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A COST-BENEFIT ANALYSIS OF INVESTMENT IN GRADUATE EDUCATION BY VIRGINIA PUBLIC SCHOOL TEACHERS

by

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(ABSTRACT)

Public school teachers have, with few exceptions, invested four or more years in higher education to prepare themselves for the teaching profession. These four years of college education can be viewed as an investment when one realizes that the teacher had to pay for that education and could have otherwise been earning an income during that time. Some teachers make an additional investment in education by earning a master's degree or a doctorate. This study looked at the practice of teachers in Virginia who decide to make the additional investment in graduate education at selected Virginia institutions of higher education.

This study used econometric methods to analyze this investment in graduate education. Social benefits and costs of education were not included in the study. Private costs included both direct and indirect acquisition costs. The salary supplements paid by school divisions to teachers who hold an advanced degree were used as the private benefits. Non-pecuniary benefits were not

included in the study. Net present valuation, discounted benefits and costs, benefit-cost ratio, and internal rate of return calculations were made. Data from similar studies done in other areas of graduate study and in other areas of the nation and world were reviewed.

The purpose of the study was to review the practice of all school divisions in Virginia which provide a salary supplement to teachers who hold a master's degree or a doctorate, and also to analyze the costs involved in the acquisition of such degrees. The cost-benefit analysis of the teachers' investment in graduate education provides information which can be used by teachers who are considering such an investment. The analysis can also be used by those school divisions which are currently spending considerable amounts of money for such salary supplements. The cost-benefit analysis of acquiring a master's degree with a subsequent change from the classroom to an administrative position has implications for school divisions and state level policy makers.

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Introduction

Public school teachers in Virginia have, with few exceptions, invested four or more years in higher education to prepare themselves for the teaching profession. Exceptions are made for the teachers of technical and industrial courses and for other similar areas in which practical experience is deemed to be an appropriate qualification for teaching in the public schools. Most often, these exceptions have been made to attract into the teaching field experienced persons who might not be willing to go back and acquire the traditional education. For the majority of teachers, however, four years of undergraduate education leading to the baccalaureate degree is the normal background.

These four years of college education represent an investment of time, effort, and money. From the financial standpoint alone, the investment must be viewed from several aspects. During the period of time enrolled the prospective teacher not only pays for tuition, books, fees, supplies, and other related expenses, he also must forego income from lost wages. Along with the loss of wages, the teacher also forfeits the income which might have been earned had the educational costs been invested in an alternative manner.

The benefits of investing the time, money, and energy in the pursuit of an education can be measured by relating the individual's earning capacity with his level of education. Exceptions to this rule include the person who is "born with a silver spoon in his mouth," or the "self-made individual" who becomes financially independent through hard work and a few lucky breaks. However, for the most part, a person's level of education and level of income are closely related. Today, on the average, a high school graduate earns more than a person without a high school education, and, similarly, a college graduate earns significantly more than a person with only a high school education.

Once they have earned a college diploma, some teachers make an additional investment in education by pursuing a master's degree and post-master's degrees. For many years, teachers have felt a need for this investment. Some consider the effort to be worthwhile because of the increased sense of self-worth which may come with an advanced degree, while others pursue the degree because of the salary increment given by most school divisions. Other teachers value the degree because of its effect on one's status within the school, the community, and the profession. Still other teachers undertake the study because of the need for an advanced degree for movement into other positions within the field of education.[1] Studies conducted among professionals in various fields suggest that

[1] Berelson, Bernard, Graduate Education in the United States (New York: McGraw-Hill Book Company, Inc., 1960), p. 136.

professional improvement and development was the most important reason for people to continue their education.[2]

The costs of education are categorized as either social or private and as either direct or indirect. Social costs of education are those costs which are borne by public tax dollars. Public university buildings, professors' salaries, materials, equipment, and other expenses funded within the state budget are considered social costs of education. Private costs are the costs which are borne personally by the student and include primarily tuition, books, room, and board. Direct costs of education are those costs which are out-of-pocket expenses for education; they include payment for tuition, textbooks, extra travel made necessary by the education, and room and board expenses. Indirect costs of education, on the other hand, are the foregone earnings (income which could have been earned had the student chosen to work rather than go to school) which are lost while attending school. Another type of indirect educational cost is the loss of any dividend which would otherwise have been earned on an alternative investment of the money paid to secure that education. [3]

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[2] Grotelueschen, Arden D., "Assessing Professionals' Reasons for Participating in Continuing Education" in Problems and Prospects in Continuing Professional Education, eds. Ronald M. Cervero and Craig L. Scanlon, (San Francisco: Jossey-Bass, Inc., Publishers, 1985), p. 41.

[3] Cohn, Elchanan, "The Costs of Formal Education in the United States, 1950-1975," Journal of Education Finance, 3 (Summer, 1977), pp. 70-81.

In an attempt to evaluate its benefits to teachers, this study considered both the direct private and indirect private costs of graduate education. A study of the social costs of education has not been undertaken.

Private benefits to the individual as a result of earning an advanced degree customarily are measured by one's increase in earning potential once the degree requirements are met. Private benefits derived due to acquiring an advanced degree may take various forms. New levels of employment made available because of the graduate degree may bring with it such non-pecuniary benefits as the use of an automobile, insurance programs, and additional vacation or travel allowances. These benefits, while notable, were beyond the focus of this study.

Measuring the costs and benefits of acquiring a graduate degree and then comparing the two figures can be accomplished in several different ways. In this study, a cost-benefit analysis was performed on the data collected.

Statement of Purpose

The purpose of this study was to review the practice of all school divisions in Virginia which provide a salary increment to

teachers who hold a master's degree or a doctorate and, then, to analyze the costs involved in the acquisition of such degrees. This study used econometric methods to analyze the investment in graduate education by teachers in Virginia who choose to attend Virginia institutions. Regardless of the reason a teacher pursues a graduate degree, considerable time, money, and effort are invested to that end. This study examined closely the related costs and benefits of graduate education for teachers. A cost-benefit analysis was done which might assist teachers who are considering such an investment as well as school divisions which are currently spending considerable amounts of money for these salary supplements.

Research Questions

The execution of an econometric analysis of teacher investment in graduate education necessitates the discovery of and manipulation of data from a variety of sources. This was done in order to answer the following research questions:

1. What are the current practices of public school divisions in Virginia relative to providing salary increments for teachers who hold a master's degree or a doctorate?
2. What is the status of salaries for public school teachers in Virginia?
3. What are the minimum degree requirements at selected Virginia institutions of higher education?
4. What are tuition costs for full-time and for part-time graduate study at selected Virginia institutions of higher education?
5. What is the benefit-cost ratio of an investment in a master's degree and a doctorate earned by a Virginia teacher from a Virginia institution of higher education?
6. What is the net present value of an investment in a master's degree and a doctorate earned by a

Virginia teacher from a Virginia institution of higher education?

7. What is the rate of return for Virginia teachers who invest in the acquisition of graduate degrees and then return to teaching?

Justification and Significance of the Study

There have been many cost-benefit studies undertaken to determine the economic feasibility of graduate education. Most studies, however, are at least ten years old and none have dealt specifically with the public school teachers of Virginia who choose to attend a college or university within the state. These previous studies have examined varied population samples and have yielded differing results. Traditionally, the internal rate of return (IROR) for graduate education is less than that for undergraduate education. The internal rate of return is an econometric concept which involves the computation of an interest rate which makes the present value of benefits equal to the present value of costs; an investment with the higher IROR is the preferred investment. Richard Eckaus indicated that the IROR for graduate education for all fields ranges between 4.0 and 5.0 percent while the same calculation for undergraduate education yields an IROR of between 11.5 and 13.0 percent.[4] Lee

[4] Eckaus, Richard S., Estimating the Return to Education (Berkeley: The Carnegie Foundation, 1973), p. 5.

Hansen found the IROR for undergraduate education to be 15.6 percent.[5] The Johns study also pointed out the lower IROR for graduate education and then proceeded to explain this difference on the basis of the customary lower student-teacher ratios and the higher professorial salaries found in graduate school.[6]

This study reviews the available literature pertinent to the question; reviews the findings of related studies; assesses the current status of salaries for teachers in Virginia categorized by type of degree held; establishes the current private costs of graduate education for Virginia institutions; and determines the cost effectiveness of such graduate education.

The public school divisions in the Commonwealth of Virginia annually expend a significant amount of money in the form of salary increments for holders of a master's degree or a doctorate. It is hoped that this study would provide data which would assist local policymakers in determining if these monies are properly allocated. Additionally, the report of the Governor's Commission on Excellence in Education, dated October, 1986, entitled "Excellence in Education: A

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[5] Hansen, W. Lee, "Total and Private Rates of Return to Investment in Schooling," in Investment in Human Capital, B.F. Kiker (Columbia: The University of South Carolina Press, 1971), p. 219.

[6] Johns, Roe L., Edgar L. Morphet, and Kern Alexander, The Economics and Financing of Education (Englewood Cliffs: Prentice-Hall, 1983), p. 37.

Plan for Virginia's Future," calls for the strengthening of teacher preparation programs. The implications of this recommendation, which might include a fifth year of education for all new teachers, should be examined in light of the costs and benefits identified in this study.[7]

Assumptions

1. It was assumed that part-time graduate study involves the completion of one course at a time; fall semester, spring semester, and summer school.
2. It was assumed that full-time study involves a twelve semester hour course load during both the fall and spring semesters and a six semester hour course load during the summer session.
3. It was assumed that the teacher will return to the classroom upon completion of the graduate degree and teach for twenty years.

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[7] Governor's Commission on Excellence in Education, "Excellence in Education: A Plan for Virginia's Future," (Richmond: Commonwealth of Virginia, 1986), p.11.

Limitations

1. Teacher salary data were not analyzed by sex or race. Currently such delineation is not available from the State Department of Education or from the Virginia Education Association.
2. Costs of acquiring an advanced degree may vary. Individual factors such as scholarships, sabbatical leaves, credit for prior coursework, variations in driving time, and other unique considerations were not considered in this study.
3. Minimum degree requirements may vary. Individual factors such as prior experience and individual talents may change the stated minimum requirements, but were not included in this study.

Delimitations

1. This study involved an analysis of the investment made by Virginia public school teachers who choose to pursue and earn an advanced degree and then return to work in the public schools of Virginia.

2. The analysis of salaries earned by classroom teachers was confined to selected levels on the salary schedule of the median school system when all Virginia public school systems were ranked according to the number of teachers employed in each. Salary schedules were obtained from the Virginia Education Association.
3. Tuition charges at the selected institutions were for 1986-1987.
4. Total private benefits received by teachers who earn an advanced degree are represented by an increase in lifetime earnings and were based upon current salary schedules.
5. Social costs and social benefits were not included in this study. Therefore, these calculations do not represent the total costs or benefits of graduate education.
6. Tuition costs used in this study did not include extra charges such as dissertation fees, graduation fees, late registration fees, or thesis fees.

Definitions of Key Terms

1. Cost-benefit analysis -- any of several procedures which attempt to ascertain the net benefit (total benefit less total cost) of a project.[8]

[8] Sassone, Peter G., and William A. Schaffer, Cost-Benefit Analysis: A Handbook (New York: Academic Press, 1978), p. 11.

2. Discount rate -- a percentage used to translate future benefits and costs into present values.[9]

3. Foregone earnings -- the income which could have been earned had the student chosen to work rather than go to school.[10]

4. Internal rate of return -- the discount rate at which the net present value of a project is zero.[11]

5. Net present value -- the sum of the benefits minus the sum of the costs, both discounted at an appropriate rate.[12]

6. Private benefits -- those benefits which accrue to the student.[13]

7. Private costs -- the costs of education borne by the individual such as tuition, fees, books, supplies, and travel required by the education as well as any earnings foregone.[14]

8. Social benefits -- those benefits which "spill-over" to others and to society in general from one's education.[15]

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[9] Anderson Lee G., and Russell F. Settle, Benefit-Cost Analysis: A Practical Guide (Lexington: Lexington Books, 1977), p. 82.

[10] Cohn, p. 69.

[11] Thompson Mark S., Benefit-Cost Analysis for Program Evaluation (Beverly Hills: Sage Publications, 1980), p. 172.

[12] Johns, p. 48.

[13] Davis, J. Ronnie, and John F. Morrall, III, Evaluating Educational Investment (Lexington: Lexington Books, 1974), p. 9.

[14] Johns, p. 45.

[15] Davis, p. 9.

9. Social costs -- those costs subsumed by the public treasury such as salaries of teachers, capital expenditures, and upkeep of buildings.[16]
10. Virginia teacher -- a classroom teacher working in one of the public school divisions in the Commonwealth of Virginia.

Organization of the Study

[16] Johns, p. 45.

Summary

In Chapter I, the concept of cost-benefit analysis was introduced. The purpose of this study, established as analyzing the investment which some public school teachers in Virginia make in acquiring a graduate degree(s), was reviewed. Specific research questions which guided the study were listed. The justification and significance of the study were established by emphasizing the nature of the burden which teachers choose to endure when acquiring a graduate degree. Additionally, it was pointed out that most public school systems within the Commonwealth of Virginia currently expend a sizeable amount of money to encourage teachers to earn a graduate degree or to reward those who have already done so. Lists of assumptions, limitations, delimitations, and definitions of key terms were provided to clarify further the scope and the direction of the study.

Chapter II

Review of the Literature

Although there has been a great deal written on the subject of investment in education, there proved to be little previous research done along lines similar to this study. There have been many studies, however in the area of human capital. Gary Becker appears to be a leading authority in this area. International studies of the impact of education produced revealing statistics which compare emerging countries with developing nations. George Psacharopoulos appears to be a leading author in this area. Richard Eckaus, Burton Weisbrod, and Elchanan Cohn appear to be leading authorities in the field of the economic impact of education on society in general. Of particular help in the development of this study were the following sources: The Economics and Financing of Education (Johns, Morphet, and Alexander), The Economics of Public Education (Benson), Benefit-Cost Analysis: A Practical Guide (Anderson and Settle), Benefit-Cost Analysis for Program Evaluation (Thompson), The Economics of Education (Cohn), Cost-Benefit Analysis: A Handbook (Sassone), Investment in Human Capital (Becker), and several related articles in the Journal of Education Finance. An article which appeared in the Journal of Education Finance (Vol. 7, Spring, 1982, p. 462) by Bettye MacPhail-Wilcox, detailing a similar study which she performed in Texas, proved to be very helpful.

Theories of Income Distribution

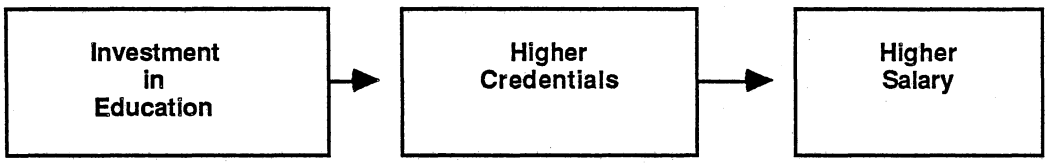
Over the centuries, the importance of education has been emphasized by families, schools, and society. It remains a widely accepted belief that careers which require the most formal education are the most prestigious and the most economically rewarding. Rewards for training and formal education are known in the literature as benefits. The benefits of education can be either monetary or nonmonetary and they can have a direct effect on an individual as well as an indirect effect on society in general. In order to understand fully the benefits of education, however, one must first understand the economic theories of income distribution. The credentialism theory, the dual labor market theory, and the human capital theory are noteworthy in their attempts to explain how society decides to pay different people different amounts for their labor.

The Credentialism Theory

Proponents of the credentialism theory argue that the investment in education or training does not necessarily affect productivity, rather that this investment merely results in the acquisition of a diploma, certificate, or other "credential." Pictorially, the credentialism theory is represented in Figure 2-1. Credentialists further argue that those persons who have elected to invest in education or training are paid a higher wage solely because of the

added credential, even though improved productivity might not be seen. The credentialism theory is not as widely accepted as the human capital theory discussed later in this chapter.[1]

[1] Cohn, Elchanan, The Economics of Education (Cambridge: Ballinger Publishing Company, 1979), p. 29.



Source: Elchanan Cohn, The Economics of Education (Cambridge: Ballinger Publishing Company, 1979), p. 30.

Figure 2-1 The Credentialism Theory

The Dual Labor Market Theory

Proponents of the dual labor market theory of income distribution argue that the labor market is composed of "primary" and "secondary" labor markets. The primary market consists of persons who are hired and placed in positions of training and upward mobility. The secondary market is composed of workers who, regardless of their education or training, are hired with little or no likelihood of advancement. The factors which predict income, according to proponents of the dual labor market theory, are a set of key characteristics which place workers in the primary group or in the secondary group; these factors exclude a worker's education, experience, or training.[2] Such key characteristics might be race, nationality, sex, age, religion, or other factor of potential bias. The dual labor market theory is conceptualized in Figure 2-2.

[2] Cohn, p. 31.

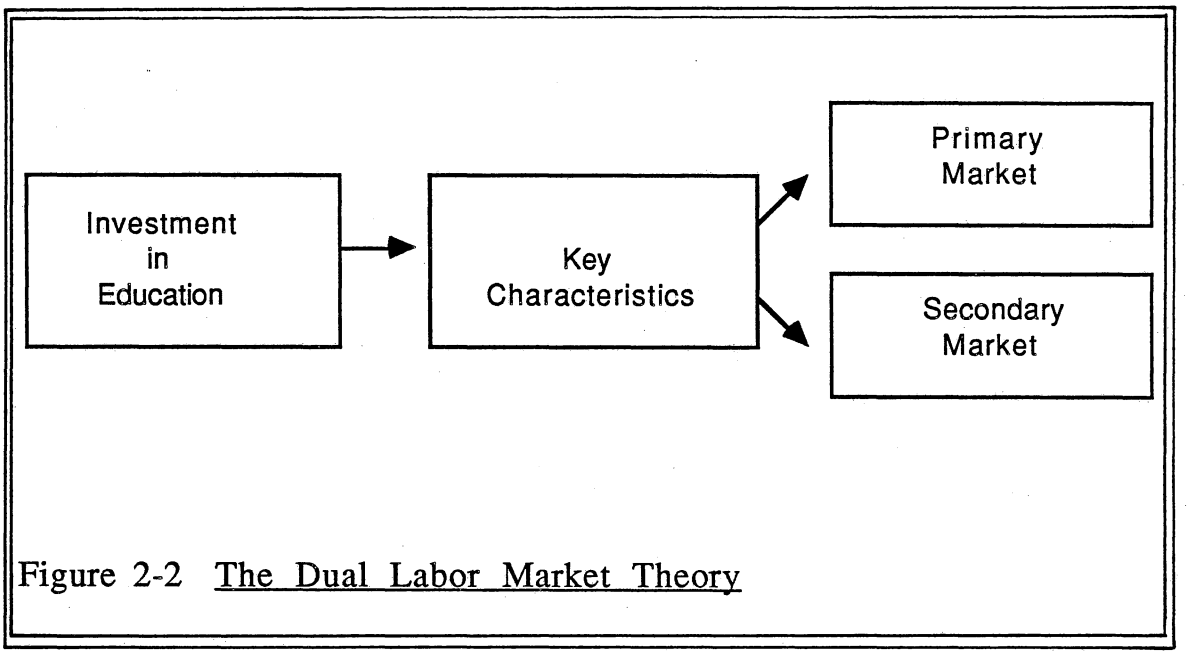


Figure 2-2 The Dual Labor Market Theory

The Human Capital Theory

Economists, over the years, have proposed theories of income distribution while others have challenged and refuted those theories. At this time, the consensus of economists appears to be on the side of the human capital theory. In the area of investment in education, there have been numerous studies relating this investment to the development of human capital.

Historically, the primary value of human beings to a nation was seen in the physical strength their numbers gave to a conquering army. Also evident throughout the centuries was the value placed on human beings as property in nations which practiced slave trading. Humans were seen as laborers rather than as thinkers. Adam Smith (1776) was among the first to include human capital in his definition of fixed capital. Smith included all of the acquired and useful abilities of all of the inhabitants of a country as part of that country's capital.[3] Smith, however, neither related the educational function of government to the development of human potential, nor did he attempt to quantify human capital.[4] Basically, Smith perceived of man as an expensive machine and expected the return from education to be comparable to the return on the purchase of a new piece of equipment. He believed that the production of human

[3] Schultz, Theodore W., Investment in Human Capital (New York: The Free Press, 1971), p. 27.

[4] Johns, Roe L., Edgar L. Morphet, and Kern Alexander, The Economics and Financing of Education (Englewood Cliffs: Prentice-Hall, Inc., 1983), p. 33.

capital resulted in a comparable return in the form of increased lifetime income.[5]

Smith later suggested that education for the masses not only provided a vital factor in the development of human capital, but also improved the general welfare of a nation. He proposed that public attention be given to the education of the poor in a manner similar to the Scottish system of parish schools which established compulsory public education for youngsters.[6] Smith asserted, as well, that this compulsory education should be financed by government money, since education would be beneficial to the whole society. [7]

In 1848, Horace Mann, in his 12th annual report to the Board of Education of Massachusetts, stated:

> ... our means of education are the grand machinery by which "raw material" of human nature can be worked into inventors and discoverers, into skilled artisans and scientific farmers, into scholars and jurists, into founders of benevolent institutions, and the great expounders of ethical and theological science quickened, which will solve the difficult problems of political and economic law.[8]

In the 1960s, Theodore W. Schultz, who later was to win the Nobel Prize for Economic Science, urged economists to recognize the economic importance of human beings to the production process, and,

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[5] Cohn, p. 17.
[6] Cohn, p. 20.
[7] Cohn, p. 20.
[8] Johns, p. 34.

then, to begin to seek ways to measure the magnitude of human capital. The main factor behind this movement was the realization that the growth of physical capital explained only a small part of the growth of income in most countries. The search for better explanations led to an interest in intangible entities such as technological change and human capital. Schultz noted that the productivity of the United States and several other countries had been increasing at a rate higher than one which could be explained by the historic measures of land, people, and hours worked. This phenomenon gave impetus to the search for evidence that training and education were also factors in productivity and could account for much of the productivity differences among nations.[9]

Frederick H. Harbison indicated that the human resources are the most important of all the resources of a country.

> Human beings are the active agents who accumulate capital, exploit natural resources, build social, economic, and political organizations, and carry forward national development. Clearly, a country which is unable to develop the skills and knowledge of its people and to utilize them effectively in the national economy will be unable to develop anything else.[10]

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[9] Becker, Gary S., "The Concept of Human Capital," in Educational Investment in an Urban Society, eds. Melvin R. Levin and Alan Shank (New York: Teachers College Press, 1970), p. 63.

[10] Johns, p. 37.

Schultz believed as well that the productive capacity of human beings was vastly larger than all the other forms of wealth taken together.[11]

People invest in themselves in several different ways: 1) health services including all expenditures which affect life expectancy, strength, stamina, vigor, and vitality; 2) on-the-job training, including apprenticeships; 3) formal education at the elementary, secondary, and higher levels; 4) study programs which continue or enlarge one's education; and 5) migration of individuals and families to changing job opportunities.[12]

The basic premise of the human capital theory is that the variations in income among people are due, at least in part, to the differences in the amount of human capital acquired by the people. The theory further states that human capital is gained through formal education, on-the-job training, and the maintenance of good health. The human capital theory can be seen in Figure 2-3.

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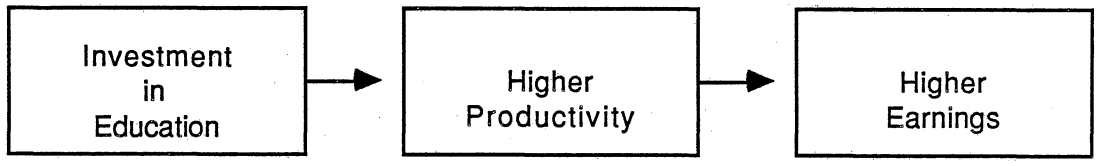
[11] Schultz, p. 25.

[12] Schultz, p. 36.



Source: Elchanan Cohn, The Economics of Education (Cambridge: Ballinger Publishing Company, 1979), p. 29.

Figure 2-3 The Human Capital Theory

The Costs of Education

The costs of education are categorized as either social or private and as either direct or indirect. Social costs of education are those costs which are borne by public tax dollars. Support of public university buildings, professors' salaries, materials, equipment and other program costs funded within the state budgets are considered social costs of education. Private costs are those costs which are borne personally by the student such as tuition, books, room, and board. Direct costs of education are those out-of pocket expenses for education such as payment for tuition, textbooks, extra travel made necessary by the education, and room and board expenses. Indirect costs of education are the foregone earnings which are lost while attending school. Another type of indirect cost of education is the loss of the dividends which would have otherwise been earned on an alternative investment of the money paid to secure that education.[13]

Social Costs of Education

The social costs of education are those costs which are borne by the public treasury. Even though an individual's tuition payments may go to pay a portion of such costs, the majority of the cost of public education at all levels is paid through tax dollars. Public expenditures on public elementary and secondary education grew from $5.8 billion in 1950 to an estimated $72.9 billion in 1977, an

[13] Cohn, Elchanan, "The Costs of Formal Education in the United States, 1950-1975," Journal of Education Finance, 3 (Summer, 1977), pp. 70-81.

increase of 1,157 percent. Enrollments increased during that same time period also but at only 76 percent.[14] Public expenditures have continued to rise to an estimated $146 billion for 1986 while enrollments have begun to decline.[15] It is evident from these figures that expenditures on public education have increased considerably which indicates a willingness on the part of the public to invest in and to pay for public education. During that same time period, public expenditures for institutions of higher education rose by 1,378 percent with public institutions expanding faster than private institutions. [16] This trend has continued through 1986.[17]

Social costs of education include the salaries of teachers, administrators, support personnel, and non-professional personnel, as well as the capital costs of new buildings and the operation, upkeep, and insurance of existing buildings. Public elementary and secondary education expenses also include the costs of transportation, textbooks, supplies, and equipment. Institutions of higher education would not include the latter as these items are traditionally purchased by the students at that level.

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[14] Cohn, p. 63.

[15] Statistical Abstract of the United States, 1986, 106th edition, p. 128.

[16] Cohn, p. 66.

[17] Statistical Abstract of the United States, 1986, 106th edition, p. 128.

Private Costs of Education

Private costs of education are those costs which are borne personally by the student or by his family. Private costs for public elementary and secondary education are minimal since the school system usually provides all textbooks, supplies, and other necessary equipment. Such students may purchase a few items for personal consumption to assist with their studies. Likewise, public education does not require tuition payments and usually provides bus transportation for students.

Students who attend institutions of higher education do, however, incur substantial private costs. Tuition is a major cost to consider. Tuition and fees are considered private costs since they are out-of-pocket expenses on the part of the student. Likewise, the cost of textbooks, supplies, and needed equipment is considered a private cost for students at the undergraduate and graduate levels. The expense of travel required by the pursuit of an education is also considered a cost of education. Room and board at an institution of higher education is another example of a private cost of education. However, the actual cost of dormitory space far exceeds the charge made for that space, the balance of which must be considered as a social cost.[18]

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[18] Cohn, p. 63.

Direct and Indirect Costs of Education

The aforementioned costs of education, both social and private, are all considered to be direct costs. Direct costs are most commonly thought of when considering the costs of an education. These are expenses which an individual must meet and the expenses which have to be supported by society. These are the costs which are the most felt by the individual student and by the individual taxpayer.

Indirect costs of education must also be considered when looking at the total cost of an education. Basically, the indirect costs of education are opportunity costs. The time and money spent by students in pursuit of an education are in place of the opportunity to do something else, perhaps more lucrative, during that time and with that money. The money which could otherwise have been earned had the student invested his money in an alternative investment rather than in his schooling is also known as earnings foregone. These are both examples of indirect private costs of education.

Indirect social costs of education are those costs resulting from the reduction of the total productivity of a country or of a state as well as the loss of tax revenue which a state faces when an individual is unemployed while pursuing an education.[19]

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[19] Johns, p. 45.

Table 2-1

CATEGORIES OF COSTS

TYPES OF COSTS	SOCIAL	PRIVATE
Direct Costs	1. Salaries of teachers, administrators, and non-professional personnel	Tuition and fees
	2. Books, supplies, and equipment (total) (out-of-pocket expenditures)	Books, supplies, and equipment
	3. Transportation (total)	Extra travel
	4. Room and board (total)	Room and board
	5. Scholarship and other subsidies to students	
	6. Capital expenditures	
Indirect Costs	7. Earnings foregone	Earnings foregone

Source: Roe L. Johns, Edgar L. Morphet, and Kern Alexander, The Economics of Education (Englewood Cliffs: Prentice-Hall, Inc., 1983), p. 45.

The Benefits of Education

Benefits derived from acquiring an education may be monetary or nonmonetary. These benefits may also be private (individual) or social (of benefit to the broader society). The private monetary benefits are easier to measure. Social benefits are more vague and more difficult to quantify but are important factors to consider. Individuals, when considering an investment in additional education, will usually concern themselves mainly with the private benefits. Economists, however, view the value of an education in light of all potential social benefits as well as private benefits.

When analyzing the benefits of education, one must be careful because many factors which are identified as benefits often cross over between categories. What benefits an individual also, in the long run, benefits his family, his neighbors, and therefore the whole of society. To view the true effect of education, in fact, many economists feel that all private benefits must be calculated along with the social benefits.

Private Benefits of Education

Private benefits of education are those which accrue to the child being educated or to his parents.[20] These benefits can be both monetary and nonmonetary. The monetary private benefits which a person might expect are an increase in earning power and possible

[20] Davis, J. Ronnie, and John F. Morrall, III, Evaluating Educational Investment (Lexington: Lexington Books, 1974), p. 9.

additional fringe benefits once the educational program is completed. Since increases of this nature are easily quantifiable, most cost-benefit research is done in the area of monetary private benefits.

Nonmonetary private benefits include not only the satisfaction which comes from the exposure to new knowledge or training, but also its related cultural benefits. These cultural opportunities bring about a degree of growth of the total person, a direct benefit, and, at the same time, they have a spillover effect to the members of that individual's family. These spillover effects are discussed later in this chapter with other forms of social benefits. Nonmonetary private benefits are more difficult to quantify than the monetary ones, but they often play an important part in a person's decision to pursue more education. One economist, Burton Weisbrod, has proposed four other types of nonmonetary private benefits to education: 1) the value of the option to continue with further education; 2) the insurance value of hedging against technological change by enabling the individual to be more adaptable to new skills; 3) the value of wider employment possibilities since education broadens the range of jobs for which the individual is suited; and 4) the value of nonmarket benefits which allow the educated individual to perform tasks for himself which he would otherwise have had to have done for him.[21]

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[21]Davis, p. 12.

Social Benefits of Education

The social benefits of education are those which accrue to society or to any part of the total society as a result of one's education. Since every individual is a member of the larger society, most economists agree that the private benefits which accrue to an individual must also be considered as social benefits within the larger picture of the total society.

Elchanan Cohn has identified two basic categories of social benefits: 1) tax payments associated with the educational benefit (i.e., income taxes paid out of one's lifetime income stream), and 2) "external" benefits, those benefits which are due to the educational investment but that the individual cannot capture.[22] The first category mentioned, that of increased taxes paid by the educated individual as a result of his increased earning potential, is of direct benefit to society. Through higher income and other related taxes, society receives more monies with which to do the business of providing the many services called for by society in general. In Virginia, public school systems which provide salary supplements pay an average increment of $1,285.20 to holders of a master's degree and an average increment of $1,935.00 to holders of a doctorate (see Appendix D, page 126, for further details).

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[22] Cohn, p. 34.

Social benefits ("externalities") include the overall strengthening of a country's economic system through increased worker productivity.[23] This type of externality is a mainstay of the theory of human capital. As individuals or groups of individuals invest in more education, they enlarge or improve their human capital and thus add to the stock of human capital within the society. This concept can partially explain the varied levels of funding for public education from one locality to another, from state to state, and among nations. Some areas put greater value in the concept of human capital and generally view substantial funding of public education as an investment in the future for their children, their community, or both.

Education differs greatly from other societal functions such as welfare and public health. These services of government maintain human capital, which is important, but they do not increase the worth of human capital. Education, on the other hand, adds to the worth of human capital by the fact that it is an increase in a skill or new knowledge which will yield economic and social benefits in the future. By this comparison, education can be seen as an investment which holds potential dividends for the individual and for society.

Some employers believe that educated employees increase the financial potential of the company. A positive relationship has been

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[23] Johns, p. 53.

established between the amount of an employee's formal education and his ability to respond to on-the-job training and other forms of inservice. As advances in technology manifest themselves in the market place, the individual with more education who is therefore more adaptable to new methods of production is more likely to be able to retain his job. Thus, additional education is seen as insurance against technological displacement.[24]

The market place commonly involves the transformation of resources into goods or the delivery of services. Educated workers have been found to be more efficient workers. H.R. Bowen has categorized six ways that worker productivity is increased by education. These concepts are generally applicable to public school teachers as well:

1) Quantity of product -- workers with higher levels of education produce more goods and services in a given time period because of their greater skill, dexterity, and knowledge.

2) Quality of product -- the more educated produce better goods and render services with greater skill and/or sensitivity to human conditions.

3) Product mix -- educated workers may be able to produce goods and services which are more highly prized by society than those produced by workers with less education.

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[24] Johns, p. 54.

4) Participation in the labor force -- educated workers are less susceptible to lost time from unemployment and illness, are usually characterized by higher aspirations.

5) Allocative ability -- workers, through education, may be better able to assess their own talents; to achieve greater skills; and to be more receptive to new technologies, new products, and new ideas.

6) Job satisfaction -- the educated may have greater job satisfaction because they tend to acquire jobs with greater psychic rewards.[25]

Another external benefit of education is the development of an informed citizenry, without which democratic institutions could not survive.[26] The ability of individuals to read cannot be taken for granted. There are many countries in which illiteracy is the rule rather than the exception. The ability to read and debate issues intelligently allows for society to function smoothly. Voting, filing tax returns, applying for permits, buying and selling, and numerous other activities which occur among educated individuals on an almost daily basis would not occur in an uneducated society.

Another important benefit of education is a subsequent reduced need for public revenue to be spent in the areas of public health, welfare, and the penal systems. It can be argued that

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[25] Bowen, H.R., Investment in Learning (San Francisco: Jossey-Bass, Inc., Publishers, 1977), p. 160.

[26] Cohn, p. 35.

education reduces crime to some degree because education reduces the likelihood of unemployment for that individual, thus eliminating at least one cause of some crimes. At the present time, Virginia Governor Gerald Baliles has proposed legislation which, if enacted, would require illiterate prison inmates to receive tutoring and achieve a degree of literacy prior to being eligible for parole. This proposed legislation is supported by research which links criminal behavior to illiteracy and other indicators of an individual's level of education. In one such survey, performed by Lohman, Ohlin, and Reitzes, it was found that the median grade of school completed for prisoners was substantially lower than that of the general public.[27] Another study has established school attendance as a deterrant to crime because it yields less time and less incentive to get involved in crimes.[28] Likewise, large expenditures are made by local, state, and federal governments in the areas of welfare costs and the costs of public health. Similar research has indicated a close link between the level of educational attainment and an individual's reliance on such social assistance.[29]

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[27] Sutherland, Edwin H., and Donald R. Cressey, Principles of Criminology (Philadelphia: J.B. Lippincott Company, 1966), p. 251.

[28] Erlich, Issac, "On the Relation Between Education and Crime," in Education, Income, and Human Behavior, ed. F. Thomas Juster (New York: McGraw-Hill Book Company, 1975), p. 322.

[29] Alexander, Kern, "The Value of an Education," in Journal of Education Finance, 1 (Spring, 1976), p. 449.

Among the other benefits of education, Johns, Morphet, and Alexander suggested that there are important intergenerational effects of education. They learned that the educational attainment of an individual will usually have a direct effect on the educational aspirations and attainment level of his children. This is due in part to the degree of encouragement and support a parent gives for a child to pursue formal education. That support and encouragement is often most forceful because of the example set by the parent. The higher level of a parent's education enables him to transfer acquired knowledge to his children during the formative years when that guidance is very important. Likewise, a higher level of educational attainment plays an important role in an individual's ability to withstand propaganda and hard-sell advertizing and to function more wisely as a consumer.[30]

[30] Johns, p. 57.

Table 2-2

PRIVATE (INDIVIDUAL) BENEFITS	SOCIAL BENEFITS
Direct Benefit:	
Monetary	
Net increase in earnings after taxes	Increase in taxes paid by the educated as a result of education
Additional fringe benefits	
Nonmonetary	
Increased satisfaction derived from exposure to new knowledge and cultural opportunities for both students and parents	
Indirect Benefits	
Monetary	
Work options available at each educational level	Increases in other income
	a) due to increasing productivity of future generations as children of
Increased consumption of goods and services due to extra income	better educated (intergenerational effect)
Nonmonetary	b) due to previously unemployed workers taking jobs vacated by
Intergenerational effect between parent and child	program participants (vacuum effect)--indirect income effect
Job satisfaction	c) due to reduced tax burden (tax effect)
	d) due to incremental productivity and earnings of workers (indirect income effect)
	Availability to employer of well-trained and skilled labor force
	Improved living conditions of neighbors

Source: Roe L. Johns, Edgar L. Morphet, and Kern Alexander, The Economics and Financing of Education, (Englewood Cliffs: Prentice-Hall, Inc., 1983), p. 47, citing Asefa Gabregiorgis, "Rate of Return on Secondary Education in the Bahamas." (Ph.D. dissertation, University of Alberta), p. 75.

Cost-Benefit Analysis

Cost-benefit analysis is an evaluative procedure which may be used first of all to generate necessary information and then to determine whether a given project is desirable or whether it constitutes a waste of productive resources.[31] It does so by comparing the costs of the project with its expected benefits. Costs and benefits are quantified and converted into present-day dollars for accuracy in comparison.

Cost-benefit analysis has roots which go back several centuries. Sir William Petty (1667) found that the public health expenditures used to combat the London plague had an extremely good cost-benefit ratio (1:84).[32] In 1844, Jules Dupuit, a French engineer, published an essay, "On the Measurement of the Utility of Public Works," in which he wrote that the output of a project multiplied by its cost is equal to the minimum social value of the project.[33] Formal recognition of cost-benefit analysis as a viable economic procedure came in the United States with the passage of the River and Harbor Act of 1902 and the Flood Control Act of 1936. These acts mandated that individual projects were to be justified by comparing their

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[31] Anderson, Lee G., and Russell F. Settle, Benefit-Cost Analysis: A Practical Guide (Lexington: Lexington Books, 1977), p. 1.

[32] Thompson, Mark S., Benefit-Cost Analysis for Program Evaluation (Beverly Hills: Sage Publications, 1980), p. 1.

[33] Sassone, Peter G., and William A. Schaffer, Cost-Benefit Analysis: A Handbook (New York: Academic Press, 1978), p. 4.

benefits, "to whomsoever they may accrue", with their costs.[34] In the mid 1960s, along with the advent of President Johnson's Great Society programs and a new stress on program accountability and assessment, the new government program of Planning, Programming, Budgeting System (PPBS) was initiated with a strong emphasis on cost-benefit analysis procedures.[35]

There are several cost-benefit procedures which may be used to evaluate alternative projects. "Net present value" is one method which transforms costs and benefits, even though they may occur over a period of years, into a single figure representing the overall worth of the project in present-day dollars.[36] This method uses a discount rate to equate the value of the dollars spent and saved over the lifetime of the project. The net present value method requires that the benefits minus the costs be greater than zero.

The "cut-off period" method may be used only if all of the related costs of a project could be recovered by a certain (cut-off) date. This procedure inherently discriminates against those projects whose benefits would occur at some unknown point in the future. Another weakness of this method is often the lack of a sound basis for establishing the cut-off date.[37] Another method, the "pay-back

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[34] Thompson, p. 1.
[35] Thompson, p. 2.
[36] Sassone, p. 14.
[37] Sassone, p. 15.

method", is a closely related procedure in which several projects are compared on the basis of each project's ability to recover its costs in the shortest period of time.[38]

The "internal rate of return" (IROR) method is concerned with the relationship of costs to benefits and uses an interest rate to equate the two figures.[39] The internal rate of return method is not recommended by economists who have recently begun to favor the net present value method. The primary worth of the IROR occurs for private companies or individuals faced with a broad variety of investment opportunities.[40]

The steps generally taken in a cost-benefit analysis include: 1) identification of any alternatives, 2) identification and quantification of costs and benefits, 3) discounting to make costs and benefits occurring at different times commensurable, and, finally, 4) interpreting the results. The identification of costs and benefits is a critical step in the procedure. One must be careful to view the project in its entirety. All possible effects to the individual, or to the company, as well as to society must be evaluated. Private and social costs and benefits as well as the direct and indirect costs must be carefully analyzed.

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[38] Irvin, George, Modern Cost-Benefit Methods (London: The Macmillan Press Ltd., 1978), p. 19.

[39] Johns, p. 48.

[40] Thompson, p. 175.

Quantification of identified costs and benefits of a proposed project or investment is a most important aspect of any cost-benefit analysis.[41] Cost-benefit analysis does not seek to describe the effects of a project. Rather, it seeks to quantify those effects so that the impact of the project can be objectively determined.

Discounting enables the costs and benefits of a project, both of which might be spread over a period of years, to be compared in common terms. This is done most often by computing the net present value of a project. The discount rate, then, is clearly the critical parameter of the net present value method as it has a major impact on the value of costs and benefits. The choice of the discount rate will affect whether the net present value of a project is greater or less than zero, thus affecting the acceptability of that project.[42]

There are several methods available for the determination of the discount rate. The most commonly recommended and used method is the market value rate -- the interest rate at which an individual can borrow or invest money. However, when companies or governments select an appropriate discount rate, the decision is much more complex. Companies will need to include a margin of profit and a margin to account for any tax implications.

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[41] Sassone, p. 43.
[42] Sassone, p. 97.

Governments, at all levels, have political issues of which to be mindful and have additional opportunities for acquiring money.[43]

Performing a cost-benefit analysis calls for planning and forethought. Planning the design of the study is the most important step (see Figure 2-4). It helps to determine the type of data required and the type of analysis to perform. The first step of planning is to precisely define the problem to be researched. A technical description and a detailed scenario are useful at this point. It is also important to identify the "society" in which the project will exist. External constraints on the project need to be identified. Data sources need to be identified. Next, the formal design of the analysis needs to be established. Specific details must be included at this point as to the identification of costs and benefits, choice of a discount rate, and time lines. Next, the actual collection of data is to be done. After the data are collected, the cost-benefit analysis is performed. The final step is the presentation of the results and the decision making.[44]

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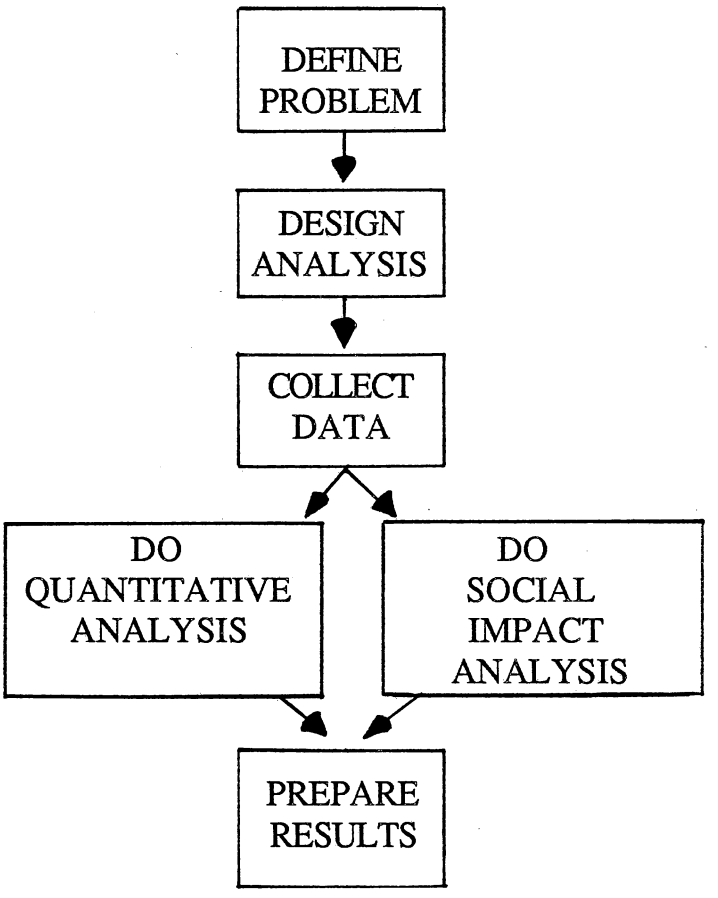
[43] Sassone, p. 101.

[44] Sassone, pp. 155-171.



Source: Peter G. Sassone and William A. Schaffer, Cost-Benefit Analysis: A Handbook (New York: Academic Press, 1978), p. 157.

Figure 2-4 FLOW DIAGRAM DEPICTING THE MAJOR STEPS IN PERFORMING A COST-BENEFIT ANALYSIS

Summary

In Chapter II, a review of the currently available literature pertinent to the subject of the economic feasibility of graduate education was presented. Theories of income distribution were discussed as they relate to income trends for Virginia public school teachers. The costs of education, both private and social and direct and indirect, were conceptualized. The benefits of education, private and social, pecuniary and nonpecuniary, direct and indirect, were discussed. The general topic of cost-benefit analysis was then reviewed. Included in the discussion were a brief history, a description of several of the more popular methods, and the steps generally involved in a cost-benefit analysis.

Chapter III

Research Design

The purpose of Chapter III is to provide a comprehensive explanation of the methodology used to analyze the investment in higher education by some Virginia public school teachers. The following research questions were addressed in this study:

1. What are the current practices of public school divisions in Virginia relative to providing salary supplements for teachers who hold a master's degree or a doctorate?
2. What is the status of salaries for public school teachers in Virginia?
3. What are the minimum degree requirements at selected Virginia institutions of higher education?
4. What are tuition costs for full-time and part-time graduate study at selected Virginia institutions of higher education?
5. What is the benefit-cost ratio of an investment in a master's degree and a doctorate earned by a Virginia teacher from a Virginia institution of higher education?
6. What is the net present value of an investment in a master's degree and a doctorate earned by a Virginia teacher from a Virginia institution of higher education?

7. What is the rate of return for Virginia teachers who invest in the acquisition of graduate degrees and then return to teaching?

Procedures Used in the Study

The discussion of the methodology used in this study is divided into eight parts. They are presented in the order of undertaking and/or calculation: 1) definition of the study, 2) review of the literature, 3) costs of education, 4) benefits of education, 5) discount rate, 6) benefit-cost ratios, 7) net present valuation of educational investment, and 8) rate of return to educational investment. A description of the data sources and data treatment for each of these steps follows.

Definition of the Study

Specifying the direction and nature of the study was the first, but very crucial step, taken. Early conversations with Virginia Tech professors and other practicing professionals led to an early interest in the worth of education to society and to individuals within that society. Subsequent coursework involving the economic outlay of funds to support public education and higher education developed and clarified that interest. A cursory review of similar studies assisted with further clarification of the topic. Then, an initial topic proposal was drafted which was critiqued individually by each of the members of the student's advisory committee. Comments and

criticisms from each adviser were used to clarify and set parameters for the study.

The study is defined as a cost-benefit analysis of the investment in graduate education made by some public school teachers in Virginia. The desire is to provide not only a clear picture of such practices, but to provide as well their economic effects on these teachers. There have been many studies in this area on a global, national, and sectional basis. The intent of this study was to be specific to Virginia. The study further was limited to an analysis of the economic effects of graduate study on Virginia public school teachers rather than to assess broadly the effects of mass education on society in general. Costs were determined from specific information from nine institutions of higher education selected because they represent the larger programs granting graduate degrees for public school teachers. These nine institutions were:

Norfolk State University

Old Dominion University

Radford University

University of Richmond

University of Virginia

Virginia Commonwealth University

Virginia State University

Virginia Polytechnic and State University

The College of William and Mary.

Review of the Literature

Extensive use was made of the Carol M. Newman Library of Virginia Tech and the McConnell Library of Radford University. An ERIC database search was performed.

Costs of Education

The costs of acquiring an education have been described in Chapter II as being both private and social. Even though they have a great impact on society, the social costs of education are beyond the scope of this study. This study involved only the private costs which the individual teacher must incur while earning a graduate degree. These private costs are divided into direct and indirect costs. Direct private costs are those which the individual must meet as out-of-pocket expenses for tuition, books, fees, and supplies. Indirect costs of education are the earnings foregone during the period of educational investment.

Direct private costs of education were calculated by using the data received from the nine institutions of higher education in Virginia which were chosen for inclusion in this study. To determine economic benefits, their tuition costs for the 1986-1987 academic year were compared with teacher salary data for the same year. The costs of acquiring a graduate degree were determined by multiplying the appropriate tuition rate by the length of time required to acquire

the degree. Costs for the master's degree and for the doctorate were calculated for each of the selected institutions. Costs for part-time and full-time graduate study were calculated for each institution. Additionally, once individual data were computed, an average cost for a master's degree and for a doctorate from the selected Virginia institutions was computed. Costs for other degrees such as Ed. S. and CAGS were not computed so that the study could concentrate on an in depth review of the costs and benefits of a master's degree and a doctorate.

The costs of textbooks and supplies were imputed. Costs of textbooks, fees, necessary supplies, and other related costs vary from institution to institution and from discipline to discipline. Becker, in his research, has indicated that these costs average 22.5 percent of the tuition rates at the institutions of higher education he surveyed.[1] This approximation was used to impute the costs of textbooks and supplies for the teachers pursuing a graduate degree.

Costs of room, board, travel, clothing, medical costs, and other miscellaneous personal expenses were not included in the private costs of education. These expenses, while potentially great, are necessary whether the teacher pursues a graduate degree or remains in the classroom without such a quest and cannot be considered as costs of the education. Room charges might be considered if the

[1] Becker, Gary, Human Capital (New York: Columbia University Press, 1975), p. 254.

person has to acquire temporary housing away from his home to complete the studies.

Indirect private costs of education are the earnings foregone which otherwise would have been earned by the teacher had he not been enrolled in graduate school. Such information for teachers enrolled in full-time study was computed by using salary information obtained from the Virginia Education Association. To compute the foregone earnings while acquiring the master's degree, the annual salary for a teacher with the bachelor's degree and five years' experience in the median Virginia school division was used. The median school division was selected based on a ranking of all school divisions according to the number of teachers employed in each. This figure was then multiplied by the appropriate length of full-time study required to complete the degree. To compute the foregone earnings while earning the doctorate, the annual salary for a teacher with the master's degree and ten years' experience in the median school division was used. This figure was then multiplied by the appropriate length of time required to complete the degree while involved in full-time study. The returns from an alternative investment of the money spent on tuition, texts, and supplies also were included as indirect costs.

In recent years, there has been an increase in the practice of earning a graduate degree while attending school on a part-time

basis. In the fall of 1985, part-time graduate students outnumbered full-time students by a ratio of almost 2:1.[2] By doing so, the teacher is able to continue his employment and reduce considerably any foregone earnings. However, another type of foregone earnings should be considered for teachers who enroll in part-time graduate studies. A teacher who elects to pursue graduate studies could alternatively choose to secure part-time employment. This forfeited potential for additional income should be considered as foregone earnings. To compute foregone earnings for teachers who pursue graduate education on a part-time basis, degree requirements were translated into a minimum number of clock hours involved. These hours were then converted into a dollar amount by multiplying them by the federally-mandated minimum hourly wage of $3.65 per hour. Appropriate foregone earnings were computed for the master's degree and for the doctorate. As with full-time enrollment, the returns from an alternative investment of the money spent on tuition, texts, and supplies were included as indirect costs.

Benefits of Education

The total benefits of education are comprised of both private benefits and social benefits. Social benefits of education, while having a vital impact on society from both a financial and a nonfinancial point of view, are beyond the scope of this study. This

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[2] Grant, W. Vance, and Thomas D. Snyder, Digest of Educational Statistics, 1985-86. (Washington: U.S. Department of Education, 1986), p. 103.

study investigates the private benefits of education; those which accrue to the individual who earns the graduate degree. Likewise, the private benefits of education are categorized as either direct or indirect and as either monetary or nonmonetary. While benefits related to acquiring an education, such as the psychological satisfactions and cultural experiences, are important, they are also beyond the scope of this study. This study measured the direct private monetary benefits of education and contrast the derived benefits with the acquisition costs of education. It is acknowledged that this study underestimates the total personal and societal benefits of an investment in education.

Private benefits to the individual as a result of earning an advanced degree customarily are measured by one's increase in earning potential once the degree requirements are met. The increased earning potential for teachers who earn advanced degrees was calculated by use of the data provided by those school divisions which provide a salary supplement to teachers who hold an advanced degree. Calculations were made for the increase of earning potential for the first year and were projected to produce an increased earning potential over the lifetime of the Virginia teacher. The practice of some teachers entering the fields of supervision and/or administration after acquiring an advanced degree and its salary implications were reviewed as well.

To calculate the private direct monetary benefits of earning a graduate degree for Virginia public school teachers, a survey of salary supplements provided by public school divisions was performed. Data sources for such information were the Department of Education and the Virginia Education Association. An average supplement for those school divisions which offer one was calculated for both the master's degree and for the doctorate. It was determined that all Virginia public school divisions provide a salary supplement for holders of the master's degree, while only half provide a salary supplement for holders of the doctorate.

Measuring the costs and benefits of acquiring a graduate degree and then comparing the two figures can be accomplished in several different ways. In this study, a cost-benefit analysis was performed on the data collected.

Discount Rate

In order to accurately compare the costs of acquiring a graduate degree with the potential benefits of receiving that degree, a discount rate was selected and used. This was necessary because both the costs and the benefits occur over a period of years. Discounting is used to equate future dollars with today's dollars. Research indicates several methods which may be used in the selection of a proper discount rate. The method chosen for this study was to use the current market value approach. A survey was

performed to determine the rate at which Virginia teachers could invest and borrow money. Recent market trends indicated that the CD (certificate of deposit) rate was fluctuating between 6 and 8 percent per annum depending upon the needs of the investor and the requirements of the banking institution. Uninsured investments allow the investor to consider fairly conservative mutual fund investments yielding 10 percent per annum while more risky ventures possess higher yield potential. Savings accounts continued to offer interest rates in the range of 5 to 6 percent. A discount rate of 6 percent was used in this study.

The formula used when discounting is:

$$PV = F_t/(1+i)^t$$

where:

PV = present value

i = the rate of interest (discount)

t = time (in years)

F_t = the amount of future payment (t periods of time in the future)

When dealing with a series of payments such as annual salary supplements to Virginia teachers with a graduate degree, the following formula was used:[3]

$$PV = \sum_{t=1}^{n} F_t/(1+i)^t$$

Net Present Value

The net present value (NPV) of an investment is the difference between the discounted benefits and the discounted costs of that investment.[4] The net present value rule implies that individuals should select projects for which the discounted benefits exceed the discounted costs (NPV=B>C).

The net present value for the investment made by Virginia public school teachers who pursue and acquire a graduate degree was calculated for each of the selected state institutions. Separate calculations of the NPV were made for full-time and for part-time study. Calculations were made using the following net present value formula:[5]

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[3] Benson, Charles S., The Economics of Public Education (Boston: Houghton Mifflin Company, 1978), p. 80.

[4] Cohn, Elchanan, The Economics of Education (Cambridge: Ballinger Publishing Company, 1979), p. 111.

[5] Cohn, p. 97.

$$NPV = \sum_{t=0}^{n} B\text{-}C/(1+i)^t$$

where: NPV = net present value

B = adjusted benefits

C = adjusted costs

i = discount rate

t = time at which costs or benefits occur

n = length of costs or benefits (in years)

Benefit-Cost Ratios

The benefits and costs associated with the acquisition of a graduate degree were discounted by an appropriate discount rate in order to fairly compare dollars spent or gained over a period of years. This is necessary because the pursuit of a graduate degree requires an investment over a period of several years. The resulting benefits, in the form of salary supplements, will occur over the remaining years of the teacher's professional career as a classroom teacher.

The benefit-cost ratio (B/C) gives the discounted benefits per dollar of discounted cost. A high positive ratio (B/C, or benefits to costs) of an investment indicates a high return to the investment dollar. Likewise, a low ratio indicates a poor return to the

investment dollar. A benefit-cost ratio of less than 1.0 would indicate a negative return to the individual because the costs of acquiring the graduate degree were greater than the benefits derived from that investment.

The formula used to compute the benefit-cost ratio is:[6]

$$B/C = \frac{\sum_{t=0}^{n} B_t/(1+d)^t}{\sum_{t=0}^{n} C_t/(1+d)^t}$$

where: B = dollar value of benefits incurred at time t

C = dollar value of costs incurred at time t

d = discount rate

n = life of the investment in years

A benefit-cost ratio was calculated for the investment made by Virginia public school teachers who pursue and acquire a graduate degree. Separate calculations were made for each institution, for each degree, and for both full-time and part-time enrollment.

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[6] Sassone, Peter G., and William S. Schaffer, Cost-Benefit Analysis: A Handbook (New York: Academic Press, 1978), p. 19.

Internal Rate of Return

The internal rate of return (IROR) is the "discount rate at which the net present value of a project is zero."[7] Stated more simply, the IROR is an econometric procedure of determining the discount rate which would equate the costs and the benefits of an investment. The IROR allows economists to rank and compare net results of alternative investments. It does so by discovering the relationship of benefits to costs. Unlike the formulae for discounting and for net present valuation, the internal rate of return does not use a discount rate; rather, it solves for a rate which equates the undiscounted costs with the undiscounted benefits. When comparing alternative investments, the one which displays the higher internal rate of return is characterized as having the higher net present value and as being, therefore, the preferred investment.[8]

To calculate the internal rate of return to an investment, all related costs and benefits must be identified along with their dates (years) of occurrence. These data are then fed into the appropriate formula for IROR calculation. The formula requires fairly spohisticated calculations and can best be done using one of several commercially available computer programs designed for statistical manipulation.

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[7] Thompson, Mark S., Benefit-Cost Analysis for Program Evaluation (Beverly Hills: Sage Publications, 1980), p. 172.

[8] Benson, p. 86.

The following formula was used to determine the internal rate of return:[9]

$$\sum_{t=0}^{n} \frac{E_t - C_t}{(1 + r)^t} = 0$$

where: E_t = undiscounted benefits for year t

C_t = undiscounted costs for year t

n = length of investment in years

t = time at which the benefits and costs occur

r = internal rate of return

Calculations for this study were performed using "the Twin", produced by Mosaic Software Inc., of Cambridge, MA. The internal rate of return was calculated for teachers who earn a master's degree and for those who earn a doctorate. Separate IROR calculations were made for teachers who pursue the degree on a full-time basis and for those who do so on a part-time basis.

Use of the IROR is not favored among economists for establishing criteria on which to base selection of alternative investments.[10] It was used in this study, however, to provide a

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[9] Woodhall, Maureen, Cost-Benefit Analysis in Educational Planning (Belgium: Les Presses de Gedit, 1980), p. 23.

[10] Thompson, p. 172.

basis of comparison with data reported in the research previously detailed in Chapter II.

Summary

In Chapter III, the research design of the study was described. The specific research questions to be undertaken in the study were reviewed. The procedures used to define and structure the study were described. Procedures undertaken to review the currently available literature were described as were the sources of data used to establish the costs and benefits of graduate education in Virginia. The econometric procedures of net present valuation, discounting, benefit-cost ratios, and internal rate of return were described. Formulas for each procedure were identified.

Chapter IV

Presentation of the Data

The purposes of Chapter IV are (1) to compute and describe the direct and indirect costs of obtaining a graduate degree from selected Virginia institutions, and (2) to compute and describe the direct private benefit of acquiring an advanced degree. Data obtained from the nine selected institutions of higher education and the classroom teacher salary schedules received from the Virginia Education Association were used to calculate these figures. Once the costs and benefits were described and analyzed, the economic advisability of the investment in graduate education in Virginia was examined. Calculations were made to determine the net present value of graduate education, its benefit-cost ratio, and the internal rate of return of a Virginia teacher's investment in a graduate degree. Separate calculations were made for full-time and part-time enrollment at each of the selected Virginia institutions, and for the average of the selected institutions.

Private Cost of Graduate Education

The private cost of obtaining a graduate degree includes direct expenditures and indirect costs. Together, these costs are known as the total private cost of education.

Direct private costs of obtaining an education include charges for tuition, fees, textbooks, supplies, and any required equipment. The additional costs for room, board, entertainment, medical care, transportation, clothing, and insurance were not considered as direct private costs of education since they are necessary whether or not the individual was enrolled in graduate school.

Costs for tuition have been obtained from the nine Virginia institutions of higher education that maintain the largest graduate programs available to public school teachers. Degree requirements and tuition charges were used to compute a total tuition cost (for graduate degrees) from each of the selected institutions.

Contained in Table 4-1 is the information obtained from the institutions that were surveyed. Tuition charges for the 1986-87 academic year were used. In the table, charges for each institution are indicated for the semester hour, for three semester hour courses, and for full-time enrollment for the fall and spring semesters. Similar information is given for summer school enrollment. All data for Virginia Tech were converted from quarter to semester costs for ease of comparison with other institutions. A simple formula of three quarters equals two semesters (three quarter hours equals two semester hours) was used.

Table 4-1

GRADUATE TUITION CHARGES AT SELECTED VIRGINIA INSTITUTIONS: 1986-87 SCHOOL YEAR

Institution	Fall and Spring Semesters per hour	Fall and Spring Semesters per course	Fall and Spring Semesters full-time	Summer School per course	Summer School full-time
Norfolk State University	$87.00	$261.00	$774.00	[b]	[b]
Old Dominion University	94.50	283.50	851.00	228.00	[c]
Radford University	76.00	228.00	908.00	228.00	[c]
University of Richmond	95.00	285.00	3,888.00	285.00	[c]
University of Virginia	97.33	292.00	1,111.00	201.00	[c]
Virginia State University	70.00	210.00	950.00	210.00	[c]
Virginia Commonwealth Univ.	111.00	333.00	1,000.00	210.00	840.00
Virginia Tech [a]	121.50	364.50	1,093.50	364.50	637.50
William and Mary	$93.03	$279.11	$1,316.16	$226.33	$738.50

[a] quarter tuition has been converted to semester tuition
[b] no summer school available
[c] no full-time tuition offered
Source: College catalogs or other publications of the selected institutions

Degree requirements for selected degrees at the Virginia institutions are indicated on Tables 4-2 thru 4-10. These degrees are not inclusive of those available at each of the institutions; they are a representation, however, of the degrees of possible interest to public school teachers. A complete listing of degree offerings available at each of the institutions may be found in their catalogs. The quarter hour requirements for the degrees offered at Virginia Tech have been converted to semester hour requirements for ease of comparison with the degree requirements of the other selected schools. A later comparison of semester hour requirements and tuition rates was used to determine the total tuition cost for each degree.

The semester hour requirement for a master's degree is listed in most catalogs as the minimum requirement. Also contained in the institutions' catalogs was a statement that indicated that additional coursework may be added to compensate for an incomplete preparation at the baccalaureate level. Usually, semester hour requirements for a doctorate were also listed as the minimum requirement. Semester hour requirements listed for a doctorate are in addition to the requirement for a master's degree.

Table 4-2

Partial Listing of Graduate Degrees Available at

NORFOLK STATE UNIVERSITY

degree	minimum semester hour requirement
M.S. in Business Administration	36
M.S. in Gifted Education	36
M.Mus. in Music Education	36
M.A. in Pre-Elementary Education	39
M.A.Ed. in Urban Education	36
M.A. in Visual Studies	33

Source: 1984-86 Bulletin, Graduate School, Norfolk State University

Table 4-3

Partial Listing of Graduate Degrees Available at

OLD DOMINION UNIVERSITY

degree	minimum semester hour requirement
M.S. in Administration and Supervision	33
M.S. in Educational Administration	36
M.S. in Educational Supervision	36
M.S. in Applied Physics	30
Ph.D. in Applied Physics	60
M.S. in Biology	31
Ph.D. in Ecological Sciences	60
M.S. in Oceanography	31
Ph.D. in Oceanography	60
Ph.D. in Urban Service	60

Source: 1986 Catalog, Old Dominion University

Table 4-4

Partial Listing of Graduate Degrees Available at

RADFORD UNIVERSITY

degree	minimum semester hour requirement
M.A. in English	30
M.A. in History	30
M.S. in Art Education	36
M.A. in Music Education	30
M.A. in Music Therapy	30
M.S. in Business Education	29
M.S. in Early Education	32
M.S. in Middle Education	33
M.S. in Secondary Education	30
M.S. in Educational Administration and Supervision	30
M.S. in Guidance and Counseling	35
M.S. in Science Education	30
M.S. in Mathematics	30
M.S. in Physical Education	30
M.S. in Reading	32
M.S. in Special Education	32

Source: 1986-87 Undergraduate and Graduate Catalog, Radford University

Table 4-5

Partial Listing of Graduate Degrees Available at

UNIVERSITY OF RICHMOND

degree	minimum semester hour requirement
M.A. in English	27
M.A. in History	27
M.A. in Psychology	27
M.S. in Biology	27
M.S. in Chemistry	27
M. Ed. in Early Education	30
M.Ed. in Middle Education	30
M.Ed. in Secondary Education	30
M.Ed. in Learning Disabilities	30
M.Ed. in Reading	30
M.Ed. in School Administration	30
M.Ed. in Supervision of Instruction	30
M.H. in Humanities	30
M.S.M. in Sports Medicine	32

Source: Graduate Catalog, 1986-88, University of Richmond

Table 4-6

Partial Listing of Graduate Degrees Available at

UNIVERSITY OF VIRGINIA

degree	minimum semester hour requirement
M.Ed. in Administration and Supervision	30
Ed.D. in Administration and Supervision	60
M.Ed. in Counselor Education	30
Ed.D. in Counselor Education	60
M.Ed. in Curriculum and Instruction	30
Ed.D. in Curriculum and Instruction	60
M.Ed. in English Education	30
Ed.D. in English Education	60
M.A. in English	24
M.Ed. in Mathematics Education	30
Ed.D. in Mathematics Education	60
M.Ed. in Physical Education	30
Ed.D. in Physical Education	60
M.Ed. in Science Education	30
Ed.D. in Science Education	60
M.S. in Biology	30
M.S. in Chemistry	30
M.Ed. in Special Education	30
Ed.D. in Special Education	60
M.A. in French	29
M.A. in History	30

Sources: 1986-87 Record, Graduate Division, Curry School of Education, University of Virginia, and Admissions Catalog, 1987-88, Graduate Arts and Sciences, University of Virginia

Table 4-7

Partial Listing of Graduate Degrees Available at

VIRGINIA COMMONWEALTH UNIVERSITY

degree	minimum semester hour requirement
M.Ed. in Administration and Supervision	39
M.Ed. in Counselor Education	39
M.Ed. in Special Education	39
M.Ed. in Adult Education	36
M.Ed. in Health and Physical Education	33
M.Ed. in Curriculum and Supervision	36
M.Ed. in English Education	30
M.Ed. in Mathematics Education	33
M.Ed. in Reading	36
M.S. in Business	30
M.A. in Art Education	36
M.S. in Biology	38
M.S. in Mathematical Science	30
M.S. in Physics	60
M.S. in Chemistry	30
Ph.D. in Chemistry	60

Source: 1986-87 Graduate Bulletin, Virginia Commonwealth University

Table 4-8

Partial Listing of Graduate Degrees Available at

VIRGINIA STATE UNIVERSITY

degree	minimum semester hour requirement
M.S. in Agricultural Education	30
M.Ed. in Agricultural Education	30
M.S. in Biology	30
M.Ed. in Biology	30
M.S. in Business Education	30
M.Ed. in Developmental Reading	30
M.Ed. in Early Childhood Education	30
M.S. in Earth Science	30
M.A. in Economics	30
M.Ed. in Educational Administration and Supervision	30
M.Ed. in Educational Media	30
M.Ed. in Elementary Education	30
M.Ed. in Guidance	30
M.A. in History	30
M.Ed. in Home Economics Education	30
M.Ed. in Industrial Arts Education	30
M.L.M. in Library Media	30
M.S. in Mathematics	30
M.Ed. in Music Education	30
M.S. in Physics	30
M.S. in Psychology	30
M.Ed. in Special Education	30

Source: 1984-86 General Information Bulletin, Graduate School, Virginia State University

Table 4-9

Partial Listing of Graduate Degrees Available at

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

degree	minimum semester hour requirement
M.S. in Biology	30
M.S. in Chemistry	30
Ph.D. in Chemistry	60
M.S. in Clothing and Textiles	30
M.S. in Computer Science	30
M.A. in Economics	30
M.S. in Education	30
M.A. in Education	30
Ph.D. in Evaluation and Research	60
M.A. in English	30
M.S. in Geography	30
M.A. in History	30
M.S. in Mathematics	30
Ph.D. in Mathematics	60
M.S. in Physics	30
Ph.D. in Physics	60
M.S. in Psychology	30
M.S. in Sociology	30
Ed.D. in Educational Administration	60
Ed.D. in Administration and Supervision of Special Education	60
Ed.D. in Curriculum and Instruction	60
Ed.D. in Student Personnel Services	60
Ed.D. in Vocational Technical Education	60

Source: 1986-87 Graduate Catalog, Virginia Tech

Table 4-10

Partial Listing of Graduate Degrees Available at

COLLEGE OF WILLIAM AND MARY

degree	minimum semester hour requirement
M.A. in Biology	32
M.A. in Chemistry	32
M.S. in Computer Science	32
M.A.Ed. in Elementary School Teaching	30
M.A.Ed. in Reading	36
M.A.Ed. in Secondary School Teaching	30
M.Ed. in Special Education	42
Ed.D. in Special Education	60
M.Ed. in Counseling	36
Ed.D. in Counseling	60
M.S. in Mathematics	32
M.Ed. in School Psychology	33
Ed.D. in School Psychology	60
M.Ed. in Educational Administration	33
Ed.D. in Educational Administration	60

Source: Graduate Programs, The School of Education, 1986-87, The College of William and Mary, and Graduate Arts and Sciences Catalog, 1985-1986.

Total private costs, both direct and indirect, for the graduate degrees at each of the selected Virginia institutions, along with an arithmetic mean for all nine institutions, are arrayed in Tables 4-11 thru 4-14. Indicated in Table 4-11 are the private costs of a master's degree earned while pursuing full-time study at each of the schools. The same information for a doctorate is shown in Table 4-12. The private costs of a master's degree earned while involved in part-time enrollment are shown in Table 4-13. The same information for a doctorate is shown in Table 4-14.

Tuition costs for full-time study were calculated with the assumption that a complete year and a summer are needed to complete the requirements for a master's degree while two complete years and two summers are needed to complete the requirements for a doctorate. This assumption had to be altered in the calculation of tuition costs for Norfolk State University because that institution does not offer a summer school. The costs of textbooks and supplies are imputed at 22.5 percent of total tuition costs (see page 51).

During periods of full-time enrollment in graduate school, the salary which the teacher could have earned had graduate study not been undertaken must be considered as foregone earnings. To determine a representative salary for this purpose, all school divisions in Virginia were ranked according to the number of

classroom teachers employed. From this ranking, several levels on the salary schedule of the median school division were then used to indicate foregone earnings. Roanoke City was determined to be the median school division (see Appendix A for a ranking of all Virginia school divisions). The salary of a Roanoke City classroom teacher with a bachelor's degree at the fifth step on the salary scale ($18,602.00) was used as the salary foregone for a teacher studying for a master's degree. To calculate the foregone earnings for earning a doctorate, the salary of a Roanoke City classroom teacher with a master's degree at the tenth step on the salary scale ($22,517.00) was selected and then multiplied by the average number of years (two) required to earn this degree. Salaries at these levels for all Virginia school divisions are indicated in Appendices B and C.

Foregone interest on the money paid for tuition, textbooks, supplies, and required equipment was calculated and indicated at 6 percent of the money spent on those items. The calculation at 6 percent of this indirect cost was used in the determination of the total private cost of graduate education. The rate of 6 percent was chosen for use with further calculations because it is a close approximation of the fluctuations of the prime rate for the 1986-1987 academic year. These figures are shown on Tables 4-11 and 4-12.

Table 4-11

PRIVATE COST OF A MASTER'S DEGREE FROM SELECTED VIRGINIA INSTITUTIONS

(full-time enrollment)

Institution	A	B	C	D	E	F	G	H	I
Norfolk State	36	$774.00	$2,322.00	$522.45	$2,844.45	$27,903.00	$170.67	$28,073.67	$30,918.12
Old Dominion	33	851.00	2,269.00	510.53	2,779.53	18,602.00	166.77	18,768.77	21,548.30
Radford Univ.	30	908.00	2,272.00	511.20	2,783.20	18,602.00	166.99	18,768.99	21,552.19
U. of Richmond	30	3,888.00	8,346.00	1,877.85	10,223.85	18,602.00	613.43	19,215.43	29,439.28
U. of Virginia	30	1,111.06	2,624.00	590.40	3,214.40	18,602.00	192.86	18,794.86	22,009.26
Va. Comm. Univ.	30	1,000.00	2,840.00	639.00	3,479.00	18,602.00	208.74	18,810.74	22,289.74
Va. State Univ.	30	950.00	2,320.00	522.00	2,842.00	18,602.00	170.52	18,772.52	21,614.57
Virginia Tech	30	1,093.50	2,824.50	635.51	4,460.01	18,602.00	207.55	18,809.55	22,269.56
Wm. and Mary	30	1,270.00	3,050.00	686.25	3,736.25	18,602.00	224.81	18,826.18	22,562.43
Mean	30	$1,316.17	$3,207.50	$721.69	$4.040.30	$19,635.44	$235.82	$19,871.19	$23,800.38

A - Degree requirements in semester hours
B - Tuition per semester
C - Total tuition
D - Books and supplies (imputed at 22.5%)
E - Total Direct Cost (C + D)
F - Foregone salary
G - Foregone investment (at 6%)
H - Total Indirect Cost
I - Total Private Cost (E +H)

Table 4-12

PRIVATE COST OF A DOCTORATE FROM SELECTED VIRGINIA INSTITUTIONS
(full-time enrollment)

Institution	A	B	C	D	E	F	G	H	I
Old Dominion	60	$851.00	$5,672.00	$1,276.20	$6,948.20	$45,034.00	$416.89	$45,450.89	$52,399.09
U. of Virginia	60	1,111.00	6,052.00	1,361.70	7,413.70	45,034.00	444.82	45,478.82	52,892.52
Va. Comm. U.	60	1,000.00	5,680.00	1,278.00	6,958.00	45,034.00	417.48	45,451.48	52,409.48
Va. Tech	60	1,093.50	5,649.00	1,271.03	6,920.03	45,034.00	415.20	45,449.20	52,369.23
Wm. and Mary	60	1,270.00	7,120.00	1,602.00	8,722.00	45,034.00	523.32	45,557.32	54,279.32
Mean	60	$1,065.11	$6,034.60	$1,357.79	$7,392.79	$45,034.00	$443.54	$45,477.54	$52,869.93

A - Degree requirements in semester hours
B - Tuition per semester
C - Total tuition
D - Books and supplies (imputed at 22.5%)
E - Total Direct Cost (C + D)
F - Foregone salary
G - Foregone investment (at 6%)
H - Total Indirect Cost
I - Total Private Cost (E +H)

Foregone salary during the period of part-time enrollment in graduate school was calculated using the number of actual clock-hours spent in class as determined by each institution's degree requirements. This number of actual clock-hours spent in class was then multiplied by the current minimum hourly wage ($3.65) in order to derive the total foregone salary. Classroom teachers who choose to secure additional employment outside of the classroom might be able to receive a higher part-time salary. The minimum hourly wage, however, was used in this study to calculate the minimum salary which the teacher would receive if employment was secured for the same amount of time spent in graduate classes.

Foregone interest on the money paid for tuition, textbooks, supplies, and required equipment was again calculated based upon a projected yield of 6 percent. The calculations at 6 percent were used in the determination of the total private cost of graduate education. These calculations are shown on Tables 4-13 and 4-14.

Table 4-13

PRIVATE COST OF A MASTER'S DEGREE FROM SELECTED VIRGINIA INSTITUTIONS

(part-time enrollment)

Institution	A	B	C	D	E	F	G	H	I
Norfolk State	36	$87.00	$3,132.00	$704.70	$3,836.70	$1,340.00	$230.20	$1,570.20	$5,406.90
Old Dominion	33	94.50	3,118.50	701.66	3,820.16	1,204.50	229.21	1,433.21	5,253.37
Radford Univ.	30	76.00	2,280.00	513.00	2,793.00	1,095.00	167.58	1,262.58	4,055.58
U. of Richmond	30	95.00	2,850.00	641.25	3,491.25	1,095.00	209.48	1,304.48	4,795.73
U. of Virginia	30	97.33	2,919.90	656.98	5,576.88	1,095.00	214.61	1,309.61	4,886.49
Va. Comm. Univ.	30	111.00	3,330.00	749.25	4,079.25	1,095.00	244.76	1,339.76	5,419.01
Va. State Univ.	30	70.00	2,100.00	472.50	2,572.50	1,095.00	154.35	1,249.35	3,821.85
Va. Tech	30	121.50	3,645.00	820.13	4,465.13	1,095.00	267.91	1,362.91	5,828.04
Wm. and Mary	30	85.00	2,550.00	573.75	3,123.75	1,095.00	187.43	1,282.43	4,406.18
Mean	31	$93.04	$2,991.71	$648.14	$3,750.96	$1,134.39	$211.73	$1,346.06	$4,874.79

A - Degree requirements in semester hours
B - Tuition per semester
C - Total tuition
D - Books and supplies (imputed at 22.5%)
E - Total Direct Cost (C + D)
F - Foregone salary
G - Foregone investment (at 6%)
H - Total Indirect Cost
I - Total Private Cost (E +H)

Table 4-14

PRIVATE COST OF A DOCTORATE FROM SELECTED VIRGINIA INSTITUTIONS
(part-time enrollment)

Institution	A	B	C	D	E	F	G	H	I
Old Dominion	60	$94.50	$5,670.00	$1,275.75	$6,945.75	$2,190.00	$416.75	$2,606.75	$9,552.50
U. of Va.	60	97.33	5,839.80	1,313.96	7,153.76	2,190.00	429.23	2,619.23	9,772.99
Va. Comm. U.	60	111.00	6,660.00	1,498.50	8,158.50	2,190.00	489.51	2,679.51	10,838.01
Va. Tech	60	121.50	7,290.00	1,640.00	8,930.25	2,190.00	535.82	2,725.82	11,656.07
Wm. and Mary	60	85.00	5,100.00	1,147.50	6,247.50	2,190.00	374.85	2,564.85	8,812.35
Mean	60	$101.87	$6,099.96	$1,375.19	$7,481.75	$2,190.00	$449.23	$2,39.32	$10,126.38

A - Degree requirements in semester hours
B - Tuition per semester
C - Total tuition
D - Books and supplies (imputed at 22.5%)
E - Total Direct Cost (C + D)
F - Foregone salary
G - Foregone investment (at 6%)
H - Total Indirect Cost
I - Total Private Cost (E +H)

Private Direct Benefit of Graduate Education

The private direct benefit of earning an advanced degree and then returning to the classroom was derived from the annual salary supplement paid by most school divisions in Virginia. All school divisions provide a salary supplement to teachers who hold a master's degree while only half provide a supplement to teachers who hold a doctorate.[1]

Salary supplements, shown in Appendix D, for the master's degree range from $750.00 (Cape Charles and Northampton counties) to $6,048.00 (Falls Church). The mean supplement provided to Virginia teachers who hold a master's degree was $1,285.20 for the 1986-87 academic year. This figure was used in later calculations as the private direct benefit of earning such a degree.

Salary supplements for the doctorate range from zero to $5,826.00 (Alexandria). The average supplement provided to Virginia classroom teachers during 1986-87 who hold a doctorate is $1,935.00. This figure will be used in later calculations as the private direct benefit of earning a doctorate in Virginia. It is noted, however, that this is the mean salary supplement of those school divisions which provide such a supplement; 50 percent of the school divisions in Virginia provide no salary supplement at all to classroom teachers who hold a doctorate. If all school divisions in Virginia,

[1] Virginia Education Association, Salary Schedules for Classroom Teachers 1986-87, 1986, pp. 29-71.

those providing a salary supplement to classroom teachers who hold a doctorate and also those school divisions that provide no such supplement, were used in the calculation of a mean salary supplement, that figure would be reduced to $967.50. While this smaller figure is representative of the entire state of Virginia, the mean supplement provided by school divisions that participate in such a practice, $1,935.00, was used for further calculations because it is more representative of the type of supplement paid.

Economic Advisability of Graduate Education

When assessing the economic advisability of an investment in graduate education, the Virginia classroom teachers must ask whether they would be better off financially to invest their time and money in an alternative investment. Alternative investments for their money could be basic savings accounts, certificates of deposit, stocks, real estate, or other forms of business endeavor. All of these alternatives have a rate of return to the investment dollar which can be compared to the rate of return available through graduate education. Alternative investments of time could be a part-time job to secure additional income or any of a number of hobbies or other pleasurable pursuits which are available for relaxation.

Three procedures were used to quantify the variables involved in graduate education and to provide an objective look at the

circumstances surrounding such an investment. The procedures are (1) net present valuation, (2) benefit-cost ratio, and (3) internal rate of return.

Net Present Value

Cost-benefit calculations involve the discounting of future flows of those benefits derived from acquiring the advanced degree (total private benefits as shown in Appendix D) as well as any cost (total private costs as shown in Table 4-1). This is necessary since the benefits will necessarily occur over a period of years in the future while the costs might occur over a period of years as well.[2] Such discounting converts the actual cost and benefit into present (1987) dollars for ease of comparison. In discounting costs and benefits for this study, a discount rate of 6 percent has been used as representative of current market rates. Discounting of benefits was done over a twenty year period assuming that the teacher would teach for that period of time following completion of the degree. Discounting of the costs was done over the period of time required to complete the degree requirements.

Present values for the cost of obtaining a graduate degree and for the benefit derived from earning that degree were then used to determine the net present value of that investment and to determine the benefit-cost ratio of that investment. The net present value rule

[2] Woodhall, Maureen, Cost-Benefit Analysis in Educational Planning (Belgium: Les Presses de Gedit, 1980), p. 22.

(see Chapter III) states that only those investments should be selected in which the present value of the benefits exceed the present value of the costs.[3] The discounted benefit (DB), the discounted cost (DC), and the net present value (NPV) for a master's degree from each of the nine selected Virginia institutions are shown in Table 4-15. Calculations are also shown for the average costs for all of the selected institutions. Similar calculations are indicated for a doctorate on Table 4-16.

Benefit-Cost Ratio

The benefit-cost ratio for a graduate degree from each of the selected Virginia institutions is another measure of comparison of the economic advisability of such an investment. This benefit-cost ratio gives the discounted benefits per dollar of discounted cost. A high positive ratio of such an investment indicates a high return to the investment dollar. A benefit-cost ratio of less than 1.0 indicates a negative return to the investment and shows that the costs of acquiring a graduate degree are greater than the benefits derived from that degree.

The benefit-cost ratio (B/C) of a master's degree from each of the selected Virginia institutions is shown on Table 4-15. Calculations are also shown for the average cost for all of the selected institutions. Separate figures are given for full-time and for part-

[3] Prest, A. R., and R. Turvey, "Cost-Benefit Analysis: A Survey", Economic Journal 75 (December) 1965, p. 703.

Calculations are also shown for the average cost for all of the selected institutions. Separate figures are given for full-time and for part-time graduate study. Similar figures are shown for a doctorate on Table 4-16.

Table 4-15

DISCOUNTED BENEFIT, DISCOUNTED COST, NET PRESENT VALUE, AND BENEFIT-COST RATIO OF A MASTER'S DEGREE

Institution	DB	DC	NPV	B/C
	full-time enrollment			
Norfolk State University	$14,741.10	$29,168.00	$-14,426.90	0.5054
Old Dominion University	14,741.10	20,328.60	-5,587.50	0.7251
Radford University	14,741.10	20,332.30	-5,591.20	0.7250
University of Richmond	14,741.10	27,772.90	-13,031.80	0.5308
University of Virginia	14,741.10	20,763.50	-6,022.40	0.7100
Va. Comm. University	14,741.10	21,028.10	-6,287.00	0.7010
Va. State University	14,741.10	20,391.10	-5,650.00	0.7229
Virginia Tech	14,741.10	21,009.00	-6,267.90	0.7016
Wm. and Mary	14,741.10	21,285.30	-6,544.20	0.6925
Mean	14,741.10	22,453.20	-7,712.10	0.6565
Median	14,741.10	20,772.90	-6,267.90	0.7016
	part-time enrollment			
Norfolk State University	14,741.10	4,431.25	10,309.80	3.3266
Old Dominion University	14,741.10	4,714.51	10,026.59	3.1268
Radford University	14,741.10	3,665.64	11,075.46	4.0214
University of Richmond	14,741.10	4,334.63	10,406.47	3.4007
University of Virginia	14,741.10	4,416.66	10,324.44	3.3376
Va. Comm. University	14,741.10	4,897.98	9,843.12	3.0096
Va. State University	14,741.10	3,454.38	11,286.72	4.2674
Virginia Tech	14,741.10	5,267.68	9,473.42	2.7984
Wm. and Mary	14,741.10	3,982.53	10,758.57	3.3456
Mean	14,741.10	4,406.08	10,335.02	3.3456
Median	$14,741.10	$4,416.60	$10,324.44	3.3376

Table 4-16

DISCOUNTED BENEFIT, DISCOUNTED COST, NET PRESENT VALUE, AND BENEFIT-COST RATIO OF A DOCTORATE

Institution	DB	DC	NPV	B/C
	full-time enrollment			
Old Dominion University	$22,194.30	$48,034.10	$-25,839.80	0.4621
University of Virginia	22,194.30	48,486.40	-26,292.10	0.4578
Va. Comm. University	22,194.30	48,043.60	-25,849.30	0.4620
Virginia Tech	22,194.30	48,006.70	-25,812.40	0.4623
Wm. and Mary	22,194.30	49,757.70	-27,563.40	0.4460
Mean	22,194.30	48,465.70	-26,271.40	0.4579
Median	22,194.30	48,043.60	-25,849.30	0.4620
	part-time enrollment			
Old Dominion University	22,194.30	8,047.72	14,146.58	2.7578
University of Virginia	22,194.30	8,233.48	13,960.82	2.6956
Va. Comm. University	22,194.30	9,130.73	13,063.57	2.4307
Virginia Tech	22,194.30	9,819.92	12,374.38	2.2601
Wm. and Mary	22,194.30	7,424.17	14,770.13	2.9895
Mean	22,194.30	8,531.20	13,663.10	2.6015
Median	$22,194.30	$8,233.48	$13,960.82	2.6956

Internal Rate of Return

Internal rate of return (IROR) calculations are used to determine the discount rate which would equate the costs with the benefits of an investment. The IROR allows an investor to rank and compare the net results of alternative investment options. The IROR does not use discounted costs and benefits in its determination; rather, it solves for that discount rate which equates the undiscounted costs with the comparable undiscounted benefits. After calculation and ranking, the investment with the highest internal rate of return is considered to be the preferred investment.

The internal rates of return of the investment of a master's degree from the selected Virginia institutions are shown on Table 4-17. Also indicated are the undiscounted cost, the number of years over which that cost is incurred, the undiscounted benefit, and the number of years over which that benefit is derived. Calculations are also given for the average cost of a degree from the selected institutions. Separate figures are given for full-time and for part-time graduate study. Similar figures are given for the doctorate on Table 4-18.

Table 4-17
UNDISCOUNTED BENEFIT, UNDISCOUNTED COST, AND INTERNAL RATE OF RETURN OF A MASTER'S DEGREE

Institution	Undiscounted Benefit	Years of Benefit	Undiscounted Cost	Years of Cost	IROR
		full-time enrollment			
Norfolk State	$1,285.20	20	$30,918.12	1.5	-1.602%
Old Dominion	1,285.20	20	21,548.30	1.0	1.742%
Radford Univ.	1,285.20	20	21,552.19	1.0	1.754%
U. of Richmond	1,285.00	20	29,439.28	1.0	-1.258%
U. of Virginia	1,285.20	20	22,009.26	1.0	1.526%
Va. Comm. Univ.	1,285.00	20	22,289.74	1.0	1.397%
Va. State Univ.	1,285.20	20	21,614.57	1.0	1.710%
Virginia Tech	1,285.20	20	22,269.56	1.0	1.406%
Wm. and Mary	1,285.20	20	22,562.43	1.0	1.275%
Mean	1,285.20	20	23,797.05	1.0	0.745%
Median	1,285.20	20	22,269.56	1.0	1.406%
		part-time enrollment			
Norfolk State	1,285.20	20	5,406.90	6.0	15.244%
Old Dominion	1,285.20	20	5,253.37	2.75	19.391%
Radford Univ.	1,285.20	20	4,055.58	2.5	23.870%
U. of Richmond	1,285.20	20	4,795.73	2.5	20.686%
U. of Virginia	1,285.20	20	4,886.49	2.5	20.348%
Va. Comm. Univ.	1,285.20	20	5,419.01	2.5	18.545%
Va. State Univ.	1,285.20	20	3,821.85	2.5	25.071%
Virginia Tech	1,285.20	20	5,828.04	2.5	17.336%
Wm. and Mary	1,285.20	20	4,406.18	2.5	22.258%
Mean	1,285.20	20	4,874.79	2.9	20.928%
Median	$1,285.20	20	$4,886.49	2.5	20.348%

Table 4-18

UNDISCOUNTED BENEFIT, UNDISCOUNTED COST, AND INTERNAL RATE OF RETURN OF A DOCTORATE

Institution	Undiscounted Benefit	Years of Benefit	Undiscounted Cost	Years of Cost	IROR
		--full-time enrollment--			
Old Dominion	$38,700.00	20	$52,399.09	2.0	-2.615%
U. of Virginia	38,700.00	20	52,892.52	2.0	-2.691%
Va. Comm. Univ.	38,700.00	20	52,409.48	2.0	-2.616%
Virginia Tech	38,700.00	20	52,369.23	2.0	-2.604%
Wm. and Mary	38,700.00	20	54,279.32	2.0	-2.902%
Mean	38,700.00	20	52,869.93	2.0	-2.688%
Median	38,700.00	20	52,409.48	2.0	-2.616%
		part-time enrollment			
Old Dominion	38,700.00	20	9,552.50	5.0	14.190%
U. of Virginia	38,700.00	20	9,772.99	5.0	13.896%
Va. Comm. Univ.	38,700.00	20	10,838.01	5.0	12.822%
Virginia Tech	38,700.00	20	11,656.07	5.0	11.706%
Wm. and Mary	38,700.00	20	8,812.35	5.0	15.254%
Mean	38,700.00	20	10,126.38	5.0	13.442%
Median	$38,700.00	20	$9,772.99	5.0	13.896%

Summary

In Chapter IV, the data obtained from the survey of the nine selected Virginia institutions of higher education and the classroom teacher salary schedules were presented. The total private cost, including both direct and indirect costs, of obtaining a graduate degree was calculated and presented. The total private benefit of obtaining a graduate degree, in the form of the annual salary supplement, was calculated and presented. Using the calculated private cost and the private benefit of a graduate degree, a cost-benefit analysis was performed to determine the economic advisability of such an investment. The net present value, the benefit-cost ratio, and the internal rate of return of each degree were calculated and reported for each institution.

Chapter V

Summary and Conclusions

The stated purpose of this study was to review the practice of those Virginia public school divisions which provide a salary supplement to teachers who hold advanced degrees and, then, to analyze the costs involved in the acquisition of such degrees. Econometric methods were then used to analyze the private pecuniary benefits and costs associated with graduate study.

The findings of this study can assist public school teachers in Virginia who, at some time, might consider acquiring an advanced degree. To that end, this study provides baseline data which will prove valuable when teachers consider alternatives to such an undertaking. The study did not attempt to delve into all individual circumstances which face teachers as they consider graduate school; rather, the study dealt with stated requirements, mean salaries, customary academic progress, and imputed indirect costs. Once these general questions are answered, teachers considering the acquisition of an advanced degree must then answer for themselves many of the specific questions within this study which have been applied to the "average" teacher and graduate student. After weighing the answers to both the general and individual questions, the teacher may then proceed to consider the other items addressed in this study.

Costs of Graduate Education

The private costs of acquiring a graduate degree in Virginia are considerable. Tuition charges at the selected Virginia institutions vary from $210.00 per course at Virginia State University to $364.50 ($243.00 per quarter) at Virginia Tech. An even greater variation appears in the comparison of full-time tuition rates of $851.00 per semester at Old Dominion University to $3,888.00 per semester at the University of Richmond. Degree requirements as stated in the catalog of each institution were used along with tuition rates to calculate a total tuition cost. While this was the only practical way to structure the study, an individual teacher must factor costs on an individual basis after considering the possibility of additional requirements due to a weak background, waived requirements due to a strong background or prior experience, and any sabbatical or scholarship possibilities. Also, it is important to be mindful that this was a study of the economic factors related to graduate education. No attempt has been made to establish or compare the quality of the programs offered at the selected institutions. When a teacher considers graduate education, the quality and reputation of the institution should be considered. A decision to attend a more expensive institution could be a cost-effective decision if the added quality of the education received at that institution better enabled that teacher to be hired or to be considered for advancement.

The costs of textbooks and supplies were imputed at 22.5 percent of tuition costs. This approximation served well the needs of this study but may not reflect a percentage which can be universally applied, for this is an area which can be controlled somewhat by the personal efforts of the teacher. The inclusion of the cost of foregone investment is required by economic principles when conducting a cost-benefit analysis. However, unless a teacher is sufficiently self-disciplined to invest the money proposed for tuition in an alternative investment, this additional cost may artificially inflate the cost of education (see Tables 4-11 thru 4-14).

Benefits of Graduate Education

The private pecuniary benefits of acquiring an advanced degree were used in the study. Social benefits and private non-pecuniary benefits, while notable, were not included in the study. Those salary increments allowed by school divisions to holders of advanced degrees were used for this purpose. Variation in the amount of this supplement is apparent across the state; master's degree supplements vary from $750.00 to $6,048.00 and supplements for the doctorate vary from zero to $5,826.00. A mean supplement was calculated for both the master's degree ($1,285.20) and the doctorate ($1,935.00) and was used in subsequent calculations. The mean salary supplement provided for holders of a doctorate was calculated among the sixty-eight school divisions which provide such supplements; the other half of the 136 school

divisions in the state of Virginia provide no supplement at all for the doctorate.

Teachers, when considering graduate education, must consider the salary supplement offered by their school division unless they are willing to relocate elsewhere in the state. A salary substantially more than the mean supplement used in this study would make graduate education a more attractive investment alternative. Likewise, a supplement substantially less than the figure used in this study would make an investment in graduate education more difficult to justify in economic terms. Half of the school divisions in Virginia provide no supplement at all to classroom teachers who hold a doctorate. Knowledge of the practice in one's school division is essential before a prudent decision can be made.

Cost-Benefit Analysis

Three procedures were used to analyze the data collected in this study in order to provide an objective look at the circumstances surrounding an investment in post-graduate education. These procedures were net present valuation, benefit-cost ratio, and internal rate of return.

Net present valuation involved discounting future flows of benefits and then combining these with acquisition costs. The net

present value of graduate degrees varies greatly for Virginia teachers, depending somewhat upon which institution was attended; the sharpest variation, however, was according to whether the degree was earned on a full-time or on a part-time basis. According to the net present value rule discussed in Chapter III, only those investments should be selected for which the NPV is positive. Thus, by this criterion alone, full-time enrollment should not be considered while part-time enrollment for either degree is a more economically viable alternative.

Benefit-cost ratio (B/C) indicates the discounted benefits per dollar of discounted cost. Similar to the findings of net present value calculations, the B/C of full-time enrollment for both the master's degree and the doctorate is less than 1.0, indicating that costs exceed benefits. Similar calculations indicate a much more favorable B/C for part-time enrollment. The B/C for part-time acquisition of a master's degree is 3.3456 (mean for all institutions) and 2.6015 for a doctorate. It is apparent again that full-time enrollment should not be considered, but that part-time enrollment is an attractive alternative. It is also apparent that the payback for a master's degree is slightly better than for a doctorate.

Internal rate of return (IROR) calculations produce a discount rate at which the net present value of the investment is zero. When comparing alternative investments, the one which yields the higher

IROR is characterized as having the higher net present value and as being, therefore, the preferred investment. IROR calculations reported in Chapter IV indicated a low (a mean of .7456 percent for a master's degree and a mean of -2.688 percent for a doctorate) IROR for full-time enrollment. Similar calculations indicated a higher (a mean of 20.9278 percent for a master's degree and a mean of 13.4418 percent for a doctorate) IROR for part-time enrollment. Comparisons of the IROR figures computed in this study indicate that educational investment options facing Virginia teachers rank, from worst to best, from full-time acquisition of a doctorate, to full-time acquisition of a master's degree, to part-time study for a doctorate, to part-time study for a master's degree.

The three procedures used in the cost-benefit analysis within this study all produced similar implications. It is indicated that, on an economic basis, part-time enrollment is far superior to full-time enrollment. It is also indicated that acquisition of a master's degree is economically more rewarding to Virginia teachers than the acquisition of a doctorate.

Conclusions

Several conclusions can be drawn from the results of the cost-benefit analysis and its supporting data, as reported in Chapter III and IV. While data were collected from institutions of higher education and from the school divisions in the state of Virginia rather than from a survey of teachers who were actually involved in graduate study, patterns have become apparent throughout the course of this study. Generalizations can be made about the practice of Virginia teachers acquiring a graduate degree, but also the benefits that accrue to them. Even though exceptions or unusual circumstances may be present, several generalizations suggested by the related studies cited in Chapter II were substantiated by the findings of this study.

A great disparity exists among school divisions throughout the state when one compares the salaries provided for classroom teachers. This disparity appears to be less when comparing neighboring school divisions, but greater when comparing school divisions from one geographical area of the state with one from another area of the state. The metropolitan areas of Richmond, Tidewater, and Northern Virginia tend to have higher teacher salaries than the rural areas of the state. This factor alone is neither startling nor unique to Virginia, but it does have one related effect. The school divisions which have higher salary schedules also tend to have higher supplements for graduate degrees. The ten school

divisions which pay the highest salaries in Appendix B, Virginia Teacher Salaries - Bachelor's Degree and Five Years' Experience, provide a mean salary supplement for holders of a master's degree of $2,265.00, or approximately $980.00 above the mean for all school divisions. At the same time, the ten school divisions which pay the lowest salaries in Appendix B provide a mean salary supplement of only $997.00, which is approximately $288.00 below the state mean. Similar results were found for the salaries ranked on Appendix C. It is apparent, then, that the practice of providing salary supplements to teachers who hold advanced degrees may be merely a form of fringe benefit which the wealthier school divisions can provide; rather than a well-developed plan either to encourage teachers to pursue graduate work, or to reward them for such accomplishments.

It is obvious, from an economic point of view, that pursuit of a graduate degree on a part-time basis is far superior to doing so on a full-time basis. The salary which a teacher forfeits may create a hardship on the teacher, while accounting for the majority of the costs of full-time graduate study. Therefore, unless other factors make full-time study more desirable, teachers will likely find part-time enrollment to be more attractive.

All phases of the cost-benefit analysis indicate that part-time enrollment is economically more desirable than full-time study. Net present valuation (Table 4-15 and 4-16) of both a master's degree

and a doctorate indicate a negative value for a degree earned on a full-time basis and a positive value for a degree earned in part-time enrollment. Similar findings were reported in the benefit-cost ratio calculations. The B/C for both a master's degree and a doctorate earned while enrolled full-time was less than 1.0 while the same calculations for part-time enrollment produced results in the 2.2 - 4.2 range. Likewise, internal rate of return calculations, as reported on Table 4-17 and 4-18, indicate a negative or very low IROR for degrees earned on a full-time basis while degrees earned on a part-time basis yielded an IROR in the 11 - 25 percent range.

Full-time enrollment does not, according to the findings of this study, compare favorably with part-time enrollment. Other factors must be considered when choosing to attend graduate school, but on an economic basis alone, the benefits related to part-time enrollment far outweigh those of full-time enrollment. Other factors which might be considered are family needs, professional concerns such as an impending promotion or advancement, and sabbatical or scholarship possibilities.

Another conclusion which can be reached from the study is that the investment in a graduate degree yields a higher return to the investment dollar if that degree is earned early in the teacher's career. This study was based on an assumption that the teacher would return to the classroom for twenty years after completion

of the degree. Since the annual salary supplement is the only way a classroom teacher can be financially rewarded for the acquisition of a degree, it is obvious that the more years a person teaches after receiving the advanced degree, the greater the economic benefit.

Data in Table 4-15 represent discounted benefits, discounted costs, net present value, and cost-benefit ratio for a master's degree earned by a Virginia teacher who is expected to teach for twenty years following receipt of the degree. Similar information for the doctorate is given on Table 4-16. As a means of comparison, the same data are reported in Table 5-1 for teachers who teach only ten years after completion of the degree and also for those who teach for thirty years following completion of the degree. The data support the conclusion that economic benefits accrue most to those teachers who acquire the graduate degree at the earliest possible time in their teaching career.

Table 5-1

ECONOMIC BENEFIT OF RETURNING TO THE CLASSROOM FOR TEN, TWENTY, AND THIRTY YEARS AFTER RECEIVING AN ADVANCED DEGREE

Degree	Years	DB	DC	NPV	B/C
Master's Degree (full-time)	10	$9,459.18	$22,453.30	-$12,994.02	0.4213
	20	14,741.10	22,453.30	-7,712.10	0.6565
	30	17,690.60	22,453.30	-4,762.60	0.7879
Master's Degree (Part-time)	10	9,459.18	4,406.08	5,053.10	2.1468
	20	14,741.10	4,406.08	10,335.02	3.3456
	30	17,690.60	4,406.08	13,283.80	4.0150
Doctorate (Full-time)	10	14,241.08	48,465.70	-34,223.90	0.2939
	20	22,194.30	48,465.70	-26,271.40	0.4579
	30	26,635.00	48,465.70	-21,830.70	0.5496
Doctorate (Part-time)	10	14,241.80	8,531.20	5,710.60	1.6694
	20	22,194.30	8,531.20	13,663.10	2.6015
	30	$26,635.00	$8,531.20	$18,103.80	3.1221

Years - Years taught after earning the advanced degree
DB - Discounted Benefits
DC - Discounted Costs
NPV - Net Present Value
B/C - Benefit Cost Ratio

Results from this study confirmed the suspicion that, once a graduate degree was earned, there was a strong economic incentive for classroom teachers to consider entering the fields of administration and supervision. Even though this study was limited to a cost-benefit analysis of graduate study by Virginia classroom teachers who return to the classroom after acquiring an advanced degree, implications of the data became clear once the calculations were performed. When researching the studies previously done about graduate education by teachers, several authors expressed a concern regarding the drain of classroom teachers into the fields of administration and supervision. Therefore, when classroom teacher salary information was sought from the Virginia Education Association, similar information was requested for these areas.

Classroom teacher salary schedules for Virginia public school divisions vary greatly as do salary schedules for Virginia school administrators and supervisors. However, the highest salary listed for a classroom teacher was $44,085.00 (Alexandria) while the highest salary listed for a building administrator was $64,047.00 (Arlington).[1] No attempt was made to compare and contrast the job descriptions of these two areas of employment, but the economic discrepancy is apparent and an incentive is therefore created. Individuals must weigh the nature of an administrative position against the increased economic benefit of moving into administration.

[1] Salary Schedules for Administrative Personnel 1986-87, Virginia Education Association. Richmond: VEA, 1986, p. 5.

To further substantiate the conclusion that there is an economic incentive for classroom teachers to consider leaving the classroom for an administrative or supervisory position, cost-benefit analysis procedures were applied to the administrative data collected from the Virginia Education Association.

To enter an administrative position, most school divisions require successful teaching experience and a master's degree. The cost of acquiring that master's degree has previously been determined. The economic benefit of accepting an administrative position was derived from the administrative salary schedules of the school divisions of the state or actual salaries currently being paid. In all cases where a salary schedule was provided, the minimum level of the scale was used. Otherwise, the actual salary currently being paid was used. A mean entry-level administrative salary was then computed; that salary figure was $30,178.00. That figure represents the mean salary that a teacher could expect to receive if he left the classroom and accepted an administrative position in Virginia during the 1986-87 school year.

Data in Table 5-2 represent the discounted benefit, discounted cost, net present value, and benefit-cost ratio of an investment in a master's degree and a resultant change to an administrative position. Comparison of these data with data arrayed in Table 4-15 for a

master's degree with a subsequent return to the classroom indicates a substantial economic advantage in the administrative position.

Table 5-2

DISCOUNTED BENEFIT, DISCOUNTED COST, NET PRESENT VALUATION, AND BENEFIT-COST RATIO OF A MASTER'S DEGREE AND ENTRY INTO PUBLIC SCHOOL ADMINISTRATION

DB	DC	NPV	B/C
	full-time enrollment		
$132,776.00	$22,453.20	.$110,322.80	5.9135
	part-time enrollment		
$132,776.00	$4,406.08	$128,369.92	30.13247

DB - Discounted Benefit
DC - Discounted Cost
NPV - Net Present Value
B/C - Benefit Cost Ratio

Future Research Questions

This study was designed with a number of delimitations and assumptions to allow for an indepth cost-benefit analysis of the private economic factors affecting a Virginia public school teacher's choice of investing in a graduate degree. By its design, the study did not attempt to answer all related questions; it has, however, identified some areas which need to be explored further. Those areas whose further study and clarification might be beneficial to the teaching profession are as follows:

1. Why do teachers who attend graduate school choose to do so?
2. Do they return to the classroom upon completion of the degree?
3. Is an advanced degree sought because of certification requirements to enter the field of administration and supervision?
4. Why do school divisions in Virginia provide salary supplements to teachers who hold a graduate degree?
5. On what basis do school divisions make decisions regarding the amount of the salary supplements?
6. What are the social costs borne by the taxpayers, of graduate education for Virginia public school teachers?
7. Is a teacher more mobile with an advanced degree or without?

8. Are holders of graduate degrees better teachers as a group than those who earned only bachelor's degrees?
9. What is the cost effectiveness of graduate education undertaken with the intention of entering the field of administration?

Final Comments

Public school teachers in Virginia have invested considerable effort and money in the pursuit of teaching credentials. This pursuit is usually an investment in an undergraduate education leading to a baccalaureate degree. Once they have earned a bachelor's degree, some teachers make an additional investment in education by earning a master's degree or post-master's degree. Many reasons have been identified as to why public school teachers decide to pursue graduate studies.

Before a teacher considers graduate school, the economic factors identified in this study should be carefully reviewed. Motives such as professional development, advancement within the profession, and improvement of personal competencies are pursuasive. The costs of such an investment have been identified and analyzed. Using the findings of this study, a classroom teacher considering graduate school will be better able to make an objective

decision based on economic data rather than relying on reactions to subjective criteria.

Virginia institutions of higher education can use the findings of this study to review the economic incentive for teachers to favor part-time enrollment over full-time enrollment in graduate school. Implications call for a consideration to modify residency requirements and increase funding of assistantships. Local school divisions can use the findings of this study to review their practice of funding salary supplements for teachers who acquire an advanced degree. The State of Virginia can use the findings of this study to review their efforts to provide suitable salaries and salary supplements in order to attract desirable persons to the teaching profession and, then, to keep them in the classroom.

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Appendix A

VIRGINIA PUBLIC SCHOOL DIVISIONS RANKED ACCORDING TO THE NUMBER OF TEACHERS EMPLOYED - 1986-1987

7,484 - Fairfax County
3,159 - Virginia Beach
2,393 - Norfolk
2,158 - Chesterfield County
2,135 - Prince William County
2,105 - Richmond
1,957 - Henrico County
1,585 - Newport News
1,474 - Chesapeake
1,269 - Hampton
1,113 - Portsmouth
1,101 - Falls Church
980 - Roanoke County
960 - Arlington
900 - Roanoke
860 - Loudon County
739 - Alexandria
724 - Pittsylvania County
710 - Henry County
672 - Augusta County
653 - Hanover County
650 - Lynchburg
632 - Stafford County
613 - Albemarle County
598 - Tazewell County
598 - Rockingham County
571 - Wise County
556 - Buchanan County
552 - Montgomery County
546 - Suffolk
535 - Campbell County
526 - York County
519 - Washington County
515 - Spottsylvania County
490 - Danville
488 - Fauquier County
469 - Bedford County
441 - Frederick County
428 - Petersburg
412 - Charlottesville
400 - Pulaski County
379 - Franklin County
375 - Smyth County
375 - Halifax County
374 - Russell County
368 - Mecklenburg County
345 - Lee County
342 - Accomack County
329 - Shenandoah County
318 - Prince George County
317 - Williamsburg
310 - Amherst County
308 - Wythe County
301 - Scott County
299 - Carroll County
291 - Culpepper
289 - Dinwiddie County
279 - Botetourt County
264 - Dickenson County
258 - Gloucester County
257 - Hopewell
252 - Isle of Wight
247 - Warren County
246 - Salem
244 - Alleghany Highlands
240 - Orange County
240 - Manassas
236 - Winchester

Appendix A - continued

232 - Louisa County
227 - Martinsville
225 - Staunton
224 - Bristol
221 - Caroline County
217 - Cape Charles
215 - Page County
214 - Colonial Heights
208 - Rockbridge County
208 - Greensville County
202 - Harrisonburg
202 - Giles County
200 - Southampton County
192 - Patrick County
184 - Brunswick County
171 - Waynesboro
164 - Northampton
156 - Nelson County
155 - Charlotte County
154 - Fredericksburg
151 - Buckingham County
150 - Nottoway County
149 - Appomattox County
146 - Prince Edward County
146 - Powhatan County
144 - Lunenburg County
140 - Westmoreland County
139 - Poquoson
136 - King George County
134 - Goochland County
134 - Fluvanna County
128 - Madison County
124 - Floyd County
122 - Grayson County

120 - New Kent County
118 - Sussex County
113 - Clarke County
112 - Radford
111 - Franklin
109 - Essex County
108 - Green County
102 - Covington
101 - Manassas Park
100 - King William County
98 - Northumberland County
98 - Cumberland County
98 - Charles City County
97 - Amelia County
96 - Lancaster County
95 - Quantico
89 - Mathews County
88 - Surry County
88 - Bath County
87 - South Boston
85 - Buena Vista
84 - Richmond County
83 - Middlesex County
82 - Galax
77 - Bland County
72 - King and Queen County
71 - Rappahannock County
58 - Norton
55 - Lexington
51 - West Point
47 - Craig County
39 - Colonial Beach
37 - Highland County
24 - Fries

Source: Salary Schedules for Classroom Teachers 1986-87, Virginia Education Association, 1986.

Appendix B

1986-87 VIRGINIA TEACHER SALARIES - BACHELOR'S DEGREE AND FIVE YEARS' EXPERIENCE

$22,669.00 - Fairfax County	$18,816.00 - Caroline County
22,466.00 - Arlington	18,815.00 - Prince George County
22,279.00 - Alexandria	18,686.00 - Manassas Park
21,115.00 - Prince William County	18,650.00 - Suffolk
21,000.00 - Falls Church	18,614.00 - Waynesboro
20,775.00 - Loudon County	18,602.00 - Roanoke
20,710.00 - Norfolk	18,560.00 - Gloucester
20,547.00 - Manassas	18,559.00 - Hopewell
20,230.00 - Quantico	18,547.00 - Roanoke County
19,870.00 - Salem	18,390.00 - Pulaski County
19,845.00 - Henrico County	18,260.00 - Dinwiddie County
19,835.00 - Stafford County	18,260.00 - Galax
19,796.00 - Harrisonburg	18,240.00 - Charlottesville
19,693.00 - York County	18,206.00 - Colonial Heights
19,618.00 - Newport News	18,162.00 - Hanover County
19,611.00 - Hampton	18,123.00 - West Point
19,400.00 - Williamsburg	18,113.00 - Smyth County
19,400.00 - Wise County	18,112.00 - Radford
19,388.00 - Bristol	18,110.00 - Martinsville
19,371.00 - Richmond	18,103.00 - Isle of Wight
19,345.00 - King George County	18,101.00 - Albemarle County
19,336.00 - Virginia Beach	18,095.00 - Warren County
19,282.00 - Chesapeake	18,094.00 - Frederick County
19,250.00 - Spottsylvania County	18,072.00 - Grayson County
19,200.00 - Poquoson	18,040.00 - Henry County
19,030.00 - Chesterfield County	18,009.00 - Staunton
19,030.00 - Franklin	17,970.00 - Rockingham County
19,000.00 - Fredericksburg	17,969.00 - Clarke County
19,000.00 - Norton	17,894.00 - Westmoreland County
18,979.00 - Lynchburg	17,886.00 - Surry County
18,970.00 - Dickenson County	17,883.00 - Fauquier County
18,966.00 - Danville	17,880.00 - Orange County
18,910.00 - Portsmouth	17,865.00 - Culpepper
$18,899.00 - Petersburg	$17,815.00 - Richmond County

Appendix B - continued

$17,789.00 - Alleghany Highlands	$16,810.00 - King and Queen Co.
17,785.00 - Northumberland County	16,800.00 - Lee County
17,765.00 - Giles County	16,800.00 - Middlesex County
17,674.00 - South Boston	16,794.00 - Buchanan County
17,650.00 - Montgomery County	16,790.00 - Charlotte County
17,600.00 - Louisa County	16,750.00 - Washington County
17,600.00 - Northampton County	16,735.00 - Shenandoah County
17,590.00 - Prince Edward County	16,727.00 - Greenville County
17,526.00 - King William County	16,720.00 - Campbell County
17,523.00 - Mathews County	16,701.00 - Rappahannock County
17,461.00 - Tazewell County	16,698.00 - Brunswick County
17,400.00 - Buckingham County	16,698.00 - Carroll County
17,352.00 - Botetourt County	16,685.00 - Nottoway County
17,325.00 - Goochland County	16,683.00 - Buena Vista
17,300.00 - Pittsylvania County	16,650.00 - New Kent County
17,240.00 - Bedford County	16,640.00 - Southampton County
17,216.00 - Lancaster County	16,468.00 - Colonial Beach
17,205.00 - Sussex County	16,428.00 - Nelson County
17,200.00 - Amelia County	16,390.00 - Page County
17,200.00 - Fluvanna County	16,353.00 - Charles City County
17,200.00 - Mecklenburg County	16,347.00 - Lunenburg County
17,177.00 - Wythe County	16,329.00 - Rockbridge County
17,172.00 - Accomack County	16,304.00 - Bath County
17,119.00 - Augusta County	16,276.00 - Madison County
17,118.00 - Winchester	16,200.00 - Cumberland County
17,106.00 - Bland County	16,170.00 - Appomattox County
17,100.00 - Franklin County	16,150.00 - Russell County
17,034.00 - Craig County	16,091.00 - Floyd County
17,028.00 - Fries	15,581.00 - Patrick County
17,027.00 - Halifax County	15,765.00 - Scott County
16,940.00 - Lexington	15,556.00 - Powhatan
16,881.00 - Covington	15,346.00 - Greene County
16,880.00 - Essex County	15,308.00 - Highland County
$16,818.00 - Amherst County	$15,100.00 - Cape Charles

Source: "Salary Schedules for Classroom Teachers 1986-87," Virginia Education Association, December, 1986.

Appendix C

1986-87 VIRGINIA TEACHER SALARIES - MASTER'S DEGREE AND TEN YEARS' EXPERIENCE

$31,584.00	Falls Church	$22,012.00	Warren County
30,622.00	Arlington County	22,006.00	Pulaski County
29,901.00	Fairfax County	22,000.00	Fredericksburg
29,455.00	Alexandria	21,988.00	Staunton
27,647.00	Quantico	21,850.00	Petersburg
27,150.00	Loudoun County	21,843.00	Lynchburg
26,836.00	Prince William County	21,797.00	Alleghany Hlnd.
26,256.00	Manassas	21,743.00	Frederick County
25,580.00	Norfolk	21,742.00	Hampton
24,800.00	Salem	21,724.00	Dickenson County
24,650.00	Stafford County	21,681.00	Isle of Wight
23,938.00	Henrico County	21,679.00	Radford
23,697.00	Harrisonburg	21,656.00	Albemarle County
23,573.00	Waynesboro	21,638.00	Culpepper
23,500.00	Spottsylvania	21,587.00	King William County
23,476.00	Virginia Beach	21,579.00	Fauquier County
23,459.00	Richmond	21,568.00	Hanover County
23,335.00	King George County	21,450.00	Franklin
23,321.00	Chesapeake	21,429.00	West Point
23,250.00	Wise County	21,422.00	Williamsburg
23,100.00	Bristol	21,410.00	Galax
23,080.00	Poquoson	21,407.00	Suffolk
22,920.00	York County	21,386.00	Hopewell
22,880.00	Prince George County	21,380.00	Rockingham County
22,693.00	Newport News	21,366.00	Clarke County
22,662.00	Manassas Park	21,232.00	Portsmouth
22,625.00	Roanoke County	21,208.00	Surry County
22,517.00	Roanoke	21,182.00	Winchester
22,505.00	Martinsville	21,181.00	Sussex County
22,330.00	Chesterfield County	21,148.00	Dinwiddie County
22,228.00	Danville	21,146.00	Colonial Heights
22,211.00	Glouchester County	21,045.00	Northumberland County
22,200.00	Norton	21,010.00	Montgomery County
$22,062.00	Caroline County	$20,987.00	Augusta County

Appendix C - continued

$20,900.00 - Franklin County	$19,800.00 - Pittsylvania County
20,900.00 - Orange County	19,750.00 - Washington County
20,808.00 - Grayson County	19,746.00 - Craig County
20,795.00 - Giles County	19,736.00 - Lancaster County
20,769.00 - Buchanan County	19,725.00 - Bland County
20,700.00 - Fluvanna County	19,704.00 - Fries
20,700.00 - Louisa County	19,700.00 - Amelia County
20,692.00 - Prince Edward County	19,640.00 - Campbell County
20,650.00 - Charlottesville	19,600.00 - Mecklenburg County
20,580.00 - Greenville County	19,565.00 - Wythe County
20,573.00 - Accomack County	19,516.00 - Shenandoah County
20,570.00 - Henry County	19,509.00 - Nelson County
20,490.00 - Richmond County	19,460.00 - Lee County
24,461.00 - Botetourt County	19,317.00 - Carroll County
20,453.00 - Smyth County	19,272.00 - Rockbridge County
20,402.00 - Covington	19,208.00 - Colonial Beach
20,398.00 - Amherst County	19,191.00 - Halifax County
20,375.00 - Goochland County	19,173.00 - Patrick County
20,317.00 - Rappahannock County	19,149.00 - Floyd County
20,293.00 - Nottoway County	19,132.00 - Charles City County
20,265.00 - Lexington	19,130.00 - Essex County
20,246.00 - Mathews County	19,113.00 - Powhatan County
20,233.00 - Buckingham County	19,080.00 - Southampton County
20,221.00 - Buena Vista	19,030.00 - Russell County
20,210.00 - New Kent County	19,010.00 - King and Queen County
20,209.00 - Westmoreland County	18,919.00 - Greene County
21,145.00 - Scott County	18,889.00 - Lunenburg County
20,086.00 - Tazewell County	18,878.00 - South Boston
20,013.00 - Brunswick County	18,850.00 - Northampton County
19,940.00 - Page County	18,820.00 - Appomattox County
19,938.00 - Madison County	18,700.00 - Cumberland County
19,856.00 - Bath County	18,516.00 - Charlotte County
19,850.00 - Bedford County	17,754.00 - Highland County
$19,800.00 - Middlesex County	$16,850.00 - Cape Charles

Source: "Salary Schedules for Classroom Teachers 1986-87," Virginia Education Association, December, 1986.

Appendix D

SALARY SUPPLEMENTS OFFERED FOR GRADUATE DEGREES IN VIRGINIA PUBLIC SCHOOL DIVISIONS

School Division	Master's	Doctorate	School Division	Master's	Doctorate
Accomack	1,035.00	$1,765.00	Danville	1,000.00	0
Albemarle	1,000.00	2,000.00	Dickenson	1,100.00	$1,200.00
Alexandria *	2,618.-4,281.	3,382.-5,826.	Dinwiddie	1,100.00	0
Alleghany H.	1,947.00	0	Essex	1,000.00	0
Amelia	1,000.00	0	Falls Church *	2,856.-6,048.	0
Amherst	1,600.00	0	Fairfax *	800.-2,517.	0-3,144.
Appomattox	1,000.00	1,000.00	Fauquier *	1,200.00	0
Arlington	1,182.-2,783.	3,153.-3,751.	Floyd	1,000.00	1,000.00
Augusta	1,200.00	0	Fluvanna	1,500.00	0
Bath	1,200.00	800.00	Franklin	1,100.00	0
Bedford	1,000.00	0	Franklin Co. *	2,000.00	0
Bland	1,250.00	650.00	Frederick	1,300.00	1,500.00
Botetourt	1,000.00	500.00	Fredericksburg	1,000.00	500.00
Bristol	1,320.00	330.00	Fries *	792.00	0
Brunswick	1,500.00	500.00	Galax	1,500.00	500.00
Buchanan *	1,320.-1,597.	403.-780.	Giles	1,000.00	0
Buckingham	900.00	750.00	Gloucester	1,200.00	300.00
Buena Vista *	1,545.-2,240.	1,645.-2,240.	Goochland	1,000.00	0
Campbell	1,200.00	0	Grayson	792.00	0
Cape Charles	750.00	0	Greene	1,000.00	0
Caroline	1,250.00	750.00	Greenville	1,500.00	0
Carroll	900.00	900.00	Halifax	1,000.00	550.00
Charles City	1,000.00	0	Hampton	1,350.00	800.00
Charlotte	1,000.00	0	Hanover	1,100.00	290.00
Charlottesville	1,000.00	1,000.00	Harrisonburg	1,250.00	1,125.00
Chesapeake	1,800.00	1,800.00	Henrico	952.-2,467.	0
Chesterfield	1,100.00	0	Henry	1,210.00	0
Clarke	1,320.00	0	Highland	1,020.00	0
Colonial Beach	1,100.00	0	Hopewell	1,100.00	0
Colonial Heights	1,000.00	0	Isle of Wight	1,200.00	2,400.00
Covington	1,650.00	0	King and Queen	1,200.00	0
Craig	1,000.00	0	King George	1,500.00	1,500.00
Culpepper	1,100.00	0	King William	1,600.00	0
Cumberland	1,000.00	0	Lancaster	1,000.00	0

Appendix D - continued

School Division	Master's	Doctorate	School Division	Master's	Doctorate
Lee	$1,000.00	0	Quantico	$2,529.-3,877.	$1,666-2,203.
Lexington	1,400.00	0	Radford	1,000.00	1,000.00
Loudoun *	1,060.1,720.	0	Rappahannock	1,230.00	0
Louisa	1,000.00	1,000.00	Richmond	1,000.00	1,000.00
Lunenburg	1,000.00	0	Richmond Co.	925.00	0
Lynchburg	1,630.-1,682.	1,297.-1,328.	Roanoke	1,300.00	1,925.00
Madison	550.-1,100.	0	Roanoke County	1,100.00	1,110.00
Manassas *	1,950.00	1,950.00	Rockbridge	1,000.00	1,000.00
Manassas Park	1,000.00	1,000.00	Rockingham	1,100.00	1,100.00
Martinsville	1,700.00	0	Russell	1,100.00	1,100.00
Mathews	1,100.00	0	Salem	1,200.00	1,200.00
Mecklenburg	1,200.00	0	Scott	900.00	0
Middlesex	1,000.00	0	Shenandoah	1,000.00	0
Montgomery	1,210.00	605.00	Smyth	1,100.00	0
Nelson	1,000.00	0	South Boston	1,100.00	500.00
New Kent	1,210.00	500.00	Southampton	1,000.00	1,400.00
Newport News	1,100.-1,872.	1,800.00	Spottsylvania	1,500.00	0
Norfolk	1,750.00	2,200.00	Stafford	1,650.00	550.00
Northampton	750.00	0	Staunton	1,100.00	0
Northumberland	1,200.00	0	Suffolk	1,200.00	800.00
Norton	1,100.00	750.00	Surry	1,500.00	0
Nottoway	1,200.00	0	Sussex	2,295.00	0
Orange	1,100.00	0	Tazewell	1,250.00	2,000.00
Page *	1,000.-2,110.	0	Virginia Beach	1,600.00	1,200.00
Patrick	1,199.00	1,200.00	Warren	1,425.00	1,325.00
Petersburg	1,000.00	700.00	Washington	1,000.00	1,000.00
Pittsylvania	1,000.00	0	Waynesboro	1,572.00	0
Poquoson	1,580.00	1,580.00	West Point	1,200.00	0
Portsmouth	1,386.00	1,386.00	Westmoreland	1,100.00	0
Powhatan	1,000.00	500.00	Williamsburg	1,177.00	1,656.-1,696.
Prince Edward *	1,200.00	1,000.00	Winchester	1,625.00	475.00
Prince George	1,500.00	0	Wise	1,000.00	100.00
Prince William *	943.-2,196.	2,006.-4,206.	Wythe	1,000.00	0
Pulaski	$1,200.00	$1,200.00	York	$1,205.00	$2,000.00

* Supplement varies with step -- figure cited is the supplement at the midpoint of salary schedule.

Source: "Salary Schedules for Classroom Teachers 1986-87", Virginia Education Association, December, 1986.

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