

COST ANALYSIS OF THREE SOUTHWEST
VIRGINIA SPECIAL EDUCATION PROGRAMS

by

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Dissertation submitted to the Faculty of the

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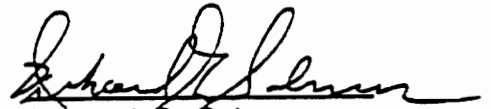
DOCTOR OF EDUCATION


in

Administration and Supervision of Special Education


APPROVED:


In Memory of
Philip R. Jones,
Co-Chairman
(Deceased 12/20/94)


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Chairmen: Philip R. Jones, Harold J. McGrady, Richard G. Salmon

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(ABSTRACT)

School funding is one of the most critical issues in public education today. Jordan & Lyons (1992) have predicted that the great debate of the 1990s will be over what proportion of available funds should be spent on programs for special-needs students. Special education has held a prominent place in fiscal discussions and analyses since the passage of the Education for All Handicapped Children Act of 1975.

The Education for All Handicapped Children Act (reauthorized as Individuals with Disabilities Education Act, 1990) required special educational programs and services for disabled students and provided a funding mechanism to assist states who chose to participate in this discretionary grant program.

Given the dramatic rise in expenditures on those special education programs, policy-makers at all levels require cost and fiscal policy information to make informed decisions regarding the provision of special education services (Jordan & Lyons, 1992; Center for Special Education Finance, 1993). To meet

that need, the Center for Special Education Finance was funded by the U.S. Department of Education to address fiscal issues including compilation of special education expenditure statistics (Council of Administrators of Special Education, 1993). The current study offered a significant contribution to that national objective.

The cost analysis method introduced in this study, called the Moche Cost Analysis of Public Education or CAPE Model, provided greater sensitivity, accuracy, and flexibility than prior methods. It responded to changing service delivery models emerging from the education reform and restructuring movements.

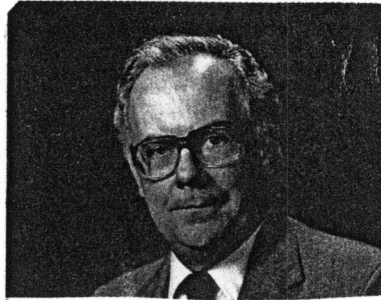
The CAPE Model was used to examine and compare costs of regular elementary education, regular secondary education, elementary special education, and secondary special education. Special education costs also were compared across disability categories and service delivery environments.

CAPE can be adapted easily to identify expenditures by building level and programs other than special education. Results can be customized for comparison with state funding formulas. CAPE calculations can be completed manually or through use of the Moche CAPE computer spreadsheet program (Moche, 1995).

DEDICATION

This project is dedicated in loving memory to:

Philip Robert Jones
April 27, 1934 - December 20, 1994
friend, advisor, family



whose tremendous insight and knowledge guided me along my academic path, and whose friendship and humor kept me there. Your advocacy work for persons with special needs will continue through me.

Justin Benjamin Spiers
February 27, 1984 - May 12, 1993
nephew, companion, child of my heart



whose interest, empathy (realizing that "graduate school sounds as hard as third grade"), and encouragement were appreciated. Your little light shines in my heart forever.

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CHAPTER 1: INTRODUCTION

The great educational finance debate of the 1990's may be over what proportion of available funds should be spent on programs for special-needs students (Jordan & Lyons, 1992). So great was the need for accurate cost data on national expenditures in special education programs that the U. S. Department of Education in 1993 provided funding for the Center for Special Education Finance (CSEF) under a five-year cooperative agreement with the American Institute for Research. The Center's mission was to address a comprehensive set of fiscal issues related to the delivery and support of special education services, including compilation of special education expenditure statistics (Council of Administrators of Special Education, 1993; Center for Special Education Finance, 1993). This study addressed that nationally-recognized need.

Statement of the Problem

Policy-makers required fiscal information to make informed decisions regarding expenditure and resource commitments essential to the provision of special education services to children with disabilities (Council of Administrators of Special Education, 1993).

Expenditure and resource commitments depended upon three variables: program models implemented or planned for implementation, severity of student

disabilities and needs, and predictions of the number of special education students to be served. These personnel and resource needs yielded estimates of physical space, materials, equipment, and transportation needs. Fiscal projections were a reflection of all of the above factors. Fiscal projections have been particularly troublesome for school administrators.

Cost studies were either lacking, outdated, inaccurate, conflicting, or incomplete in current data sources and literature. The first step in resolving this problem was the selection of an appropriate cost analysis methodology. The second step was application of that selected methodology.

Reasons for Cost Analysis of Special Education

Some important reasons for cost analysis of special education programs were to:

- 1) calculate **excess costs** of special programming as required pursuant to application for federal funding;
 - 2) assist in **program planning**, implementation, and continuation;
 - 3) plan for adequate funding of a **free appropriate public education** in the least restrictive environment;
 - 4) ensure equitable **distribution of resources** among all disabled students;
- and

- 5) aid in **selection of services** and service delivery environments from appropriate alternatives.

Excess Costs

Economy of scale, available in regular education programming, provided the greatest fiscal efficiency due to larger class sizes, homogeneity of curriculum materials and assignments, and student transportation systems serving large numbers of students. The individualized instruction, small class sizes, related services, specialized equipment and transportation requirements of special education translated into higher costs of education for disabled students.

The extent of this added fiscal obligation (or excess cost) has been the focus of special education cost analysis. It was critical for school administrators to accurately identify per pupil costs of special programming in order to obtain government reimbursements, to contain present costs, and to estimate future costs (Andersen, 1982).

Program Planning

The basic excess cost formula based on discrete school budget categories is appropriate when making application for federal funding. However, this formula has not proved adequate for program planning.

Billingsley and Houck (1988) listed as a critical element of successful program planning the adoption of realistic plans augmented by the resources and support necessary to achieve them. Successful programming was not assured by elaborate planning if those plans were not supported by adequate funding. Adequate funding demanded accurate cost estimation.

Free Appropriate Public Education

The Individuals with Disabilities Education Act (IDEA, 1990) required local education agencies to provide disabled students with a free appropriate public education in the least restrictive environment. A free appropriate public education, hereafter referred to as FAPE, has been defined federally as special education and related services that are provided at public expense in conformity with an Individualized Education Program for each disabled student (34 C.F.R. 300.8).

FAPE could be provided within a range of service delivery models. Policy-makers deciding if and when to implement new service delivery and organizational models needed information regarding costs of all special education placement alternatives.

A comprehensive cost analysis would provide such data.

Distribution of Resources

Federal circuit courts have recognized the need to allocate scarce resources among as many disabled children as possible, although cost could not be offered as a defense against inappropriate educational programming. Accurate and efficient cost analysis yielded information on current and proposed distribution of fiscal resources.

Selection of Services

Selection of services was based upon individual student needs. However, cost considerations could play a role in selection of educational programming from appropriate alternatives. Given two or more equitable service delivery alternatives, school systems must show that the costs of all program alternatives have been correctly estimated, that said costs are of sufficient weight to be a consideration, and that adequate efforts have been made to educate the child in a regular classroom.

Methods of Cost Analysis

Efforts to accurately pinpoint the required fiscal commitment for special education services have been varied. They have included hypothetical comparisons of program costs and of social costs given the absence of special

programming, budgetary analyses of regular and special education program costs, and cost-benefit analyses.

Worthen and Sanders (1987) stated that sound decision-making depends on knowledge of potential accomplishments and cost of programs. They recommended well-defined, limited-scope cost analysis for educational evaluation due to the complexity of analyzing educational costs and benefits.

Selected Methodology

The first step in remediation of problems encountered in prior special education program cost studies was selection of appropriate cost analysis methodology. It was proposed herein that this cost analysis could be conducted best using a cost-effectiveness or a cost-feasibility design with a resource-cost component.

Both models generated per pupil cost figures. A cost-effectiveness model was useful for comparing program options based on per pupil costs and student outcomes. However, agreement did not exist in the field at this time regarding appropriate selection and measurement of student educational outcomes.¹

A cost-feasibility analytical model held the greater promise for special education program planning. Identification of program costs allowed the decision-

¹For more information on measurement of educational outcomes, see Center for Resource Management (1986), National Center on Educational Outcomes (1993), Rusch (1992), and Ysseldyke, Thurlow, & Bruininks (1992).

maker to compare needs to current fiscal ability and to plan for future program initiation and continuation. The cost analysis model developed for this study was a cost-feasibility design which implemented a resource-cost methodology for descriptive and comparative program analysis. That model was called the Moche Cost Analysis of Public Education Model, hereafter referred to as the CAPE Model.

The CAPE Model computed costs of public education services in four broad categories: Regular Elementary, Regular Secondary, Elementary Special Education, and Secondary Special Education. Costs per category were calculated across five cost components: (1) Comprehensive, (2) Service, (3) Administrative, (4) Support, and (5) Instruction Cost. Special Education costs were also calculated by disability category and by service delivery environment.

CAPE Definitions

Terminology used in the CAPE Model:

- 1) **Regular Elementary Education Cost Category** - Comprehensive, Service, Administrative, Support, and Instruction costs associated with the education of nondisabled students in grades kindergarten through seven.
- 2) **Regular Secondary Education Cost Category** - Comprehensive, Service, Administrative, Support, and Instruction costs associated with the education of nondisabled students in grades eight through twelve.

- 3) **Special Education Cost Category** - Comprehensive, Service, Administrative, Support, and Instruction costs associated with the education of eligible disabled students in preschool through grade twelve.
- 4) **Comprehensive Cost Component** - total costs associated with educational services across the school system which cannot be attributed directly to one particular academic level, program, or service.
- 5) **Transportation Input Center (Comprehensive Cost)** - current administrative and non-administrative costs associated with provision of general transportation (regular transportation and activities transportation) and special transportation (special public transportation, special arrangement transportation, contract transportation, and other transportation) services.
- 6) **Depreciation Cost Center (Supplemental Expenses Input Center, Comprehensive Cost)** - depreciation costs of facilities and vehicles.
- 7) **Supplemental Expenses Input Center** - total costs associated with a given cost component which are not included in computation of current mean annual per pupil expenditures but were appropriate costs to consider for budget analysis, needs projection, and accounting confirmation.
- 8) **Adult Education Cost Center (Supplemental Expenses Input Center, Comprehensive Cost)** - current administrative and non-administrative costs

associated with local education agency (LEA) provision of adult education services.

- 9) **Service Cost Component** - current costs associated with maintenance and operations and with supplemental expenses such as food services.
- 10) **Administrative Cost Component** - current costs associated with administration of the public school programs. This included general central administrative costs, level-specific administrative costs, special education administrative costs, and site-based administrative costs.
- 11) **General Central Input Center (Administrative Cost)** - current costs associated with the positions of Superintendent, Assistant Superintendent(s), general directors (including Special Education Director), and general supervisors, as well as clerical and technical personnel positions associated with system-wide school administration.
- 12) **Level-specific Input Center (Administrative Cost)** - current costs associated with elementary or secondary level supervisors, directors, and coordinators.
- 13) **Special Education Input Center (Administrative Cost)**- current costs associated with subordinate special education administrative personnel.
- 14) **Site-based Input Center (Administrative Cost)** - current costs associated with activities of building-level school administration allocated to principals, assistant principals, clerical, and other office staff.

- 15) **Instruction Cost Component** - current costs associated with classroom instruction, attributable to activities of certified (classroom teachers and substitute teachers) and non-certified (instructional aides) personnel.
- 16) **Support Cost Component** - current costs associated with level-specific support personnel, including but not limited to librarians, guidance counselors, school nurses, truant officers, and costs associated with supplemental pay positions such as coaching or activity sponsorship.
- 17) **Ingredient variables** - separation of total costs within cost centers by salary, benefits, materials and supplies, equipment, professional development, and other miscellaneous costs.
- 18) **Start-up Cost Centers (Supplemental Costs Input Centers, Comprehensive and Instruction Cost Components)** - current costs associated with the first-year of program implementation which do not recur after the first year.

Purpose of the Study

The purpose of this study was to develop and field-test an instrument for assessing the cost of special education programming. A new cost analysis model was constructed to correct for limitations in prior studies, in particular a lack of sensitivity to changing service delivery options.

The CAPE Model was piloted using 1991-92 fiscal data from one local education agency. It was then applied to the 1992-93 fiscal data in three southwest Virginia public school districts.

Research Questions

The primary research questions addressed in this study were:

- 1) Did the Moche CAPE Model (Cost Analysis of Public Education) accurately and efficiently calculate costs of special education and related services in public day schools as compared to prior cost analysis models?
- 2) What were the differences between state reported data and CAPE cost analysis data results?
- 3) What were the differences in methodology and conclusions derived from excess cost computation formulas presented in the federal regulations, the Virginia state regulations, and the CAPE formula?

Secondary research questions were:

- 4) What were the total mean annual per pupil expenditures of elementary regular education, secondary regular education, elementary special education, and secondary special education services, and how did they compare?
- 5) What were the total mean annual per pupil expenditures of special education by service delivery options (intensity and location of services across the continuum of services), and how did they compare?
- 6) What were the total mean annual per pupil expenditures of special education by disability category, and how did they compare?

Limitations of the Study

The formula implemented within this study could be used to assess costs of special education programming in any public school district. In this aspect, the study could be replicated. However, the study offered limited generalizability due to its use of demographically and geographically similar sample school districts. The population sample consisted of three adjacent school systems in the southwestern region of the Commonwealth of Virginia. Cost analysis studies always have been limited due to the lack of certain types of data, i.e. location of services, therapy and assessment hours per pupil, and administrative hours per

pupil. Certain CAPE cost factors, such as assessment units, relied upon professional estimates of time involved in activities. Employment of estimates inevitably led to some degree of inaccuracy and limited study replication. Comprehensive cost analysis, however, required such estimation.

When a cost study is applied to prior school year data, teacher recall may be unreliable. When applied to current school year data, cost study analysis must rely upon increased estimates and budget projections in the absence of completed fiscal reports.

The CAPE Model presented in this study was intended for use by practicing special education administrators to identify current resource commitments. This model allowed each local education agency to enter its own unique features for a site-specific analysis.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

Public funding and provision of special education and related services is not optional. The nature, extent, and cost of this programming has been litigated and studied for over twenty years. A review of case law, below, is followed by a detailed explanation of cost analysis efforts.

Case Law and Legislative History

Can cost be a factor in special education programming? If so, how much weight does it carry? These questions have been woven into special education court cases for the past twenty years.

Educational agencies, in planning special programming, and the courts, in evaluating said programming, looked first to see that a proposed program provided a free appropriate public education in the least restrictive environment. Preference was given to instruction in regular education classrooms with supplemental services as needed. A special education student may receive special education services in a segregated environment only if appropriate instruction can not be delivered in the general education classroom setting. It is at this point in planning that cost may become an issue.

Precedents for Integrated Education

Racial desegregation cases of the 1950s, 1960s, and 1970s, which denied financial constraints as a reason for maintaining segregated school systems, provided impetus to later efforts at public schooling for disabled youngsters. The courts challenged state and local school boards to implement wise fiscal management policies in provision of integrated schools while granting that costs may play a role in selection of programs from appropriate alternatives.

In Brown v. Board of Education (1954), the Court looked at tangible and intangible considerations of education and concluded that:

. . . it is doubtful that any child may reasonably be expected to succeed in life if he is denied the opportunity of an education. Such an opportunity, where the state has undertaken to provide it, is a right which must be made available to all on equal terms. (Brown v. Board of Education, 1954).

If the effect of school policy was to prolong the existence of segregation, then the end of segregation could not be subordinated to such policy even if it was more economical in time and cost (Brown v. Board Of Education, 1954; Bradley v. School Board of the City of Richmond, Virginia, 1972; Reed v. Rhodes, 1978; Liddell v. State of Missouri, 1987, Moche, 1993). Localities claiming financial inability to comply with federal and state statutes were expected to present evidence of financial soundness, efficiency, or feasibility in proposed planning (Reed v. Rhodes, 1978). The Reed court introduced the notion that cost may be a factor in choosing between alternatives.

Deprivation of equal education opportunity has been considered as it relates to gender as well as race. The Glover v. Johnson (1989) court entered the opinion that educational opportunity not only needs to be comparably funded, but that equal programming must be provided.

In ordering that programs for male and female inmates in Michigan prisons at minimum be taught, funded, and equipped in a comparable manner, the court warned that

. . . The fact that greater economies of scale can be achieved in education of male prisoners does not mean that the Department should be permitted to satisfy its obligation to female prisoners with provision of equally costly, but substantially inferior, programming. (Glover v. Johnson, 1989).

These concepts of minimum equal expenditure and equal quality programming were established in desegregation cases and in early special education cases such as Mills (1972) and P.A.R.C. (1972). They provided a blueprint for federal legislation that was designed to protect the rights of disabled individuals.

Legislative Protections on the Federal Level

Federal legislation during the second one-half of the twentieth century attempted to address the needs of low-achieving and disabled students. The Elementary and Secondary Education Act (ESEA) of 1965 provided funding for the education of culturally disadvantaged children -- a portion of which fell into the

category of children with disabilities (Alexander & Alexander, 1992). Subsequent amendments to ESEA strengthened funding and services and encouraged educational opportunities for disabled students through provision of federal aid for development of special education resources and personnel (Elementary and Secondary Education Act, 1965; Elementary and Secondary Education Act Amendments, Public Law 89-750, 1966; Education Consolidation and Improvement Act, State Operated Programs (ESEA[SOP]), Public Law 89-313, 1981; Education Consolidation and Improvement Act, Public Law 97-35, 1981; Turnbull, 1986; Ballard, Ramirez, & Zantal-Wiener, 1987; Hawkins-Stafford Elementary and Secondary School Improvement Amendments, 1988; U. S. Dept. of Education, 11th Annual Report, 1989).

Public Law 91-230, the first Education of the Handicapped Act (1970), provided federal funding for the education of disabled students. Public Law 93-380 (Title IV-C, ESEA, the Education Amendments of 1974), entitled the Education of the Handicapped Act together with Public Law 91-230, increased the federal funding with the requirement that state recipients adopt a goal of full educational opportunity for disabled students (Turnbull, 1986; Vergason & Anderegg, 1992).

Legislators recognized the need for funded educational programs for disabled children while acknowledging state and local budget constraints. In providing the necessary funding through enactment of the Education for All Handicapped Children Act in 1975, Congressman John Brademas noted that lack

of state fiscal resources had made it impossible to implement necessary special education programs. That such programming was creating tremendous fiscal burdens for already overburdened local and state educational agencies was observed by Congressman Carl Perkins (121 Cong. Rec. 37025 (1974), in Anderson v. Thompson 658 F.2d at 1211 (1981)).

The Education for All Handicapped Children Act, or EAHCA, replaced the Assistance to States portion (Part B) of the early Education of the Handicapped Acts and required that all children with disabilities be assured a free appropriate public education including special education and related services. The Act provided federal money to assist state and local agencies in educating disabled children (Alexander & Alexander, 1992). EAHCA has been amended several times to respond to changing needs and procedural issues (Education of the Handicapped Act Amendments, Public Law 98-199, 1983; Handicapped Children's Protection Act, Public Law 99-372, 1985; Education of the Handicapped Act Amendments, Public Law 99-457, 1986; U.S. Dept. of Education, 10th Annual Report, 1988; Individuals with Disabilities Education Act (IDEA), Public Law 101-476, 1990; Individuals with Disabilities Education Act Amendments, 1991).

The 1983 technical amendments required compilation of comprehensive national estimates of per-pupil expenditures for disabled students. This requirement resulted in the landmark Survey of Special Education Expenditures, commonly referred to as the Expenditures Survey, funded by the Department of

Education and conducted by Moore, Strang, Schwartz, and Braddock (1988). In 1990, the Education for All Handicapped Children Act was reauthorized as the Individuals with Disabilities Education Act (IDEA), Public Law 101-476.

The upcoming reauthorization of IDEA has elicited comment on several issues, with funding provisions commanding great attention. Advocacy groups recommended funding formulas that support the child in all environments (including inclusive settings). The linkage of IDEA, health reform, school-to-work initiatives, the Elementary and Secondary Education Act (ESEA), and Goals 2000 has been recommended to facilitate better use of funds (Ayers, 1994; Special Education Report, 1994).

The Goals 2000: Educate America Act was signed into law by President Clinton during March 1994 (Sklaroff, 1994). The Goals 2000 law, which established a National Education Standards and Improvement Council (NESIC) to develop model national standards and assessments, required participating states to specify the manner in which they will accommodate all students (including students with disabilities) in their standards and assessments programs.

Two provisions under Title X of the Goals 2000 Act have direct fiscal ramifications. One directed the federal government to provide states and committees with adequate resources under IDEA, as soon as was reasonably possible, through reallocation of noneducation funds. The other authorized the Secretary to release funds to the National Academy of Sciences to conduct a

comprehensive study of the inclusion of disabled students in Goals 2000 school reform activities (Department of Public Policy, 1994).

Funding Considerations

According to federal law, special education has been defined to mean "specially designed instruction, at no cost to parents or guardians, to meet the unique needs" of the disabled student. Related services include transportation, developmental, corrective, and other supportive services required to assist a disabled student "to benefit from special education" (20 U.S.C. Sections 1401-1461).

These educational services were to be provided at no cost to parents. Appropriateness of placement under IDEA was determined based on educational benefits available in a special education classroom, effect of the presence of the disabled student on the regular classroom teacher and other students, educational and nonacademic benefits available in a special education classroom, and costs of those supplementary aids and services necessary to mainstream the disabled child (Board of Education, Sacramento City School District v. Holland, 1992). Consideration of these factors should result in provision of FAPE.

FAPE cannot be denied based on funding constraints (Mills v. Board of Education, 1972; Pennsylvania Association for Retarded Children (P.A.R.C.) v.

Pennsylvania, 1972). The Mills court, like the Brown Court in considering racial segregation, affirmed the reasonable expectation of educational opportunity.

The defendants in the Mills case, citing arguments from the 1954 Brown trial, challenged the Washington, D.C. Board's practice of excluding disabled children from the public schools and/or denying them publicly-supported education. The Mills court found such exclusion impermissible, holding that:

. . . The District of Columbia's interest in educating the excluded children clearly must outweigh its interest in preserving its financial resources. (Mills v. Board of Education, 1972).

The Pennsylvania Association for Retarded Children (P.A.R.C.) successfully challenged statutes excluding retarded children from public education in 1972 (P.A.R.C. v. Commonwealth of Pennsylvania). The settlement decision required provision of free public education services for the previously excluded students and introduced the concept of state reimbursement to localities for the excess instructional costs required to educate disabled students.

Funding and FAPE

A multitude of court cases have revolved around district funding obligations and definition of appropriate education. The courts consistently have found that education can not be denied to disabled students based on funding constraints, but cost considerations may play a role in selection of programming from appropriate alternatives.

Parents of disabled students may be eligible to recover tuition costs incurred in provision of private school education if the local education agency (LEA) does not provide an appropriate education for the student (Stemple v. Board of Education of Prince George's County, MD, 1980; Town of Burlington v. Department of Education, Commonwealth of Massachusetts, 1984). However, the mere existence of a better program did not make a proposed public school program inappropriate (Age v. Bullitt County Public Schools, 1982; Board of Education v. Rowley, 1982; Mark A. v. Grant Wood Area Education Agency, 1986).

The requirements of IDEA must be construed in light of the reality of limited public funding. There has been both an acceptance of cost as a factor in selecting placement alternatives and an obligation to give preference to non-segregated settings (Department of Education v. Katherine D., 1983; Roncker v. Walter, 1983).

If only one appropriate placement was available, cost could not be a consideration even when the placement was extremely expensive (Clevenger v. Oak Ridge School Board, 1984). Cost considerations were found to be relevant only when choosing between appropriate options. Cost of all available options must be presented in order for cost to be a consideration (P.J. By and Through W.J. v. Connecticut Board of Education, 1992).

A public school system was found to be responsible for providing disabled youngsters with a free appropriate public education from which reasonable benefit

can be anticipated (A.W. By and Through N.W. v. Northwest R-1 School District, 1987). More important from a cost perspective, the A.W. court held that cost to the school district for an educational placement may be a consideration.

More recent case law emphasized differences in quality of programming with less consideration to cost. The Greer by Greer v. Rome City School District (1991) court acknowledged that

. . . The school district may consider the cost of the supplemental aids and services that will be necessary to achieve a satisfactory education for the handicapped child in a regular classroom . . .

This is not to say that a school district may decline to educate a handicapped child in a regular classroom because the cost of doing so, with the appropriate supplemental aids and services, would be incrementally more expensive than educating the child in a self-contained special education classroom.

(Greer by Greer v. Rome City School District, 1991)

School districts were required to show that costs of supplemental services and aids had been estimated correctly, were of significant weight to be unreasonable, and that adequate efforts to educate the child in a regular classroom had been made (Board of Education v. Holland, 1992; Daniel R. R. v. Texas State Board of Education, 1989).

Related Services

Related services are those services necessary for the child to benefit from special education. In deciding financial responsibility for services, the courts focused on who provided the service to determine whether it was a related service

(and therefore the responsibility of the school system) or a non-diagnostic medical service (Tokarcik v. Forest Hills, 1981; Irving Independent School District v. Tatro, 1984).

Services other than diagnostic services which require expertise in administration have not been found to be related services (Detsel v. Board of Education, 1987). Related services did not include purchase of medical equipment (Rothstein, 1990; 34 CFR 300.303).

The public education agency was also responsible for acquiring and maintaining assistive technology devices necessary to increase, maintain, or improve the functional capabilities of children with disabilities. These devices could be provided as a special education service, related service, or as supplementary aids and services necessary for a disabled student to achieve a satisfactory education in regular classes (34 CFR Sections 300.5, 300.6, and 300.308, 1992).

Fiscal Constraints

Program funding could not be withdrawn summarily due to fiscal constraints. The Kerr court (Kerr Center Parents Association v. Charles, 1988) found that a state is free to design its own system of finance but cannot abrogate its responsibility to provide funding without violating federal funding assurances.

Summary of Case Law

The courts have held that program considerations can not be based solely on cost. However, cost could be a viable factor in choosing among appropriate alternatives.

Important case law guidelines in cost consideration are identified in Table 1, which follows, by case opinions.

Table 1: Excerpts from Special Education Case Law

Excerpts from Special Education Case Law, 1979-1993

If sufficient funds are not available to finance all of the services and programs that are needed and desirable in the system then the available funds must be expended equitably in such a manner that no child is entirely excluded from a publicly supported education consistent with his needs and abilities to benefit therefrom. **Mills v. Board of Education of District of Columbia** 348 F.Supp. at 867 (D.C. 1972)

Difference in cost among various possible methods of providing services is an important consideration. **Reed v. Rhodes** 455 F.Supp. 569 (N.D. Ohio 1978)

There can be little doubt, however, that in determining the "appropriate placement" of an individual handicapped child, one must balance the important personal needs of the individual handicapped child, and the realities of limited public monies. **Doe v. Anrig** 692 F.2d at 806 (1st Cir. 1982), citing **Pinkerton v. Moye** 509 F.Supp. 107 (W.D. Va. 1981)

We cannot say that the State has failed to reconcile satisfactorily Michael Age's need for a free, appropriate public education with the need for the State to allocate scarce funds among as many handicapped children as possible. **Age v. Bullitt County Public Schools** 673 F.2d at 145 (6th Cir. 1982)

Available financial resources must be equitably distributed among all handicapped children. **Board of Education v. Rowley** 102 S.Ct. at 3044 (1982)

If education agencies fail to offer a classroom program to a handicapped child who has clearly demonstrated his ability to function in a normal classroom environment, leaving a private school placement as the only feasible means for satisfying the congressional preference that handicapped children be placed in the least restrictive environment, the State must pay the costs of that placement until an appropriate program is devised. **Board of Education, State of Hawaii v. Katherine D.** 727 F.2d at 818 (9th Cir. 1983)

Cost is a proper factor to consider . . . Cost is no defense, however, if the school district has failed to use its funds to provide a proper continuum of alternative placements for handicapped children. **Roncker v. Walter** 700 F.2d 1058 (6th Cir. 1983)

Table 1 continued

If the cost of educating a handicapped child in a regular classroom is so great that it would significantly impact upon the education of other children in the district, then education in a regular classroom is not appropriate. Greer by Greer v. Rome City School District 18 IDELR at 417 (11th Cir. 1991)

Where a school system proposes an appropriate program, it has no duty to consider non-public programs . . . Offering an 'appropriate' program does not . . . require the school system to duplicate each aspect of a private school program. Doyle v. Arlington 19 IDELR at 260 (E.D. Va. 1992)

Only where the cost of placing a handicapped child in regular education will significantly affect other children in the district will this factor weigh against placement in a regular classroom. Board of Education, Sacramento City School District v. Holland 786 F.Supp. at 880 (E.D. Cal. 1992)

School districts . . . must consider placing children with disabilities in regular classroom settings, with the use of supplementary aides and services, including classroom assistants, before exploring other, more restrictive, alternatives. Oberti v. Board of Education of Borough of Clementon School District 1993 WL 178480 (3rd Cir. 1993)

Funding Formulas

Federal Support

Federal funding of special education is allocated according to a flat, student-based formula. A set monetary amount is disbursed per student served in special education regardless of type, cost, or duration of service (Dempsey & Fuchs, 1993). The federal funds distributed under IDEA Part B may only be used for the excess costs of providing special education and related services for children with disabilities. "This insures that children served with part B funds have at least the same average amount spent on them, from sources other than part

B, as do the children in the school district taken as a whole" (U.S. Dept. of Education, 34 CFR 300, 1992).

Federal guidelines for the computation of minimum average and excess costs, as specified in implementation regulations (34 CFR 300.182-300.186) are as follows:

- 1) Add all local education agency (LEA) expenditures from the preceding school year, excluding capital outlay and debt service, for elementary school students if the disabled child is an elementary school student and for secondary school students if the child is a secondary school student.
- 2) From the above amount, subtract the total amounts the LEA spent in the preceding year from IDEA Part B, Title I and VII of the Elementary and Secondary Education Act of 1965, and other federal, state or local funds for the education of disabled, educationally deprived, or bilingual students.
- 3) Divide the amount obtained above by the average number of students (including disabled students) enrolled in the elementary or secondary school, respectively, for the appropriate year. This figure is the average minimum amount the LEA must spend on education for disabled students before IDEA Part B funds may be used.

State educational agencies (SEAs) must conduct an annual child count on December 1 of the previous fiscal year, aggregate these data, and submit them to OSEP [Office of Special Education Programs]. IDEA Part B funds are

distributed to states based upon these child counts (U.S. Dept. of Education, 1991).

IDEA authorized funding at a maximum level of 40% of the national average per pupil expenditure. The Part B per pupil federal support of disabled students was \$72 in 1977 and \$419 in 1992 (U.S. Dept. of Education, 1993). As of January 1991, that federal funding stood at a level of nine percent, having reached a peak of thirteen percent in the third year of the program (U.S. Dept. of Education, 1992).

Receipt of federal IDEA Part B funds is contingent upon compliance with federal regulations as documented through a federally-approved State Plan. The Commonwealth of Virginia was temporarily denied \$50 million in fiscal 1994 special education funds for alleged noncompliance. Virginia's plan did not contain a procedure for provision of services to disabled students who had been expelled from school. Virginia claimed that such services were not necessary in cases where no relationship had been found to exist between a student's behavior and his/her disability (Special Education Report, 1994).

Virginia officials filed for and received an injunction forcing the U.S. Education Department to release the state's Part B funds. The court found that funds could not be withheld without affording the State either notice or the opportunity for a hearing (Virginia Department of Education v. Riley, 1994).

Virginia is currently providing educational services to expelled special education students pending resolution of this dispute through the required hearing.

State Support

Current state funding formulas are varied and unique to each state. States typically administer a school finance plan consisting of basic state aid supplemented by categorical funding for special programs such as special education.

State procedures for determining additional resources necessary to offset the cost of educating exceptional children may be resource-based, child-based, or cost-based. Formulas within these categories are 1) personnel reimbursements, 2) unit financing procedures, 3) straight sum reimbursements, 4) weighted formula systems, 5) excess cost calculations, and 6) percentage reimbursements (Thomas, 1973; Johns, Morphet & Alexander, 1983; Sage & Burrello, 1986; Hartman, 1992; Jordan & Lyons, 1992; Dempsey & Fuchs, 1993).

Personnel and unit funding are resource-based formulas (Sage & Burrello, 1986; Dempsey & Fuchs, 1993). Their strengths lie in the linkage of program needs to financial assistance, the direct identification of cost items, and the ability to track or audit funds. Such formulas may neglect costs of mainstreaming and program initiation as well as the costs of materials, supplies, equipment, and special transportation. Smaller districts may be unable to qualify based on

inability to meet unit requirements (Thomas, 1973; Sage & Burrello, 1986; Dempsey & Fuchs, 1993).

The two child-based formulas are straight sum reimbursements and weighted formula systems. Straight sum reimbursements involve a set amount of money per disabled student. Under the weighted formula system, the State reimburses LEAs for the average regular per pupil reimbursement amount multiplied by a predetermined factor for each type of service or disability category. Child-based formulas facilitate optimal programming when they are fiscally neutral, closely match real costs, and a sufficient number of levels of support are included. Such formulas are compatible to basic state aid formulas based on pupil membership or attendance (Sage & Burrello, 1986).

The final two formulas, excess cost calculations and percentage reimbursements, are cost-based formulas. The excess cost formula is similar to the federal excess cost requirement. The sum of educating a non-disabled child is subtracted from the sum of educating a disabled child to obtain excess costs of special education per pupil. Percentage reimbursements provide local education agencies (LEAs) with reimbursement for a percentage of special education costs as determined by state formula. Cost-based formulas are fiscally neutral if they are fully reimbursed (Sage & Burrello, 1986).

The percentage method, without a state predetermined restraint or ceiling, may place excessive demands on state treasuries. Under an excess cost formula,

it may be difficult to ascertain what constitutes an excess cost although allowable costs are specified in state regulations.

In addition, excess costs are influenced by regular education as well as special education costs. Increases in regular education costs, which may not provide services to disabled children, reduce the excess cost amount eligible for funding although special education expenditures may remain unchanged. System-wide enrollment decreases result in a higher average cost per student in regular education, which also results in a reduced figure for excess cost of special education (Hartman, 1992).

Dempsey & Fuchs (1993) found that the type of reimbursement formula used by a state was correlated statistically with the type of special education placements that disabled students received. Efforts to reform special education finance in the United States are now at their highest level since the enactment of EAHCA in 1975 (Center for Special Education Finance, 1993a). Eighteen of the fifty states have implemented some type of special education finance reform in the last five years, and 28 states are currently considering changes in special education finance policies. As of 1993, pupil weighted funding formulas were the most commonly used state formulas (Center for Special Education Finance, 1993b).

Virginia Public School Financing

In Virginia, State aid to education is distributed to schools through a fiscal equalization formula and is determined by an individualized school division state-guaranteed minimum per pupil expenditure. The required local contribution is then determined, with the difference between the two becoming the State responsibility. Required local contribution, based upon local fiscal capacity, is determined through the Local Composite Index (LCI) formula. The Standards of Quality (SOQ) costs per pupil are calculated individually for each Virginia school division (Salmon, 1991).

Determination of Basic Aid costs is made through a complex application of state Standards of Quality requirements and accreditation standards. Minimum numbers of instructional personnel are identified by the state, and artificially adjusted salaries are multiplied by the respective instructional personnel in order to derive aggregated instructional costs. These Basic Aid costs are applied to the LCI in order to determine state and local fiscal responsibilities.

Special education SOQ grants, as well as other categorical programs, also are subject to the LCI. The State share of special education is calculated by computing the State Aid Ratio (SAR) as equal to 1 minus the LCI, then multiplying the SAR by each account in the Basic State Aid Distribution Formula. Their respective differences determine additional required local expenditures. These

local required expenditures are added to the local required expenditures determined through Basic Aid (Salmon, 1991).

The Virginia Department of Education discusses Part B funds based on LEA application for such funds according to applicable federal requirements. In Virginia, other state and federal disbursements are made in accordance with state requirements and "subject to the availability of funds. In the event of insufficient funds, disbursement will be prorated accordingly" (Virginia Department of Education, Regulations, Section 4.1, 1990). Identification of all disabled residents from ages two to twenty-one, inclusive, is required by Virginia state statute (Virginia Department of Education, 1987; Code of Virginia Section 22, 1991).

The Virginia Education Association (1990) issued a statement that identified several inherent inequalities in the system. On the issue of underestimation of staff needs, the pro-rata adjustment proportional to projected changes in ADM penalized school divisions that are experiencing pupil enrollment decline. School divisions experiencing enrollment decline did not reduce personnel proportional to yearly changes in numbers of pupils served, yet state assistance was reduced based on these changes.

Further, calculation of special education revenue based upon total projected school division ADM did not reflect actual incidence of clients or need in Special Education. School divisions with a decline in total ADM suffered a

decrease of special education categorical funding regardless of the numbers of disabled students identified and served.

Special education also suffered from the "charge-back" of special educational personnel units to Basic Aid positions. Currently, if the Basic Aid Floor guarantee exceeded the number of calculated Basic Aid positions, excess positions were deducted from the Add-On Special Education and Vocational Education positions. Therefore, the Virginia school finance formula suggested a number of special education positions required to comply with the Standards of Quality yet deducted a portion of those positions and redistributed them through Basic Aid.

A coalition of students and school boards in Southwest and Southside Virginia unsuccessfully challenged the Virginia School Finance system in 1992, claiming that the Virginia school finance formula was unconstitutional because of wide disparity between per pupil funding among and within Virginia school divisions. The Virginia Supreme Court upheld a Circuit Court opinion that the Constitutional provision calling for the Commonwealth to assure opportunity for people to develop to their fullest by an effective system of education did not impose a requirement of substantial equality in funding (Scott v. Commonwealth of Virginia, 1994).

Cost Analysis Methodology

Just as case law and legislation worked to define public educational responsibilities, education professionals attempted to determine the cost of those responsibilities. Costing efforts over the past twenty years have improved from use of simple budget references and state-reported data to in-depth cost analysis techniques.

Haller (1974) listed three critical aspects of cost analysis. The first aspect was description of the decision to be made, which formed the basis for construction of analysis guidelines. Next, activities necessary to obtain program objectives should be described. Finally, programs should be broken down into input structures which reflect resource components and their functional categories.

Cost input data could be pulled from school budgets, state-reported data, employee interviews and estimates, and receipts. School budgets alone were inadequate means to address cost issues for several reasons, such as those listed by Levin (1983). Levin suggested that costs be estimated according to incremental ingredients behind interventions. Once costs of ingredients were ascertained, total costs of interventions could be identified.

Comparison of Cost Studies

A significant number of special education cost studies have been conducted during the past twenty-five years.

Early Efforts

The first comprehensive American study of public special education costs was the 1970 National Education Finance Project, or NEFP, study by Rossmiller, Hale, & Frohreich (Rossmiller et al., 1970; Larson, 1985; Kienas, 1986; Sage & Burrello, 1986; Slobojan, 1986; Slobojan, 1987; Chaikind, Danielson, & Brauen, 1993). The NEFP study was conducted prior to the federal mandate for categorical special education programs.

Rossmiller and colleagues identified necessary resource commitments for budget planning and monitoring of expenditures. Their 1970 study allocated program costs across six broad categories to calculate current operating costs (Rossmiller et al., 1970; Slobojan, 1987).

The NEFP study yielded national average costs of special education by disability category in exemplary public school special education programs. Rossmiller et al. (1970) found that special education services cost two to three times as much as regular education services. The study has been criticized for its exclusive reliance on budget data and for the lack of distinction among levels

and types of service delivery systems. Nonetheless, it has been a most frequently cited and imitated landmark study.

Several notable cost studies were conducted in the early 1980's, such as those by Hartman (1981), Kakalik, Fury, Thomas, and Carney (1981), Andersen (1982), and Rossmiller (1982). Hartman et al. conducted a comprehensive cost analysis study in 1978 through which a resource-cost model for estimating current and future special education costs was developed (Slobojan, 1987). Hartman (1981) criticized cost analysis models of the 1970's for limited usefulness in estimating future special education program costs related to programmatic changes, for use of aggregated per student cost figures which hid program cost variations, and for procedures which did not lend themselves to replication.

He proposed a resource-cost model of the special education process, called the Special Education Planning Model or SEPM. Educational and programmatic variables such as disabling condition, programs, services, resources, and enrollment were translated into costs.

For each special education program, resources comprising the program were multiplied by the quantity of each resource. These figures were multiplied by the price of each resource to identify unit resource cost per program. Total cost of special education for each program was obtained by multiplying the unit resource costs by the number of personnel required for each program. Hartman's

SEPM model was used to generate estimates of national special education costs from 1976-77 to 1980-81.

Study results indicated that the level of special education costs are influenced by programming decisions. Lack of available data at the time on nature, need, range, composition, and costs of some services limited study projections. Also, Hartman (1981) cautioned that cost figures in the SEPM study represented a specific set of program and price level assumptions, and replication should employ particular programming and pricing assumptions for the given state under study.

A 1981 Rand Corporation study by Kakalik and associates estimated the national total cost of special education and related services during the 1977-78 school year. Kakalik et al. looked at: (1) costs of special education and related services according to district size, service delivery model, and student age, disability, and placement, (2) costs of assessment, placement, and administration, and (3) added costs of special education and related services above costs of general education (Sage & Burrello, 1986; Slobojan, 1987; Chaikind, Danielson, & Brauen, 1993).

On average, per pupil expenditures for special education students were found to be twice that spent per pupil for regular education students. Lack of readily available cost data forced the researchers to rely on estimates for some costs. Average data for the nation were presented with no interpretation of

variances within multiple categories. However, the 1:2 ratio of regular to special education costs has been found in subsequent studies.

Andersen (1982), commissioned by the non-profit Public Education Association (PEA), analyzed the costs of self-contained and school-based support services for disabled students in the New York City schools during the 1979-80 school year. He concluded that resource programs were less costly than separate classrooms for the Division of Special Education but not less expensive than separate classrooms in terms of district-wide costs over-all, which included Division of Special Education costs and System-wide Administrative and Support costs. Andersen (1982) criticized the lack of distinction, both in his study and in other cost studies, between new costs versus displaced costs, i.e. some special education costs involve a reallocation of dollars rather than additional financial commitments.

Rossmiller (1982) addressed the dearth of cost data on organizational arrangements, delivery modes, and program expenditures in small and sparsely populated school districts. He studied costs in a randomly selected sample of 39 Idaho school districts, assigned to study groups based on average daily attendance (ADA).

Data were collected from school district reports submitted to the State. Program costs were calculated by program level (K-6 or 7-12) and disability severity (mild, moderate, or severe). Direct and indirect costs were allocated to

general and special programs based on student full-time equivalency (FTE) participation per program.

Rossmiller found that per pupil costs were substantially higher in small districts than in large districts. Costs of educating special education pupils were four to five times that of educating general education pupils among districts. Economy of scale affected cost differences between programs and districts, i.e. classrooms serving more pupils did so at a lower per pupil cost.

The costs of educating students in resource room programs were approximately five times that of the cost of general education services. Self-contained special education services cost almost three times that of general education services. Self-contained service delivery models were less expensive than resource service delivery.

Resource programs for combined moderately and severely disabled students were more costly than resource programs for moderately and severely disabled students who were served in a single program. Resource services for mildly, moderately, and severely disabled students in a combined classroom were the least expensive of all resource service configurations.

The IPSEC Model

The interest in special education cost studies continued during the middle and late 1980s. Cost factors of primary interest were service delivery environments and disability categories.

An evaluation of public and nonpublic special education programs in a Maryland school system, conducted by Jones and Salmon of Virginia Polytechnic Institute and State University in 1983, spawned interest in cost methodology which continued into the early 1990s. The aim of the evaluation was to determine cost effectiveness of the programs and services in use (Slobojan, 1987).

Jones and Salmon developed a four-component model for obtaining and analyzing public day school costs. A parallel model for analyzing public costs for nonpublic day school special education programs was developed by Salmon and Larson (Larson, 1985).

Larson (1985) used those models as prototypes for his IPSEC (Identification of Public Special Education Costs) and INSEC (Identification of Non-public Special Education) models field-tested through his doctoral program research.

Larson's IPSEC model examined costs of services in five environments: diagnostic/prescriptive, itinerant, resource, self-contained, and separate day school. He calculated costs per environment across five costs components: 1) discrete costs, 2) transportation costs, 3) overhead costs, 4) fixed assets costs, and 5) related services costs. Cost components were subdivided into cost

centers for separate calculations. Larson totalled the costs of each of the four components to obtain aggregate public special education day school program costs by disability category and service delivery environment. Related services, divided into therapy and evaluation cost centers, were presented as aggregate costs given lack of data on program costs by disability category or environment.

Four doctoral students field-tested Larson's IPSEC Model between 1986 and 1994. They were Kienas (1986), Slobojan (1986), Taylor (1990), and McCracken (1994).

Kienas field-tested the Rossmiller and Larson cost analysis models in an urban Virginia school system in 1986. He concluded that the Larson model was more efficient than the Rossmiller model for calculating special education costs because less information from the regular budget was needed and shared costs could be prorated through the use of a multiplier. He also considered the Larson model to be more accurate in calculating the costs of related services.

Kienas modified Larson's formula for calculation of transportation costs to remedy cost overestimates. Calculation of related services also posed some difficulty, which Kienas resolved through estimation of caseloads for related service personnel. Information was not available to make the distinction between related services costs classified as therapy versus evaluation (Kienas, 1986).

The Larson IPSEC comparative and descriptive cost analysis model was also field-tested by Slobojan (1986, 1987) in a Maryland public school system for

the 1984-85 school year. Slobojan amended Larson's model to: include principals within the cost of administration instead of instruction; include costs associated with principals of all schools, prorated for special education students; recalculate transportation by cost center; and allocate expenditures to cost centers based upon positions within environments. Study results indicated that self-contained special education services cost approximately four times as much as itinerant or resource services.

Slobojan concluded that the IPSEC model, with modifications, yielded valid calculations of per pupil costs. The modified model, while providing a comprehensive analysis of special education services, failed to consider regular education instructional costs for students enrolled in special education programs while receiving some regular education instructional services.

The Larson model was revisited by a third doctoral student in 1990. Taylor used the Larson Model (1985) as revised by Kienas (1986) to determine costs for self-contained services for seriously emotionally disturbed (SED) students in six local education agencies (LEAs) in Hampton Roads, Virginia. A program inventory was developed by Taylor to compare costs of programming with quality of SED programming. Taylor found that cost to LEAs is greater for SED students placed in self-contained programs operated by the LEAs than was the cost of placement of SED students in regional programs, yet administrators' perceptions of quality were not related to cost.

McCracken (1994) employed Larson's IPSEC Model, modified to allow for sensitivity to costs of inclusive programming in selected Virginia public school systems. McCracken's work will be considered more thoroughly in the section on Inclusion Studies.

**Mid- to late 1980's: Cost Effectiveness,
Cost Benefit, and Range of Services**

A variety of special education cost analysis models were constructed and piloted during the mid and late 1980's. Fagan, Piuma, Raphael and colleagues all published cost studies during 1985. Moore and colleagues conducted their landmark national study in 1988. Discussions of these important cost analyses follow.

Fagan (1985) focused his study on the cost effectiveness of school psychological services in rural areas. The issue of cost was related closely to the role and function of school psychologists as determined by different school districts. Fagan calculated costs through construction and examination of several hypothetical service delivery models. The study contained certain methodological flaws. Salary levels and caseload sizes may have been underestimated. Salary figures were held constant and employee benefits were largely omitted in calculations.

Fagan found that increased district expenditures resulted from a short-sighted definition of the role of the school psychologist as educational and psychological evaluator rather than other roles such as counselor or therapist. Several factors impacting costs were discussed. Most school psychological services were provided through the use of special education funds. School psychological services were provided in response to referral for probable special education placement only. Services were primarily reactive and rarely proactive or interventive in nature.

Contractual services were not found to be cost effective. Fagan recommended that districts form joint agreements to share costs of full-time psychologists rather than seek the higher per diem cost of services from the non-school sector. In this manner, rising costs of salaries, benefits, travel, etc. could be restrained.

Pioma (1985) conducted a cost-benefit analysis of special education programs for severely disabled students. This sample pilot study examined costs of two integrated and two segregated classrooms with students of comparable age and severity of disability. Costs were allocated across personnel, supplies and equipment, travel, facilities, and transportation. Pioma found that costs were slightly higher for severely disabled students served in segregated settings than for those served in integrated settings. However, students in segregated settings received a greater number of direct contact hours with teachers and aides

whereas students in integrated settings received more services from other personnel.

The range and relationships of special education expenditures were analyzed in the Collaborative Study of Children with Special Needs conducted by Raphael, Singer, and Walker (1985). Raphael et al. found two common approaches implemented in prior cost studies: the expenditure method and the resource allocation method. The expenditure method addressed district budgets and expenditures associated with special education programs. Resource allocation addressed costs of inputs within program components. Reported data were based either on aggregate costs or on the "typical child" as the unit of analysis; neither approach provided data on range or relationship of expenditures. Those issues were addressed by Raphael and colleagues.

The Collaborative Study of Children with Special Needs revealed that average teacher salaries for special education teachers were lower than that for regular education teachers due to seniority of teachers and not to a differential in salary schedules. Over-all instructional expenses for special education students exceeded those for regular education students. The expenditure for the education of a special education student in a regular classroom was lower than that for special class services. Pull-out services (student leaves classroom to receive additional services) from special or regular classes were more expensive than full-time services in either class location (Raphael et al., 1985).

The lowest expenditures were made on speech-impaired students and learning disabled students. The highest expenditures were made on students with physical, sensory, and other health impairments, according to Raphael and associates. The average per pupil expenditure for special education students was a result of the mix of children in a given program, input costs, and educational resources. The Raphael, Singer, and Walker study indicated that program placement option systematically influences expenditures.

A national study of special education expenditures was required by the 1983 Amendments to the Education of the Handicapped Act (EHA) in order to calculate a range of per pupil expenditures by handicapping conditions and assess the national response to the 1975 mandates contained in the Education for All Handicapped Children Act (Moore, Strang, Schwartz, & Braddock, 1988). The Office of Special Education Programs (OSEP) in the U. S. Department of Education (DE) commissioned the Decision Resources Corporation (DRC) to conduct such a study. The DRC study was implemented by Moore and colleagues.

National per pupil costs for disabled students by categorical program and by service delivery model were analyzed and compared from 1977-78 to 1985-86. Personnel and nonpersonnel costs were analyzed across five instructional placements, five supplemental service areas, and seven related services areas over 12 mandated program disability categories.

Moore et al. found the average per pupil expenditure for special education pupils to be 2.3 times the cost of educating regular education pupils. Adjusted for inflation, data revealed that special education costs had increased by ten percent between 1977-78 and 1985-86, while regular education costs only increased by four percent during that same 8-year time frame. Vast variations in district-level expenses limited the usefulness of the study for projecting and applying national averages for state-level and district-level implications (Moore et al, 1988).

A 1988 study by Singer and Raphael as well as the 1988 DRC study by Moore et al. indicated that less restrictive or mainstream placements reflected lower costs than other placement or service delivery options (Jones, 1991). Jones cautioned that both methodologies reflected currently provided services and not needed services. He noted that many students receive a prescribed number of special education direct service hours based on pre-existing local service delivery models and not individualization of student needs. Special education staffing shortages could also result in minimal services provided to the maximum number of students allowed. Jones suggested that future studies should better relate student need to services provided in order to ascertain true cost of program delivery.

Recent Studies

The late 1980s and early 1990s witnessed several more significant studies of costs of services provided. Lewis and colleagues from the University of Minnesota addressed cost issues in 1988, 1989, and 1990. Chambers conducted a case study evaluation of special education costs in 1991.

Lewis, Bruininks, Thurlow, and McGrew (1988) assessed the appropriateness of cost-benefit analysis as an evaluation technique applied to special education. They compared costs and benefits of public school special education programming for mentally retarded students to hypothetical examples receiving no school services or institutionalization. Cost estimates were based on all regular and special education resources for thirteen special education service areas and grade levels.

Lewis and colleagues concluded that public school special education services are economically efficient. The study provided limited generalizability due to design problems with comparison groups while presenting a feasible description of a cost-benefit framework.

In 1989, Lewis, Bruininks, and Thurlow employed a resource components approach to educational cost analysis. They focused on services and hours of instruction in special education service areas rather than on budget, reimbursement, or administrative functions. Essential components (input data) of

the cost model were personnel, facilities, equipment and materials, tuition and external costs, transportation, and other educational costs.

Lewis and colleagues (1989) determined that cost variations across service areas render service area comparisons inappropriate. They also found direct special education services in conjunction with regular education mainstreaming to be more effective and efficient than earlier segregated models. Total special education costs to the school district, unadjusted of state and federal reimbursements, were more than one and a half times the amounts normally identified in printed local education budgets.

A resource components approach also was implemented by Lewis, Bruininks, and Thurlow in 1990. They again found that school district budgets underestimate the real costs of special education. Lewis et al. (1990) reported major cost differences between programs were due to the numbers of pupils (economy of scale), and differing amounts and mixes of resources in the delivery of services.

Several limitations of the study threatened generalizability and efficiency. Summer school and facilities costs were included in per pupil cost calculations. Indirect overhead costs and costs of administrative and programmatic services were estimated (Lewis et al, 1990).

Chambers (1991) conducted a cost analysis of federal early intervention services through use of a case study evaluation of California's implementation of

EAHCA Part H (P.L. 99-457) services. The purpose of Chambers's study was to develop overall estimates of the necessary investment should California decide to continue participation in the discretionary Part H program. Cost estimates of current processes of intake, evaluation, assessment, monitoring and program planning such as those used for the Individualized Education Program (IEP) were compared to costs of services through implementation of an Individualized Family Service Plan (IFSP).

Use of state-specific data and estimates limited the generalizability of the Chambers study. Time estimates of direct client services were provided by personnel. Predictions of potential client population were difficult to construct and were unverifiable. Finally, judgments had to be made about likely allocations of resources in the absence of specific data.

Inclusion Studies

A critical area of concern in the special education field today is determination of the costs of inclusion, a relatively new descriptor for one of the least restrictive options for location of services on the continuum of services. Inclusion means different things to different people; operational definitions vary across organizations.

Two problems emerged in cost analysis of special education which include delineation of inclusive programming costs. One problem was determination of

an acceptable operational definition of inclusion. Once defined, determination of inclusive costs presented a challenge.

The national Center for Special Education Finance (1993) is in the process of conducting data collection efforts which will focus on critical issues related to special education finance reform and service delivery and on development of prototype procedures for efficiently collecting fiscal data that will be useful to policy-makers.

The states of Kentucky, Oregon, and Florida are working collaboratively with the Center for Special Education Finance to conduct special education cost studies. Virginia also is preparing to study the costs of special education service delivery models. The Virginia House of Delegates approved House Joint Resolution No. 102 (1994) "requesting the Department of Education to study incentives for integrating students with disabilities into general education classrooms in the Commonwealth's public schools". In conducting the study, the Department of Education was instructed to consider: 1) effects of integrating disabled students in general education on the education of nondisabled students, 2) allocation of instructional and support staff resources, 3) general education class size, 4) staff development requirements, and 5) potential fiscal incentives and disincentives. The study is to be completed by the 1995 session of the Virginia General Assembly.

A recent cost study, the Fiscal Analysis of Clark County Schools Inclusion Site Grant, was conducted by Roahrig (1993). Roahrig evaluated an inclusion pilot program funded by the Indiana General Assembly to determine the fiscal effect of inclusive programming. The study samples were four elementary schools within the Clark County Special Education Cooperative. The Roahrig model calculated costs of special education across four cost components: Instruction, Administration and Related Services, Transportation, and Staff Development.

In the absence of Indiana state-mandated staffing requirements, staffing requirements were established by the local education agency. The numbers of required instructional personnel positions were calculated per school. Given an indicated number of special education staff positions per school based upon the number of disabled students eligible for services, actual staffing patterns for inclusive schools were determined through site-based decisions. One teaching position was considered the equivalent of three aide positions. These site-based decisions resulted in varying numbers of teachers and aides per school building.

In inclusive schools, 28% of the special education instructional personnel were teachers and 72% were instructional aides. In schools with traditional special education programs (i.e. pull-out services), 46% of the special education staff were teachers and 54% were aides.

Roahrig reported that personnel costs (salaries and benefits) typically represent approximately 90% of special education services. Staffing patterns such

as those employed by the Cooperative uniquely influenced instructional costs within school buildings, limiting generalizability of study results to local education agencies which must comply with state-mandated staffing patterns and/or do not participate in site-based management.

The number utilized in per pupil cost computations was a duplicated pupil count of enrollment, i.e. students receiving more than one service were counted for each service. This may have overestimated the number of students eligible for special education services and may have underestimated per pupil costs.

Roahrig reported minimal per pupil cost differences between inclusive and traditional service delivery programs in the Cooperative while noting a significant range of costs within low incidence categorical programs. However, those per pupil expenditure figures were based upon an average per pupil cost of inclusion derived from an average of the average annual per pupil costs per school buildings (an average of averages). Per pupil costs of special education in inclusive schools ranged from \$3,743 to \$4,744. Per pupil costs of special education in traditionally structured schools ranged from \$1,732 to \$8,243.

All special education program costs were presented as aggregate figures, without separation of per pupil costs by disability categories, for total inclusive costs. Costs were separated by categories of mild and moderate/severe disabilities for cost figures from traditional schools; these figures ranged from \$3,920 to \$8,017 (Roahrig, 1993).

Home school attendance, a key element of the Clarke County, Indiana, inclusive education programming, resulted in reduced transportation costs. Staff positions and costs related to special education feeder or special routes were eliminated.

Staff development was also a critical point in inclusive education. The total costs of staff development, while difficult to assign to cost centers, was found to be roughly equal to the cost of one certified instructional personnel position.

The Roahrig study presented viable components within a cost analysis framework. Special education costs were presented as total add-on costs (supplemental costs as opposed to replacement costs), therefore the costs of regular education instruction for special education students was not calculated.

Roahrig (1993) concluded that the total cost of special education programming was not reduced or increased significantly by inclusive programming in this pilot study. Costs of inclusive programming were approximately 4% higher than costs of traditional special education programming. He recommended that a subsequent study be conducted by using a larger sample size to verify results.

An internal study was conducted in the Montgomery County, Virginia, Public Schools to assess and monitor the progress of inclusive education within that system from 1990 to 1993 (Radcliffe & Troutman, 1994). While the focus of

the study was on public perceptions and student achievement, excess cost figures also were considered.

Montgomery County's inclusive education program was defined as integrated home-school placement of disabled students provided with collaborative, consultative, and team teaching educational services between special education and regular education staffs. Special education funding allocations were modified for site-based decision-making models.

Cost figures from the 1991-1992 school year indicated that Montgomery County expended less on excess costs for special education students than did eleven of thirteen other southwest Virginia school systems.

During 1994 Larson revisited his IPSEC Model (previously discussed) with modifications for calculation of inclusion costs within the instruction cost component. By Larson's calculations, the average cost of inclusive education exceeded traditional special education programming costs by 10%.

Mildly disabled students served on a resource basis within a traditional organizational model captured \$6,394 per pupil and \$6,486 per student within an inclusive model (a difference of \$92). These results indicate that selected service delivery model has little effect on costs for mildly disabled learners. Per pupil cost differentials between traditional and inclusive programming for severely disabled students were greater than that for mildly disabled students but not significantly so.

The greatest effect on total special education costs fell within the area of services for moderately-disabled students. The per pupil cost of serving moderately disabled students was significantly higher in inclusive settings than in traditional resource settings (\$2,704 and \$2,018, respectively).

Total average per pupil costs were \$13,562 in traditional settings and \$14,897 in inclusive settings, a difference of \$1,335. Costs of educating disabled students, whether in traditional or inclusive settings, were higher at the elementary school level than at either the middle or high school levels. Total average per pupil costs of middle and high school levels were roughly equivalent.

Larson (1994) found that traditional resource room placement was less costly than inclusive placement, and inclusive placement was less costly than self-contained placement.

Traditional special education services at the elementary level were 2.8 times that of general education. Inclusive education services were 3.2 times the cost of general elementary education. Traditional special education costs at the middle school level were 2.5 times more costly than general education middle school costs, and inclusive education costs were 2.7 times more costly. Traditional special education services at the high school level were 3.2 times as expensive as the average general education per pupil cost, with inclusive education costs reported as 3.6 times as costly as general education.

Five factors determining cost differentials were identified by Larson. First, staffing and itinerant staff travel increased in the inclusionary model. Equipment costs increased in the inclusionary model due to the increase of number of locations at which services are provided. Staff development costs increased, although Larson noted that this may reflect start-up or program implementation costs. He found no decrease in transportation costs for inclusive education within the sample study district.

A fourth study on costs of inclusive education was conducted by McCracken (1994). The purpose of McCracken's study was to determine changes in cost of special education in eight Virginia Statewide Systems Change Project participant school divisions following formal 3-year implementation of inclusive special education. Two case studies were also analyzed using the Larson (1985) IPSEC cost analysis model. Inclusive education was defined as education of disabled students with age-appropriate peers in integrated environments; extent of inclusive programming varied widely. McCracken found that the data did not clearly show that inclusive programming was either significantly more costly or significantly less costly than traditional special education programming.

McCracken's detailed case study of two school divisions, employing the Larson IPSEC cost analysis model, showed a greater increase in costs for inclusive special education than for a non-inclusive model but no significant

difference in total special education expenditures as a percentage of the total school budgets.

Elements of cost formulas as described in these studies, as well as limitations illustrated through prior cost analysis research, were addressed in the CAPE Model implemented herein.

CHAPTER 3: DESCRIPTION OF STUDY

Statement of Methodology

The cost analysis model constructed for this study was the Moche Cost Analysis of Public Education model (CAPE). Total mean annual per pupil expenditures (PPEs) were calculated for regular and special education students in three southwest Virginia school systems. Costs were allocated by academic level (elementary and secondary) and by program (regular and special education). Special education costs were also calculated by student disability category and by service delivery model.

Finally, CAPE results were compared to state-reported data. Excess costs of special education, as required by IDEA implementation regulations (U. S. Dept. of Education, 34 CFR 300, 1992; Virginia Dept. of Education, 1990), were computed from both data sets to compare costs identified through state, federal, and CAPE Model formulas.

Factors in Educational Analysis

The CAPE model met the current need to assess educational costs in a changing school environment. That changing environment encompasses new school organizational structures, new disability categories for program eligibility, and new service delivery models.

Significant organizational factors are (A) class assignment, (B) instructional scheduling, and (C) academic level assignments. Class assignment may be organized through traditional classroom placement based upon student grade assignment or continuous progress (achievement-based class assignments). Instructional blocks may be comprised of six to eight daily class periods for the school year or semester block scheduling. Academic level assignments reflect grade placement, grade equivalency, and course content of classes.

School buildings may house preschool, primary classrooms, elementary programs, middle school, or high school programs. Some school districts also offer alternative secondary school programs. The Commonwealth of Virginia Department of Education designates grades K-7 as elementary and grades 8-12 as secondary for purposes of program fiscal reporting and funding. There is no separate designation for middle school at this point in time. However, the CAPE Model can easily be modified to separate costs by middle or junior high school levels.

Special education factors encompass disability categories and service delivery models. Disability categories are defined by federal regulations on implementation of IDEA (34 CFR 300.7). Service delivery models are defined by an individualized education program (IEP) and listed in terms of location of services (34 CFR 300.551). Organizational and special education factors in educational evaluation are listed in Table 2.

Table 2: Factors in Educational Evaluation

Factors in Educational Evaluation	
I.	ORGANIZATIONAL FACTORS
A.	Class Assignment
1.	traditional class assignment
2.	continuous progress
B.	Instructional Arrangement
1.	traditional class periods
2.	semester block scheduling
C.	Academic Level
1.	preschool
2.	primary
3.	elementary
4.	middle
5.	junior high
6.	high/secondary
7.	alternative
II.	SPECIAL EDUCATION FACTORS
A.	Disability Categories (34 CFR 300.7[a][1])
1.	preschool/developmental delay
2.	developmental delay ages 3-5
3.	mental retardation
4.	hearing impairment
5.	speech or language impairment
6.	visual impairment
7.	serious emotional disturbance
8.	orthopedic impairment
9.	autism
10.	traumatic brain injury
11.	other health impaired
12.	specific learning disability
13.	deaf-blindness
14.	multiple impairments
B.	Service Delivery Models (34 CFR 300.551[b][1])
1.	regular classes
2.	special classes (resource, self-contained, etc.)
3.	special schools
4.	home instruction (homebound, home-based)
5.	hospital/institution

For purposes of this study, service delivery models were defined as follows:

- 1) **mainstream** - instruction by regular education personnel, delivered to disabled and nondisabled students in the general education environment.
- 2) **inclusion** - instruction by both regular and special education personnel, delivered to disabled and nondisabled students in the general education environment. A regular education classroom with an aide paid through the regular education budget but assigned for purposes of including disabled students in the program also was considered an inclusive classroom.

Neither the Virginia Department of Education nor the U.S. Department of Education defined inclusion as a service delivery option. The Virginia Department of Education (1994) defined time in special education as time calculated on the basis of special education services described in the student's IEP. The Office of Special Education Programs, hereafter referred to as OSEP, defined regular class as an educational environment in which students receive the majority of their education program in a regular classroom, with special education and related services provided outside the regular classroom for less than 21% of the school day. This alternative placement included provision of special education services to students within the regular class setting (U.S. Department of Education, 1993).

System 1 and System 2 in this study defined inclusion as a service delivery option in which direct educational services are provided to disabled students in the general education environment with special and regular education personnel

assigned to that general education environment. System 3 defined inclusion as a service delivery option in which special education personnel provide consultative, collaborative, or direct educational services to disabled students within the general education environment.

3) monitor - instruction by regular education personnel, delivered to disabled and nondisabled students in the general education environment, with consultative or supplemental services provided by special education personnel as needed. This model was included within the resource designation for reporting and cost calculation purposes.

4) resource - instruction by special education personnel, delivered to disabled students, within a separate ("pull-out") special education classroom for less than 50% of the instructional day excluding lunch, time spent before the first instructional period begins, transition time between classes, and time spent at school after the last instructional period.

According to the Virginia Department of Education (1994) program standards, "resource" referred to programs where students receive special education services for less than 50% of their instructional day (excluding lunch). OSEP defined resource room as an educational environment in which students receive special education and related services outside the regular classroom for at least 21% but no more than 60% of the school day (U.S. Dept. of Education, 1993).

5) self-contained - instruction by special education personnel, delivered to disabled students within a separate ("pull-out") special education classroom for 50% or more of the instructional day excluding lunch, time spent before the first instructional period begins, transition time between classes, and time spent at school after the last instructional period.

Virginia Department of Education (1994) defined "self-contained" as programs where students receive special education services 50% or more of their instructional day (excluding lunch). Separate class was defined by OSEP as an educational environment in which students receive special education and related services outside the regular classroom for more than 60% of the school day (U.S. Department of Education, 1993).

6) home instruction (homebound or home-based instruction) - instruction provided to students in the home setting or other prearranged meeting place within the community but outside of the regular school setting.

7) hospital/institution - instruction provided in a non-LEA (non-local education agency) program, including hospitals, institutions, and residential schools.

Selection of Sample

Three adjacent southwest Virginia local education agencies (LEAs), designated herein as System 1, System 2, and System 3, were selected for this

study. Considerations in making this selection were (1) geographic proximity, (2) comprehensive array of special education service delivery models and disability categorical programming, and (3) contrast of demographics.

System 1, the smallest LEA in the study, educated approximately 1,500 students in a city of nearly 13,000 residents. The System 1 dropout rate was 2%, with 93% of graduates pursuing higher education (Virginia Education Association, 1994). Almost 30% of resident adults held college degrees, and fewer than 12% of residents had less than a ninth grade education (Lindquist, 1993).

System 2, the middle LEA both in geographic size and demographics, educated approximately 5,300 students from a population of 34,500 residents. The school dropout rate was 5%, with 82% of graduates pursuing higher education (U.S. Department of Commerce, 1992). Over 20% of System 2 adults attended less than nine years of school, and 53% of resident adults did not hold high school diplomas (Debell, 1994; Lindquist, 1993).

System 3, which served 8,800 students, was the largest LEA in this study. Almost 13% of System 3's 74,000 residents left school prior to the ninth grade. Approximately 81% of high school graduates continued their education. System 3's dropout rate fell between 3% and 4% (Virginia Education Association, 1994).

Twelve to fourteen percent of students in the three LEAs received special education services. A continuum of special education services was offered for eligible students in all categories of disability.

Demographic features and characteristics of the sample sites are highlighted in Tables 3 and 4.

Data Collection

Data analysis consists of examining, categorizing, tabulating, and recombining evidence to address the propositions of a study (Yin, 1989). Yin recommends the use of several sources of information for corroboration and development of converging lines of inquiry. When highly precise cost data are unavailable, as is frequently the case, use of reasonably accurate indicators is permissible (Coombs & Hallak, 1987).

Information analyzed for this study came from the 1992-93 School Year (Fiscal Year 1993) receipts and records. The following types of data were collected from LEA Annual School Reports, annual budgets, state-reported data, and internal documents:

- 1) Federal Support
 - a. IDEA Part B funds
 - b. IDEA Part H funds
 - c. Chapter I, ESEA[SOP] funds
 - d. Applicable special grants
 - e. Other federal funds

Table 3: Comparison of Sample Sites, General Population

	System 1	System 2	System 3	Commonwealth of Virginia
1990, Total Population	15,940	34,496	73,913	6,187,358
Anglo-American Population	91.1%	93.4%	91.2%	77.4%
African-American Population	5.9%	5.8%	3.8%	18.8%
Other Ethnic in Population	3.0%	0.8%	5.0%	6.8%
1992, Local Unemployment Rate	10.4%	9.8%	9.0%	6.3%
Land area	9 sq.mi.	318 sq.mi.	388 sq.mi.	N/A
1993, Population with Bachelors Degree	29.1%	11.5%	31.6%	24.5%
1993, Population with High School Diploma	75.4%	59.6%	73.6%	88.8%

Table 4: Comparison of Sample Sites, School Population

	System 1	System 2	System 3	Commonwealth of Virginia
Dropout Rate, 1992	1.6%	5.3%	3.7%	3.3%
Average SAT Scores, 1993	959	920	937	894
Continuing Education, 1992	93.4%	82.4%	81.5%	80.2%
ADM 1992-93	1468	5323	8539	N/A
Number & Percentage in Special education	217; 14.8%	642; 12.1%	1053; 12.2%	N/A
Ratio, Special Education Pupil: Instructional Personnel	1:12	1:11	1:8	N/A
Teachers as percentage of Special Education Staff	74%	68%	53%	N/A

Data Sources: Virginia Dept. of Education (1990); U.S. Dept. of Commerce (1992); Park (1993); Radford Chamber of Commerce (1994a); Radford Chamber of Commerce (1994b).

- 2) State Support
 - a. Basic School Aid
 - b. Standards of Quality support
 - c. Categorical funds
 - d. Special Education
 - e. Applicable special grants
 - f. Other state funds
- 3) Local Support
 - a. Local funds for education
 - b. Applicable special grants

CAPE Study Design

Cost Study Terminology

Cost analysts, like other professionals, found it necessary to develop field-specific terminology for ease of communication. Pertinent educational cost study terminology (as defined by Levin, 1983; Coombs & Hallak, 1987; National Education Association, 1993; and used within this study) included:

average daily membership (ADM) - the aggregate membership of a school during a reporting period divided by the number of days school is in session during that period.

capital outlay - costs related to the purchase of, replacement of, addition to, repair of, and maintenance of fixed assets which render useful service over a period of years.

constant prices - adjusted expenditures, converted into constant prices based on the price and wage structure for a selected base year, to allow for comparison of costs from year to year. This is done by applying a deflator, based on an appropriate price index, to compute real costs.

cost categories - program designations which include regular elementary education, regular secondary education, elementary special education, and secondary special education.

cost centers - descriptive division of costs by function within input centers.

cost components - primary cost allocations among categories based upon academic level, program, or service to which costs may be attributed.

current expenditures - expenditures, unadjusted for inflation, for operating local public schools, excluding capital outlay and interest on school debt.

ingredient variables - expenditures described in terms of resources or ingredients required to implement a given program or intervention; line-item expenses within CAPE cost centers.

input centers - separation of component costs by main function.

line-item - classification of expenditures by function (such as "instruction") and by object (such as "teacher").

resource costs - educational inputs measured in physical units, such as number of teachers or teacher hours.

total expenditures - sum of current and capital expenditures; includes all current expenditures, depreciation costs, capital outlay, and interest on the school debt.

unit costs - total complete expenditure divided by some unit, such as number of pupils, to derive an average figure for a defined group.

Calculation Procedure

Data were documented on data collection worksheets. Calculations, which could be completed manually or by computer spreadsheet, were computed through the # Cruncher: The Complete Spreadsheet IBM computer program by Goldstein Software Inc. (1992) which is compatible with Lotus 1-2-3 Spreadsheet.

Interview worksheets provided an avenue for verification of bookkeeping conventions when bookkeeping was not verbatim or position classifications by function were unclear. They also provided a format for teacher report of instructional hours in full-time equivalencies (FTE's) in various service delivery environments.

The CAPE Computer program was constructed in such a way that it easily could be modified to calculate costs by building level, by a variety of special programs, and/or by more discrete grade level divisions.

Cost Categories and Components

The four CAPE Model cost categories were Regular Elementary Costs, Regular Secondary Costs, Elementary Special Education Costs, and Secondary Special Education Costs as defined in Chapter One. Special education costs were those costs which could be attributed to the education of disabled students at all grade levels.

Each cost category was broken down into five components. Those components were: (1) Comprehensive Cost Component, (2) Service Cost Component, (3) Administrative Cost Component, (4) Support Cost Component, and (5) Instruction Cost Component. Each component was calculated by appropriate input centers, cost centers, and their ingredient variables as previously defined.

CAPE study design methodology was influenced by prior cost analysis research as described in Chapter 2 and by informal feedback from education administration practitioners. For example, broad administrative costs were analyzed by previous researchers including Rossmiller et al. (1970), with the inclusion of secretarial expenditures by Moore et al. (1988), and the funds expended within the function of school principal by Larson (1985) and Slobojan (1986). The CAPE Model included all of the above in three discrete input centers which do not appear in prior cost analysis designs.

Math checks were embedded throughout the CAPE computer program to guard against data entry error. Decision points were available within the final summary of costs formula whereby the user may choose to exclude certain items, such as those from self-supporting programs, from per pupil cost calculations. LEA customization of data also was possible for assignment of level-specific and site-specific administrative costs to the Instruction Cost Component if preferred for agreement with local or state bookkeeping conventions.

The CAPE Model was designed as follows:

COST ANALYSIS OF PUBLIC EDUCATION
(Cost Analysis of General and Special
Elementary and Secondary Education)

- A. Comprehensive Cost Component
 - 1. Transportation Input Center
 - 2. Supplemental Expenses Input Center
- B. Service Cost Component
 - 1. Maintenance/Operations Input Center
 - 2. Supplemental Expenses Input Center
- C. Administrative Cost Component
 - 1. General Central Administrative Input Center
 - 2. Level-specific Administrative Input Center
 - 3. Site-based Administrative Input Center
- D. Support Cost Component
 - 1. Assessment Input Center
 - 2. Direct Services Input Center
 - 3. Related Services Input Center
- E. Instruction Cost Component
 - 1. Regular Education Input Center
 - 2. Special Education Input Center
 - 3. Supplemental Expenses Input Center

Costs were assigned to program categories on a per pupil basis. Regular education student numbers reflected average daily membership (ADM) for the study year. Special education student numbers reflected the number of students served based upon December 1 special education child count during the study year. Personnel numbers were based upon data reflected in Annual School Reports to the Commonwealth of Virginia.

Both student and personnel numbers were expressed as full-time equivalencies (FTEs). Rossmiller (1982) recommended use of an FTE approach rather than one based on enrollment or membership. Rossmiller maintained that the FTE approach, which bases cost calculations on hours or minutes of involvement in a program, provides a more accurate portrayal of student access to services.

Comprehensive Cost Component

The COMPREHENSIVE COST COMPONENT contained those costs attributable to all levels of school operation which could not be directly allocated to one particular academic program or program level. It included (1) transportation and (2) supplemental expenses.

(1) Transportation Input Center. The first input center in the Comprehensive Cost Component was Transportation.

Transportation costs were analyzed as follows:

COMPREHENSIVE COST COMPONENT

- A. Transportation Input Center
 - 1. General Transportation Cost Center
 - a. Administrative Ingredient Center
Ingredient variables: salary, benefits, materials, equipment, professional development, and other miscellaneous costs
 - b. Non-administrative Ingredient Center
Ingredient variables: salary, benefits, materials, equipment, professional development, and other miscellaneous costs of general public transportation services
 - c. Contract Ingredient Center
 - 2. Non-general Transportation Cost Center
 - a. Composite Ingredient Center
Ingredient variables: aggregate costs of special public, special arrangement, non-general contract, and other non-general transportation costs.
- B. Supplemental Expenses Input Center

The General Transportation Cost Center included those costs of transporting students to and from public day schools within the LEA. These included general public LEA-owned and -operated services as well as contracted services for general transportation to and from public day schools.

The Non-general Transportation Cost Center contained those costs of transporting regular and special education students to and from within-district and

out-of-district educational facilities when general transportation services were not feasible or appropriate. These included costs of special public, special arrangement, non-general contract, and other non-general transportation expenses.

Special public transportation costs were those costs associated with student transportation provided by the LEA instead of general transportation services. Special arrangement transportation costs involved payments to parents in lieu of LEA-provided transportation when other transportation arrangements were not feasible or appropriate. Non-general contract transportation costs were those costs for transportation of special education pupils provided by a non-LEA service provider hired by the LEA on a fee or contract basis. Transportation arrangements not covered in the above descriptions fell under the heading of other non-general transportation services.

Expenditures allocated to transportation administrative costs were those costs attributable to the administration and supervision of general and non-general transportation services for all public school students. Non-administrative costs included other costs attributable to the operation of transportation services.

A twenty-step process was employed to calculate costs of transportation for general and special education programs. While all students may not choose to take advantage of transportation services, the costs of these services when made available by an LEA are attributable to all eligible students. The numbers

of eligible K-12 non-general transportation students were obtained from school records. The numbers of eligible general transportation students were obtained by subtracting the number of eligible K-12 non-general transportation students from the number of all K-12 students in average daily membership (ADM). Preschool transportation costs were also calculated.

First, total administrative costs of transportation were calculated and divided by the number of eligible general transportation students to obtain a mean per pupil cost of transportation administration. Total non-administrative costs of general transportation were then calculated and divided by the number of students eligible to receive general transportation services to obtain a mean per pupil cost of transportation non-administrative services for general transportation. The aggregate amount of general contract service costs were divided by the number of eligible general transportation students to obtain a mean per pupil cost of transportation contract services.

Likewise, aggregate costs of non-general transportation services were summed and divided by the number of students eligible to receive non-general transportation for a mean per pupil cost of non-general transportation.

These mean per pupil expenditure (PPE) figures were summed within appropriate categories. The total was then multiplied by the number of students eligible for services within cost centers to obtain aggregate costs of general and non-general transportation for preschool regular education (nondisabled),

preschool disabled, elementary regular education, secondary regular education, elementary special education, and secondary special education pupils. Special education costs were further subdivided and analyzed by disability category and service delivery environment based upon number of students enrolled in each categorical program and service delivery environment.

(2) Supplemental Expenses Input Center. The second input center contained those costs associated with the Comprehensive Cost Component but which were not included in computation of current per pupil expenditures. The Supplemental Expenses costs were analyzed through a sixteen-step process as follows:

COMPREHENSIVE COST COMPONENT

A. Transportation Input Center

B. Supplemental Expenses Input Center

1. Depreciation Cost Center
 - a. Facilities Ingredient Center
Ingredient variables: annualization factor, assets anticipated lifetime
 - b. Vehicles Ingredient Center
Ingredient variables: annualization factor, assets anticipated lifetime
2. Initiation (start-up) Cost Center
Ingredient variables: materials, equipment, other miscellaneous costs of adult education and transportation
3. Adult Education Cost Center
Ingredient variables: administration and non-administration costs of salaries, benefits, materials, equipment, professional development, and other miscellaneous costs.

The **Depreciation Cost Center** assessed depreciation costs resulting from use of buildings and vehicles. Larson (1985) defined depreciation as "the amount of devaluation from the current appraised value of all the buildings [and vehicles] in the local education agency over the course of one year due to normal usage, decay, and/or decline in price". Depreciation costs were allocated equally among all K-12 students in ADM. Depreciation costs were not allocated to the preschool program given the diversity of individualized service delivery models such as home-based instruction and staggered classroom instruction schedules.

The two ingredient centers within the depreciation cost center were facilities and vehicles. Levin (1983), Larson (1985), and Slobojan (1986) recommended a generally accepted depreciation rate of 1/30, or lifetime of 30 years, for facilities. Larson (1985) and Slobojan (1986) recommended a rate of 1/12, or lifetime of 12 years, on vehicles.

Levin (1983) suggested a five-step process for determining the annual value of fixed assets:

1. determine replacement value,
2. determine life of asset,
3. determine annual cost of depreciation by dividing replacement value by life,

4. determine opportunity cost by multiplying the undepreciated value by an appropriate interest rate,
5. obtain an annual cost by adding the annual cost of depreciation to the annual interest forgone on the remaining investment.

Levin (1983) simplified the process through production of a table of annualization factors for determining annual cost of facilities and equipment by anticipated lifetimes of assets and interest rates. His annualization formula is:

$$a(r,n) = \frac{[r(1+r) \text{ to the } n\text{th power}]}{[(1+r) \text{ to the } n\text{th power} - 1]},$$

where r = interest rate and n = lifetime of asset for depreciation.

An annualization factor is located on Levin's table by locating the intersection of the lifetime of assets (n) and the selected interest rate (r). Levin suggested employment of a ten percent interest rate, which represented average rates across time.

The annual depreciation cost could be assigned per pupil or per treatment based on proportion of the facility used for each purpose. For purposes of this study, annual depreciation costs were assigned on a per pupil basis.

The first ingredient center, facilities, included all buildings within and owned by the school system. Lifetime of buildings was set at 30 years (as recommended by Larson, 1985, and Slobojan, 1986). Interest rate was set at 10%. The annualization factor of .1061, obtained from Levin's table, was multiplied by the replacement cost of the facilities for a total cost of building depreciation.

The second ingredient center, vehicles, included all buses, automobiles, and trucks within and owned by the school system. Lifetime of vehicles was set at 12 years (Slobojan, 1986). Interest rate was set at 10%. The annualization factor of .1468, obtained from Levin's table, was multiplied by the replacement cost of the vehicles to obtain a total cost of vehicle depreciation.

The last step of depreciation calculation involved the addition of building depreciation and vehicle depreciation to yield total costs of depreciation. This sum was divided by the total number of K-12 students in ADM to obtain a mean annual per pupil cost of vehicle depreciation, which was then multiplied by the number of regular elementary, regular secondary, elementary special education, and secondary special education students to yield aggregate depreciation costs per category and program. Special education costs were further subdivided across disability categorical programs and service delivery environments.

The second cost center within the Supplemental Expenses Input Center was the **Initiation (Start-up) Cost Center**. Start-up costs were those costs associated with the first year of program implementation for adult education and

transportation. Start-up costs should not recur after the first year. They included materials and supplies, equipment, professional development, and other costs attributable to program initiation. They did not include costs of salaries and benefits which recur each year, nor did they include annual costs of materials and supplies, equipment, and professional development.

The last cost center within supplemental costs was the **Adult Education Cost Center**. While not directly attributable to the public education of kindergarten through twelfth grade students, the costs of adult education were included in local school budgets, annual state reports, and federal computations of current per pupil expenditures. Administrative and non-administrative costs of adult education services were considered.

Table 5 displays the computation formula for the Transportation Input Center and Table 6 displays the computation formula for the Supplemental Expenses Input Center of the CAPE Comprehensive Cost Component.

Table 5: CAPE Comprehensive Cost Component, Transportation Input Center

CAPE COMPREHENSIVE COST COMPONENT	TRANSPORTATION INPUT CENTER	
Formula	Spreadsheet Cell #	Calculation
A. TRANSPORTATION INPUT CENTER		
1. General transportation administrative costs (V40)	E77	(V40) _____
2. Average per pupil expenditure, administrative costs (V40) divided by all K-12 students general transportation students (P46)	F79	(V40) _____ / (P46) _____ = (F79) _____ PPE
3. General transportation non-administrative costs (X40)	E88	(X40) _____
4. Average per pupil expenditure, non-administrative costs (X40) divided by all K-12 general transportation students (P46)	F90	(X40) _____ / (P46) _____ = (F90) _____ PPE
5. General transportation contract costs (V46)	E93	(V46) _____
6. Average per pupil expenditure, contract costs (V46) divided by all K-12 general transportation students (P46)	F94	(V46) _____ / (P46) _____ = (F94) _____

Table 5 Continued		
<p>7. Total General Transportation Costs for REGULAR EDUCATION, (Admin. PPE F79 times all K-12 reg.ed. general transportation students P49) plus (Non-admin. PPE F90 times students P49) plus (Contract PPE F94 times students P49)</p>	E104	$\begin{aligned} & [(F79) \underline{\hspace{2cm}} \times \\ & (P49) \underline{\hspace{2cm}} = \\ & (E100) \underline{\hspace{2cm}}] \\ & + \\ & [(F90) \underline{\hspace{2cm}} \times \\ & (P49) \underline{\hspace{2cm}} = \\ & (E101) \underline{\hspace{2cm}}] \\ & + \\ & [(F94) \underline{\hspace{2cm}} \times \\ & (P49) \underline{\hspace{2cm}} = \\ & (E102) \underline{\hspace{2cm}}] \\ & = \\ & (E104) \underline{\hspace{2cm}} \end{aligned}$
<p>8. Average per pupil costs of general transp. for Regular Education, Total Costs (E104) divided by K-12 regular education students (P21)</p>	E105	$\begin{aligned} & (E104) \underline{\hspace{2cm}} / \\ & (P21) \underline{\hspace{2cm}} = \\ & (E105) \underline{\hspace{2cm}} \end{aligned}$
<p>9. Total General Transportation Costs for SPECIAL EDUCATION, (Admin. PPE F79 times all K-12 special ed. general transportation students P52) plus (Non-admin. PPE F90 times students P52) plus (Contract PPE F94 times students P52)</p>	E111	$\begin{aligned} & [(F79) \underline{\hspace{2cm}} \times \\ & (P52) \underline{\hspace{2cm}} = \\ & (E107) \underline{\hspace{2cm}}] \\ & + \\ & [(F90) \underline{\hspace{2cm}} \times \\ & (P52) \underline{\hspace{2cm}} = \\ & (E108) \underline{\hspace{2cm}}] \\ & + \\ & [(F94) \underline{\hspace{2cm}} \times \\ & (P52) \underline{\hspace{2cm}} = \\ & (E109) \underline{\hspace{2cm}}] \\ & = \\ & (E111) \underline{\hspace{2cm}} \end{aligned}$
<p>10. Average per pupil costs of general transportation for SPECIAL EDUCATION, total costs (E111) divided by all K-12 sp.ed. students (P18)</p>	E112	$\begin{aligned} & (E111) \underline{\hspace{2cm}} / \\ & (P18) \underline{\hspace{2cm}} = \\ & (E112) \underline{\hspace{2cm}} \end{aligned}$

Table 5 Continued		
NON-GENERAL TRANSPORTATION		
11. Composite Costs of Non-general transportation (V52)	E118	$\frac{(V52)}{\quad}$
12. Per pupil expenditure (PPE), Composite Costs (V52) divided by all non-general transportation students (P63)	E119	$\frac{(V52)}{(P63)} =$ $\frac{(E119)}{\quad}$
13. REGULAR EDUCATION non-general transportation costs, Composite PPE (E119) times number of regular ed. non-general transportation students (P39)	E123	$\frac{(E119)}{(P39)} \times$ $\frac{(E123)}{\quad} =$
14. Average PPE distributed across all K-12 REGULAR ED. students, Regular Ed. costs (E123) divided by all K-12 regular ed. students (P21)	E124	$\frac{(E123)}{(P21)} =$ $\frac{(E124)}{\quad}$
15. SPECIAL EDUCATION non-general transportation costs, Composite PPE (E119) times number of special ed. non-general transportation students (P43)	E127	$\frac{(E119)}{(P43)} \times$ $\frac{(E127)}{\quad} =$
16. Average PPE distributed across all K-12 SPECIAL ED. students, Special Ed. costs (E127) divided by all K-12 special ed. students (P18)	E128	$\frac{(E127)}{(P18)} =$ $\frac{(E128)}{\quad}$

Table 5 Continued		
17. PRESCHOOL REGULAR EDUCATION, non-general transportation costs, Composite PPE (E119) times the number of preschool regular ed. non-general transportation students (P53)	E130	$\frac{(E119)}{(P53)} \times (E130) =$
18. Average PPE distributed across all PRESCHOOL REGULAR ED. students, Composite Costs (E130) divided by all preschool regular ed. students (P34)	E131	$\frac{(E130)}{(P34)} \div (E131) =$
19. PRESCHOOL SPECIAL EDUCATION, non-general transportation costs, Composite PPE (E119) times the number of preschool special ed. non-general transportation students (P60)	E133	$\frac{(E119)}{(P60)} \times (E133) =$
20. Average PPE distributed across all , PRESCHOOOL SPECIAL ED. students, Composite Costs (E133) divided by all preschool special ed. students (P35)	E134	$\frac{(E133)}{(P35)} \div (E134) =$

Table 6: CAPE Comprehensive Cost Component, Supplemental Expenses Input Center

CAPE COMPREHENSIVE COST COMPONENT	SUPPLEMENTAL EXPENSES INPUT CENTER	PAGE 1
Formula	Spreadsheet Cell #	Calculation
A. DEPRECIATION		
1. Facilities Annualization Factor	E144	<u>(E144) 0.1061</u>
2. Replacement cost of facilities (T88)	E146	<u>(E146)</u>
3. Annual cost of facilities depreciation, factor (E144) times replacement cost (E146)	E148	<u>(E144) 0.1061</u> x <u>(E146)</u> = <u>(E148)</u>
4. Average PPE for all K-12 students, annual cost (E148) divided by all K-12 students in ADM (P16)	E151	<u>(E148)</u> / <u>(P16)</u> = <u>(E151)</u>
5. REGULAR EDUCATION cost of facilities depreciation, Average PPE (E151) times number of K-12 regular ed. students (P21)	E152	<u>(E151)</u> x <u>(P21)</u> = <u>(E152)</u>
6. SPECIAL EDUCATION cost of facilities depreciation, Average PPE (E151) times number of K-12 special ed. students (P18)	H152	<u>(E151)</u> x <u>(P18)</u> = <u>(H152)</u>

Table 6		
7. Vehicles Annualization Factor	E154	<u>(E154) 0.1468</u>
8. Replacement cost of vehicles (T92)	E156	<u>(T92)</u>
9. Annual Cost of Vehicles depreciation, factor (E154) times replacement cost (E156)	E158	<u>(E154) 0.1468</u> x <u>(E156)</u> = <u>(E158)</u>
10. Average PPE for all students, annual cost (E158) divided by all K-12 students in ADM (P16)	E161	<u>(E158)</u> / <u>(P16)</u> = <u>(E161)</u>
11. REGULAR EDUCATION vehicle depreciation costs, average PPE (E161) times K-12 regular ed. students (P21)	E162	<u>(E161)</u> x <u>(P21)</u> = <u>(E162)</u>
12. SPECIAL EDUCATION vehicle depreciation costs, average PPE (E161) times K-12 special ed. students (P18)	E163	<u>(E161)</u> x <u>(P18)</u> = <u>(E163)</u>
B. START-UP (PROGRAM INITIATION) COSTS		
13. Total program initiation costs for Adult Education (AB40) and Transportation (AD40)	E169	<u>(AB40)</u> + <u>(AD40)</u> = <u>(E169)</u>

Table 6		
14. Average per pupil expenditure, total costs (E169) divided by all K-12 students in ADM (P16)	F169	$\frac{(E169)}{(P16)} \div (F169) =$
15. REGULAR EDUCATION program start-up costs, average PPE (F169) times number K-12 regular ed. students (P21)	G169	$\frac{(F169)}{(P21)} \times (G169) =$
16. SPECIAL EDUCATION program start-up costs, average PPE (F169) times number K-12 special ed. students (P18)	H169	$\frac{(F169)}{(P18)} \times (H169) =$

Service Cost Component

The Service Cost Component was the second CAPE cost component. It contained building operations costs which could be attributed to all levels of school operation and which could not be directly allocated to a particular program or academic level. It was calculated in 14 steps. The Service Cost Component included those costs associated with two input centers: (1) maintenance and operations, and (2) supplemental expenses. The Service Cost Component was subdivided as follows:

SERVICE COST COMPONENT

- A. Maintenance and Operations Input Center
 - 1. Personnel Cost Center
Ingredient variables: salaries, benefits, materials, equipment, professional development, other
 - 2. Other Operations Expenses Cost Center
Ingredient variables: utilities, communications, insurance, leases, rentals, etc.
- B. Supplemental Expenses Input Center
 - 1. Food Services Cost Center
Ingredient variables: salaries, benefits, materials, equipment, professional development, other
 - 2. Facilities/Capital Outlay Cost Center
Ingredient variables: site acquisition, site improvement, architecture, specifications, building acquisition, building improvements.
 - 3. Debt Service and Fund Transfers Cost Center

(1) Maintenance and Operations Input Center. Maintenance and operations costs were computed through a six-step process. Maintenance and operations personnel were grounds-keepers, gardeners, custodians, and other personnel responsible for repair and maintenance of school properties. Other operations expenses included but were not limited to utilities, communications, insurance, leases, and rentals. Total costs attributable to those positions plus other operations expenses were summed and allocated equally among all students per ADM.

(2) Supplemental Expenses Input Center. Supplemental Expenses were computed through an eight-step process. The three cost centers within the Supplemental Expenses Input Center were Food Services, Facilities/Capital Outlay, and Debt Service and Fund Transfers.

The **Food Services Cost Center** included all costs attributable to food preparation and service positions and supplies..

The **Facilities and Capital Outlay Cost Center** contained those costs attributable to repair of, replacement of, or addition to public school facilities. These included costs allocated to site acquisition, site improvement, architecture, specifications, building acquisition, and building improvements.

The final cost center within supplemental costs was the **Debt Service and Fund Transfers Cost Center.** These costs were listed as line-item expenditures.

Supplemental cost centers were summed for a complete Supplemental Expenses Input Center total.

The CAPE Service Cost Component formula appears in Table 7.

Table 7: CAPE Service Cost Component

CAPE SERVICE COST COMPONENT		PAGE 1
A. MAINTENANCE AND OPERATIONS		
1. Total of personnel costs (AJ40 + AN40)	E361	$\frac{(AJ40)}{(AN40)} +$ $\frac{(E361)}{(E361)} =$
2. Total of other operations expenditures (AJ54)	E366	$\frac{(AJ54)}{(AJ54)}$
3. Total maintenance and operations (E361 + E366)	E368	$\frac{(E361)}{(E366)} +$ $\frac{(E368)}{(E368)} =$
4. Average annual PPE, total maintenance and operations (E368) divided by all K-12 students in ADM (P16)	E371	$\frac{(E368)}{(P16)} /$ $\frac{(E371)}{(E371)} =$
5. REGULAR EDUCATION costs of maintenance and operations, PPE (E376) times all K-12 reg. ed. students (P21)	G371	$\frac{(E376)}{(P21)} \times$ $\frac{(G371)}{(G371)} =$
6. SPECIAL EDUCATION costs of maintenance and operations, PPE (E376) times all K-12 sp. ed. students (P18)	H371	$\frac{(E376)}{(P18)} \times$ $\frac{(H371)}{(H371)} =$
B. SUPPLEMENTAL EXPENSES		
1. Total, food services (AL40)	E374	$\frac{(AL40)}{(AL40)}$
2. Average annual PPE, total costs (E374) divided by all K-12 students (P16)	E376	$\frac{(E374)}{(P16)} /$ $\frac{(E376)}{(E376)} =$

Table 7 Continued		
3. REGULAR EDUCATION costs of food services, PPE (E376) times all K-12 regular ed. students (P21)	G374	$\frac{(E376)}{(P21)} \times (G374) =$
4. SPECIAL EDUCATION costs of food services, PPE (E376) times all K-12 special ed. students (P18)	H374	$\frac{(E376)}{(P18)} \times (H374) =$
5. Total cost of other supplemental expenses including facilities, capital outlay, debt service and fund transfers (E383+E386+E388)	G388	$\frac{(E383)}{(E386)} + (E388) =$
6. Average PPE, total cost (G388) divided by all K-12 students (P16)	H388	$\frac{(G388)}{(P16)} = (H388)$
7. REGULAR EDUCATION costs of other supplemental, PPE (H388) times all K-12 regular ed. students (P21)	H389	$\frac{(H388)}{(P21)} \times (H389) =$
8. SPECIAL EDUCATION costs of other supplemental, PPE (H388) times all K-12 special ed. students (P18)	H390	$\frac{(H388)}{(P18)} \times (H390) =$

Administrative Cost Component

The Administrative Cost Component contained those costs attributable to the administration of schools. Input centers were 1) general central administration, 2) level-specific administration including middle management special education administration, and 3) site-based administration. The Administrative Cost Component was calculated in twenty-three steps by these subdivisions:

ADMINISTRATIVE COST COMPONENT

- A. General Central Administration Input Center
 - 1. Central Administrative Cost Center
Ingredient variables: salaries, benefits, materials, equipment, professional development, other
 - 2. Central Clerical and Technical Staff Cost Center
Ingredient variables: salaries, benefits, materials, equipment, professional development, other
- B. Level Specific Administration Input Center
 - 1. Elementary Administration Cost Center
 - 2. Secondary Administration Cost Center
 - 3. Special Education Cost Center
- C. Site-Based Administration Input Center
 - 1. Principal's Office
Ingredient variables: salaries, benefits, materials, equipment, professional development, other

(1) General Central Administration Input Center. General Central Administration included costs associated with the positions of Superintendent,

Assistant Superintendent(s), general directors, and general supervisors. It also included school board services as well as clerical and technical positions associated with central office, system-wide school administration. It did not include costs associated with positions which were level-specific (such as Elementary Supervisor, Director of Secondary Instruction, and so on), nor did it include administrative costs attributable to transportation, adult education, or middle level special education personnel. Where one individual fulfilled responsibilities of several positions, costs were prorated according to estimated time per position.

The sum of all General Central Administrative costs was divided by the total number of principals and assistant principals employed by the LEA to render a mean per principal cost of General Central Administration. The mean per principal cost was then multiplied by the number of principals and assistant principals assigned to schools by elementary and secondary levels to obtain an aggregate cost of General Central Administration for elementary and secondary education.

(2) Level-specific Administration Input Center. The Level-specific Administration input center contained costs associated with elementary and secondary level supervisors, directors, and coordinators. Costs were assigned by proportion of time to position as previously described for individuals holding more than one position. Costs were summed to obtain aggregate elementary and

secondary costs of Level-specific Central Administration. Costs were allocated equally among students in ADM by level and program.

Costs attributable to special education middle-level administrators (supervisors and coordinators who did not have primary administrative responsibility for the system-wide special education program) also were calculated within this input center and allocated equally among special education students.

(3) Site-based Administration Input Center. The Site-based Administration Input Center contained those costs associated with the principal's office. It included costs attributable to the positions of principal, assistant principal, clerical and other office staff. Costs were calculated and totalled to obtain an aggregate cost of Site-based Administration for elementary and secondary programs.

Final administrative computations required the totalling of all three input centers, the sum of which represented the composite cost of administration for Elementary Education and Secondary Education, subdivided by regular education and special education services. That sum was divided by the number of students in ADM per level and program to obtain mean annual current per pupil expenditures. See Table 8 for the CAPE Administrative Cost Component formula.

Table 8: CAPE Administrative Cost Component

CAPE COMPREHENSIVE COST COMPONENT		PAGE 1
Formula	Spreadsheet Cell #	Calculation
A. GENERAL CENTRAL ADMINISTRATION INPUT CENTER		
1. Total General Central Admin. Costs	F76	_____
2. Total number of principals and assist. princ. (M19+M26)	F78	$\frac{(M19)}{+}$ $\frac{(M26)}{=}$ $(F78)$
3. Mean cost per princ./assist. princ., total cost (F76) divided by total principals & assist. princ. (F78)	F81	$\frac{(F76)}{(F78)}$ $=$ $(F81)$
4. Total elementary regular princ. & assist. princ. (M20+M28)	F83	$\frac{(M20)}{+}$ $\frac{(M28)}{=}$ $(F83)$
5. Total elementary cost, mean (F81) times total elem. admin. (F83)	F85	$\frac{(F81)}{x}$ $\frac{(F83)}{=}$ $(F85)$
6. Mean PPE, elementary, Total (F85) divided by all elem. ADM (P23)	G85	$\frac{(F85)}{(P23)}$ $=$ $(G85)$

Table 8 Continued		
7. ELEMENTARY REGULAR ED., PPE (G85) times elem. reg. ed. students (P39)	H85	$\frac{(G85)}{(P39)} \times$ $=$ $(H85)$
8. Ave. (F81) times Elem. special ed. princ. & assist. princ. (M23)	F92	$\frac{(F81)}{(M23)} \times$ $=$ $(F92)$
9. ELEMENTARY SPECIAL ED., PPE (G85) times elem. spec. ed. students (P32) plus sp.ed. costs (F92)	H86	$\left[\frac{(G85)}{(P32)} \right] \times$ $+$ $(F92)$ $=$ $(H86)$
10. Total secondary princ. & assist. princ. (M21+M30)	F89	$\frac{(M21)}{+}$ $(M30)$ $=$ $(F89)$
11. Total secondary cost, ave. (F81) times regular secondary administration (F89)	F91	$\frac{(F81)}{\times}$ $(F89)$ $=$ $(F91)$
12. Ave. PPE, sec. cost (F91) divided by all second. students (P25)	G91	$\frac{(F91)}{(P25)}$ $=$ $(G91)$
13. SECONDARY REGULAR ED., PPE (G91) times second. reg.ed. students (P36)	H91	$\frac{(G91)}{\times}$ $(P36)$ $=$ $(H91)$

Table 8 Continued		
14. Ave. (F81) times sec. special ed. admin. (M18)	F93	$\frac{(F81)}{\times} \frac{(M18)}{=} \frac{(F93)}{}$
15. SECONDARY SPECIAL ED., PPE (G91) times second. spec. ed. students (P43) plus second. sp.ed. cost (F93)	H92	$\left[\frac{(G91)}{\times} \frac{(P43)}{=} \right] + \frac{(F93)}{=} \frac{(H92)}{}$
B. LEVEL-SPECIFIC ADMIN. INPUT CENTER		
1. Total cost of elem. level specific admin.	F97	_____
2. Total cost of sec. level specific admin.	F100	_____
3. Total cost of non-primary spec. educ. admin.	F103	_____
4. Ave. elem. PPE, elem. level cost (F97) divided by all elem. students (P23)	G97	$\frac{(F97)}{\frac{(P23)}{=} \frac{(G97)}{}}$
5. Ave. sec. PPE, sec. level cost (F100) divided by all sec. students (P25)	G100	$\frac{(F100)}{\frac{(P25)}{=} \frac{(G100)}{}}$

Table 8 Continued		
6. Ave. spec. ed. PPE, sp.ed. cost (F103) divided by all sp.ed. students (P29)	G103	$\frac{(G97)}{P29} = (G103)$
7. REGULAR EDUCATION ELEMENTARY LEVEL-SPECIFIC, PPE (G97) times reg. ed. elem. students (P39)	H97	$(G97) \times P39 = (H97)$
8. SPECIAL EDUCATION ELEMENTARY LEVEL-SPECIFIC, Elem. PPE (G97) times elem. sp.ed. students (P32) plus Sp.Ed. PPE (G103) times elem. sp.ed. students (P32)	H103	$[(G97) \times P32] + [(G103) \times P32] = (H103)$
9. REGULAR EDUCATION SECONDARY LEVEL-SPECIFIC, PPE (G100) times reg.ed. sec. students (P43)	H100	$(G100) \times P43 = (H100)$
10. SPECIAL EDUCATION SECONDARY LEVEL-SPECIFIC, Sec. PPE (G100) times sp.ed. secondary students (P36) plus special ed. PPE (G103) times sp.ed. secondary students (P36)	H104	$[(G100) \times P36] + [(G103) \times P36] = (H104)$
C. SITE-BASED ADMINISTRATION INPUT CENTER		

Table 8 Continued		
1. Total cost, elementary principal's office	F112	_____
2. Total cost, secondary principal's office	F116	_____
3. Total cost, special educ. principal's office	F120	_____
4. PPE, elem. cost (F112) divided by all elem. students in ADM (P23)	G112	$\frac{(F112)}{(P23)}$ = _____ $(G112)$
5. PPE, second. cost (F116) divided by all second. students in ADM (P25)	G116	$\frac{(F116)}{(P25)}$ = _____ $(G116)$
6. PPE, spec. ed. cost (F120) divided by all spec. educ. students (P29)	G120	$\frac{(F120)}{(P29)}$ = _____ $(G120)$
7. REGULAR ELEMENTARY EDUC., PPE (G112) times all elem. reg.ed. (P39)	H112	$\frac{(F112)}{(P39)}$ x _____ = _____ $(H112)$
8. ELEMENTARY SPECIAL ED. , PPE (G112) times all elem. sp.ed. (P32) plus sp.ed. PPE (G120) times elem. sp.ed. (P32)	H120	$\left[\frac{(G112)}{(P32)} \right] \times$ $+$ $\left[\frac{(G120)}{(P32)} \right] \times$ = _____ $(H120)$

Table 8 Continued		
9. REGULAR SECONDARY EDUCATION, PPE (G116) times regular education secondary students (P43)	H116	$\frac{(G116)}{(P43)} \times$ $=$ $(H116)$
10. SECONDARY SPECIAL EDUCATION, PPE (G116) times special education secondary students (P36) plus sp.ed. PPE (G120) times special education secondary students (P36)	H121	$\left[\frac{(G116)}{(P36)} \right] \times$ $+$ $\left[\frac{(G120)}{(P36)} \right] \times$ $=$ $(H121)$

Support Cost Component

The Support Cost Component included those costs associated with activities which were primarily non-instructional and were available to all students in a given program. Support costs were calculated through an fifteen-step process analyzing the following subdivisions:

SUPPORT COST COMPONENT

- A. **Assessment Input Center**
 - 1. **Regular Education Cost Center**
Ingredient variables: salaries, benefits, materials, equipment, professional development, other
 - 2. **Special Education Cost Center**
Ingredient variables: as above
- B. **Direct Support Services Input Center**
 - 1. **Regular Education Cost Center**
 - 2. **Special Education Cost Center**
- C. **Related Services Input Center**
 - 1. **K-12 Special Education Cost Center**
- D. **Supplemental Expenses Input Center**
 - 1. **Preschool Disabled Cost Center**
(Related Services provided to preschool disabled students)

(1) Assessment Input Center. The Assessment Input Center, calculated through a seven-step process, analyzed costs attributable to positions engaged in assessment and evaluation activities within general and special education. These positions included psychology, audiology, medical and health, and educational assessment services. Assessment costs were added together to yield a total cost of assessment. These costs were multiplied by the proportion of

assessment activities conducted as a part of annual and triannual review of student progress for students already eligible for special education services. The product was prorated equally across all special education students.

The remaining proportion of assessment activities involved school-wide screening activities and initial diagnostic referral activities. Those activities were considered of benefit to all students and were equally prorated across all K-12 students in ADM.

(2) Direct Support Services Input Center. The Direct Services Input Center analyzed costs attributable to positions engaged in instructional support. A four-step process was applied to calculate costs. Direct Support Services personnel included guidance, library, attendance, work study, social work, visiting teacher, athletic activities, and other support personnel. While some duties encompassed classroom instruction, all costs were allocated to the Direct Services Input Center rather than to the Instruction Cost Component. Direct services benefitted all K-12 students in ADM and were allocated equally among all regular and special education students.

(3) Related Services Input Center. The Related Services Input Center, which involved a four-step computational process, included cost of services provided to disabled students in addition to special education services which were necessary for them to participate in and benefit from educational services. These positions included but were not limited to social worker, occupational therapist,

physical therapist, special recreational and physical education, and parent center consultant. Those costs benefitted special education students only and were equally allocated across all special education students.

(4) Supplemental Expenses Input Center. Costs of related services for preschool students appeared as a supplemental expense and were not included in K-12 PPE calculations. See Table 9 for the CAPE Support Cost Component formula.

Table 9: CAPE Support Cost Component

CAPE SUPPORT COST COMPONENT	ASSESSMENT INPUT CENTER	PAGE 1
Formula	Spreadsheet Cell #	Calculation
A. ASSESSMENT INPUT CENTER		
1. Total assessment costs	F211	_____
2. Proportion special ed., assessment costs (F211) times special ed. % (N80)	F214	$\frac{(F211)}{(N80)} \times$ = $(F214)$
3. Proportion regular ed., assessment costs (F211) times regular ed. % (N78)	F217	$\frac{(F211)}{(N78)} \times$ = $(F217)$
4. Special ed. PPE, Sp.Ed. assessment costs (F214) divided by all special ed. students (P29)	F219	$\frac{(F214)}{(P29)}$ = $(F219)$
5. Regular ed. PPE, Reg.Ed. assessment costs (F217) divided by all regular ed. students (P20)	F221	$\frac{(F217)}{(P20)}$ = $(F221)$
6. REGULAR EDUCATION Costs, reg.ed. PPE (F221) times reg.ed. students (P21)	F224	$\frac{(F221)}{(P21)} \times$ = $(F224)$
7. SPECIAL EDUCATION Costs, reg.ed. PPE (F221) times sp.ed. students (P29) plus sp.ed. PPE (F219) times sp.ed. students (P29)	F230	$\left[\frac{(F221)}{(P29)} \times \right]$ + $\left[\frac{(F219)}{(P29)} \times \right]$ = $(F230)$

Table 9 Continued		
B. DIRECT SUPPORT SERVICES INPUT CENTER		
1. Total Direct Support Services, F235+F238	F239	$\frac{(F235)}{(F238)} +$ $\frac{(F238)}{(F239)} =$
2. PPE, total costs (F239) divided by all K-12 (P20)	F241	$\frac{(F239)}{(P20)} /$ $=$ $(F241)$
3. REGULAR EDUCATION, PPE (F241) times all K-12 regular ed. students (P21)	F244	$\frac{(F241)}{(P21)} \times$ $=$ $(F244)$
4. SPECIAL EDUCATION, PPE (F241) times all K-12 special ed. students (P29)	F247	$\frac{(F241)}{(P29)} \times$ $=$ $(F247)$
C. RELATED SERVICES INPUT CENTER		
1. Total Costs, related	F254	_____
2. PPE, total (F254) divided by sum of number preschool disabled (M68) plus K-12 special ed. (P29)	F257	$\frac{(F254)}{[(M68) + (P29)]} /$ $=$ $(F257)$

Table 9 Continued		
3. PRESCHOOL DISABLED, PPE (F227) times number preschool disabled (M68)	F260	<u>(F227)</u> x <u>(M68)</u> = <u>(F260)</u>
4. K-12 SPECIAL EDUCATION, PPE (F227) times number K-12 special ed. students (P29)	F263	<u>(F227)</u> x <u>(P29)</u> = <u>(F263)</u>

Instruction Cost Component

The Instruction Cost Component included costs associated with classroom instructional activities. These costs could be attributed to teachers, teacher aides and assistants, and substitute teachers across ingredient centers, and were analyzed as follows:

INSTRUCTION COST COMPONENT

- A. Special Education Input Center
 - 1. Elementary Special Education Cost Center
 - 2. Secondary Special Education Cost Center
- B. Regular Education Input Center
 - 1. Elementary Regular Education Cost Center
 - a. General Education Ingredient Center
 - b. Special Education Ingredient Center
 - 2. Secondary Regular Education Cost Center
 - a. General Education Ingredient Center
 - b. Special Education Ingredient Center
- C. Supplemental Expenses Input Center

(1) Special Education Input Center. Special education instructional costs were those costs associated with direct instructional personnel in all special education service delivery environments. Costs were assigned by level (preschool, elementary, and secondary), by disability category, and by service delivery environment.

The salary ingredient center was a composite of salary costs of teachers, teacher aides, teaching assistants, and substitute teachers. The benefits center also was a composite of benefit costs associated with those positions.

The third and fourth ingredient centers contained aggregate costs allocated for materials and equipment associated with instruction. Professional development, the fifth ingredient center, was comprised of those aggregate costs attributable to teacher travel, tuition reimbursements, in-service training, convention attendance, conference attendance, and other costs related to professional development of instructional staff. The final ingredient variable, other costs, contained any costs attributed to instruction not captured in preceding definitions.

Mean special education instructional costs were calculated separately from aggregate costs and divided by total personnel FTEs per program. The number of personnel FTEs for instructional environment (inclusion or segregated special education classroom) was then multiplied by the mean instructional cost for a total instructional cost per category, level, and environment. FTE-based costs also were delineated by intensity of student services (resource and self-contained). Instructional costs were equally assigned to students based upon student FTEs to derive current per pupil expenditures.

(2) Regular Education Input Center. Regular education instructional costs were those costs associated with regular homeroom or classroom teachers, including but not limited to regular instructional personnel, regular instructional aides and assistants, itinerant art, music, and physical education personnel, vocational personnel, and Chapter I remedial personnel. These costs did not

include costs of special education instruction, although a portion of regular education instructional costs were assigned to special education students based upon student FTEs in mainstream and inclusive settings. The same procedures applied to calculation of special education costs were applied to regular education costs.

(3) Supplemental Expenses Input Center. Supplemental Expenses included costs allocated to: (1) purchase of textbooks, (2) homebound instruction, (3) summer school instruction, (4) non-LEA/tuition programs, and (5) initiation or start-up costs.

Tables 10 and 11 contain formulas for computation of Special Education Instructional Costs. For Regular Education Instructional Costs formulas, see Tables 12 and 13.

Table 10: CAPE Instructional Cost Component, Special Education, Segregated Placement

***NOTE:** The following worksheet may be used to calculate broad program as well as specific program category costs.

CAPE INSTRUCTIONAL COST COMPONENT	SPECIAL EDUCATION (If calculating for specific disability, list here _____)	PAGE 1 SEGREGATED PLACEMENT
NOTE: Insert appropriate cell numbers and cost data when calculating for specific disability and model.	(If calculating for specific model, Circle One: Resource Self-contained)	
Formula	Spreadsheet Cell #	Calculation
A. ELEMENTARY SP.ED., SEGREGATED LOCATION		
1. Total Special Education teacher costs	AR 40 Elementary	_____
	AU40 Secondary	_____
2. Mean SpEd teacher costs, total costs divided by total teacher FTEs	AR41 Elementary	$\frac{(AR40)}{(K41)}$ $= (AR41)$
	BD14 Secondary	$\frac{(AU40)}{(J74)}$ $= (BD14)$

Table 10 Continued		Page 2
3. Teacher costs to environment: Ave. SpEd teacher costs times sp.ed. teacher FTEs to sp.ed. segregated class	F79 Elementary	$\frac{(AR41)}{(L41)} \times (F79)$
	F125 Secondary	$\frac{(AU41)}{(K74)} \times (F125)$
4. Total Special Education aides costs	BA13 Elementary	$(BA13)$
	BD 13 Secondary	$(BD13)$
5. Mean SpEd aides costs, total aides cost divided by total aides FTEs	BA14 Elementary	$\frac{(BA13)}{(K106)} = (BA14)$
	BD14 Secondary	$\frac{(BD13)}{(N106)} = (BD14)$
6. Aides costs to environment: Ave. Sp.Ed. aides costs times sp.ed. aides FTEs to sp.ed. segregated class	F83 Elementary	$\frac{(BA14)}{(L106)} \times (F83)$
	F129 Secondary	$\frac{(BD14)}{(O106)} \times (F129)$

Table 10 Continued		
7. Total costs of segregated sp.ed. class	F87 Elementary	<u>(F79)</u> + <u>(F83)</u> = <u>(F87)</u>
	F132 Secondary	<u>(F125)</u> + <u>(F129)</u> = <u>(F132)</u>
8. PPE, total costs divided by sp.ed. student FTEs to segregated class	F94 Elementary	<u>(F87)</u> / <u>(T23)</u> = <u>(F94)</u>
	F138 Secondary	<u>(F132)</u> / <u>(T24)</u> = <u>(F138)</u>
9. Distributed PPE, total costs divided by total sp.ed. student FTEs	F95 Elementary	<u>(F87)</u> / <u>(S23)</u> = <u>(F95)</u>
	F139 Secondary	<u>(F132)</u> / <u>(S24)</u> = <u>(F139)</u>
10. Total K-12 special education instructional costs to segregated placement	F140	<u>(F87)</u> + <u>(F132)</u> = <u>(F140)</u>

Table 10 Continued		
11. PPE, total costs divided by total sp.ed. student FTEs to segregated placement	F141	$\frac{(F140)}{(T25)} /$ $=$ $(F141)$
12. Distributed PPE, total costs divided by total sp.ed. student FTEs	F142	$\frac{(F140)}{(S25)} /$ $=$ $(F142)$

Table 11: CAPE Instructional Cost Component, Special Education, Inclusive Placement

***NOTE: The following worksheet may be used to calculate broad program as well as specific program category costs.**

CAPE INSTRUCTIONAL COST COMPONENT	SPECIAL EDUCATION (If calculating for specific disability, list here _____)	PAGE 1 INCLUSION PLACEMENT
NOTE: Insert appropriate cell numbers and cost data when calculating for specific disability and model	(If calculating for specific model, Circle One: Resource Self-contained)	
Formula	Spreadsheet Cell #	Calculation
B. SPECIAL EDUCATION INCLUSION CLASS PLACEMENT		
1. Sp.ed. teacher costs to inclusion: Mean sp.ed. teacher costs times sp.ed. teacher FTEs to inclusion placement in general education environment	F101 Elementary	$\frac{(AR41)}{(M41)} \times$ $=$ $(F101)$
	F144 Secondary	$\frac{(AU41)}{(L74)} \times$ $=$ $(F144)$
2. Sp.ed. aides costs to inclusion: Mean sp.ed. aides costs times sp.ed. aides FTEs to inclusion placement in general education environment	F105 Elementary	$\frac{(BA14)}{(M106)} \times$ $=$ $(F105)$
	F148 Secondary	$\frac{(BD14)}{(P106)} \times$ $=$ $(F148)$

Table 11 Continued		
3. Total special education instructional costs to inclusion	F108 Elementary	<u>(F101)</u> + <u>(F105)</u> = <u>(F108)</u>
	F151 Secondary	<u>(F144)</u> + <u>(F148)</u> = <u>(F151)</u>
4. PPE, total special ed. costs of inclusion divided by sp.ed. student FTEs to inclusion	F112 Elementary	<u>(F108)</u> / <u>(V23)</u> = <u>(F112)</u>
	F156 Secondary	<u>(F132)</u> + <u>(F151)</u> = <u>(F156)</u>
5. Distributed PPE, total special ed. costs of inclusion divided by total special ed. student FTEs	F113 Elementary	<u>(F108)</u> / <u>(S23)</u> = <u>(F113)</u>
	F157 Secondary	<u>(F108)</u> / <u>(S24)</u> = <u>(F157)</u>
6. Total sp.ed. costs of inclusion	F114	<u>(F108)</u> + <u>(F151)</u> = <u>(F114)</u>

Table 11 Continued		
7. PPE, total sp.ed. costs divided by total sp.ed. student FTEs to inclusion	G114	$\frac{(F114)}{(V25)}$ = $(G114)$
8. Distributed PPE, total special ed. costs of inclusion divided by total special ed. student FTEs	H114	$\frac{(F114)}{(S25)}$ = $(H114)$

Table 12: CAPE Instruction Cost Component, Regular Education, Mainstream Placement

***NOTE:** The following worksheet may be used to calculate broad program as well as specific program category costs.

CAPE INSTRUCTION COST COMPONENT	REGULAR INSTRUCTION	PAGE 1 MAINSTREAM
NOTE: Insert appropriate cell numbers and cost data when calculating for specific disability and model.	(If calculating for specific disability, list here _____)	(If calculating for specific model, Circle One: Resource Self-contained)
Formula	Spreadsheet Cell #	Calculation
A. GENERAL EDUCATION COSTS OF MAINSTREAM EDUCATION		
1. Total regular education teacher costs	FK28 Elementary	_____
	FK31 Secondary	_____
2. Ave. regular ed. teacher costs, total costs divided by total reg.ed. teacher FTEs	FI28 Elementary	$\frac{(FK28)}{(FG18)}$ = (FI28)
	FI31 Secondary	$\frac{(FK31)}{(FJ18)}$ = (FI31)
3. Total reg.ed. mainstream teacher costs, ave. reg.ed. teacher costs times reg.ed. teacher FTEs to mainstream	F82 Elementary	$\frac{(FI28)}{(FH18)}$ = (F82)

Table 12 Continued		
	F143 Secondary	$\frac{(F134)}{+}$ $\frac{(F141)}{=}$ $(F143)$
8. Mean mainstream PPE, total costs divided by all student mainstream FTEs	F96 Elementary	$\frac{(F91)}{(U24)}$ / $=$ $(F96)$
	F149 Secondary	$\frac{(F143)}{(U25)}$ / $=$ $(F149)$
9. Mainstream costs to reg.ed., ave. cost times student FTEs	F101 Elementary Reg.Ed.	$\frac{(F96)}{x}$ $\frac{(U19)}{=}$ $(F101)$
	F154 Secondary Reg.Ed.	$\frac{(F149)}{x}$ $\frac{(S20)}{=}$ $(F154)$
	F188 Elementary Spec. Ed.	$\frac{(F96)}{x}$ $\frac{(U21)}{=}$ $(F188)$
	F198 Secondary Spec. Ed.	$\frac{(F149)}{x}$ $\frac{(U22)}{=}$ $(F198)$

Table 13: CAPE Instruction Cost Component, Regular Education, Inclusive Placement

NOTE: The following worksheet may be used to calculate broad program as well as specific program category costs.

CAPE INSTRUCTION COST COMPONENT	REGULAR EDUCATION	PAGE 1 INCLUSION
Note: insert cell #s and cost data for calculation of specific program costs	(If calculating for a specific disability, list here _____)	(If calculating for a specific program model, Circle One: Resource Self-contained)
Formula	Spreadsheet Cell #	Calculation
GENERAL EDUCATION INCLUSION COSTS TO REGULAR AND SPECIAL EDUCATION		
1. Total general education teacher costs of inclusion = mean regular education teacher costs times regular education teacher FTEs to inclusive education	F107 Elementary	$\frac{(F128)}{(F118)} \times (F107) =$
	F160 Secondary	$\frac{(FH31)}{(FK18)} \times (F160) =$
2. Total general education aides costs of inclusion = mean regular education aides/assistants costs time regular education aides FTEs to inclusive education	F112 Elementary	$\frac{(EY42)}{(U38)} \times (F112) =$
	F165 Secondary	$\frac{(FA42)}{(X38)} \times (F165) =$
3. Total general education inclusion costs, teacher costs plus aides costs	F114 Elementary	$(F107) + (F112) + (F114) =$

Table 13 Continued		
	F167 Secondary	$\frac{(F160)}{(F165)} +$ $\frac{(F167)}{(F167)} =$
4. PPE, Mean inclusion costs per pupil: total inclusion costs divided by inclusion students FTEs	F120 Elementary	$\frac{(F114)}{(V24)} /$ $\frac{(F120)}{(F120)} =$
	F173 Secondary	$\frac{(F167)}{(V25)} /$ $\frac{(F173)}{(F173)} =$
5. Inclusion costs by program and level: PPE times student FTEs to inclusion	F124 Regular Education, Elementary	$\frac{(F120)}{(V19)} \times$ $\frac{(F124)}{(F124)} =$
	F192 Special Education, Elementary	$\frac{(F120)}{(V21)} \times$ $\frac{(F192)}{(F192)} =$
	F177 Regular Education, Secondary	$\frac{(F173)}{(V20)} \times$ $\frac{(F177)}{(F177)} =$
	F203 Special Education, Secondary	$\frac{(F173)}{(V22)} \times$ $\frac{(F203)}{(F203)} =$
6. Supplemental expenses to regular education: homebound plus textbooks plus tuition plus program initiation plus summer school plus other	F210 to F220 Regular Education, Elementary	$\frac{(F210)}{(F212)} +$ $\frac{(F214)}{(F216)} +$ $\frac{(F218)}{(F220)} +$ $\frac{(F220)}{(F220)} =$

Table 13 Continued		
	F222 to F232 Regular Education, Secondary	<u>(F222)</u> + <u>(F224)</u> + <u>(F226)</u> + <u>(F228)</u> + <u>(F230)</u> + <u>(F232)</u> = <hr/>
	F233 Preschool Nondisabled	<u>(F233)</u>

Summary of Educational Expenditures

Costs from each component were totalled and analyzed by program levels, program categories, and service delivery models (service delivery environment and intensity of services). The CAPE computer spreadsheet program performed calculations and also allowed the user to make decisions as to which input centers would be included in final calculations. For example, if a user resided in a state which did not include school food services in its per pupil calculations, that input cost could be excluded from final calculations.

Prior year data could be adjusted to constant prices by entering a deflator. The program allowed the user to enter a deflator such as the Consumer Price Index (CPI) for the year or years under consideration. A recalculation of data from the original study year to the year under current consideration could then be performed.

CHAPTER 4: RESULTS

The CAPE Model was pilot-tested, using 1991-1992 fiscal data from System 1. It was then applied to 1992-93 fiscal data from System 1, System 2, and System 3 Public School Systems.

Pilot Study

A pilot study was conducted using the CAPE Model to check for accuracy and proper functioning. The pilot data set also was run through the Larson IPSEC Model, as amended by Slobojan (Larson, 1985; Slobojan, 1986; Moche, 1992), for comparative purposes. A pilot study is useful in revealing inadequacies of initial study design. After early data collection and analysis, the initial design may prove faulty and be modified (Yin, 1989).

Data

Aggregate and annual mean per pupil expenditures for total special education costs were calculated from the CAPE Model and the IPSEC Model using the same data set. Differences between model results represent variations in formula cost allocations or distribution. Some of those variations will be analyzed within the Discussion section which follows.

The IPSEC Model was designed to analyze costs of special education only. Therefore, only special education costs as computed by IPSEC and CAPE Models are reported within this pilot study, although the CAPE Model also calculates costs of general and special education. Separate costs by elementary and secondary level could be calculated through the CAPE Model as well. Both models were equipped to separate costs by disability category and by service delivery model.

Results

Aggregate costs (rounded to the nearest whole dollar) and total mean annual per pupil expenditures from the CAPE Model and the IPSEC model, as calculated through the Pilot Study, are presented in Table 14.

Discussion

CAPE and IPSEC cost computations appear above in Table 14. CAPE calculations revealed an average annual per pupil expenditure (PPE) of \$9,552 for special education students; the IPSEC model computed a PPE of \$9,615. Excess cost of special education was identified as \$4,636 by the CAPE Model and \$4,699 according to the IPSEC Model. Major differences in the two models involved variations in definitions, discrete breakdown of cost components, and formula variations for allocation of expenditures.

Table 14: Pilot Study Fiscal Data

CAPE MODEL		IPSEC Model	
Comprehensive	\$ 12,746	Discrete	\$575,003
Transportation	\$ 12,746	Administration/ Supervision	\$ 62,316
Supplemental	(see below)	Support	\$ 12,126
N/A		Instruction	\$ 500,561
Service	\$ 147,546	Transportation	\$ 12,530
Maintenance/ Operations	\$ 106,406	Special	\$ 9,306
Supplemental	(see below)	Contract	\$ 0
N/A		Regular	\$ 3,224
Administrative	\$ 117,503	Overhead	\$ 158,164
General Central	\$ 43,146	(Administration)	(above)
Level-specific	\$ 19,343	(Maintenance/ Operations)	(above)
Site-based	\$ 55,014	(Adult Education)	(above)
Instruction	\$ 829,607	Fixed Assets	\$ 92,673
Regular Education	\$ 355,729	Building Depreciation	\$ 91,082
Special Education	\$ 473,044	Vehicle Depreciation	\$ 1,591
Supplemental	(see below)	N/A	
Support	\$ 154,754	Related Services	\$ 77,893
Assessment	\$ 81,845	N/A	
Direct Services	\$ 21,686	N/A	
Related Services	\$ 51,223	N/A	
Supplemental	(see below)	N/A	
TOTALS:	<u>\$1,262,156</u>	TOTALS:	<u>\$ 916,263</u>
Annual Mean Per Pupil Expenditures (PPE)	\$ 6,473	Annual Mean Per Pupil Expenditures (PPE)	\$ 4,699

Table 14 Continued			
Plus CAPE Supplemental:		N/A	
Depreciation	\$ 279,869	N/A	
Food Services	\$ 41,140	N/A	
Adult Education	\$ 15,623	N/A	
Other Supplemental	\$ 263,922	N/A	
<u>NEW TOTAL:</u>	<u>\$1,862,710</u>	<u>TOTAL:</u>	<u>\$ 916,263</u>
New Annual Mean Per Pupil Expenditure (PPE) for Special Education	\$ 9,552	PPE, Special Education Services Only	\$ 4,699
Regular Education PPE	(Included above)	Regular Education PPE	\$ 4,916
TOTAL SPECIAL EDUCATION PPE:	\$ 9,552	TOTAL SPECIAL EDUCATION PPE:	\$ 9,615
Excess Cost of Special Education Per Pupil	\$ 4,636	Excess Cost of Special Education Per Pupil	\$ 4,699

For example, the CAPE Model captured the costs of transportation within a Comprehensive Cost Component. These costs were calculated as general and non-general transportation cost centers. Slobojan's amended IPSEC Model (Larson, 1985; Slobojan, 1986) calculated Transportation Costs across three centers as one of four distinct model components. While the CAPE Model distributed per pupil costs equally across eligible students resulting in proportional allocations to disability categories, the IPSEC model was concerned with discriminating between students eligible to receive

transportation services and students actually receiving transportation services. The CAPE Model considered eligibility as a more reasonable factor in that students may opt to take advantage of services during some periods of the school year and not do so during other periods, particularly in the case of regular transportation services. Such a situation makes the differential between eligibility for transportation services and receipt of transportation services a gray area involving estimates at best (the IPSEC Model applies prorated estimates).

The IPSEC Model computed a final per pupil cost of transportation through addition of per pupil costs of special transportation, contract transportation, and regular transportation for special education pupils. This computation was faulty in that it appears that all special education transportation students captured costs from each category when in fact different pupils (and pupil numbers) captured costs from different categories. This could only be remediated by presenting four separate cost figures: special, contract, regular, and no services. Slobojan broke down the per pupil costs in text, although this was not reflected in the formula.

Slobojan concluded his study with the recommendation that the IPSEC transportation cost component should be modified to correct for accuracy. He recommended a procedure which calculates a total transportation cost for each cost center and addition of those total costs to yield an over-all transportation

figure, which would then be divided by the number of disabled students in each condition and environment to determine a per pupil cost. Such a procedure was adopted within the CAPE Model.

Another difference between models involved computation of depreciation costs. Depreciation costs, one of the CAPE Model cost centers within the Supplemental Expenses Input Center of the Comprehensive Cost Component, were presented as the Fixed Assets Cost Component of the IPSEC Model. Both models calculated total costs and annual mean per pupil expenditures of building and vehicle depreciation over the course of one year.

The depreciation formula within the CAPE Model computed annual costs of depreciation employing Levin's (1983) depreciation factors of anticipated lifetime and annual percentage rate applied to value of facilities or vehicles. The IPSEC Model employed a straight proration of costs across the lifetime of buildings and vehicles.

The CAPE Model allocated costs by pupils. The IPSEC model considered the special education share of depreciation costs as a function of the proportion of instructional personnel employed by the special education program, the total allocation to which is divided by the number of special education students to yield per pupil costs. The total cost of depreciation was \$92,673 according to IPSEC computations (identified as Fixed Assets) and \$279,869 according to CAPE computations.

Depreciation costs, a valid cost ingredient to consider, is problematic since such costs do not appear in school budgets and are not typically included in established per pupil expenditure procedures. The CAPE Model provided for computation of per pupil expenditures with and without the depreciation figure for easier budget comparisons by the user.

Slobojan (1986) recommended that the IPSEC Model procedure be clarified and expanded so that individuals unfamiliar with financial terminology could more easily use the model. The CAPE Model addressed the issue of user friendliness through construction of a computer spreadsheet program. Data-entering instructions and worksheet categories were clearly defined. Formula computations were then completed through the computer spreadsheet, eliminating the need for hand-calculations or thorough knowledge of cost analysis terminology and procedure.

Slobojan (1994) further recommended that costs associated with the position of principal be allocated equally across all students rather than just regular education students. He also recommended that a cost formula should consider the costs of regular class instruction for special education students, and the costs of personnel professional development. These three issues were addressed by the CAPE Model.

Dissertation Research Study

Procedure

Fiscal data from 1992-1993 (Fiscal Year 1993) were collected from System 1, System 2, and System 3. Data were analyzed and compared as total expenditures, mean annual per pupil expenditures, and ratios of expenditures across programs. Where hard data, such as internal documents and state reports, were unavailable, estimates were made by school personnel (i.e. teacher FTEs to instructional environment, percentages of assessment time to initial and re-evaluations, and similar time allotment issues). Special education student FTEs were provided through state report documentation from System 1 and System 2.

System 3 provided broad documentation of special education student FTEs by student age, disability, and whole program breakdown of resource and self-contained models, but was unable to provide data on resource and self-contained delivery assigned by program level and age by disability. Those subdivisions of costs were conducted using System 3 data with environmental and intensity of services costs based upon estimations derived from expected delivery according to national trends (U.S. Department of Education, 1993).

Research Question One:

Did the Moche CAPE Model accurately and efficiently calculate costs of special education as compared to prior models?

The Moche CAPE Model accurately and efficiently calculated costs of special education as compared to prior models. The accuracy and efficiency of CAPE was illustrated within the Pilot Study.

The accuracy and efficiency of the Larson IPSEC Model (1985) has been confirmed through studies comparing IPSEC results to state reported data and to data from other cost models (Larson, 1985; Kienas, 1986; Slobojan, 1986; Taylor, 1990; Larson, 1994; McCracken, 1994). The Pilot Study reported herein compared results and functioning of both the IPSEC and the CAPE models. Pilot Study data indicated that the CAPE Model is more efficient than the IPSEC Model in identifying discrete costs of educational programming for disabled children. The CAPE formula itself corrected for IPSEC Model deficiencies as identified by Larson (1985, 1994).

Research Question Two:

What were the differences between state reported data and CAPE cost analysis results?

The CAPE Model redistributed funds across discrete categories similar to those of state reported formats. However, CAPE costs were more closely

aligned with employee function. For example, Virginia state data reported costs related to the positions of principals, coordinators, supervisors, and directors as instructional costs. These positions were assigned as administrative costs within the CAPE Model. Stand-alone programs, such as adult education and food services, appeared as supplementary costs within the CAPE Model while resting within broad cost categories by state designation. Discrete data results are discussed in the next section, as part of Research Question Three.

Research Question Three:

What were the differences in excess cost comparisons from federal, state, and CAPE Model formulas?

The federal regulations for distribution of IDEA Part B funds detailed a formula for determination of minimum per pupil expenditure required prior to consideration of excess cost reimbursement (300 C.F.R.). System 1, System 2, and System 3 all three met and exceeded individually-calculated basic per pupil expenditure amounts according to federal formula.

State-reported data consistently underestimated costs of special education services. Costs identified through the CAPE formula were higher than costs identified through the Virginia state formula for elementary special education in all three school systems, by 6% to 75%. Costs identified through

the CAPE formula were 1% to 84% higher than state-formula costs for secondary special education in the three systems. CAPE annual mean per pupil expenditures are compared to state-formula annual mean per pupil expenditures in Table 15.

**Table 15: CAPE Comparisons to State Reported Data:
Total Annual Mean Per Pupil Expenditures**

1992-93	System 1	System 2	System 3
NOTE: CAPE results reflect total costs (basic plus depreciation)			
Elementary sp.ed. PPE, CAPE results	\$ 9,455	\$ 6,018	\$ 5,734
Elementary sp.ed. PPE, state data	\$ 5,326	\$ 4,599	\$ 5,425
Difference, CAPE results minus state data	+\$ 4,129	+\$ 1,419	+\$ 309
Secondary sp.ed. PPE, CAPE results	\$ 7,471	\$ 5,071	\$10,154
Secondary sp.ed. PPE, state data	\$ 5,734	\$ 5,031	\$ 5,529
Difference	+\$ 1,737	+\$ 40	+\$ 4,625

Costs identified through CAPE exceeded state-reported cost data by 1.01 to 1.84 times the state-reported amounts. Lewis et al. (1989) found that LEAs spend more than 1.5 times the amounts normally identified in printed local education budgets and reports. A second study by Lewis and colleagues

(1990) again found that school districts underestimate the real costs of special education.

Question Four:

What were the current mean per pupil expenditures of elementary regular, secondary regular, elementary special, and secondary special education?

Current mean per pupil expenditures for special education students were thirty percent to sixty percent greater than current mean per pupil expenditures for regular education students, as shown in Table 16.

Special education in the study groups was found to be 1.3 to 1.6 times the cost of regular education services. The greatest differences in costs were on the elementary level. Elementary special education services were 1.6 to 1.9 times as costly as elementary regular education services. A smaller difference was found on the secondary level. Secondary special education students were educated at a rate of 1.1 to 1.4 the cost of educating secondary regular education students. The unusually high per pupil expenditure for secondary regular education students in one of the three school systems could have skewed the ratio figures for this study given the small number of LEAs under consideration. Secondary education data from System 3 was atypical.

Table 16: Current Mean Annual Per Pupil Expenditures and Ratios, Regular Education PPE to Special Education PPE

1992-93	System 1	System 2	System 3
*Basic CAPE formula excluding supplemental costs			
PPE, All Reg. Ed.	\$ 4,399	\$ 3,871	\$ 4,675
PPE, All Sp.Ed.	\$ 5,770	\$ 5,560	\$ 7,379
Excess Cost	\$ 1,371	\$ 1,701	\$ 2,704
PPE, Elem. Reg.Ed.	\$ 3,951	\$ 3,653	\$ 3,267
PPE, Elem. Sp.Ed.	\$ 7,392	\$ 6,018	\$ 5,734
Excess Cost	\$ 3,441	\$ 2,365	\$ 2,467
PPE, Sec. Reg.Ed.	\$ 5,070	\$ 4,228	\$ 7,235
PPE, Sec. Sp.Ed.	\$ 5,394	\$ 5,071	\$10,154
Excess Cost	\$ 324	\$ 843	\$ 2,919
CAPE Supplemental Costs Per Pupil	\$ 2,068	\$ 1338	\$ 2,113
Ratio, broad reg.ed. to broad sp.ed.	1 to 1.3	1 to 1.4	1 to 1.6
Ratio, elem. reg.ed. to elem. sp.ed.	1 to 1.9	1 to 1.6	1 to 1.8
Ratio, sec. reg.ed. to sec. sp.ed.	1 to 1.1	1 to 1.2	1 to 1.4

This study did not reveal as high an excess cost ratio as has been found in previous studies. For example, Kakalik et al. (1981) stated that average per pupil expenditures for special education students were twice the amount spent for regular education students. Rossmiller (1982) reported that special education costs four to five times the cost of regular education. Moore et al.

(1988) found that special education programs were 2.3 times more costly than regular education programs. More recent cost studies revealed lower ratios between regular and special education. Larson (1994) reported that special education services were 2.5 to 3.2 times the cost of regular education services.

The smaller difference between special and regular education costs calculated through the CAPE Model could be attributed to model design as well as site-specific characteristics of the sample LEAs. The CAPE Model calculated both regular and special education costs as opposed to other models which calculated special education program costs alone to add-on and to reported regular education costs. As previously noted, state-reported data consistently underestimate LEA educational costs.

The CAPE Model distributed a portion of traditional special education costs, such as costs associated with the Director of Special Education and costs associated with assessment, among regular education and special education students. Certain costs traditionally considered regular education, such as costs associated with the Office of Principal and regular education instruction, were assigned to regular and special education.

The CAPE Model identified all resource costs, regular and special education, involved in provision of educational services in the total school environment. Costs were distributed across all students for various administrative and support activities which may not typically be considered

applicable to special education. For these reasons, the CAPE Model would be expected to reveal a smaller, but more accurate, cost differential between regular and special education services.

Question Five:

What were the mean annual PPE of special education by service delivery option?

Two service delivery options which were analyzed were: (1) intensity of services, and (2) location of services. Both will be discussed following the raw data display in Table 17.

Intensity of services encompassed two models, Resource and Self-contained. Students receiving direct special education services for less than 50% of the school day, regardless of location of services, were considered to be resource students. Students receiving direct special education services for more than 50% of the school day were considered to be self-contained students.

Location of services included mainstream, inclusive, and segregated instructional services. These were defined as mainstream education with regular education personnel, inclusive services with regular and special education personnel, and segregated special education services with special education personnel.

Table 17: Current Mean Annual Per Pupil Expenditure by Service Delivery Option

Raw Data: PPE	System 1	System 2	System 3
Per Pupil Expenditures of Instruction			
Regular Education Student PPE	\$ 2,809	\$ 2,483	\$ 2,880
Special Education Student PPE	\$ 3,838	\$ 3,947	\$ 5,334
PPE, Mainstream Instruction for Special Educ. Students	\$ 2,743	\$ 2,467	\$ 2,942
PPE, Inclusive Instruction for Special Educ. Students	\$ 4,508	\$ 5,294	\$10,527
PPE, Segregated Special Educ. Instruction for Special Educ. Students	\$ 6,786	\$ 6,814	\$ 0

Regardless of location of services, all three school systems provided resource services to approximately 73% of special education students. Resource services cost 10% to 20% more than self-contained services regardless of service delivery environment. Location of services did not have an effect upon intensity of services delivered or upon cost ratios between those services.

Total per pupil costs by location of services was unavailable. None of the school systems studied provided a pure traditional (segregated with

mainstreaming) or a pure inclusive (direct special services all day in inclusive setting) model. Rather, all three offered a mixture of mainstreaming and inclusive services, with System 1 and System 2 also offering segregated services.

Per pupil costs based upon instructional units, illustrated in Table 17, indicated that mainstream education is the least costly environmental option, followed by inclusive education. The most costly services were provision of special education in a segregated environment.

Similar results have been found in previous research studies. Piuma (1985) found higher costs of special education in segregated settings than in integrated settings. Raphael, Singer, & Walker (1985) also determined that it was less costly to educate the disabled children in regular classrooms than in segregated special education classrooms. Larson (1994) found that traditional resource room placements were less costly than inclusive placements (a typical model involving special education pull-out services with mainstreaming for at least 50% of the school day), and inclusive placements were less costly than self-contained placements.

Location of services did not have a great effect upon distribution of educational costs. Location of services did not result in appreciable differences in transportation costs in System 1, System 2, or System 3. System 3, which described itself as an all-inclusive LEA, spent approximately

11% of total PPE on administrative costs, while System 1 and System 2 spent 8% on administration. This may be due to the larger geographic size of System 3 and not due to the special education service delivery model. In System 1, 48% of PPE involved instructional costs compared with 56% to instruction in System 2 and 32% to instruction in System 3.

Question Six:

What were the average annual PPE of special education by disability category?

The CAPE study considered average annual PPE of special education by disability category. Elementary services were less costly than secondary services regardless of type of disability. The three primary service delivery categories across levels, as well as across LEAs, were Educable Mentally Disabled (EMD), Seriously Emotionally Disturbed (SED), and Significantly Learning Disabled (SLD). These costs will be discussed briefly.

The costliest category was SED. Resource costs for SED services across the three study groups ranged from \$10,380 to \$13,126 on the elementary level and \$7,693 to \$13,689 on the secondary level. Self-contained services were \$9,308 to \$9,555 for elementary SED students and \$6,113 to \$11,820 for secondary SED students. The least costly of the three categories, SLD, ranged in cost from \$5,123 to \$11,474 per pupil.

The CAPE Model identified cost of services, as total and per pupil costs, across all disability categories by service intensity (resource and self-contained) and by academic level (elementary and secondary).

Conclusion

In conclusion, the CAPE Model accurately identified discrete costs involved in the provision of regular and special education services. It provided a user friendly format through a computer spreadsheet program, although hand-calculation would be tedious and time-consuming. Comparison of data with other studies and data sources indicated that CAPE results are accurate and useful for the practicing special education administrator.

CHAPTER 5: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussion

Information from measurement and estimation of educational costs should not be used as the sole basis for programming decisions (Yin, 1989). Cost is not the sole indicator of quality. However, it is a valuable factor to inform decisions and to insure that the education system makes the best possible use of its resources, while acknowledging that high quality options may carry a higher short-term financial commitment and low quality options may carry a higher long-term financial commitment (Levin, 1983; Coombs & Hallak, 1987). The CAPE Model offers an avenue through which practicing special education administrators may identify their current usage and cost of educational resources.

Cost data indicate site-specific trends in program expenses. Several trends indicated in the current study include:

1. RATIO OF EXPENSES, REGULAR EDUCATION TO SPECIAL EDUCATION

Results of the current study, in congruence with prior study conclusions, indicated that special education total annual mean per pupil expenditures average 1.2 to 1.6 times the costs of regular education total annual mean per

pupil expenditures.

2. PER UNIT COSTS OF SERVICE DELIVERY MODELS

Per pupil costs of inclusive programming were almost twice as great as instructional costs for traditional mainstream programming, but 30% to 50% less costly than segregated special education instruction. While inclusive programming involved commitment of more personnel in one location at a time, the general education setting provided an economy of scale which outweighed the seemingly greater personnel cost due to a higher teacher:pupil ratio than that found in traditional special education segregated programs.

3. PROPORTION OF PUPIL TIME SPENT IN SPECIAL EDUCATION

The proportion of time students receive special education services was not affected by service delivery model.

4. STAFFING PATTERNS

Staffing patterns were affected by service delivery model. Inclusive programs were more likely to be staffed by either an equal number of teachers and teacher assistants or by a greater number of teacher assistants than by teachers. Traditional special education programs were primarily staffed by teachers with a smaller portion of teacher assistants (roughly one-quarter).

These findings were similar to those found by Roahrig (1993). In Roahrig's study, 28% of special education personnel in inclusive schools were teachers; 46% of all special education instructional personnel in traditionally programmed schools were teachers.

Conclusions

True discrete models of inclusive programming are not currently practiced in a format which can be verified. State reported data from inclusive programming reflected percentages of time during which students receive direct special education services not unlike those percentages reported by systems operating traditional programming models. State reported data from the three study groups did not indicate large differences in time students spend in the various program models.

Cost data between LEAs cannot be compared meaningfully without consideration of site-specific characteristics regarding general population and student demographics. Another drawback to comparing data among LEAs involved the lack of consistency in program model definitions. For example, what one school system described as traditional mainstream services was characterized as inclusive programming by another system.

Despite these drawbacks, some general conclusions may be drawn from the current study data.

1. Inclusive special education programming as currently implemented did not appreciably increase or decrease special education expenditures. Similar ratios of regular to special education per pupil expenditures were found in all three study groups regardless of programming model.
2. Inclusive programming involved a reallocation of expenditures rather than significant monetary changes.
3. Traditional (pull-out) special education programming was more costly than inclusive (pull-in) programming.
4. Total mean per pupil expenditures for special education students were higher at the elementary level than at the secondary level in two of the three LEAs.
5. Total mean per pupil expenditures for regular education students were higher at the secondary level than at the elementary level in all three LEAs.
6. The ratio between regular and special education expenditures was greater at the elementary level than at the secondary level in all three LEAs.

Recommendations

Complex organizations are comprised of many factors and relationships, all of which may not reasonably be identified and/or incorporated into a cost analysis. Certain cost estimates may be necessary. However, accurate analysis is only achieved through maximum identification of specific

educational resources and their cost data. More exact documentation of expenditures at the local level is needed, particularly as costs relate to program function and service delivery models.

Identification of special education costs by service delivery model is hampered by the various uses of terminology among school systems.

Resolution of definitional disputes in the field of special education is critical before accurate cost identification will be possible. Specifically, lack of consensus regarding the terms mainstreaming, integration, and inclusion render identification of these costs problematic at present.

Further field-testing of the CAPE Model is recommended in order to adequately assess the accuracy and efficiency of this cost analysis model. A larger special education sample population from more diverse geographic settings also is recommended.

Finally, application of raw data from this study to other formulas for purposes of comparing formula results and further evaluating the efficiency of the CAPE Model to accurately and efficiently identify costs is recommended.

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Appendix

Raw Data

Individuals interested in obtaining raw data from this study may do so by sending a written request, along with the reason for said request, to:

Joanne Spiers Moche
Rt. 3, Box 180-1C
Floyd, VA 24091

Resume

JOANNE SPIERS MOCHE

Rt. 3, Box 180-1C, Floyd, VA 24091 (703)745-3679

HIGHLIGHTS OF QUALIFICATIONS

- Special education administration experience as well as 13 years successful experience teaching children with special needs
- Doctor of Education, Administration and Supervision of Special Education
- Proven effectiveness in leadership, program planning and implementation, curriculum adaptation, assessment and diagnosis

PROFESSIONAL EXPERIENCE

Program Administration

1994 to present, **ED Specialist**, Roanoke City Schools (VA), coordinator of programs for emotionally disturbed students, behavior/emotional disturbances consultant to regular education.

- 1992, **Chairperson**, Radford High School (VA) Special Education Department.
- 1992, **Coordinator**, RECORDED TEXTBOOKS for learning disabled students in grades 7-12, RHS Alumni Foundation grant for Recording for the Blind services; initiated grant, coordinated 5-teacher grant implementation team from middle school and high school.

- 1991, **Chairperson**, Science Discovery Center Committee, Radford (VA) Council for Community Enrichment.
- 1990, **Chairperson**, School Activities, Radford (VA) Community Earth Day Committee.
- 1989, **Coordinator**, SCHOOL SYSTEM RECYCLING PROGRAM, for students in grades K-12, initiated program, coordinated activities and teacher teams in Radford (VA) elementary, middle, and high schools as well as coordination of participation by city municipal employees.
- 1986, **Grant Administrator**, EXPERIENCE-BASED LANGUAGE ARTS PROGRAM for students in grades K-4, Virginia Commission for the Arts grant incorporating art activities, with supplemental lessons by artist-in-residence, in special education reading and language instruction; initiated and implemented grant.
- 1985, **Grant Coordinator**, AFFECTIVE SKILLS DEVELOPMENT for regular classroom students in grade 4, Montgomery County (VA) Teacher Incentive Fund grant; initiated and assisted in implementation of grant.
- 1985, **Grant Coordinator**, MONEY MANAGEMENT EDUCATION PROGRAM for regular classroom students in grades 1 and 2, Montgomery County (VA) Teacher Incentive Fund grant; initiated grant, coordinated 3-teacher grant implementation team.
- 1984, **Grant Administrator**, MULTISENSORY READING INSTRUCTION based on learning styles for learning disabled students in grades K-4, Montgomery County (VA) Teacher Incentive Fund grant; initiated and implemented grant.

Presentations

- 1995, **Presenter**, MOCHE CAPE FORMULA: COST ANALYSIS OF PUBLIC EDUCATION, Annual International Convention, Council for Exceptional Children, Indianapolis, Indiana.
- 1994, **Presenter**, COST ANALYSIS OF SPECIAL EDUCATION (CAPE FORMULA), Annual Convention, International Society for Educational Planning, Nashville, Tennessee.

- 1993, **Presenter/Team Leader**, ALTERNATIVE ASSESSMENT presentation with teacher team to Roanoke County (VA) learning disabilities teachers, as well as presentation of Alternative Assessment handbook researched and authored by me.
- 1989-1992, **Speaker**, RECYCLING presentations to community organizations, Radford, VA.
- 1980-1992, **Speaker**, SPECIAL EDUCATION IN-SERVICE presentations to school faculties and Special Education Advisory Board.
- 1990, **Speaker**, RECYCLING MINI-WORKSHOPS, Governor's Conference on Education (VA)
- 1990, **Speaker and Award Recipient**, CITY SCHOOLS RECYCLING PROJECT, Plaque of Recognition for Quality Program, for City Schools Recycling Project, United States Senate Productivity Conference (VA)
- 1986, **Speaker**, READING INSTRUCTION BASED ON CARBO'S READING STYLE INVENTORY, presentation at 29th Annual Conference of the Council for Exceptional Children
- 1985-1986, **Speaker**, READING INSTRUCTION IN-SERVICE presentations to Chapter I teachers and to School Board, Montgomery County (VA)

EMPLOYMENT

1994 - present	ROANOKE CITY SCHOOLS, Roanoke, VA. Special Education Department, Emotional Disturbances Specialist. Supervisor: Bob Sieff, Director of Special Education.
1992-1994	VIRGINIA TECH UNIVERSITY, Blacksburg, VA. Dept. of Admin. & Supv. of Special Education, Graduate Assistant. Supervisor: Dr. Philip Jones, Dept. Chairman.

- 1987-1994 RADFORD CITY PUBLIC SCHOOL SYSTEM,
Radford, VA.
Radford High School, SLD/SED teacher.
Supervisor: James Martin, Principal;
Olivia Linkous, Special Education
Coordinator.
- 1983-1987 MONTGOMERY COUNTY PUBLIC SCHOOL SYSTEM,
Montgomery County, VA.
Bethel Elementary School, SLD teacher.
Supervisor: Ray Van Dyke, Principal;
Elliston-Lafayette Elementary School,
SLD/SED teacher.
Supervisor: Lois Hinkle, Principal;
Chris Gilley, Special Education Director.
- 1980-1983 FLUVANNA COUNTY PUBLIC SCHOOL SYSTEM,
Fluvanna County, VA.
Fork Union & Cunningham Elementary
Schools, Itinerant SLD teacher.
Supervisor: Mozelle Booker, Principal,
Lee Davis, Special Education Director;
Cunningham Elementary School,
First grade teacher.
Supervisor: Emogene Johnson, Principal.
- 1979-1980 BUCKINGHAM COUNTY PUBLIC SCHOOL SYSTEM,
Buckingham County, VA.
Arvonnia Primary School,
First grade teacher.
Supervisor: Anna Belle Warren,
Principal.
- 1978-1979 ROANOKE COUNTY MENTAL HEALTH CLINIC,
Roanoke, VA.
Activity aide for EMR/ED children.
Supervisor: Sally Croxson, Director.

PRACTICUM EXPERIENCE

- 1993 ROANOKE COUNTY PUBLIC SCHOOL SYSTEM,
Roanoke, VA.
Administrative Intern.
Supervisor: Dr. Eddie Kolb,,
Special Education Director;
Dr. Philip R. Jones, Virginia
Tech University, Blacksburg, VA.
- 1993 PULASKI COUNTY PUBLIC SCHOOL SYSTEM,
Pulaski, VA.
Administrative Intern.
Supervisor: Rebecca Phillips,
Pupil Personnel Director/
Special Education Supervisor;
Dr. Philip R. Jones, Virginia
Tech University, Blacksburg, VA.
- 1983 OAKLAND SCHOOL, Residential School
for the Learning Disabled,
Fluvanna County, VA.
Masters Special Education Practicum.
Supervisor:
Gerry Wallace, University of Virginia,
Charlottesville, VA.
- 1979 PULASKI COUNTY PUBLIC SCHOOL SYSTEM,
Pulaski County, VA.
Student teacher.
Supervisor: Joyce Whitmer,
Kindergarten teacher;
Nancy Hale, First grade teacher;
Staff, Radford University,
Radford, VA.
- 1978 RADFORD CITY PUBLIC SCHOOL SYSTEM,
Radford, VA.
Teacher Assistant.
Supervisor: Staff, Radford University,
Radford, VA.
- 1976 MISSION RESERVATION SCHOOL SYSTEM,

Residential and Public Schools,
Bureau of Indian Affairs (BIA),
Mission, South Dakota.
Administrative Intern,
Public Relations, School
Board Office.
Supervisor: Staff, Yankton
College, Yankton, South Dakota;
Staff, St. Mary's College,
St. Mary's County, MD.

CERTIFICATIONS

- Supervisor of Special Education**, Postgraduate Professional, Commonwealth of Virginia.
- NK-4 Endorsement**, State Teachers Certificate, Postgraduate Professional, Commonwealth of Virginia.
- Sp. Ed. Learning Disabilities Endorsement**, State Teachers Certificate, Postgraduate Professional, Commonwealth of Virginia.
- Sp. Ed. Emotional Disturbances Endorsement**, State Teachers Certificate, Postgraduate Professional, Commonwealth of Virginia.

PROFESSIONAL AFFILIATIONS

- Council on Exceptional Children,
Council of Administrators of Special
Education (CASE),
Council for Children with Behavioral
Disorders (CCBD),
Division of International Special
Education and Services (DISES).
- Council on Learning Disabilities
International Reading Association, NRV
Kappa Delta Pi, Gamma Alpha Chapter,
Honor Society in Education
National Education Association
Phi Delta Kappa, International Honor Society
in Education

Phi Kappa Phi, Honor Society

EDUCATION

- 1995, Doctor of Education,
Administration and Supervision of Special Education,
Virginia Polytechnic Institute and State University,
Blacksburg, Virginia.
- 1994, Certificate of Graduate Studies,
Administration and Supervision of Special Education,
Virginia Polytechnic Institute and State University,
Blacksburg, Virginia.
- 1984, Master of Education,
Special Education: Learning Disabilities,
University of Virginia,
Charlottesville, Virginia.
- 1979, Bachelor of Science,
Early Childhood Education,
Radford University,
Radford, Virginia.
- 1974, High School Diploma,
Radford High School,
Radford, Virginia.

VITA
Joanne Spiers Moche

Education: Virginia Polytechnic Institute
and State University, Ed.D., Administration and
Supervision of Special Education, 1995.
University of Virginia, M.Ed., Special Education, 1984.
Radford University, B.S., Early
Childhood Education, 1979.

Experience:

1994-present Special Education Coordinator,
Roanoke City Public Schools,
Roanoke, VA
1993-1994 Graduate Assistant,
Virginia Polytechnic Institute
and State University,
Blacksburg, VA.
1987-1993 High School Special Education Teacher
(LD/ED), Department Chairperson,
Radford City Public Schools,
Radford, VA.
1983-1987 Primary and Elementary Special Education
Teacher (LD/ED),
Montgomery County Public Schools,
Montgomery County, VA.
1980-1983 Primary and Elementary Special Education
Teacher (LD) & Primary Teacher (Grade 1),
Fluvanna County Public Schools,
Fluvanna County, VA.
1979-1980 Primary Teacher (Grade 1), Buckingham County
Public Schools, Buckingham County, VA.
1978-1979 Activity Aide, Roanoke Mental Health Clinic,
Roanoke, VA.

Background: Born November 11, 1955, Radford, VA.


Joanne Spiers Moche