

## Cost-Benefit Analysis in K-12 Education

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In this report, we first discuss the prevalence of cost-benefit analysis in K-12 education. In doing so, we highlight the difficulties involved in cost-benefit analysis and offer step-by-step instructions for designing an analysis. Finally, we examine examples of cost-benefit analyses of established programs at the pre-school and higher education levels.

## Introduction

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Confronted with rising costs and dwindling resources, K-12 school district administrators are increasingly relying on cost-benefit analyses to help them determine which programs and policies provide the largest return on investment. Typically, cost-benefit analysis consists of three steps:<sup>1</sup>

1. Determining the benefits of a proposed or existing program and placing a dollar value on those benefits;
2. Calculating the total costs of the program; and
3. Comparing the benefits and the costs.

Among other advantages, this form of evaluation can measure a wide range of outcomes, and allows for comparisons across programs, policies, and other types of interventions.<sup>2</sup>

In this report, we first assess the prevalence of cost-benefit analysis in K-12 education. We also discuss the difficulties involved in cost-benefit analysis, and offer step-by-step instructions so that school districts can better determine whether or not they have the capacity to undertake cost-benefit analyses without outside assistance. Finally, we provide examples of cost-benefit analyses of programs implemented at the elementary and secondary school levels, as well as instructive examples of cost-benefit analyses of established programs at the pre-school and higher education levels.

## Key Findings

### *Prevalence of District Cost-Benefit Analysis*

- ❖ Cost-benefit analysis is either not currently prevalent in K-12 education, or these analyses are not made available to the public. Articles on program assessment in K-12 education point to the former.
- ❖ In the examples of district program evaluations we did discover, cost-effectiveness was a more popular form of economic analysis than cost-benefit analysis.

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<sup>1</sup> Kee, J. 1999. "At What Price? Benefit-Cost Analysis and Cost-Effectiveness Analysis in Program Evaluation." *The Evaluation Exchange*, 5:2-3. <http://www.hfrp.org/evaluation/the-evaluation-exchange/issue-archive/methodology-15/at-what-price-benefit-cost-analysis-and-cost-effectiveness-analysis-in-program-evaluation>

<sup>2</sup> Small, S. and O'Connor, C. "Cost-Benefit Analysis." University of Wisconsin-Extension and University of Wisconsin-Madison. [http://whatworks.uwex.edu/attachment/whatworks\\_cost\\_benefit.pdf](http://whatworks.uwex.edu/attachment/whatworks_cost_benefit.pdf)

*Management of Cost-Benefit Analysis*

- ❖ Challenges in cost-benefit analysis include identifying all costs and benefits and assigning an appropriate monetary value to them, determining the geographical scope of the analysis and the populations which should be included/addressed, and offering a detailed explanation of all of the assumptions and decisions the evaluator(s) make.
- ❖ Cost-benefit analyses must include considerations of costs and benefits that are both direct and indirect as well as fiscal and social.
- ❖ Though intangible costs and benefits cannot, by definition, be monetized, they should be included in the analysis.
- ❖ Cost-benefit analyses should include a sensitivity analysis which demonstrates how the analysis is affected if assumptions are changed.

*Cost-Benefit Analysis of Established Pre-School and Higher Education Programs*

- ❖ We found cost-benefit analyses of several types of programs in K-12 settings, though most appeared to be carried out by outside researchers or state-level policymakers, rather than initiated by the school district.
- ❖ Cost-benefit analysis can involve the calculation of multiple cost-benefit ratios based on the consideration of different benefit scenarios.
- ❖ Benefits were categorized in the example analyses in different ways: by immediacy (near-term, intermediate, long-term) and by overtness (explicit, implicit)
- ❖ Some analyses indicated that not all benefits could be measured (or measured with data currently available); therefore, the estimate of the benefits was conservative.

## Section I: Economic Analysis in K-12 Education

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In this section, we summarize the results of our research regarding cost-benefit analyses in K-12 education. We begin by differentiating between cost-benefit and cost-effectiveness analyses, as the two terms are often used interchangeably to refer to analysis of outcomes and economic efficiency. Next, we describe common issues faced when designing a cost-benefit analysis. Finally, we provide an overview of the basic steps involved.

### Prevalence of District Cost-Benefit Analysis

Our research revealed two primary types of economic analysis that researchers and education administrators typically apply to K-12 education: cost-benefit analysis and cost-effectiveness analysis. The primary difference between these two types of analyses lies in the tangible measures used to evaluate programs. Cost-effectiveness analysis “provides a method of comparing alternatives for their relative costs and results and providing guidelines on which of the alternatives provides the most **impact relative to cost.**” By contrast, cost-benefit analysis “**requires monetary measures of impact** relative to cost.”<sup>3</sup> Describing the difference between the two, Henry Lavin notes that,

Most endeavors to improve education are unable to use cost-benefit analysis because it is difficult to measure the values of the improvements in market terms or benefits. But it is possible to measure academic achievement and other measures of school quality and effectiveness. Accordingly, cost-effectiveness analysis enables measures of learning, as well as other appropriate indicators to be used to assess educational outcomes relative to costs.<sup>4</sup>

Available literature has pointed to the prevalence of cost-effectiveness studies in school districts rather than cost-benefit analysis. In fact, a meta-analysis of studies incorporating cost-effectiveness in K-12 education, conducted by researchers at the University of Wisconsin, evaluated the abstracts of these studies and placed them into four categories based on apparent methodological rigor:<sup>5</sup>

- ❖ **Rhetorical:** Cost-effectiveness claims with no data on either costs or effects
- ❖ **Minimal:** Minimal data, such as potential categories of effectiveness or cost feasibility with no evidence of systematic study

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<sup>3</sup> Levin, H. 2011. “Waiting for Godot: Cost-Effectiveness Analysis in Education.” *New Directions for Evaluation*, 90, 56. [http://www.cbcse.org/media/download\\_gallery/Waiting%20for%20Godot.pdf](http://www.cbcse.org/media/download_gallery/Waiting%20for%20Godot.pdf)

<sup>4</sup> Ibid.

<sup>5</sup> Ibid., 57.

- ❖ **Substantial Attempt:** Attempt to mount data on cost and effectiveness but with serious flaws, such as effectiveness design or cost measurement
- ❖ **Plausible:** Ingredients or resource approach to costs and a strong effectiveness design with comparisons among alternatives

Of the 541 studies reviewed, more than 80 percent were determined to be rhetorical (56 percent) or minimal (27 percent), and only 1 percent were determined to be plausible.<sup>6</sup> Additionally, it was noted that researchers in the reviewed studies tended to develop a rigorous methodology for determining cost *effectiveness*, but rarely developed a similarly-rigorous methodology for performing cost-effectiveness *analysis*. In other words, “the same persons who have great concern for the validity and implementation of evaluation designs of effectiveness and reliability of measures ignore completely the methodology of cost analysis in making cost-effectiveness claims.”<sup>7</sup> Given the above findings, it is particularly important that districts interested in conducting cost-benefit analyses devote adequate time and resources to *analysis design*.

The majority of K-12 schools and districts examined in our own review of the literature surrounding educational economic analysis also identified *cost-effectiveness* analysis as the primary method for evaluating program effectiveness. Indeed, Hanover was only able to identify one example of a K-12 school district that had independently undertaken a *cost-benefit analysis* in order to assess the effectiveness of its own program. This cost-benefit analysis, undertaken by the Poudre School District in Fort Collins, Colorado is described in Section II. Additionally, the Appendix to this report includes a table which provides a summary of *cost-effectiveness* analyses reviewed during the course of our research. Although primarily concerned with cost-effectiveness rather than cost-benefit analysis, the examples contained in the Appendix provide useful information regarding the ways in which various school districts assess the value of their educational programs.

## Management of Cost-Benefit Analysis

In the following paragraphs, we provide a brief overview of how districts manage cost-benefit analysis. As discussed above, it appears that districts often struggle with putting a monetary value on outcomes associated with various programs and in many cases turn to cost-effectiveness studies instead.

### *Issues with Cost-Benefit Analysis Design*

The greatest challenge in conducting a cost-benefit analysis is identifying, quantifying and placing a dollar value on costs and benefits that are, in many cases, difficult to

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<sup>6</sup> Ibid.

<sup>7</sup> Ibid., 61.

monetize. In the technical appendix for its evaluation of prevention and early intervention programs targeting youth, the Washington State Institute for Public Policy details the methods it used to estimate the monetary benefits of its programs. Researchers placed monetary values on several types of outcomes, including those related to human capital (e.g., graduation, number of years of schooling completed, achievement test scores) and K-12 resources (years of education and grade retention). Data from the U.S. Census Bureau's Current Population Survey for earnings and financial records for program costs were used to estimate these values.<sup>8</sup>

The document further explains that the standard economic equation for performing the cost-benefit analysis is given by the following formula:<sup>9</sup>

$$NPV_{progate} = \sum_{y=progate}^N \frac{Q_y \times P_y - C_y}{(1 + Dis)^y}$$

This formula determines the net present value (NVP) of a particular program as defined by the quantity of outcomes produced from that program within a particular amount of time, multiplied by the price per unit of the outcome, minus the cost of producing the outcome.

Special consideration also must be given to different kinds of costs. In addition to direct costs, indirect costs and capital costs must be calculated. Direct costs may include the value of personnel, facilities, equipment and material, and administration. Indirect or secondary benefits and costs are by-products, multipliers, spillovers, or investment effects of the project or program. An additional category is "intangible costs," which refer to any costs that cannot be assigned an explicit price; though they are not monetized, the evaluator should include them in the analysis. When calculating costs, it is important to be explicit about how the costs are being measured and assumptions made in transforming costs into a dollar amount. Table 1 provides a brief overview of the four kinds of costs.<sup>10</sup>

<sup>8</sup> Aos, S., Lieb, R., Mayfield, J., Miller, M., and Pennucci, A. 2004. "Benefits and Costs of Prevention and Early Intervention Programs for Youth: Technical Appendix." Washington State Institute for Public Policy, 33-34. <http://courses.washington.edu/pbaf513m/prevention%20tech%20appendix.pdf>

<sup>9</sup> Ibid., 33.

<sup>10</sup> Kee. Op. cit.

**Table 1: Kinds of Costs**

Category	Examples
<b>Direct Costs</b>	e.g., personnel, materials, and equipment
<b>Indirect Costs</b>	e.g., overhead, insurance, costs to other providers supporting the intervention, and costs to participants
<b>Capital Costs</b>	e.g., buildings and computers
<b>Intangible Costs</b>	e.g., lost time spent in leisure activities

Like costs, benefits can be direct (e.g., increase in earnings as a result of higher educational achievement), indirect (e.g., a decrease in welfare costs or an increase in taxes), or intangible (e.g., higher self-esteem). It is also important to be clear about who benefits. Market value or willingness to pay can be used to assign a dollar amount.<sup>11</sup>

Additionally, while the focus may be on the effects of a program on the district, there may be benefits or costs that extend to neighboring jurisdictions. Spillover effects may have political consequences. Thus, the evaluator must determine if consideration should be given only to those benefits and costs that accrue to the population within the jurisdiction for which the evaluator is doing the analysis, or if all benefits and consequences of the program can be assessed.

The Washington State Institute for Public Policy provides further guidance on the design of a cost-benefit analysis. As explained in the document, several factors must be considered:<sup>12</sup>

- ❖ Long-run benefits and costs: because the goals of many programs involve long-term benefits in addition to immediate outcomes, long-term outcomes must be estimated using information from various sources. Ultimately, life-cycle benefits and costs should be estimated using the model.
- ❖ Internal consistency: a cost-benefit analysis involves several estimates and assumptions so it is important to be as internally consistent as possible. In other words, bottom-line estimates should be “developed so that a benefit-cost ratio for one program can be compared directly to that of another program. By striving for internal consistency, individual estimates can be compared to each other on a relative basis.”
- ❖ Cautious assumptions: evaluations must have a scientifically valid research design. The document explains that the study “used a number of other assumptions in an effort to isolate the causal relationships between prevention and early intervention and the valuation of the outcomes of interest.”

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<sup>11</sup> Ibid.

<sup>12</sup> Aos et al. Op. cit., 1-2.

- ❖ Multiple perspectives on benefits and costs: Washington’s analysis incorporated estimates from three perspectives, including those participating in the program, non-participants as taxpayers, and non-participants in other non-taxpaying roles. These divisions allow the analysis to examine rate-of-return information as well as broader societal implications of the program.

### *Steps in a Cost-Benefit Analysis*

A cost-benefit analysis requires the following 10 steps.<sup>13</sup> This enumeration of the steps is intended to help school districts determine if they have the capacity to undertake this kind of analysis.

- ❖ Set the framework for the analysis
- ❖ Is a program worth its costs?
- ❖ Should a program be extended?
- ❖ Decide whose costs and benefits should be recognized
  - Society?
  - The State?
  - The District?
- ❖ Identify and categorize the direct/indirect, tangible/intangible, and fiscal/social costs and benefits
- ❖ What are the one-time, ongoing and recurring costs to program participants?
- ❖ What are the one-time, ongoing and recurring costs to the district, state or society?
- ❖ What are the benefits to participants?
- ❖ What are the benefits to the district, state or society?
- ❖ Project costs and benefits over the life of the program, if applicable
  - What is the time frame for your analysis?
  - Does each cost or benefit remain the same each year or does it increase, decrease, or disappear? What costs are up-front and what costs are recurring?
- ❖ Monetize costs
- ❖ Monetize benefits
  - What is/are the most important benefit(s) (the benefit(s) by which you plan to measure the success of the program)?
  - What “units of effectiveness” are attributable to the program?
  - Have you considered non-market goods and services? Cost avoidance? Time saved? Increased productivity? Taxes? Value of the environment?
- ❖ Discount costs and benefits to obtain present values
- ❖ Compute a net present value
  - What is the benefit-cost ratio?

<sup>13</sup> Cellini, S. and Kee, J. 2010. “Cost-Effectiveness and Cost-Benefit Analysis.” *Handbook of Practical Program Evaluation*. <http://home.gwu.edu/~scellini/CelliniKee21.pdf>



- What is the return on investment?
- ❖ Perform sensitivity analysis
  - How sensitive is the analysis to particular assumptions? If certain assumptions are relaxed or changed, how would it affect the outcome of the analysis?
  - Will you perform a partial sensitivity analysis, varying one assumption at a time and holding others constant? Or will you perform an extreme case sensitivity analysis, picking the value for each parameter that will yield either the best or worst case scenario?
- ❖ Make a recommendation where appropriate

## Section II: Cost-Benefit Analyses of Established Programs

In this section, we examine examples cost-benefit analyses carried out in K-12 and other environments. Though it seems few districts have undertaken economic evaluations of their programs and services (or had outside contractors undertake these evaluations), more schools and districts seem to be showing interest in or signaling commitment to cost-benefit analyses. Table 2 presents a sample of districts that have committed to cost-benefit analysis in action plans, mission statements or have referenced cost-benefit analysis in prior decision-making.

**Table 2: District/School Commitments to Cost-Benefit or Cost-Effectiveness Analysis**

District or School	Commitment	Source
<b>Adams County/Ohio Valley School District (OH)</b>	“In order to ensure efficient and effective use of resources and maximum educational value, we will not institute or continue programs without cost/benefit analysis.” <sup>14</sup>	District Website
<b>Elizabeth Haddon Elementary School (NJ)</b>	“We will never...adopt a program without considering...cost benefit analysis.” <sup>15</sup>	District Website
<b>Asbury Park School District (NJ)</b>	“Cost-benefit, cost-effect analysis should be embedded, as feasible, in every program decision that is made and evaluated on a yearly basis.” <sup>16</sup>	Action Plan for the Asbury Park School District
<b>Benicia Unified School District (CA)</b>	“Design a system for program evaluation to determine success and cost effectiveness.” <sup>17</sup>	Strategic Plan

### Examples of Cost-Benefit Analyses for K-12 Programs

We found that most of the cost-benefit analyses for programs in K-12 settings focused on large-scale programs while evaluating district-level data. In fact, our research uncovered just one district-initiated cost-benefit analysis, and we were unable to find a report detailing the process of the analysis. This district, Poudre School

<sup>14</sup> “Adams County/Ohio Valley School District.” Adams County/Ohio Valley School District. <http://www.ovsd.us/>

<sup>15</sup> “Vision/Mission Statement.” Elizabeth Haddon Elementary School. <http://www.haddonfield.k12.nj.us/elizabeth/mission.html>

<sup>16</sup> Lowe, D. “Action Plan for the Asbury Park School District.” Asbury Park School District. <http://www.asburypark.k12.nj.us/18571054153128903/lib/18571054153128903/PDK%20Action%20Plan%20final-Edited%20for%20Web.pdf?1857Nav=|&NodeID=148>

<sup>17</sup> “Strategic Plan.” Benicia Unified School District. [http://www.beniciaunified.org/index.php?option=com\\_content&task=view&id=22&Itemid=66](http://www.beniciaunified.org/index.php?option=com_content&task=view&id=22&Itemid=66)

District in Colorado, examined summer school research and engaged in a cost-benefit analysis to determine how elementary schools might best make use of summer school funds.<sup>18</sup> As a result of this analysis, the district moved away from its traditional summer school model. Elementary schools are now able to apply for “Targeted Learning Opportunity” funds (\$85,000 total district-wide). Once granted, these funds are then used “to address students’ specific needs for additional instruction to close achievement gaps and to meet achievement goals stated in school improvement plans.”<sup>19</sup>

In the following paragraphs, we highlight different types of programs that have undergone cost-benefit analyses. These profiles are intended to demonstrate the diversity of district programs that can be evaluated through a cost-benefit analysis while describing the steps taken to conduct these studies.

### *Programs Targeting Graduation Rate*

In a 2007 paper, Henry Levin and Clive Belfield listed the few K-12 programs that have demonstrated effectiveness in raising the graduation rate *and* whose costs can be calculated with reasonable confidence.<sup>20</sup> In this analysis, the program costs are compared with the benefits that accrue from high school graduation. “Benefits” are assessed from the perspective of the taxpayer. Table 3 presents the figures associated with the cost-benefit analyses of these programs.

**Table 3: Cost Effective K-12 Programs that Raise Graduation Rates**

	Unit costs per student	Extra high school graduates per 100 students	Costs per additional graduate	Benefits to taxpayers divided by costs of intervention
<b>Success for All (Elementary school reform)</b>	\$3,842	4	\$96,050	2.38
<b>First Things First (High school reform)</b>	\$5,440	16	\$33,680	6.72
<b>Talent Development (High school reform with career academy model)</b>	\$2,790	8	\$34,850	6.56
<b>Check &amp; Connect (High school mentoring and monitoring program)</b>	\$8,150	17	\$47,930	4.77

<sup>18</sup> “Elementary Schools Offer Targeted Learning Opportunities Instead of Traditional Summer School.” Poudre School District (June 13, 2011). <http://www.psdschools.org/news/2011/03/elementary-schools-offer-targeted-learning-opportunities-instead-traditional-summer-sch>

<sup>19</sup> Ibid.

<sup>20</sup> Levin, H. and Belfield, C. 2007. “Investments in K-12 Education for Minnesota: What Works?” Growth and Justice Conference. [http://www.cbcse.org/media/download\\_gallery/GROWTH\\_JUSTICE\\_PAPER.pdf](http://www.cbcse.org/media/download_gallery/GROWTH_JUSTICE_PAPER.pdf)

	Unit costs per student	Extra high school graduates per 100 students	Costs per additional graduate	Benefits to taxpayers divided by costs of intervention
<b>Achievement for Latinos through Academic Success (High school program monitoring behavior and academic success)</b>	\$3,940	5	\$78,860	2.90

Source: Levin and Belfield (2007)

### *Child Parent Center (CPC) Program*

The Child Parent Centers (CPC) program is a federally-funded school-based intervention that has served low-income children since 1967. While a preschool component is an integral part of the program, we discuss the cost-benefit analysis of this program in this section because part of the program is elementary-based.

The Child-Parent Center program serves children from ages 3 through 9. The Center, run by a head teacher, includes a staffed parent resource room, school-community outreach activities, and health services. The non-preschool component provides for “reduced elementary class sizes, teacher aides for each class, continued parent involvement activities, and an enriched classroom environment for developing reading and math skills.”<sup>21</sup>

In 2001, Arthur Reynolds and co-authors (of the University of Wisconsin-Madison and Northern Illinois University) conducted the first cost-benefit analysis of this ongoing program. Individuals who had gone through the program were compared with individuals who were eligible but chose not to participate in the program on a number of different achievement and behavioral measures. Five categories of program benefits were estimated:

- ❖ Reductions in expenditures for the school remedial services of grade retention and special education;
- ❖ Reductions in criminal justice system expenditures for both juvenile and adult arrest and treatment;
- ❖ Reductions in child welfare system expenditures associated with child abuse and neglect;
- ❖ Averted tangible costs to crime victims; and

<sup>21</sup> Reynolds, A., Temple, J., Robertson, D., and Mann, E. 2001. “Age 21 Cost-Benefit Analysis of the Title I Chicago Child-Parent Center Program Executive Summary.” University of Minnesota. <http://www.cehd.umn.edu/icd/cls/Cbaexecsum4.html>

- ❖ Increases in adult earnings and tax revenues projected for increases in educational attainment.<sup>22</sup>

Benefits were calculated separately for society at large (program participants and the general public), the general public, and the government.

With an average cost per child of \$6,730 (1998 dollars) for 1.5 years of participation, the preschool program generated a total return to society at large of \$47,759 per participant. The largest benefit was program participants' increased earnings capacity, though the program also resulted in increased tax revenues, savings on school remedial services, lower rates of arrest, and decreased costs for crime victims. Benefits to the general public totaled \$25,771 per participant, for a return of \$3.83 dollars to the general public for every \$1 invested in the program. For every dollar the government invested in the program, it saved \$2.88. In other words, economic benefits exceeded costs for each population considered.

A follow-up study conducted in 2011 found that “economic benefits in 2007 dollars exceeded costs.”<sup>23</sup> The preschool part showed the strongest economic benefits providing a total return to society of \$10.83 per dollar invested; the school-age program yielded a return of about \$4 per dollar invested.

### *School Breakfast Programs*

Researchers with the University of Wisconsin Extension School conducted a cost-benefit analysis of school breakfast programs (SBPs) in seven Wisconsin school districts.<sup>24</sup> Key research questions included:<sup>25</sup>

- ❖ What are the benefits of SBPs?
- ❖ Do SBPs make money?
- ❖ What are the start-up costs?
- ❖ How can an SBP become profitable?
- ❖ How should a district evaluate an SBP?

The overall objective of the research was to assess the costs of establishing and running the SBP to determine how SBPs can become profitable. Sources of data included interviews with the foodservice director, employees, and other staff, and

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<sup>22</sup> Ibid.

<sup>23</sup> “School-based early childhood education program yields high economic returns, University of Minnesota researchers find.” University of Minnesota (February 3, 2011). [http://www1.umn.edu/news/news-releases/2011/UR\\_CONTENT\\_293949.html](http://www1.umn.edu/news/news-releases/2011/UR_CONTENT_293949.html)

<sup>24</sup> Hilleren, H. 2007. “School Breakfast Program Cost/Benefit Analysis.” UW – Extension, Family Living Program. <http://fyi.uwex.edu/wischoolbreakfast/files/2009/10/Wisconsin-School-Breakfast-Cost-Benefit-Analysis-Report-20071.pdf>

<sup>25</sup> Ibid., 3.

financial information provided by each district. To measure outcomes, the researchers determined that profitability of the SBP can be assessed using participation (percentage of total students purchasing meals), breakfast-to-lunch ratio (number of students eating breakfast compared to those eating lunch), meals per labor hour (labor productivity), number of healthy meals vs. a la carte (reveals success of meal incentives), per-meal cost (expenses on a per-meal basis), amount of food returned uneaten (measures meal appeal), and student surveys (provides formal or informal qualitative assessment).<sup>26</sup> The table below summarizes the costs and benefits identified for this study:

**Table 4: Cost-Benefit Analysis Summary, SBPs<sup>27</sup>**

Costs	Benefits
<b>Start-up costs</b> (equipment, labor, communication) <b>Meal costs</b> (e.g., labor, food, equipment, services)	<b>Nutritional benefits</b> (e.g., decreased cardiovascular risk, daily intake of fat, stomachaches) <b>School performance benefits</b> (e.g., increased attention spans; decreased discipline problems, absenteeism, tardiness) <b>Financial benefits</b> (e.g., additional funds brought into school, job creation, increase overall financial stability of food service)

### *School Based Health Centers*

A group of researchers affiliated with the University of Cincinnati carried out a cost-benefit analysis using a “longitudinal quasi-experimental repeated-measures design” in order to measure the impact of school-based health centers (SBHC) on health care disparities as well as the net social benefit to the population.<sup>28</sup> In doing so, the researchers matched four school districts with SBHCs with two control school districts according to demographics of the students. Data sources included school enrollment files, Medicaid claims, SBHC encounter records, and parent’s and SBHC coordinators’ survey data. The surveys provided data on the costs and benefits of the program, including travel distance from home to the hospital or clinic, as well as hours spent in physician visits, facility utility and space cost, and any health care grants received. The primary outcomes were measured as “quarterly total health care cost per student, as a proxy for health care utilization.” This cost was defined as the total dollar amount that Medicaid paid for all health care.<sup>29</sup> The table below summarizes the costs and benefits identified for this study:

<sup>26</sup> Ibid.

<sup>27</sup> Ibid., 2.

<sup>28</sup> Guo, J., Wade, T., Pan, W., and Keller, K. 2010. “School-Based Health Centers: Cost-Benefit Analysis and Impact on Health Care Disparities.” *American Journal of Public Health*, 100:9, 1617. <http://www.schami.org/0037-SBHC%20Cost%20Benefit%20Analysis%20from%20the%20AJPH.pdf>

<sup>29</sup> Ibid., 1617-1618.

**Table 5: Cost-Benefit Analysis Summary, SBHCs<sup>30</sup>**

Costs	Benefits
<b>Looked at from three sectors:</b> <b>Health care (e.g., SBHC operation costs including prescription drugs, medical equipment, and physician and nurse hours)</b> <b>Patients and families (e.g., out of pocket expenses in traveling to get medical care, copayments, and lost work time)</b> <b>All other sectors (e.g., essential startup funds and costs for school facility use)</b>	Activities that would not have occurred without SBHC: <b>Students' health status change</b> , measured in terms of equivalent value of clinical effects <b>Other sector savings</b> (e.g., other value or grants created by the SBHCs) <b>Resources saved</b> by the SBHCs or costs not spent on an alternative <b>Unquantifiable benefits</b> (e.g., better attendance and learning performance)

### *Beginning Teacher Mentoring Program*

Researchers at the University of California, Santa Cruz conducted a cost-benefit analysis of teacher mentoring programs to determine the rate of return of such training. The researchers specifically sought to determine if “the relative cost of a comprehensive mentoring program for new teachers represents a good return on investment, particularly when there are many competing demands for scarce (and declining) school district funds.”<sup>31</sup> The following research questions were addressed:

- ❖ What is the level of new teacher effectiveness that results from a comprehensive induction program?
- ❖ What are the changes in new teacher attrition as a result of instituting a district-wide induction program for all new teachers?
- ❖ How well prepared are mentors to contribute to new teacher development?

To answer these research questions, the researchers used a mixed-model approach based on regression discontinuity (comparing the effectiveness of new teachers with that of more experienced teachers), comparative change (comparing attrition rates within the district to state rates), and a one-shot case study (year-end data collected by the program for formative evaluation purposes). Data sources included student test data, attrition rates, and satisfaction ratings of participants. Outcomes were measured by the net present value (NPV) of induction, calculated as the NPV of returns (savings from induction and returns on training investment) minus the NPV of costs (program costs and private costs).<sup>32</sup> The table below summarizes the costs and benefits identified for this study:

<sup>30</sup> Ibid., 1617.

<sup>31</sup> Villar, A. and Strong, M. “Is Mentoring Worth the Money? A Benefit-Cost Analysis and Five-year Rate of Return of a Comprehensive Mentoring Program for Beginning Teachers.” University of California, Santa Cruz, 2. <http://www.maine.gov/education/teacherinduction/forms/Mentoring%20Article.pdf>

<sup>32</sup> Ibid., 3-4.



**Table 6: Cost-Benefit Analysis Summary, Mentoring<sup>33</sup>**

Costs	Benefits
<p><b>Mentor salaries</b> (salary including benefits divided among mentor's caseload of new teachers)</p> <p><b>Travel costs</b> (district budget for travel distributed among beginning teachers in the program)</p> <p><b>Administrative overhead</b>, mentor, and new teacher training (expenditures left over in the budget after accounting for salaries, divided among teachers)</p> <p><b>Beginning teacher private time</b> (time investment that new teachers have to make outside of normal working hours to participate in the program)</p>	<p><b>Savings on credential investment</b> (annual tuition at local university multiplied by the number of teachers who left and divided among all teachers in the program – represents the annual return on investment per teacher saved by their remaining in the profession)</p> <p><b>Savings on reduced attrition</b> (including turnover costs)</p> <p><b>Increased teacher effectiveness</b> (aggregated gains students make in annual achievement test scores)</p> <p><b>Acquisition of mentoring capacity</b> (veteran teachers acquire a new skill by mentoring)</p> <p><b>Student academic returns</b> due to assignment (benefits that accrue to students from having a better teacher – increased interest in school, better attendance, reduced dropout, access to AP and college)</p>

### Cost-Benefit Analyses at Other Levels

In the following paragraphs, we provide brief descriptions of cost-benefit analyses conducted at other levels of education, including preschool and higher education.

#### *Preschool Learning Programs*

In 2004, Charlotte-Mecklenburg Schools (CMS) performed a cost-benefit analysis of Bright Beginnings (BB) – a prekindergarten program designed to provide a child-centered, literacy-focused learning environment that prepares children for school. The district considers data from six separate cohorts of students (1997-98 through the 2002-03 school years) and looked to cost-benefit analyses of the CPC program (described above), the High/Scope Perry Pre-School Program, and the Abecedarian Program for guidance.

Sixteen benefit areas were identified and grouped into Near-Term, Intermediate-Term, and Long-Term categories.<sup>34</sup> Evaluators determined that it was reasonable to estimate tangible economic benefits in six of the benefit areas. Three of these six –

<sup>33</sup> Ibid., 4-6.

<sup>34</sup> "Charlotte-Mecklenburg Schools Bright Beginnings Program Cost-Benefit Analysis Project Report." Charlotte-Mecklenburg Schools (August 5, 2004), 2. <http://www.cms.k12.nc.us/cmsdepartments/ci/pre-kservices/Documents/Cost%20Benefit%20Analysis.pdf>



reduction of in-grade retention, reduction of time required to teach routine social, and literacy skills in Kindergarten, and reduction in child care costs – fall into the “near-term” category. The other three – reduction in Level of Public Assistance Usage, reduction in Criminal Justice Costs, and reduction in Crime Costs to Victims – fall into the “long-term” category.

The district presented three cost-benefit scenarios: one considering only the calculable near-term benefits, one considering both calculable near-term and long-term benefits with the exception of a speculative reduction in crime costs to victims, and the final considering both calculable near-term and long-term benefits including a speculative reduction in crime costs to victims.

According to the first scenario, \$0.58 is returned for each dollar invested – a negative cost-benefit ratio. Conversely, the second and third scenarios produce a positive cost-benefit ratio. According to the second scenario, \$2.47 is returned for each dollar invested. According to the third, \$13.74 is returned for each dollar invested.

CMS is careful to note that these are conservative estimates of the benefits of these programs: remember that 16 areas of benefit were identified but only six were deemed calculable at this point. In terms of “near-term” benefits, four other tangible economic benefits were identified:

- ❖ Reduction of In-School ESL Interventions (K-2)
- ❖ Reduction in Special Education Requirements
- ❖ Reduction in Learning Interventions from External Agencies
- ❖ Reduction of Expenditures by Other Agencies for Social Services

However, these were not included in the analysis as “significant long-term effort would be required to create metrics or acquire data from external sources.” The district also noted that there were non-economic benefits to the Bright Beginnings program, including better academic performance of participants as compared with companion groups both during the pre-school period and following.

#### *Concurrent Enrollment Program*

The University of Central Arkansas (UCA) cooperates with various high schools through its concurrent enrollment program that offers sections of a variety of courses. These courses are “taught on the high school campuses, using high school facilities and high school personnel, under the guidance of UCA faculty and staff.”<sup>35</sup> In 2008, the Faculty Senate formed a University Concurrent Enrollment Policy Committee and tasked this committee with performing a cost-benefit analysis on the

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<sup>35</sup> “Cost Benefit Analysis of UCA’s Concurrent Enrollment Program.” University of Central Arkansas (March 19, 2009). [http://uca.edu/facultysenate/documents/concurrentenrollment\\_cba\\_report.pdf](http://uca.edu/facultysenate/documents/concurrentenrollment_cba_report.pdf)

concurrent enrollment program. The Committee developed the following list of “explicit” and “implicit” benefits and costs:<sup>36</sup>

**Table 7: Cost-Benefit Analysis Summary, CE**

	Costs	Benefits
<b>Explicit</b>	Any source or method by which dollars flow <i>out of</i> UCA accounts: Rebates of student tuition/fees Stipends/salary assistance for UCA faculty Stipends or assistance for high school (HS) teachers Expenses for materials provided to high schools Expenses for mandatory training for HS teachers Expenses for travel/materials related to program coordination or management Expenses for UCA faculty travel related to CE programs	Any source or method by which dollars flow <i>into</i> UCA accounts: Student-paid tuition and fees State revenues based on CE Semester Credit Hour (SCH) State special revenue for CE program SCH Local, State, Federal grant revenues for CE programs Privately raised revenues for CE programs
<b>Implicit</b>	Any costs incurred by UCA not immediately or directly tied to cash outflow: Increased faculty workload or job dissatisfaction Increased use of adjuncts on campus, diminishing overall educational quality Use of scarce faculty time and effort, preventing the development of other beneficial projects at UCA If there is a revenue difference between “normal” SCH and CE SCH, lost revenue due to a decline in “normal” SCH as students matriculate with accumulated CE SCH.	Any stream of benefits accruing to UCA not immediately or directly tied to cash inflow: Community goodwill, owing to the general popularity of CE programs Students matriculate at UCA because of positive experiences with UCA’s CE program as a HS student Former CE students elevate overall retention rates because of positive learning outcomes of UCA’s CE program HS CE programs attract high quality students, who may then matriculate to UCA. UCA exercises quality control over CE courses.

The committee could not claim that the Concurrent Enrollment (CE) initiative had yet produced explicit tangible benefits because the program does not collect tuition and fees or benefit from state funding. Moreover, plausible numbers regarding matriculation and persistence at UCA *due exclusively to the existence of its CE program* could not be produced. The Committee did, however, find that the program incurred

<sup>36</sup> Taken verbatim from Ibid.

extra costs of up to \$100,000 beyond the cost figures provided by Academic Outreach, totaling a projected \$571,000 price the university in the 2008-2009 school year.

### *Accelerated Learning Program*

The Accelerated Learning Program (ALP) at Baltimore County Community College (BCCC) is designed to maximize students' likelihood of success in English 101.<sup>37</sup> Under ALP, students placed into the college's developmental writing course can register for specially designated sections of ENGL 101 and an ALP companion course. The companion course meets right after the ENGL 101 course, and is taught by the same instructor. During these sections, the teacher is available to answer students' questions, practice writing short papers, work on grammar and punctuation, etc.

In 2009, CCBC asked the Community College Research Center (CCRC) at Teachers College, Columbia University, to conduct an in-depth quantitative analysis to assess whether ALP is effective and, if so, whether it is worth the added cost. The additional cost of ALP is \$250 per student – a function primarily of smaller section sizes. The evaluators found that “among students who place into the highest level developmental writing course, participating in ALP is associated with substantially better outcomes in terms of English 101 completion and English 102 completion, the two primary outcomes ALP was designed to improve.”<sup>38</sup> Specifically, the evaluators determined that ALP students pass 1.79 more courses than students who go the traditional route. Each course costs \$293 per student, so they calculated the net benefit of ALP at \$524 per student (\$293 x 1.79 additional courses passed). Therefore, ALP's benefits are more than double the costs (\$250 as compared with \$524).

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<sup>37</sup> Jenkins, D., Speroni, C., Belfield, C., Jaggars, S., and Edgecombe, N. 2010. “A Model for Accelerating Academic Success of Community College Remedial English Students: Is the Accelerated Learning Program (ALP) Effective and Affordable?” Community College Research Center.  
[http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CFEQFjAA&url=http%3A%2F%2Fccrc.tc.columbia.edu%2FDefaultFiles%2FSendFileToPublic.asp%3Fft%3Dpdf%26FilePath%3Dc%3A%255CWebsites%255Cccrc\\_tc\\_columbia\\_edu\\_documents%255C332\\_811.pdf%26fid%3D332\\_811%26aid%3D47%26RID%3D811%26pf%3DContentByType.asp%3Ft%3D&ei=6V4JUImYHuL10gGl1\\_3GAw&usg=AFQjCNFxtYXVPOMns9xUYNbLdyqJveJ\\_cA](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CFEQFjAA&url=http%3A%2F%2Fccrc.tc.columbia.edu%2FDefaultFiles%2FSendFileToPublic.asp%3Fft%3Dpdf%26FilePath%3Dc%3A%255CWebsites%255Cccrc_tc_columbia_edu_documents%255C332_811.pdf%26fid%3D332_811%26aid%3D47%26RID%3D811%26pf%3DContentByType.asp%3Ft%3D&ei=6V4JUImYHuL10gGl1_3GAw&usg=AFQjCNFxtYXVPOMns9xUYNbLdyqJveJ_cA)

<sup>38</sup> Ibid., i.

## Appendix: Summary of Cost-Effectiveness Program Evaluations

**Figure A: School and District Level Program/Initiative Analysis**

District	Program(s) Evaluated	Kind of analysis	Pre- or post-implementation	Report Title/Year	Author(s)	Affiliation(s) of author(s)
Austin Independent School District (TX)	Special Programs (Dropout Prevention, Drug Prevention, etc.)	Cost-effectiveness	Post	“Riding Them Off into the Sunset: A cost-Effectiveness review of a District’s Special Programs” (1994) <sup>39</sup>	David Wilkinson and Others	District’s DRE (Department of Research and Evaluation)
Austin Independent School District (TX)	Career and Technical Education Program	Cost-effectiveness	Post	“Career and Technical Education: College Readiness and Cost-Effectiveness” (2011) <sup>40</sup>	Carol Pazera	District’s DRE (Department of Research and Evaluation)
Pocantico Hills Central School District (NY)	Food Services Program	Cost-effectiveness	Post	“Food Services Program Evaluation” (2011) <sup>41</sup>	Frank Rinaldi	SLANT Consultants – School Lunch Administrative, Nutritional and Technical

<sup>39</sup> Wilkinson, D. 1994. “Riding Them Off Into the Sunset: A Cost-Effectiveness Review of the District’s Special Programs.” Austin Independent School District. <http://www.eric.ed.gov/PDFS/ED372082.pdf>

<sup>40</sup> Pazera, C. 2011. “Career and Technical Education: College Readiness and Cost-effectiveness.” Austin Independent School District (December). [http://archive.austinisd.org/inside/docs/ope\\_10-90\\_RB\\_CTE\\_College\\_Readiness\\_Cost\\_Effectiveness\\_2011.pdf](http://archive.austinisd.org/inside/docs/ope_10-90_RB_CTE_College_Readiness_Cost_Effectiveness_2011.pdf)

<sup>41</sup> “Food Services Program Evaluation.” Slant Consultants (March 28, 2011). [http://www.pocanticohills.org/boe/present/Food\\_Service\\_Evaluation\\_3.28.11.pdf](http://www.pocanticohills.org/boe/present/Food_Service_Evaluation_3.28.11.pdf)

District	Program(s) Evaluated	Kind of analysis	Pre- or post-implementation	Report Title/Year	Author(s)	Affiliation(s) of author(s)
Mechanicsburg Area School District (PA)	Extra-curricular activities requiring \$1,000 or more in funding from district	Cost savings/Revenue Generation + Intangible Benefits	Post	“Mechanicsburg Area School District Extracurricular Program Evaluation Report – January 2012” <sup>42</sup>	Various	District
North Hunterdon-Voorhees Regional High School District (NJ)	Educational Excellence Goals, Communications Goals, Partnership Goals and Resources Goals in the Strategic Plan	Qualitative cost-benefit	Pre	Strategic Plan 2011 <sup>43</sup>	Volunteers	District

<sup>42</sup> “Mechanicsburg Area School District Extracurricular Program Evaluation Report – January 2012.” [https://doc-04-c0-docsviewer.googleusercontent.com/viewer/securedownload/qpiiphosnq6prol8pqto3rr2ft8g9rat/kft1oelof3dfcms6qljmhv4hc6pqu87g/1342647000000/Ymw=/AGZ5hq8nq8y0rUC7cbQjV99gq\\_Vx/QURHRUV1TzZl0N2Z3amYzQzV1ZXEtUTBpLVNkMEhxbExmZXRHYVJuVEhZOTc4RWltN2loLVVhbUhhIjYblI5d293bnpra0NveWk1OWlzUm9ieGFSNG9EdlRIWUp2a2lrVFJISFZNa2t2ZFRxNE91WXhmYWk3OWhqNjdVczh5aHF7b2xwZnRkQ1lSbjc=?chan=EgAAAGbMgtRXvpaEa%2BBUK2wRC4xo7OcgYVfyDNvkOJ0I92Px&docid=59523de9d367070048965fedc3daa63f&hash=lgcfe01t06telh3n17ug1bnb64apmsms&nonce=b6up8720t7ia8&dom=virginia.edu&sec=AHsqidbC\\_R-B5BSJjncss5eOa7eFA90BC\\_aaeiWiMrCRRp7BHA2xxqlH2WeivznqpFvQJ0xpapjK&a=gp&filename=Extra-Curricular\\_Activities\\_Program\\_Evaluation.pdf&user=AGZ5hq8nq8y0rUC7cbQjV99gq\\_Vx](https://doc-04-c0-docsviewer.googleusercontent.com/viewer/securedownload/qpiiphosnq6prol8pqto3rr2ft8g9rat/kft1oelof3dfcms6qljmhv4hc6pqu87g/1342647000000/Ymw=/AGZ5hq8nq8y0rUC7cbQjV99gq_Vx/QURHRUV1TzZl0N2Z3amYzQzV1ZXEtUTBpLVNkMEhxbExmZXRHYVJuVEhZOTc4RWltN2loLVVhbUhhIjYblI5d293bnpra0NveWk1OWlzUm9ieGFSNG9EdlRIWUp2a2lrVFJISFZNa2t2ZFRxNE91WXhmYWk3OWhqNjdVczh5aHF7b2xwZnRkQ1lSbjc=?chan=EgAAAGbMgtRXvpaEa%2BBUK2wRC4xo7OcgYVfyDNvkOJ0I92Px&docid=59523de9d367070048965fedc3daa63f&hash=lgcfe01t06telh3n17ug1bnb64apmsms&nonce=b6up8720t7ia8&dom=virginia.edu&sec=AHsqidbC_R-B5BSJjncss5eOa7eFA90BC_aaeiWiMrCRRp7BHA2xxqlH2WeivznqpFvQJ0xpapjK&a=gp&filename=Extra-Curricular_Activities_Program_Evaluation.pdf&user=AGZ5hq8nq8y0rUC7cbQjV99gq_Vx)

<sup>43</sup> “Strategic Planning.” North Hunterdon-Voorhees Regional High School District. <http://www.nhvweb.net/index.php/community-resources/strategic-planning-2011/>

## **Project Evaluation Form**

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