programs showed that for both academic graduates and combined graduates, significant and positive relationships existed between the variable, Further Education Benefits, and total cost. The coefficients for Academic and Combined graduates were, $r = .2452$, $p < .01$ and $r = .2542$, $p < .005$, respectively. Applying analysis of variance to the dependent variable, Further Education Benefits, determined that a Total Cost effect existed for the Academic graduate subgrouping, $F(3,134) = 4.492$, $p = .005$.

Analysis of the six sub-groups of post-high school activities found three significant Pearson correlation coefficients between further education benefits and total costs. Those graduates who were attending school full-time and working part-time, attending school or working equally, and working full-time had positive and significant relationships between this category of benefits and total costs. Their coefficients were; $r = .3758$, $p < .05$; $r = .2766$, $p < .01$; and, $r = .2881$, $p < .001$, respectively. An analysis of variance on the variable, Further Education Benefits, for the group of graduates who were working full-time, found a

Total Cost effect, $F(3,114) = 3.899$, $p = .011$.

The final group that was analyzed for relationships between total costs and further education benefits consisted of graduates who had opted for differing numbers of elective courses. Significant relationships were identified for those graduates taking eight and twelve courses. Pearson coefficients for these two sub-groups were, $r = .3231$, $p < .01$, and $r = .3364$, $p < .05$, respectively, between the variables, Further Education Benefits and Total Costs. A Total Cost effect was also determined using an analysis of variance on the dependent variable, Further Education Benefits, for those graduating with eight electives, $F(3,53) = 3.176$, $p = .031$.

Table 4.8 summarizes the significant relationships between the variables, Further Education Benefits and Total Costs.

Instructional Personnel Costs

For the overall sample of three hundred and thirty-one graduates, correlation analysis identified a positive and strong relationship between the variables, Instructional Personnel Costs and Further Education Benefits, $r = .3794$, $p < .001$. Testing for similar relationships across the graduation programs, it was determined that: Academic $r = .2139$, $p < .01$; Combined, $r = .3240$, $p < .001$; and, Vocational, $r = .2262$, $p < .035$. An analysis of variance

Table 4.8. Summary of Relationships, Further Education Benefits and Total Costs

Groups	Level of Significance	
	Correlational	Anova
Overall Sample (n=331)	p < .001	p = .005
Graduation Program		
Academic (n=138)	p < .01	p = .005
Combined (n=106)	p < .005	
Vocational (n=87)		
Post-High School Activity		
School Full-Time (n=57)		
School Full-Time and Work		
Part-Time (n=34)	p < .05	
School and Work (n=75)	p < .01	
Full-Time Work and Part-Time		
Work (n=20)		
Work Full-Time (n=118)	p < .001	p = .011
Number of Graduation Electives		
8 Courses (n=57)	p < .01	p = .031
9 Courses (n=61)		
10 Courses (n=79)		
11 Courses (n=104)		
12 Courses (n=26)	p < .05	

was performed on the dependent variable, Further Education Benefits, and identified an Instructional Personnel Cost effect for both the Academic Program graduates, $F(3,134) = 3.673$, $p = .014$ as well as the Combined Program graduates, $F(3,102) = 4.523$, $p = .005$.

Analysis of the post-high school activity sub-groups, using Pearson correlation coefficients identified three

significant and positive relationships between instructional costs and further education benefits. The groups with significant relationships were: graduates attending school full-time and working part-time, $r = .3607$, $p < .05$; graduates attending school and working equally, $r = .3078$, $p < .005$; and, graduates working full-time, $r = .3669$, $p < .001$.

Applying analysis of variance and correlational analysis to groups of graduates with varying numbers of graduation electives, identified four significant relationships. Those graduates who completed only eight electives showed relationships between their instructional costs and their further education benefits, using Pearson coefficients, $r = .4103$, $p < .001$ and analysis of variance, $F(3,53) = 3.227$, $p = .030$. For graduates who completed ten courses, the equivalent significance indicators were, $r = .3070$, $p < .005$, and $F(3,75) = 2.830$, $p = .044$. The relationships between instructional costs and further education benefits are summarized in Table 4.9.

Materials Costs and Overhead Costs

The variables, Materials and Overhead Costs were tested against further education benefits and only three positive and significant relationships were identified. For Academic graduates, materials costs and overhead costs were both related to further education benefits using Pearson correla-

Table 4.9. Summary of Relationships, Further Education Benefits and Instructional Personnel Costs

Groups	Level of Significance	
	Correlational	Anova
Overall Sample (n=331)	p < .001	--
Graduation Program		
Academic (n=138)	p < .01	p = .014
Combined (n=106)	p < .001	p = .005
Vocational	p < .05	
Post-High School Activity		
School Full-Time (n=57)		--
School Full-Time and Work Part-Time (n=34)	p < .05	--
School and Work (n=75)	p < .005	--
Full-Time Work and Part-Time School (n=20)		
Work Full-Time (n=118)	p < .001	--
Other (n=27)		--
Number of Graduation Electives		
8 Courses (n=57)	p < .001	p = .030
9 Courses (n=61)		
10 Courses (n=79)	p < .005	p = .044
11 Courses (n=104)		
12 Courses (n=26)		

tion analysis. The respective values were, $r = .1681$, $p < .05$ and $r = .1704$, $p < .05$. The other relationship, also determined using correlation analysis, was for those graduates who were attending school full-time and working part-time. For this subgroup, overhead costs were related to further education benefits, $r = .3131$, $p < .05$.

Job Benefits

The variable, Job Benefits was determined from graduate responses in this separate category. Graduates were asked to rate those benefits related to earning money by working part-time or full-time. Each course was listed and graduates had the opportunity to indicate on a six-point Likert scale the extent to which they benefitted. This category was added to obtain total job benefits. The third major section in this chapter will identify those positive and significant relationships existing between the variable, Job Benefits and senior high school program costs.

Total Costs

Both correlation analysis using Pearson coefficients as well as analysis of variance was performed on the variables, Total Cost and Job Benefits for the overall sample and sub-groups of graduate programs, post-high school activity, and number of courses elected for graduation. Total job benefits and total costs are given in Table 4.10. Unlike further education benefits, it can be observed from Table 4.10 that job benefits across the many sub-groups of the sample do not differ extremely. As expected, vocational graduates and those graduates working full-time, even if attending school part-time, are those with the highest job benefits. It is also not surprising that the

Table 4.10. Means for Job Benefits and Total Costs

Groups	Job Benefits		Total Costs	
	Mean	SD	Mean	SD
Overall Sample (n=331)	23.8	10.4	\$2,487	\$365
Graduation Program				
Academic (n=138)	23.1	10.4	2,592	292
Combined (n=106)	24.2	10.0	2,404	357
Vocational (n=87)	24.4	10.8	2,423	436
Post-High School Activity				
School Full-Time (n=57)	20.8	10.7	2,627	297
School Full-Time and Work Part-Time (n=34)	21.8	8.2	2,492	321
School and Work (n=75)	22.8	9.2	2,554	364
Full-Time Work and Part-Time Work (n=20)	30.0	10.0	2,553	437
Work Full-Time (n=118)	25.8	10.3	2,410	367
Other (n=27)	22.1	12.9	2,293	351
Number of Graduation Electives				
8 Courses (n=57)	22.1	10.3	2,120	315
9 Courses (n=61)	22.7	9.3	2,314	278
10 Courses (n=79)	25.0	11.2	2,545	276
11 Courses (n=104)	24.3	10.3	2,667	306
12 Courses (n=26)	23.8	11.1	2,841	252

groups with the lowest job benefits are those where the graduates are attending school full-time. In general, there appears to be little relationship between the number of courses elected for graduation and job benefits.

A correlation analysis between the variable, Job Benefits and total costs found a positive and significant re-

lationship for the overall sample, $r = .1221$, $p < .05$. A study of the possible relationships between job benefits and total costs for the three graduation programs, identified the only significance within the vocational program graduates. A Pearson coefficient for this sub-group was $r = .2566$, $p < .01$. For the post-high school activity group, those graduates who were working full-time were the only sub-group where significant relationships between total costs and job benefits could be identified. An analysis of variance performed on the dependent variable, Job Benefits, found of total costs effect for the working graduates, $F(3,114) = 4.092$, $p = .008$. The Pearson coefficient for the same group was $r = .2273$, $p < .01$. Analysis of graduates electing eight to twelve courses, identified two sub-groups with significant relationships between job benefits and total costs. Correlation coefficients for those graduates taking eight and ten elective courses were, respectively, $r = .3169$, $p < .01$ and $r = .2463$, $p < .05$. For this latter sub-group, an analysis of variance showed a total cost effect on the variable, Job Benefits, $F(3,75) = 4.690$, $p = .005$. The significant relationships between job benefits and total costs are summarized in Table 4.11.

Table 4.11. Summary of Relationships, Job Benefits and Total Costs

Groups	Level of Significance	
	Correlational	Anova
Overall Sample (n=331)	p < .05	
Graduation Program		
Academic (n=138)		
Combined (n=106)		
Vocational (n=87)	p < .01	
Post-High School Activity		
School Full-Time (n=57)		
School Full-Time and Work Part-Time (n=34)		
School and Work (n=75)		
Full-Time Work and Part-Time School (n=20)		
Work Full-Time (n=118)	p < .01	p = .008
Number of Graduation Electives		
8 Courses (n=57)	p < .01	
9 Courses (n=61)		
10 Courses (n=79)	p < .05	p = .005
11 Courses (n=104)		
12 Courses (n=26)		

Instructional Personnel Costs

Relationships between the variables, Job Benefits and Instructional Personnel Costs were not found to be significant for the overall sample of graduate respondents.

Analysis of variance performed on the variable, Job Benefits for the three graduation programs, also was unable to identify

any effects that could be linked to instructional costs. A correlation analysis did find a positive and significant relationship between instructional costs and job benefits for graduates of the vocational programs, $r = .2186$, $p < .05$. A similar relationship existed for the one hundred and eighteen graduates who were working full-time, $r = .2308$, $p < .01$. For those graduates who chose only eight courses, $r = .3467$, $p < .005$. The final relationship determined by an analysis of variance on job benefits, did identify an instructional personnel costs effect for those graduates who had taken ten elective graduation courses, $F(3,75) = 4.728$, $p = .050$.

Materials Costs

The variable, Materials Costs was related to job benefits for the overall sample. This relationship was determined using correlation analysis where, $r = .1171$, $p < .05$. However, applying Pearson correlational analysis and analysis of variance techniques to the three graduate program uncovered no significant relationship between job benefits and materials costs. For those graduates who were attending school full-time two years after leaving school or who chose nine elective graduation courses, significant relationships were identified between job benefits and materials costs. These were determined by correlation analysis $r = .3249$, $p < .01$ and analysis of variance per-

formed on the dependent variable, Job Benefits that found a materials costs effect, $F(3,57) = 2.766$, $p = .050$.

Overhead Costs

Overhead costs were found to be significantly and positively related, using correlation analysis, to the variable, Job Benefits for the overall sample of three hundred and thirty-one graduates. These costs were also linked to job benefits for vocational program graduates. Both relationships were determined by Pearson coefficients, respectively, $r = .1498$, $p < .005$ and $r = .2352$, $p = .05$. Virtually no relationships could be identified for any of the post-high school activity groups. For graduates electing ten or eleven courses in their senior years, the variables Job Benefits and Overhead Costs appeared to be related. For the ten course graduates, $r = .2209$, $p < .05$, and for those taking eleven courses, $F(3,100) = 5.711$, $p = .001$.

Personal Benefits

The variable, Personal Benefits was determined by adding up graduate responses that rated those benefits of a personal nature. This category of benefits was defined by outcomes that made the graduate feel happier, more interesting, wiser, or more informed. The responses were aggregated for all elective courses, and the total represented

those personal benefits of interest in this analysis. The fourth major section in this chapter will identify the positive and significant relationships between the variable, Personal Benefits and senior high school program costs.

Total Costs

Total costs, determined by combining instructional costs, materials costs and overhead costs, were tested against the variable, Personal Benefits to identify any significant relationships. Correlation analysis between these two variables resulted in an $r = .2473$, $p < .001$ for the overall sample. Applying an analysis of variance on the dependent variable, Personal Benefits identified a total cost effect, $F(3,327) = 6.607$, $p < .001$, for the total sample of graduates who responded to the benefit survey. Clearly, for the variable, Total Costs and personal benefits, a significant relationship does exist.

Personal benefits, unlike job benefits, tend to decline as graduate programs move from an academic to a vocational focus. However, these benefits appear to be consistently higher than any other category of benefits. It is interesting to note that personal benefits also drop off evenly as post-high school activity takes on a greater work emphasis and less school based activity. Finally, Table 4.12 shows that as the number of graduation electives increase, there

Table 4.12. Means for Personal Benefits and Total Costs

Groups	Personal Benefits		Total Costs	
	Mean	SD	Mean	SD
Overall Sample (n=331)	38.6	11.2	\$2,487	\$365
Graduation Program				
Academic (n=138)	40.8	11.0	2,592	292
Combined (n=106)	37.9	11.3	2,404	357
Vocational (n=87)	36.0	10.8	2,423	436
Post-High School Activity				
School Full-Time (n=57)	40.4	10.0	2,627	297
School Full-Time and Work Part-Time (n=34)	42.6	11.2	2,492	321
School and Work (n=75)	38.9	10.8	2,554	364
Full-Time Work and Part-Time School (n=20)	38.9	11.8	2,553	437
Work Full-Time (n=118)	37.1	11.6	2,410	367
Other (n=27)	35.9	11.3	2,293	351
Number of Graduation Electives				
8 Courses	32.4	8.5	2,120	315
9 Courses	33.7	10.1	2,314	278
10 Courses	37.8	10.6	2,545	276
11 Courses	42.7	10.1	2,667	306
12 Courses	49.4	10.6	2,841	252

is a corresponding increase in the personal benefits derived from the graduation electives.

For those graduates who were on an academic program, both analysis of variance and correlation analysis uncovered significant relationships between personal benefits and total program costs. Respectively, these were $F(3,134) = 4.282$, $p = .006$ and $r = .3099$, $p < .001$. Combined program

graduates were also found to show positive and significant relationships between personal benefits and total costs, $r = .2640$, $p < .006$. No such relationships were found to be significant for the group of eighty-seven graduates on the vocational program.

Among those graduates who were attending school full-time and working part-time, the variables Total Costs and Personal Benefits were related. Analysis of variance was performed on the variable, Personal Benefits, and a Total Cost effect was identified for this group of graduates, $F(3,30) = 4.396$, $p = .011$. A Pearson correlation analysis on the same variables resulted in an $r = .5084$, $p < .001$. The only two other subgroups in this category to register significant relationships were those graduates who worked and attended school equally, $r = .3071$, $p < .005$, and the small group of twenty-seven graduates who neither attended school nor worked since graduating from high school, $F(3,23) = 3.628$, $p = .028$.

No relationships were identified for those sub-groups based on the number of electives chosen for graduates. This was actually the situation for all component costs as well; no relationships were identified between personal benefits and either instructional costs, materials costs, or overhead costs according to the number of graduation electives.

Personal benefits' relationships with total costs are

summarized in Table 4.13.

Table 4.13. Summary of Relationships, Personal Benefits and Total Costs

Groups	Level of Significance	
	Correlational	Anova
Overall Sample (n=331)	p < .001	p < .001
Graduation Program		
Academic (n=138)	p < .001	p < .006
Combined (n=106)	p < .005	
Vocational (n=87)		
Post-High School Activity		
School Full-Time (n=57)		
School Full-Time and Work Part-Time (n=34)	p < .001	p < .011
School and Work (n=75)	p < .005	
Full-Time Work and Part-Time School (n=20)		
Work Full-Time (n=118)		
Other (n=27)		p < .028
Number of Graduation Electives		
8 Courses (n=57)		
9 Courses (n=61)		
10 Courses (n=79)		
11 Courses (n=104)		
12 Courses (n=26)		

Instructional Personnel Costs

A correlation analysis of the variable, Instructional Personnel Costs and personal benefits for the overall sample disclosed that a significant relationship did exist,

$r = .2514$, $p < .001$. Three positive and significant relationships were found between costs and benefits for academic and combined program graduates. An analysis of variance performed on personal benefits identified an instructional cost effect for academic graduates, $F(3,134) = 2.870$, $p = .039$. A Pearson correlation for the academic graduates was $r = .2623$, $p < .001$. The third relationship was for combined program graduates, determined by correlation analysis to be $r = .2381$, $p < .01$. For the post-high school activity sub-groups, positive and significant relationships were identified for all except those attending school full-time and those in the small group of twenty who attended school part-time and worked full-time. The significant relationships were between personal benefits and instructional costs for: full-time students working part-time, $r = .4900$, $p < .005$; graduates attending school and working equally, $r = .2689$, $p < .01$; graduates working full-time, $r = .1696$, $p < .05$; and, those graduates who were neither working nor attending school, $r = .3563$, $p < .05$.

The relationships between the variables, Personal Benefits and Instructional Personnel Costs are summarized in Table 4.14.

Table 4.14. Summary of Relationships, Personal Benefits and Instructional Personnel Costs

Groups	Level of Significance	
	Correlational	Anova
Overall Sample (n=331)	$p < .001$	--
Graduation Program		
Academic (n=138)	$p < .001$	$p = .039$
Combined (n=106)	$p < .01$	
Vocational (n=87)		
Post-High School Activity		
School Full-Time (n=57)		--
School Full-Time and Work Part-Time (n=34)	$p < .005$	--
School and Work (n=75)	$p < .01$	
Full-Time Work and Part-Time School (n=20)		--
Work Full-Time (n=118)	$p < .05$	
Other (n=27)	$p < .05$	
Number of Graduation Electives		
8 Courses (n=57)		
9 Courses (n=61)		
10 Courses (n=79)		
11 Courses (n=104)		
12 Courses (n=26)		

Materials Costs

Materials costs were related to personal benefits according to a Pearson correlation analysis, $r = .1182$, $p < .05$. The only graduate program for which significant relationships were found was the combined program. An analysis of variance performed on personal benefits generated

evidence of a materials cost effect, $F(3,102) = 3.3470$, $p = .019$. The Pearson correlation for the same variables in this group of graduates was $r = .2425$, $p < .01$. For the sub-groups of graduates who were working and attending school equally and who were working full-time, relationships were identified between personal benefits and materials costs. These were $r = .2357$, $p < .05$, and $r = .1561$, $p < .05$, respectively.

Overhead Costs

For the overall group of graduates who responded to the benefit survey, no relationships were determined between personal benefits and overhead costs. Three relationships were identified for the graduation program sub-groups. Academic graduates showed a positive and significant relationship between personal benefits and overhead costs, $r = .3315$, $p < .001$. For this same sub-group, an analysis of variance on the variable, Personal Benefits showed an overhead costs effect of $F(3,134) = 4.169$, $p = .007$. A similar effect was also identified for the combined program graduates, $F(3,102) = 2.689$, $p = .050$. The only other significant relationship for any of the sub-groups was found for those graduates who attended school full-time and worked part-time, $r = .4130$, $p < .01$.

Summary

This chapter has applied general statistical analysis and Pearson product-moment correlation analysis to all benefit and cost variables included in the study. Also, analysis of variance was employed in examining total cost effects on the variables, Total Benefits, Further Education Benefits, Job Benefits, and Personal Benefits for the overall sample. An analysis of variance was also performed on Graduation Program and Number of Graduation Electives sub-groups, testing for program cost effects. These analyses were directed toward the central hypothesis, that:

Educational benefits are positively related to educational costs.

The following four research hypotheses were tested, in order:

1. Total Educational Benefits are positively related to senior high school program costs.
2. Total Further Education Benefits are positively related to senior high school program costs.
3. Total Job Benefits are positively related to senior high school program costs.
4. Total Personal Benefits are positively related to senior high school program costs.

A general statistical analysis determined that benefits derived from graduation courses differed, and these are

summarized in Figure 4.1. Production costs were also calculated and are illustrated in Figure 4.2. From these summary graphs it is possible to obtain a clear appreciation of the relative differences in magnitude between the total cost and total benefit components. For instance, while the

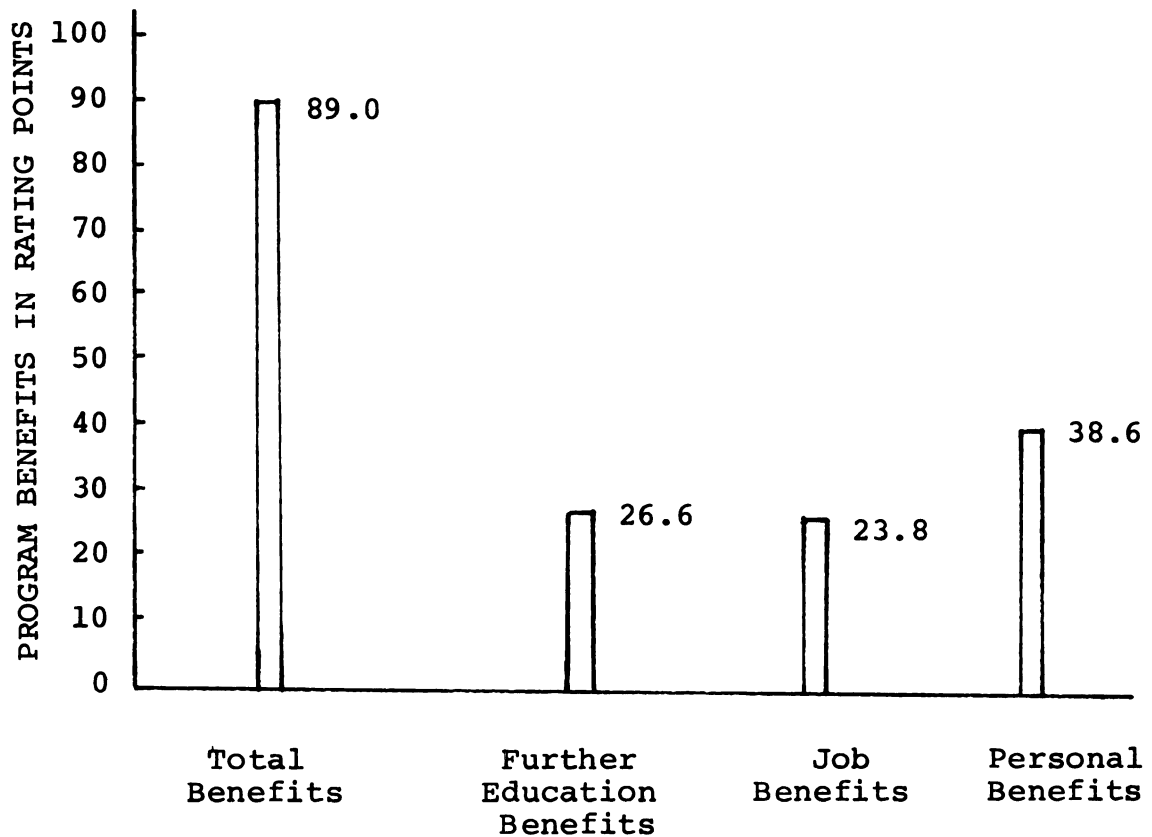


Figure 4.1
Summary of Total Benefits

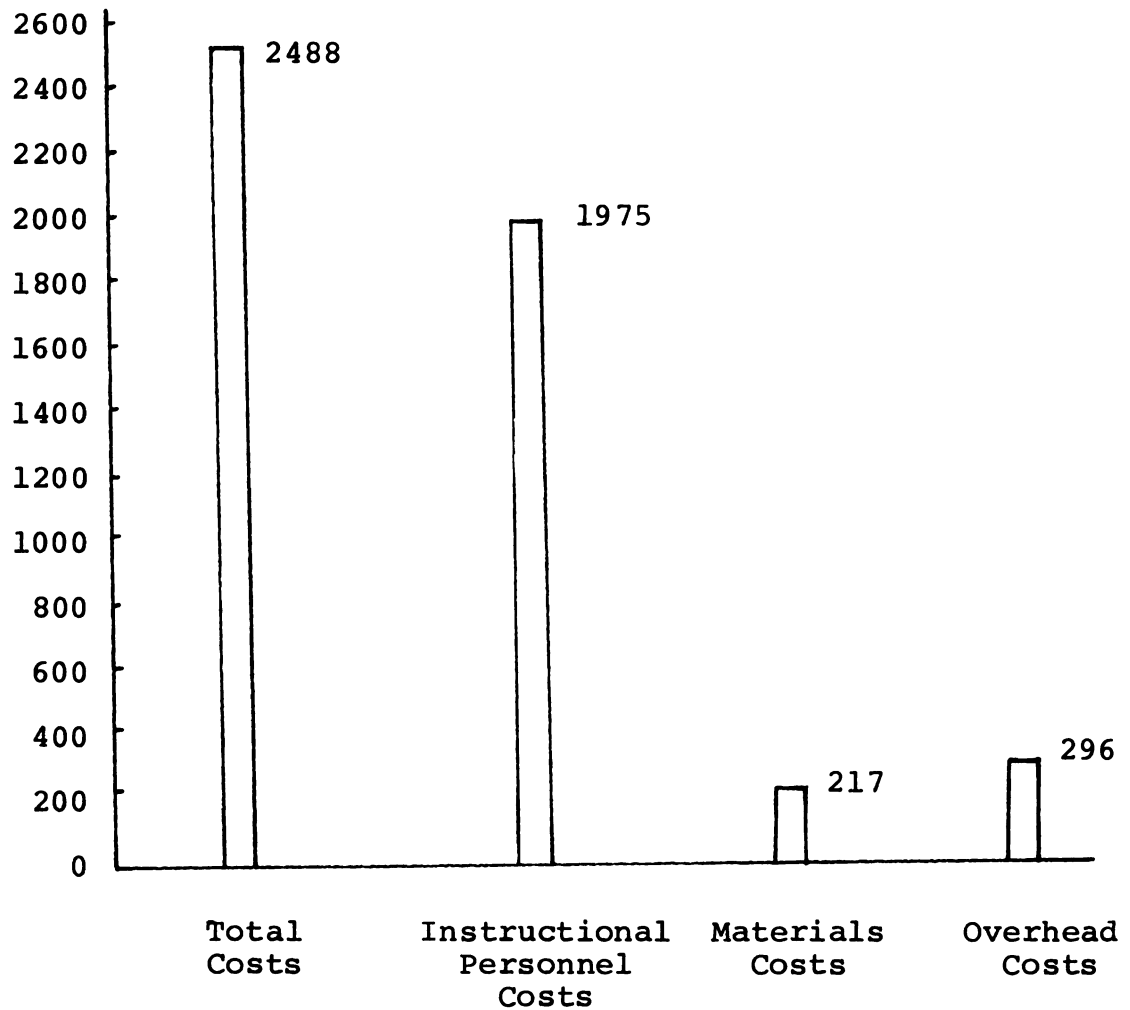


Figure 4.2

Summary of Total Costs

benefits for the overall sample do differ, with personal benefits at 38.6 and job benefits at 23.8, these are not nearly so divergent as the production costs, where materials account for only \$217 and instruction, \$1,975. Table 4.15 presents a summary of cost and benefit components for the three sub-groups of graduates considered in this study.

Table 4.15. Summary of Component Benefits and Costs

Groups	Benefits			Costs \$		Over.
	Ed.	Job	Per.	Inst.	Mat.	
Overall Sample (n=331)	26.6	23.8	38.6	\$1,975	\$217	\$296
Graduation Program						
Academic (n=138)	32.8	23.1	40.8	2,103	198	291
Combined (n=106)	24.5	24.2	37.9	1,917	212	275
Vocational (n=87)	19.2	24.4	36.0	1,841	252	330
Post-High School Activity						
School Full-Time (n=57)	34.3	20.8	40.4	2,136	201	289
School Full-Time and Work Part-Time (n=34)	31.1	21.8	42.6	2,043	173	276
School and Work (n=75)	29.8	22.8	38.9	2,033	220	301
Full-Time and Part-Time School (n=20)	31.2	30.0	38.9	2,026	227	300
Work Full-Time (n=118)	20.3	25.8	37.1	1,871	235	304
Other (n=27)	19.6	22.1	35.9	1,799	209	286
Number of Graduation Electives						
8 Courses (n=57)	17.0	22.1	32.4	1,644	205	271
9 Courses (n=61)	24.7	22.7	33.7	1,853	194	266
10 Courses (n=79)	25.9	25.0	37.8	2,025	222	298
11 Courses (n=104)	30.4	24.3	42.7	2,117	229	321
12 Courses (n=26)	39.3	23.8	49.4	2,287	232	322

An examination of the sub-groups' costs and benefits reflect differences in component patterns and totals. These differences are relatively consistent within the sub-groups and seem indicative of "product" differences. Graduation programs, post-high school activity, and the number of graduation electives in particular, clearly show that there are differences in magnitude and substance that must be considered in an analysis of the high school "product."

The first section of this chapter was concerned with testing for positive and significant relationships between the variable, Total Benefits and educational costs. Those determined to be significant beyond the .05 level are summarized in Table 4.16. It can be observed from this table that for both total costs, as well as for component total costs, several significant relationships were identified with the variable, Total Benefits. The second section in this chapter involved analyzing those relationships between the variable, Further Education Benefits and high school program costs. These have been summarized in Table 4.17. The third and fourth sections of this chapter were concerned with the variables, Job Benefits and Personal Benefits, respectively. The results of hypotheses testing relative to these two variables and the cost variables are presented in Tables 4.18 and 4.19.

Table 4.16. Summary of Hypothesis 1 Tests

	Overall	Graduation Program	Post-High Activity	Program Electives
	AC	Com	Voc S Sw WS W O	8 9 10 11 12
Total Benefits				
Total Costs	X*	X*	X	X*
Instructional and Personnel Costs	X*	X	X	X
Materials Costs	X	*	X	
Overhead Costs	X			

Table 4.17. Summary of Hypothesis 2 Tests

	Overall	Graduation Program	Post-High Activity	Program Electives
	AC	Com	Voc S Sw WS W O	8 9 10 11 12
Further Education Benefits				
Total Costs	X*	X	X	X*
Instructional and Personnel Costs	X	X*	X	X*
Materials Costs				
Overhead Costs			X	

Note: X denotes a significant correlation $p < .05$
 * denotes a cost effect ANOVA

Table 4.18. Summary of Hypothesis 3 Tests

		Overall		Graduation Program			Post-High Activity			Program Electives				
		AC	Com	Voc	S	SW	WS	W	O	8	9	10	11	12
Job Benefits														
Total Costs		X		X				X*	X		X*			
Instructional and Personnel Costs				X				X	X		X*			
Materials Costs		X			X						X*			
Overhead Costs		X		X								X		

Table 4.19. Summary of Hypothesis 4 Tests

	Overall		Graduation Program		Post-High Activity			Program Electives					
	Ac	Com	Voc	S	Sw	Ws	W	O	8	9	10	11	12
Personal Benefits													
Total Costs	X*	X		X*	X			X*					
Instructional and Personnel Costs	X	X		X	X		X	X					
Materials Costs	X	X*			X		X						
Overhead Costs		X*											

Not.: X denotes a significant correlation $p < .05$.
 * denotes a cost effect ANOVA $p < .05$.

The final tables in this chapter summarize those hypotheses tested involving all cost and benefit variables considered in this study. Two hundred and forty hypotheses were tested using Pearson correlation analysis, while one hundred and forty-four analyses of variance were performed on dependent benefit variables in an attempt to identify cost effects. Table 4.20 is a summary of significant cost-benefit relationships for the overall sample and three subgroupings. Table 4.21 presents the same information in a more detailed format. From these tables it is possible to observe that some benefits and costs' relationships tend to be more related for certain subgroupings of the sample. For instance, no significant relationships were identified for the small group of graduates who worked full-time and attended school part-time. This was also true for those graduates who had elected 11 or 12 courses for their graduation. Compared to these, several subgroups displayed consistently frequent relationships between costs and benefits. This can be seen for groups such as the academic graduates, combined graduates, graduates working and attending school equally, graduates working full-time, and those graduates who had elected either 8 or 10 graduation courses.

It is also possible to recognize some trends or patterns of relationships for specific sub-groups. For example, one would expect job benefits to show more relationships for Vocational program graduates or those grad-

Table 4.20. General Summary of Hypotheses' Tests

Costs		Overall	Graduation Program	Post-High Activity	Program Electives	Total
Total Benefits	Ac	3	9	6	4	22
	Re	1	3	18	16	38
Further Education Benefits	Ac	2	7	7	3	19
	Re	2	5	17	17	41
Job Benefits	Ac	3	3	3	6	15
	Re	1	9	21	14	45
Personal Benefits	Ac	3	7	10	0	20
	Re	1	5	14	20	40
Total	Ac	11	26	26	13	76
	Re	5	22	70	67	164

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Note: Ac--Accept Hypothesis $p < .05$
 Re--Reject Hypothesis

Table 4.21. Detailed Summary of Hypotheses' Tests

Groups	Overall	Graduation Program			Post-High Activity					Program Electives					Total
		Ac	Com	Voc	S	Sw	SW	WS	WO	8	9	10	11	12	
Total Benefits															
Total Costs	X	X	X	X	X	X	X	X	X	X	X	X			9
Instructional and Personnel Costs	X	X	X	X											8
Materials Costs	X	X	X												3
Overhead Costs	X	X													2
Further Education Benefits															
Total Costs	X	X	X		X	X	X	X	X	X	X				7
Instructional and Personnel Costs	X	X	X												9
Materials Costs	X	X													1
Overhead Costs	X	X													2
Job Benefits															
Total Costs	X			X						X	X	X			5
Instructional and Personnel Costs															4
Materials Costs	X														3
Overhead Costs	X														3
Personal Benefits															
Total Costs	X	X	X		X	X	X		X						6
Instructional and Personnel Costs	X	X	X												7
Materials Costs	X	X	X												4
Overhead Costs	X	X													3
Subtotal															
Total Costs	4	3	3	2	0	3	3	0	3	3	0	2	0	0	27
Instructional and Personnel Costs	3	3	3	3	0	2	3	0	4	3	0	3	0	0	28
Materials Costs	2	2	2	0	2	0	1	0	1	0	1	0	0	0	11
Overhead Costs	2	3	1	0	1	2	0	0	0	0	0	1	0	0	10
Overall Total Relationships	11	11	9	5	3	7	7	0	8	6	1	6	0	0	76

Note: X denotes hypotheses accepted $p < .05$

uates working full-time, and this confirmed by the results shown in Table 4.21. One would also anticipate fewer relationships between job benefits and costs for Academic program graduates, and this also was observed in the data.

From both the actual number of relationships as well as the patterns between sub-groups, it would appear that educational benefits are positively related to educational costs within the parameters of this study.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

This study has been designed to test the relationships between high school graduation program benefits and their production costs. The approach is from a "product" perspective and relies on techniques drawn from Systems Analysis, Marketing Research, Economics, and Finance. Schools are considered to be similar in many respects to factories and service-producing enterprises that are also comprised of workers, buildings, equipment and materials. The study assumes a multi-faceted composition of the complex educational product, and tests for positive relationships between benefit components of the product and production costs as determined by cost accounting methods.

The current literature in four areas was examined. First, objectives held for schools are nowhere clear and educators do not agree on desirable outcomes. As such, identifying the school product is not simple but does seem to point in the general direction of defining the educational product at a consumer level. Lester Ruth's taxonomy

of educational benefits affords a means for identifying the product in this study. A second focus in the literature centered on how the educational product could be measured. Traditional letter grades and achievement scores, while appropriate measures for certain specific objectives, were not deemed as appropriate as follow-up studies and graduate opinion for obtaining a measure of the product consumed during the senior high school years. A third area of interest in this study related to the costing of the educational product. The literature revealed a trend toward the increased implementation of a cost accounting approach to supplement the traditional methods of financial or general accounting. More and more, one is likely to find instructional budgets broken down to show expenditures in greater detail and directly associated with the distribution of resources to specific school functions. The final area examined in the literature is cost-benefit or cost-effectiveness analysis. Contemporary thinking of the respective components as well as their interrelationships provided essential background for studying how cost is specifically related to various benefits in this study.

For the purpose of the study, sixty graduates from the 1979 graduating classes at each of seven Okanagan high schools were randomly selected as a survey sample to determine their perceived benefits from each course com-

pleted during their senior high school years. Three hundred and thirty-one usable responses were then costed on a course-by-course basis according to a number of cost factors unique to their program courses. The study and survey instrument were designed to focus on further education benefits, job benefits, and personal benefits. Graduates rated their perceived benefits for each course completed and this was done using a six-point Likert scale for each of the three benefit categories. Course costs, determined on a cost accounting basis, were similarly classified into the three categories of instructional personnel costs, materials costs, and overhead costs. Costs and benefits for each course were then aggregated into totals for each graduate. The overall sample of three hundred and thirty-one graduates was reclassified into three sub-groupings according to graduation program, post-high school activity, and the number of courses elected for graduation.

The central hypothesis, that educational benefits are positively related to educational costs, was tested for all benefit and cost variables. The Pearson product-moment correlation coefficient was employed in testing for significance at the .05 level between two hundred and forty cost and benefit variables. Analysis of variance was performed on one hundred and forty-four benefit variables in testing for significant cost effects beyond the .05 level.

The four research hypotheses examined in these tests were:

1. Total Educational Benefits are positively related to senior high school program costs.
2. Total Further Education Benefits are positively related to senior high school program costs.
3. Total Job Benefits are positively related to senior high school program costs.
4. Total Personal Benefits are positively related to senior high school program costs.

Conclusions

Total Education Benefits

Total education benefits were positively and significantly related to total costs for the overall sample, for graduates on all three high school programs, and for approximately half of the sub-groups according to post-high school activity or graduation electives. Many other positive and significant relationships were identified between total benefits and component cost variables, particularly instructional personnel costs. From the overall and graduation program results, one can conclude that those graduates with the most perceived benefits had the most expensive programs. Total benefits were also significantly related to instructional costs, and it must be concluded that this component cost is to a large extent

indicative of total benefits. Materials and overhead costs are relatively minor determinants for total benefits.

Further Education Benefits

Further education benefits, comprising thirty percent of total benefits, were notably related to the instructional personnel costs. These benefits were positively and significantly related for nine of the fifteen graduate groupings considered in the study. They were somewhat less related for the total costs; the vocational graduates who reported low benefits in this category were one of the groups not significantly related. Again, materials costs and overhead costs did not appear to have more than a minor impact on further education benefits. From these records, it is reasonable to conclude that most graduates, excluding those on the Vocational program, derive further education benefits in proportion to their total costs and in particular to their instructional costs.

Job Benefits

Job benefits accounted for twenty-seven percent of the total benefits and had fewer significant relationships than any other benefit category. It was not surprising that these benefits were highest for Vocational program

graduates and those graduates working full-time. It was also observed that these two groups were the ones that had the significant cost-benefit relationships. These job benefits were also highest for graduates who had selected 10 elective courses for their graduation and job benefits actually dropped off as the number of courses increased. This pattern was not evidenced for either further education benefits or personal benefits. For the group of graduates attending school full-time two years after graduation, their job benefits were significantly related with materials and overhead costs. Overall job benefits were also significantly related to both materials as well as overhead costs. An examination of the job benefits relationships point toward the conclusion that these benefits, while reflecting cost-benefit links for some sub-groups, are generally more related for vocational program graduates and those working full-time. There is also a stronger association with materials and overhead costs.

Personal Benefits

Personal benefits constituted the largest portion of total benefits, making up about forty-three percent of the total. These benefits were related to total costs for the overall sample and to most cost categories for Academic and Combined program graduates. Virtually no relationships were identified for the Vocational program graduates.

Similarly, no significant relationships were found for any of the sub-groups according to number of graduation electives. For those graduates who were working and attending school full or part-time, significant relationships were identified between personal benefits and costs. There were also the two groups who had the highest personal benefits. One can conclude that personal benefits for some groups of graduates are linked to their program costs, including instructional, materials, and overhead costs. There are other groups who show no relationship between these benefits and program costs.

Discussion

Even the most complicated school system can be viewed as a conversion process by which certain inputs are converted into outputs. This study has examined educational benefits and their production costs, and then tested for significant and positive relationships between costs as input and benefits as output. The actual processes of converting cost inputs into benefit outputs has not been a concern of this study.

Using Lester Ruth's Taxonomy of Educational Benefits as a basis for three benefit categories, the study established that clearly these benefits varied in degree from one graduate to another. Subgroupings of graduates according to the type of graduation program, post-high school

activity, and the number of courses elected for graduation, revealed that in terms of total and categorical benefits, graduation "products" varied greatly.

The application of cost accounting techniques to costing out each graduate's program made it possible to classify specific costs into the categories of instructional personnel costs, materials costs, and overhead costs. It was not surprising to find that instructional personnel costs were consistently in the eighty percent of total costs range; however, the relative consistency of materials and overhead costs across all graduation programs was not expected. For individual graduates, particularly those on a heavily vocational-oriented program, course costs would vary considerably. To some extent these unique graduate situations were averaged-out in determining totals, but it is likely that these costs were important in the analysis of benefit relationships.

The benefits obtained from the graduate survey were treated as dependent variables, while program costs were tested for relationships or effects on the benefit variables. Statistical analysis identified many positive and significant relationships between benefit and cost variables. A marketing approach was applied in this study and graduates were grouped as "consumers" into graduation programs, post-high school activity groups, or groups based on the number of electives in a graduation program. By

examining these different groups' results and relationships, it was possible to tie some specific responses and patterns to them.

The disaggregated approach designed into this study, while requiring much effort to identify individual course costs and benefits, has facilitated the isolation of group results and relationships. The data base was in fact built-up, rather than being obtained by averaging, and probably lends itself to more valid and accurate conclusions. The early studies, involving aggregation of data at a level far above the graduate, would have difficulty offering the same substantive base for analyzing data, effects, or relationships.

Implications for Future Research

This study has shown that the educational product is composed of differing educational benefits and these are related in some positive ways to production costs and specific cost categories. It has also established that different groups of consumers have varying cost-benefit relationships. The disaggregation techniques applied in this study have essentially enabled some of the educational benefit parts to be linked to some of the educational cost parts.

Future research can reach further into the Taxonomy of educational benefits proposed by Lester Ruth and applied

in this study. Specifically, the categories of Further Education Benefits, Job Benefits, and Personal Benefits can be broken even more into sub-benefits that can in turn be tested against other more detailed factors. For instance, individual courses or subject areas across certain predetermined groups could be tested for positive relationships with costs which have also been categorized using cost accounting techniques.

This study has indicated that the variable, Job Benefits is not related to any of the cost components for either Academic or Combined program graduates. Economic conditions today and job preparation programs would both encourage the pursuit of further research on the topic of job benefits as well as demand that such a consideration include the associated cost factors. It can be concluded from this study that high schools are graduating quite distinct products with very unique combinations of courses and some other school experiences not considered in this investigation. Certainly, future studies could focus on a particular group of graduates and determine what input, including costs, is most important to the production of their benefits.

Another area worth investigating is, assessment of the long-term benefits from high school courses. This study surveyed graduates two years after high school and in many cases the individuals are still changing their life

patterns, to such an extent that present perceived benefits may not endure over a longer term. A longitudinal study of graduates would add a new dimension to understanding benefits and how they relate to cost and other inputs.

Perhaps in summary, the greatest implication for future research arising out of this study is the unlimited potential for understanding the educational product by adopting a product-centered, production approach with all the best interests of the consumers in mind.

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APPENDICES

APPENDIX A

LETTER OF AUTHORIZATION SENT TO SCHOOLS

SCHOOL DISTRICT NO. 23 (CENTRAL OKANAGAN)

MEMORANDUM

SECONDARY SCHOOL PRINCIPALS

FROM

M. G. Pendharkar

Superintendent of Schools

81-03-30

SUBJECT RESEARCH PROJECT - GRADUATES 1979

CUR FILE NO.

This is to inform you that I have authorized Mr. M. Marshall to conduct a doctoral research project that will involve over four hundred 1979 Graduates from School District #23. While the primary purpose of the study will be to fulfil Mr. Marshall's PhD requirements, it is also quite likely some of the information generated will be of interest to School Principals and Counsellors.

A random sample of 1979 Graduates will be contacted regarding their perceived benefits from specific courses and subject areas. These benefits will then be statistically considered relative to actual achievements, present activities, course costs, school program taken, and other variables. The data gathering will involve survey instruments, personal interviews, students record cards (PR), and District financial records.

This study should not place any extra demands on your school, however, should Mr. Marshall require some assistance or information from you relative to your 1979 Graduating Class, I would ask that cooperation be given wherever possible.

APPENDIX B

FIRST SURVEY LETTER SENT TO GRADUATES

Telephone (604) 860 8888
Telex 048-5103

Board of School Trustees
School District No. 23
(Central Okanagan)

OFFICE OF THE SUPERINTENDENT OF SCHOOLS:

M. G. Pendharkar
Superintendent of Schools

1940 Haynes Road
KELOWNA, B.C., Canada
V1X 5X7

File No. DS-1

April 27, 1981

Dear

As a 1979 Graduate you are important to me!

To complete requirements for my Ph.D. in Education, I am undertaking a research study involving selected high school graduates from School District #23. I also hope the information you provide and the thesis itself may assist the School District in reviewing its programs and course offerings. Your name has been chosen as part of the survey sample; not all your former classmates are being asked to participate. Your response is particularly needed to make this project worthwhile.

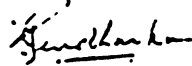
Since graduating almost two years ago, you have now had the opportunity to use some of the knowledge and skills learned from your high school courses in work, college, and other personal settings. I am interested in knowing which courses you think have been of most benefit to you in the past two years and the type of benefit involved. Space has also been provided for additional comments you wish to make regarding your courses.

Please take the few minutes required to complete this survey. To assist you, I have listed your Grade 11 and Grade 12 courses on the survey form. After completing, return the form as soon as possible in the post-paid envelope to the Office of the Superintendent of Schools.

Your cooperation in this survey will be very much appreciated.

Sincerely,

Authorized by:



M. Marshall
Supervisor of Instruction

M. G. Pendharkar
Superintendent of Schools

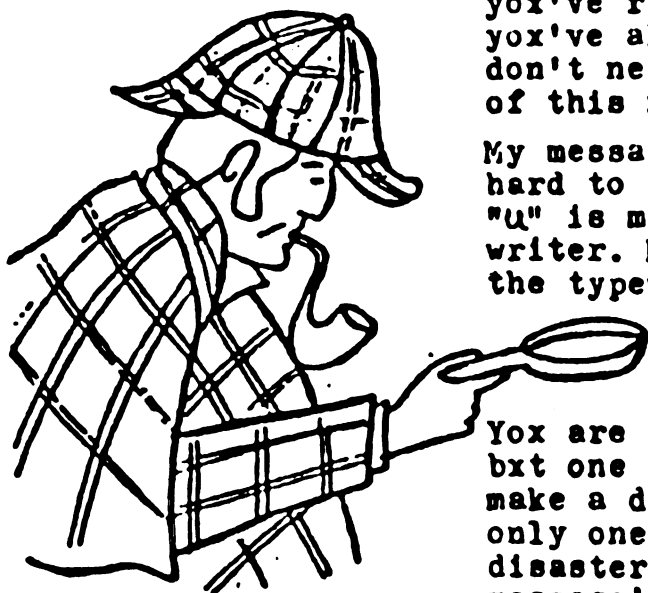
MM/ed

APPENDIX C

REMINDER NOTE SENT TO GRADUATES

81-05-11

Dear Graxate:



Help!!! I am looking for missing qxestionnaires! If yox've retrrned yoxrs, yox've already helped and don't need to read the rest of this note.

My message may be a little hard to read becaxse the "u" is missing on my typewriter. My sxrvey is like the typewriter -- a little hard to complete becaxse yox are missing.

Yox are only one gradxate, bxt one gradxate can really make a difference jxst as only one key has made a disaster oxt of this message! Woxld yox please mail yoxr completed qxestionnaire today.

THANKS

APPENDIX D

SECOND SURVEY LETTER SENT TO GRADUATES

Telephone (604) 860-8888
Telex 048 5103

Board of School Trustees
School District No. 23
(Central Okanagan)

OFFICE OF THE SUPERINTENDENT OF SCHOOLS

M. G. Pendharkar
Superintendent of Schools

1940 Haynes Road
KELOWNA, B.C., Canada
V1X 5X7

File No. DS-1

Dear

In case you did not receive my earlier letter, this second copy of the questionnaire is being sent.

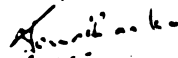
Your opinions are particularly important to me in completing this research study for my Ph.D. in Education. Your response actually represents several members of the 1979 Graduating class and I would like to include your opinions in my study. Please help by mailing your completed questionnaire today.

I have enclosed for your convenience a post-paid envelope addressed to the Office of the Superintendent of Schools.

Thank you for your help.

Sincerely,

Authorized by:



M. Marshall
Supervisor of Instruction

M. G. Pendharkar
Superintendent of Schools

MM/ed

APPENDIX E

SAMPLE COMPLETED SURVEY FORM

GRADUATE, 1970—A FOLLOW-UP STUDY
SCHOOL DISTRICT 823 (CENTRAL OKANAGAN)

WHICH OF THE FOLLOWING ACTIVITIES HAVE YOU BEEN PRIMARILY INVOLVED WITH SINCE GRADUATION? CHECK (✓) EACH ITEM THAT DESCRIBES YOUR ACTIVITIES.

IN SCHOOL, FULL-TIME ☒ WORKING, FULL-TIME ☒ LOOKING FOR A JOB ☐
 IN SCHOOL, PART-TIME ☐ WORKING, PART-TIME ☒ OTHER: _____

WHICH OF YOUR HIGH SCHOOL COURSES HAVE BEEN OF MOST BENEFIT TO YOU SINCE GRADUATION, AND IN WHAT WAYS? PLEASE CONSIDER EACH OF YOUR GRADE 11 AND GRADE 12 COURSES COMPLETED, AND INDICATE ON THE SIX POINT SCALE THE DEGREE OF BENEFIT DERIVED. FOR INSTANCE, A COURSE MAY HAVE GREAT BENEFIT UNDER "FURTHER EDUCATION", NO BENEFIT FOR "EMPLOYMENT", AND SOME(2) BENEFIT UNDER "PERSONAL". ANOTHER COURSE MAY HAVE NO BENEFIT FOR "FURTHER EDUCATION", GREAT BENEFIT FOR "EMPLOYMENT", AND CONSIDERABLE (4) BENEFIT UNDER "PERSONAL". WE ARE INTERESTED IN KNOWING THE TYPE AND DEGREE OF BENEFIT DERIVED FROM HIGH SCHOOL COURSES.

BENEFITS SINCE GRADUATION

	FURTHER EDUCATION						EMPLOYMENT						PERSONAL					
	DEGREE OF BENEFIT RELATIVE TO FURTHER EDUCATION AT COLLEGE, UNIVERSITY, ETC.						DEGREE OF BENEFIT RELATIVE TO EARNING MONEY AND WORKING FULL-TIME AFTER GRADUATION						DEGREE OF BENEFIT RELATIVE TO A PERSONAL SATISFACTION THAT HAS BEEN DERIVED, GAINED INTERESTING, USEFUL, ETC.					
	GREAT BENEFIT	BENEFIT	BENEFIT	BENEFIT	BENEFIT	NO BENEFIT	GREAT BENEFIT	BENEFIT	BENEFIT	BENEFIT	BENEFIT	NO BENEFIT	GREAT BENEFIT	BENEFIT	BENEFIT	BENEFIT	BENEFIT	NO BENEFIT
ENGLISH 11		✓						✓					✓					
ENGLISH 12		✓						✓					✓					
MATHEMATICS 11			✓						✓				✓					
PHYSICAL EDUCATION 11						✓					✓			✓				
SCIENCE 11			✓						✓				✓					
SCIENCE 12			✓						✓				✓					
ART 11	✓						✓						✓					
ART 12	✓						✓						✓					
ART 11	✓						✓						✓					
ART 12	✓						✓						✓					
ART 11				✓					✓				✓					
ART 12				✓					✓				✓					
ED 11	✓						✓						✓					

P.S. I am sorry this is so late but I only just returned from B.C.I.T., Burnaby.

THANK YOU FOR COMPLETING THE QUESTIONNAIRE

ADDITIONAL COMMENTS BELOW WILL ALSO BE CONSIDERED

Am presently enrolled in a 2 year program at B.C.I.T. the option I am taking is Hotel, Motel, and Restaurant Management. I am finding that my English, and Algebra courses were a necessity. However the course I used most is Food. I think that perhaps a course focusing on communication would be a good idea in high school (some what more concentrate). Overall most have helped me in finding employment.

APPENDIX F

SAMPLE DATA RECORDING SHEET

1	C	4
---	---	---

code

M. C. F. H. R. 1

name

C PROGRAM

— ABILITY

10/1 ATTENDANCE

S P/T ☒ W P/T ☒ L ☐

S P/T ☐ W P/T ☒ Oth ☐

G	BENEFIT				InsP Cost	Costs		Course Code
	E	J	P	Σ		Mit	OverH	
C	5	4	6		156	9	12	001
F	5	4	6		137	11	11	002
A	4	3	6		172	17	11	101
P	1	1	4		140	10	31	201
C	4	3	6		156	32	10	111
B	4	3	6		211	18	14	121
C	6	6	4		220	11	14	301
A	6	6	6		179	12	13	504
A	6	6	6		179	12	13	505
A	3	3	6		237	18	32	901
A	3	3	6		237	20	33	902
F	3	5	6		303	20	32	611
A	6	6	6		228	55	45	701

52 56 59 74

2559 305 273

2yr program at BIT (HKI Mon)

En. Alg was a necessity

Course of use next was funds.

Course teaching oral communication would be
a good idea.

APPENDIX G

HIGH SCHOOL COURSE CODES

ENGLISH

EN 11 001
 EN 12 002
 WR 11 003
 LIT 12 004

SOCIALS

SS 11 101
 GEOG 12 111
 HIST 12 121
 EC 11 131
 LAW 11 141
 CIV 12 191

PHYSICAL EDUCATION

PE 11 201
 CR 12 211
 PE 12 291

MATHEMATICS

ALG 11 301
 ALG 12 302
 CON MA 11 311
 TR MA 11 312
 GEOM 12 303

SCIENCE

BI 11 401
 BI 12 402
 Ch 11 411
 CH 12 412
 IH 11 421
 PH 12 422
 E SC 11 431
 GEOL 12 432
 FOR 11 491
 AG 11 441
 AG 12 442

FOREIGN LANGUAGE

FR 11 501
 FR 12 502
 B GER 11 503
 GER 11 504
 GER 12 505
 B SP 11 506
 SP 11 507
 SP 12 508

INDUSTRIAL EDUCATION

DRAFT 11 601
 DRAFT 12 602
 DRAFT 11/12 603
 CON 11 611
 CON 12 612
 MTL 11 621
 MTL 12 622
 FLAST 11 623
 MX 11 631
 MX 12 632
 ELX 11 641
 ELX 12 642
 TECH 11 643
 TECH 12 644
 AERO 11 691
 AERO 12 692
 AE 11 693
 AE 12 694

HOME ECONOMICS

FD 11 701
 FD 12 702
 TX 11 711
 TX 12 712
 MGT 11 721
 HIS 12 731
 CC 12 741
 LIFE IN THE 70s 791

BUSINESS EDUCATION

Per. TY 11 801
 TY 11 802
 Per. TY 12 803
 SH 11 811
 SH 12 812
 BK 11 821
 BK 12 822
 QB 11 831
 QB 12 832
 MK 11 841
 OP 11 851
 OP 12 852
 OO 12 861
 ACCT 12 871
 ACCT 11 872
 EM 12 881
 BC 12 882
 DM 12 891

ART/MUSIC/DRAMA

ART 11 901
 ART 12 902
 DP 11 903
 DP 12 904
 AD 11 905
 PA 11 906
 AD 12 907
 GR COMM 11 908
 ACT 11 911
 ACT 12 912
 ST CR 11 913
 TH 11 914
 BA 11 921
 BA 12 922
 MU 11 923
 MU 12 924
 IS 11 925
 IS 12 926
 CHO 11 927
 CHO 12 928
 GUITAR 11 931
 FILM STUDIES 11 932
 ORCH 11 931
 ORCH 12 932

APPENDIX H

COURSE COST CALCULATIONS

Course Cost Calculations

Total Costs: Instructional Personnel Costs
Materials Costs
Overhead Costs

1. Instructional Personnel Costs

1.1 Instruction--Teacher's Salary

$$\frac{1/7 \text{ Scale and Experience}}{\text{Class Size}}$$

1.2 Fixed Charges--.05 x Instruction

1.3 Administrative Costs Per Student

7

1.4 Counselling Costs Per Student

7

1.5 Clerical Costs Per Student

7

2. Materials Costs

2.1 Texts Costs of Texts Per Course (depreciation 4 four years)

2.2 Course Materials--Actual Per Course

3. Overhead Costs

3.1 Facilities--Per sq. ft. cost calculated for each area of the school X

$$\frac{(X) \text{ (actual room area)} (.02)}{(7) \text{ (Class size)}}$$

3.2 Equipment--Using standard course equipment lists and costs with 20 year depreciation

$$\frac{(X) (.05)}{(7) \text{ (Class size)}}$$

3.3 Operation--Heat, light, power, water, sewer

(special area) (school costs)
(total school area) (7) (class size)

3.4 Custodial--Total district C-1 Budget \$2,325,600

District hours

Hours per school

(special area) (school cust cost)
(school area) (7) (class size)

APPENDIX I

SAMPLE TEACHER SALARY WORKSHEET FOR COURSES AT
KELOWNA SECONDARY SCHOOL

SCHOOL: Kelowna Secondary

SALARY WORKSHEET

SUBJECT	No. in class(es)	Post. Inst.	Salary Cat.	Act Salary	Cost/Student
CH 11	30	1/7	6-15	28726	137
Ge 12	26	1/7	6-21	28726	158
Ge 12	30	1/7	5-17	25993	124
Fd 11	89/4	4/7	5-5	20761	133
PT 11A	26	1/7	5-18	25993	143
SH 12	10	1/7	5-18	25993	371
BE 12	25	1/7	5-18	25993	149
PH 11	32	1/7	5-8	23377	104
PE 11	90/3	3/7	5-1	17273	82
Art 11	21	1/7	5-4	19889	135
Cl 11/12	22	1/7	5-4	19889	129
BGM 11	100/4	4/7	5-23	25993	149
EN 12	32	1/7	5-6	21633	97
Hy 12	30	1/7	5-6	21633	103
Az 12	15	1/7	5-17	25993	248
DM 12	49/3	3/7	5-17	25993	227
Ez 11	24	1/7	5-17	25993	155
BK 11	29	1/7	5-17	25993	128
BK 12	25	1/7	5-17	25993	149
SS 11	122/4	4/7	5-5	20761	97
Ge 12	14	1/7	5-4	19889	203
B:Ge 11	17	1/7	5-4	19889	167
Ge 11	27	1/7	5-4	19889	105
HK 11	53/2	2/7	5-6	21633	117
Mk 11	30	1/7	5-6	21633	103
PE 11	83/3	3/7	5-6	21633	112
SS 11	16	1/7	5-0	16401	146
En 11	26	1/7	5-0	16401	90
SS 11	65/2	2/7	5-5	20761	91
En 12	55/2	2/7	5-17	25993	135
WR 11	12	1/7	5-17	25993	309
TE 11	55/2	2/7	5-3	19017	99
SW 11	58/2	2/7	5-14	25993	128
Ty 11B	20	1/7	5-12	25993	186
BM 12	92/3	3/7	5-12	25993	121
OP 11	46/2	2/7	5-12	25993	161
Ma 12	38/2	2/7	5-5	20761	156

APPENDIX J

SCHOOL SUPPORT COSTS PER STUDENT

School Costs In Dollars Per Student

	GE	GP	KLO	KSS	MB	OKM	RS
Area (FT ²)	64525	67909	73623	185310	69139	61745	72002
Enrolment	593	612	681	1602	651	606	534
Admin \$	119	95	84	69	83	87	79
Counsel \$	45	60	99	84	88	71	94
Sec \$	74	74	74	74	74	74	74

Inst .05 Inst 1/7 (Admin Coun Sec)

APPENDIX K

TEXTBOOK CATALOGUE USED FOR PRICING TEXTS



MINISTRY OF EDUCATION, SCIENCE
AND TECHNOLOGY

1979-80

TEXTBOOK CATALOGUE

THIS BOOKLET IS A PRICE LIST ONLY AND
IS NOT TO BE USED AS AN ORDER FORM.
PLEASE RAISE ORDERS IN SAME SEQUENCE
AS CATALOGUE LISTING, AND QUOTE
CATALOGUE NUMBERS.

PUBLICATION SERVICES BRANCH

Victoria, B.C.

Printed by E. M. MacDONALD, Printer to the Queen's Most Excellent Majesty
in right of the Province of British Columbia.
1979

APPENDIX L

TEXT COSTS FOR PRESCRIBED AND AUTHORIZED
COURSES DEPRECIATED OVER FOUR YEARS

TEXT--FOUR YEAR DEPRECIATION

	<u>Prescribed Text</u>	<u>Supplementary First Class</u>
En 11	\$4.59	\$ 3.25
En 12	6.78	2.77
SS 11	1.24	15.06
PE 11	----	----
P. Ty 11	4.41	2.28
Sh 11A	7.60	----
Sh 11B	8.45	----
Sh 12	8.45	----
MK 11	5.55	----
GB 11	1.54	.47
GB 12	0.98	3.29
BK 11	3.62	----
BK 12	----	4.76
Acct 12	4.77	----
OO 12	----	----
OP 12	----	----
BM 12	1.78	----
Wr 11 (J)	3.53	10.36
Wr 11 (CW)	0.38	0.30
Wr 11 (BM)	1.05	2.24
Lit 12	6.36	3.98
Man 11	3.52	9.59
Fd 11	1.00	11.52
Fd 12A	5.14	8.22
Fd 12B	1.73	5.13
Tx 11*	3.00	3.79
Tx 12A	3.76	7.85
Tx 12B	3.95	3.80
CC 12	2.39	0.75
Hls 12	3.23	----
Drf 11/12	3.67	----
M+1 11/12	3.75	----
Mx 11/12	3.66	----
Con 11/12	2.01	----
Electx 11/12	6.54	----

APPENDIX M

**MEMO TO SCHOOL DISTRICT STAFF OUTLINING
NON INSTRUCTIONAL COST NEEDS**

The following cost needs should be placed in perspective. Educational costing is a difficult business, particularly when it becomes specific, and this probably accounts for the fact that very little "course" costing has been attempted. With this in mind and also knowing my Doctoral Committee is understanding as I attempt some original work, my own expectations for very precise and readily available data are limited accordingly. This said, and fairly confident that I have a good handle on Instructional Salaries (typically 50% of course costs), let me elaborate my needs.

For Fiscal 1979: Schools: GE, GP, KLO, KSS, MB, OKM, & RS

1. Capital--As of December 31, 1979
 - 1.1 Site--Assessed Values by School
 - 1.2 Buildings--Assessed (insurance?) value by school and by school area if possible
i.e. KLO gym, KSS Auto Shop, OKM HEC, RS art, etc.
 - 1.3 Equipment--Assessed value by school and by school area if possible
i.e. MB shops, GP commerce, etc.
2. Other Instructional--January 1, 1979 to December 31, 1979
 - 2.1 Aides--Salaries by school and subject area.
 - 2.2 Supplies--B-3 by school and area
 - 2.3 Secretarial Salaries--By school
 - 2.4 Texts--By school
3. Plant Operation--By school
4. Plant Maintenance--By school
5. Administration--District staff 1979
6. School Services
 - 6.1 Transportation--By school

7. Fixed Charges--Fringe Benefits (pension, dental, etc.)
per teacher

8. Debt Retirement--By school

Note: Some of the above categories may not be most appropriate for British Columbia Educational Costing. I am certainly open to suggestions that would improve the costing format.

APPENDIX N

CALCULATION OF SCHOOL ADMINISTRATION AND
COUNSELLING COSTS

ADMINISTRATION COSTS

Admin Hours/Total Hours (Pay Category)/Years Experience)

Admin Costs/Time:

Cat/Yrs Class

GE	21/24 (6/18)	33 + 15/24 (5/23) + 15/24 (5/22)
GP	35/40 (5/14)	34 + 30/40 (6/15)
KLO	14/48 (6/24)	37 + 14/48 (5/28) + 48/48
KSS	48/48 (5/30)	94 + 26/48 (6/15) + 26/48 (6/21) + 26/48 (6/19)
MB	18/25 (6/18)	37.5 + 15/25 (6/12)
OKM	33/48 (6/14)	33 + 30/48 (6/16)
RS	42/75 (6/28)	29 + 35/75 (6/26)

COUNSELLING COSTS

Coun. Hours/Total Hours (Pay Category)/Years Experience)

Counselling Costs/Time:

GE	18/24 (5/6) + 12/24 4/8
GP	15/40 (4/13) + 25/40 (6/18) + 15/40 (4/0) + 10/40 (6/2)
KLO	10/48 (6/24) + 12/48 (5/28) + 6/48 (4/5) + 6/48 (6/7) + 18/48 (6/31) + 24/48 (4/3) + 70/48 (5/max) + 24/48 (6/12) + 27/48 (6/7) + 14/48 (6/17) + 16/48 (5/15)
KSS	10/48 (6/15) + 10/48 (6/21) + 10/48 (6/19) + 24/48 (5/6) + 24/48 (5/5) + 12/48 (6/6) + 12/25 (6/12)
MB	6/25 (5/18) + 6/25 (6/12) + 12/25 (6/4) + 12/25 (6/2) + 8.5/25 (6/12)
OKM	30/48 (6/14) + 30/48 (5/13) + 18/48 (5/8)
RS	25/75 (6/28) + 15/75 (6/26) + 60/75 (6/3) + 52/75 (5/13)

Admin Costs "K" Forms:

GE 34085.25 + 20720.63 + 5844.25 + 6498.25 + 3590.75
 = 70,739

GP 31863.88 + 26104.5
 = 57,968

KLO 18168 + 12476.29 + 8766.38 + 7181.5 + 10772.25
 = 57364.42

KSS 25993 + 46679.75 + 37950
 = 110,622.75

MB 37918.32 + 15930
 = 53848.32

OKM 37702.88 + 14925
 = 52627.88

RS 29492.03 + 12915
 = 42407.03

Counselling Costs:

GE 16224.75 + 10216.5
 = 26,441.25

GP 8470.13 + 17953.75 + 5508.38 + 5055.25
 = 36,987.51

KLO 5984.58 + 6498.25 + 2284.88 + 3118.25 + 1072.25
 + 8421.5 + 17328.67 + 12814.37
 = 67,222.75

KSS 17953.75 + 10816.5 + 10380.5 + 6000.25 + 37906.46 +
 14363 + 14032.13 + 14363 + 8664.33
 = 134,479.92

MB 6238.32 + 6894.24 + 10613.28 + 9706.08 + 23555.32
 = 57007.24

OKM 17953.75 + 16245.63 + 8766.38
 = 42965.76

RS 9575.33 + 5745.2 + 16932.8 + 18021.81
 = 50275.14

APPENDIX O

CALCULATION OF SCHOOL EQUIPMENT COSTS

Course	Blue Book Sq. Ft.	81/82 Equip- ment	Jul 82 Equip- ment	Jul 79 Equip- ment $(\frac{x}{y}) - (.05)$	
EN	784	2,618	1,870	13	
MA	784	2,618	1,870	13	
SS	784	2,618	1,870	13	
Lang	784	6,380 2,618	4,557 1,870	46	
Art	1008	21,460	15,329	109	
Music	1344	9,700	6,929	49	
Band	1344	19,500	13,929	99	696 ← + 8 classes
Drama	1344	14,950	10,679	76	
Bus Ed.	896	40,838	29,070	208	
Sc Bi 11	1232 }	27,500	19,643 }	140	70 } 982 ← + 8 classes
Bi 12	1232 }				70 }
Ch 11	1232 }	28,380	20,271 }	145	72 } 1014 ← + 8 classes
Ch 12	1232 }				73 }
Ph 11	1232	21,191	15,136	108	54 378 756 ← + 8 classes
Ph 12	1232	5,764	4,117	29	83 584 206 ← only 12's
ESc	1232 }	8,030	5,736	41	287
G 12	1232 }			41	
HEcFd	1400	17,495	12,496	89	
Tx	1400	20,397	14,569	104	
Comb	1400	36,993	26,424	(189)	
FE	1915	34,428	24,591	88	
IE Wd	3024	49,941	35,672	255	
M+1	2160	82,020	58,586	418	
Flx	2160	59,590	42,564	304	
PM/Metro	2520	86,027	61,448	439	
Drf	1008	15,678	11,199	80	
Bus Ed	896	40,838	29,170	208	
Cafet- eria	3024	131,660	94,043	671	

APPENDIX P

SCHOOL ASSESSMENTS 1979 AND 1980

Replacement Value--May 29, 1983

	Construction	Equipment	Per Cent	Blacktop	Fencing	Other	Total
1. GE	3,802,977	617,309	16.2	5,987	11,589	1,990	
2. GP	4,631,290	733,356	15.8	23,682	18,561	40,134	
3. KLO	4,004,527	690,008	17.2	36,127	26,057	26,320	
4. KSS	11,179,073	1,625,460	14.5	204,979	11,638	19,648	
						25,260	
5. MB	5,722,470	342,476	6.0	10,135			
6. OKM	3,238,583	295,489	9.1	24,836	30,130	22,820	
						22,431	
7. RS	3,750,181	490,520	13.0	5,427	19,082	43,758	
			May 30, 1980				
1. GE	3,504,164	534,842		5,443	10,535	1,843	3,185,600
2. GP	3,965,031	588,857		21,529	16,874	35,131	3,604,600
3. KLO	3,689,598	611,029		32,843	23,688	23,927	3,354,200
4. KSS	7,950,594	1,390,055		186,345	10,580	17,862	7,227,800
						23,389	
5. MB	5,294,618	298,361			9,214		4,813,300
6. OKM	2,993,632	259,797		22,578	27,391	21,130	2,721,500
						20,392	
7. RS	3,470,445	412,700		4,934	17,347	39,780	3,155,000

APPENDIX Q

**CUSTODIAL COSTS AND FACILITY DEPRECIATION FOR
SUBJECT AREAS IN EACH SCHOOL**

Custodial Costs and Facility Depreciation for Subject Areas in Each School
Custodial--

	Enrol- ment	Rate Cost	Per Cent	Total Cost	C-1 Per Student	Normal Room 784	Art 1008	Music 896	Bus Ed 896	Sc 1232	MEC 1400	Gym 1915	Wood 3023	Metal 2160	Elect 2160	PM/Auto 2520	Draft 1008
CE	593	40	3.71	66,280	146	1,048	1,348	1,797	1,198	1,647	1,872	2,561	4,044	2,888	2,888	3,370	1,348
GP	612	44.5	4.13	96,047	157	1,109	1,426	1,901	1,267	1,741	1,980	2,708	4,277	3,055	3,055	3,564	1,426
KLO	681	48	4.45	103,489	152	1,102	1,417	1,889	1,259	1,732	1,968	2,692	4,250	3,036	3,036	3,542	1,417
KSS	1,602	120	11.13	258,839	162	1,095	1,408	1,877	1,252	1,721	1,956	2,675	4,224	3,017	3,017	3,520	1,408
MB	651	48	4.45	103,489	159	1,025	1,318	1,758	1,172	1,611	1,831	2,504	3,954	2,825	2,825	3,295	1,318
OKM	606	44	4.08	94,884	157	1,205	1,549	2,065	1,377	1,893	2,151	2,943	4,647	3,319	3,319	3,873	1,549
PS	534	56	5.19	120,698	226	1,314	1,690	2,253	1,502	2,065	2,347	3,210	5,069	3,621	3,621	4,224	1,690
	5,279	1078.	37.14	863,726													

C-1 2,325,600
1979

Facility Depreciation

CE 49	110	141	188	125	172	196	268	423	302	302	353	141
Eq	13											
GP 53	119	153	204	136	187	212	290	458	327	327	382	153
Eq												
KLO 46	103	132	177	118	162	184	252	397	284	284	331	132
Eq												
KSS 39	87	112	150	100	137	156	213	389	241	241	281	112
Eq												
MB 61	137	176	234	156	215	244	334	527	376	376	317	127
Eq												
OKM 44	99	127	169	113	155	176	241	380	272	272	317	127
Eq												
PS 44	99	127	169	113	155	176	241	380	272	272	317	127
Eq												

APPENDIX R

**CUSTODIAL TIMES AND SPACES FOR ALL SCHOOLS IN THE
CENTRAL OKANAGAN SCHOOL DISTRICT**

REPORT OF SCHOOLS CHECKED

No.	School	Square Feet	Present Hours	13,000 Sq. Ft.	15,000 Sq. Ft.	16,500 Sq. Ft.	Chief's Time Added
01	Mount Boucherie Secondary	79,139	48	49	42	38	44
02	George Elliot Secondary	64,525	40	40	34	31	36
03	George Pringle Secondary	67,909	44.5	42	36	33	110
04	Kelowna Alternate Secondary	5,200	--	--	--	--	--
05	Kelowna Secondary	185,310	120	114	99	90	112
06	K.L.O. Junior Secondary	73,632	48	45	39	36	42
07	Dr. Knox Junior Secondary	61,090	39	38	33	30	36
08	Okanagan Mission Secondary	58,667	44	36	31	28	34
09	Rutland Junior Secondary	68,256	40	42	36	33	110
10	Rutland Senior Secondary	72,002	56	44	38	35	40
11	Springvalley Junior Secondary	64,737	42	45	35	31	36
12	A.S. Matheson Elementary	31,600	16	19	17	15	16
13	Hollywood Road Secondary	50,014	32	31	27	24	32
14	Bankhead Elementary	31,600	16	19	17	15	16
15	Belgo Elementary	28,810	18	18	15	14	16
16	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--
19	Casorso Elementary	12,344	8	8	7	3	6
20	Central Elementary and Damar	36,764	24	23	20	18	24
21	Bellevue Creek Elementary	21,538	12	13	11	10	12
22	DeHart Elementary	--	--	--	--	--	--
23	Davie Road Elementary	7,012	--	--	--	--	3
24	Dorothea Walker Elementary	33,000	18	20	18	16	18
26	East Kelowna Elementary	9,500	--	--	--	4	--
27	Ellison Elementary	9,350	--	5	5	4	5
28	Ellison Primary	6,298	--	1	3	1	3
30	Glenmore Elementary	34,927	24	21	19	17	19
32	Glenn Avenue Elementary	16,696	8	10	9	8	10
33	Glenrosa Elementary	30,400	24	19	10	15	16
34	Gordon Elementary	6,794	--	7	2.5	2	--
35	Black Mountain Elementary	29,220	20	18	16	14	16
36	--	--	--	--	--	--	--
37	Hudson Road Elementary	26,420	16	16	14	13	16
38	Lakeview Elementary	29,775	24	18	16	14	16
40	Martin Elementary	18,609	9	11	10	9	11

APPENDIX S

ENERGY EXPENDITURES FOR SCHOOLS

MEMORANDUM

From: M. Groves Subject: Place: Administration Office....
To: M. Marshall Date: January 21, 1982
ENERGY EXPENDITURES

The energy costs (September 1978 - June 1979) for the selected schools are as follows:

Mount Boucherie

Power	\$29,264
Fuel (gas)	12,955
Water	466

George Elliot

Power	\$12,075
Fuel (gas)	10,197
Water	608

George Pringle

Power	\$16,413
Fuel (gas)	12,737
Sewage	1,853
Water	655

Kelowna Secondary

Power	\$16,366
Fuel (gas)	31,048
Sewer	6,065
Water	884

K.L.O. Secondary

Power	\$12,873
Fuel (gas)	11,823
Sewage	3,529
Water	680

Okanagan Mission Secondary

Power	\$10,992
Fuel (gas)	10,773
Water	2,031

Rutland Senior Secondary

Power	\$11,496
Fuel (gas)	14,691
Water	420

APPENDIX T

SAMPLING FORTRAN CODING SHEET

62-60-28 2175

FORTRAN CODING FORM

[illegible]

APPENDIX U

SAMPLE SCHOOL COST DATA RECORDING SHEET

Sample Course Costs For Schools:

Course	I	M	O	I	M	O	I	M	O	I	M	O	I	M	O	I	M	O
901	239	18	33	--	18	17	188	18	20	115	18	14	204	18	28	139	18	19
902	239	20	33	130	20	17	212	20	23	159	20	22	204	20	28	223	20	34
903	--	3	--	--	--	--	188	18	20	261	3	39	--	--	--	223	3	34
904	--	3	--	--	--	--	--	--	--	306	3	46	--	--	--	--	3	--
905	--	13	--	--	--	--	188	18	20	246	13	26	--	--	--	235	13	27
906	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
907	13	--	--	--	--	--	212	20	23	--	--	--	--	--	--	224	13	27
908	--	--	--	--	--	--	--	--	--	146	--	31	268	--	28	--	--	--
911	--	5	--	136	5	28	126	5	21	165	5	24	176	5	29	275	5	44
912	--	8	--	136	5	28	126	8	21	199	8	29	--	--	--	275	8	44
913	--	--	--	152	--	28	--	--	--	--	--	--	--	--	--	--	--	--
914	155	5	20	--	--	--	--	--	--	--	5	--	--	--	--	--	--	--
921	156	14	20	191	14	20	172	14	37	162	14	22	144	14	51	202	14	62
922	156	16	20	191	14	20	172	16	37	143	16	19	144	16	51	202	16	62
923	155	18	20	--	--	--	172	14	37	310	18	37	--	--	--	213	18	26
924	155	18	20	--	--	--	--	--	--	292	18	35	--	--	--	--	18	--
925	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18	--
926	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18	--
927	--	20	--	191	20	20	105	20	15	167	20	24	--	--	--	--	20	20
928	--	20	--	191	20	20	105	20	15	167	20	24	--	--	--	--	20	20
991	--	10	--	--	--	--	172	16	37	--	--	--	--	--	--	--	--	--
992	--	--	--	--	--	--	--	--	--	201	--	19	--	--	--	--	--	--
931	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
932	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

APPENDIX V

SAMPLE COURSE COSTS FOR SCHOOLS

Sample School Cost Data Recording Sheet:

School: KSS (84 Courses)

Subject	No. in Class(es)	Facility	Equipment "O" Salary Cat.	And .210 HLP Art. Salaries	Cost/Student	I
En 11	531 19	3.11	.47 10.36	5.60 1.18	117	154.85
En 12	491 18	3.19	.48 10.60	5.73 1.20	141	180.05
SS 11	418 18	3.74	.56 12.46	6.74 1.42	111	148.55
PE 11	509 18	7.53	3.11 26.99	17.51 2.84	104	141.20
CR 12	46 2	9.26	3.82 33.18	16.61 3.49	129	167.45
Alg 11	251 9	3.12	.47 10.74	5.91 1.24	125	163.25
Alg 12	222 3+1+4	3.14	.47 10.42	5.63 1.18	141	180.05
Geom 12	69 1+2	3.78	.57 12.58	6.80 1.43	173	213.65
Tr Ma 11	93 1+1+2	3.74	.56 12.43	6.72 1.41	160	200.00
Bl 11	211 3+4	4.55	4.64 19.00	8.16 1.71	136	174.80
Bl 12	109 3+2	6.28	9.01 28.94	11.28 2.37	188	229.40
Ch 11	207 1(30)3+4	5.29	5.59 22.38	9.50 2.00	158	197.90
Ch 12	141 3+2	4.85	7.19 22.58	8.71 1.83	146	185.30
Ph 11	131 1(32)4	5.28	5.77 22.35	9.38 1.97	139	177.95
Ph 12	38 2	7.21	11.11 33.98	12.94 2.72	195	246.75
MS 11	45 2	6.09	4.25 23.57	10.93 2.30	132	170.60
Geol 12	21 1	6.51	4.56 25.24	11.70 2.46	141	180.05
Aq 11	21 1	6.52	.62 21.30	11.70 2.46	177	217.85
Aq 12	141 1	9.78	.93 31.96	17.56 3.69	265	310.25
Fr 11	130 1+2+2	3.35	1.76 12.38	6.01 1.26	110	147.50
Fr 12	57 2	3.05	1.61 11.30	5.49 1.15	125	163.25
Ger 11	27 1	3.22	1.70 11.93	5.79 1.22	105	142.25
B Ger 11	17	5.12	2.70 18.95	9.20 1.93	167	207.35
Ger 12	14	6.21	3.29 23.02	11.17 2.35	203	245.15
Sp 11	22 1	3.95	2.09 14.64	7.11 1.49	156	195.80
Sp 12	12 1	7.25	3.83 26.86	13.04 2.74	286	312.30
B Sp 11	20 1	4.35	2.30 16.11	7.82 1.64	171	211.55
Hist 12	91 1+2	2.87	.93 9.53	5.15 1.08	124	162.20
Geog 12	78 1(26)1(30)+1	3.35	.50 11.13	6.02 1.26	153	192.65
Lit 12	12 1	7.25	1.08 24.11	13.04 2.74	342	391.10
Civ 12	10 1	8.70	1.30 28.92	15.64 3.28	410	462.50
Law 11	157 2+3	2.77	.41 9.21	4.98 1.05	125	161.25
Ec 11	24 1	3.63	.54 12.60	6.52 1.37	155	194.75
Wr 11	31 1+1	5.61	.84 18.66	10.09 2.12	217	259.85
Draft 11	50 2	4.48	3.20 17.42	8.65 1.69	149	188.45
Draft 12	02 2	5.33	3.81 20.73	9.58 2.01	177	217.85
Cat 11	100 1+4	19.45	12.75 68.71	30.17 6.34	185	226.25
Cat 12	38 1+1	20.47	13.42 72.32	31.76 6.67	195	236.75
M+1 11	119 2+4	12.15	21.08 59.52	21.73 4.56	200	242.00
M+1 12A	24 1	10.04	17.41 49.18	17.96 3.77	155	194.75
B	15 1	16.07	27.87 78.70	28.73 6.03	248	292.40
Mx 11	110 5	12.77	19.95 60.38	22.86 4.80	135	173.75
Mx 12	38 2	14.79	23.11 69.93	26.47 5.56	156	195.80
Elx 11	100 4	9.64	12.16 42.66	17.24 3.62	139	172.95
Elx 12A	11 1	21.91	27.64 96.96	39.18 8.23	315	362.75
B	12 1	20.08	25.33 88.86	35.91 7.54	289	335.45
TV 11	34 1	7.09	8.94 31.37	12.68 2.66	109	146.45
Acor 11/12	28 2	20.07	31.35 44.88	35.92 7.54	203	245.15
AE 11/12	33 2	17.03	26.60 80.51	30.48 6.40	172	212.60
Fd 11	290 13	6.99	3.99 26.14	12.53 2.63	136	174.40
Fd 12A	154 4	20.20	34.85 92.98	31.35 6.58	132	170.60
B	4					
CC 12	123 6	7.61	.63 24.73	13.63 2.86	181	222.05
Mgt 11	19 1	8.21	.68 26.68	14.70 3.09	195	236.75
FS 12	46 2+1	5.67	.85 18.86	10.20 2.14	161	201.05

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