Is Mentoring Worth the Money?
A Benefit-Cost Analysis and Five-year Rate of Return of a Comprehensive Mentoring Program for Beginning Teachers

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1. Introduction

Most states mandate, and several also fund, some form of support for new teachers during their period of induction into the profession (Education Week, 2004). The type of support that school districts have most often chosen to provide over the past decade is mentoring by a veteran teacher (Fideler & Haselkorn, 1999). Mentoring programs may take many different forms, ranging from informal buddy systems to intensive models with fully released, highly trained mentors. In spite of existing evidence that mentoring programs in general may have a beneficial effect on teacher retention (Colbert & Wolff, 1992; National Commission on Teaching & America's Future, NCTAF, 1996; Odell & Ferraro, 1992; Pearson & Honig, 1992, Strong & St.John, 2000), and even on student achievement (Strong, Fletcher, & Villar, 2003), school district administrators often balk at the apparent high cost of mentoring programs, especially the intensive versions where resources are required for recruitment, training, and hiring teacher replacements for the veteran mentors. Their decisions on program choice are made, by necessity, without recourse to information about the potential returns on investment in mentoring. Legislators, also, are interested in understanding the potential returns on educational investments, since it is often a financial justification that is ultimately needed to pass costly reforms.

Until now there have been no benefit-cost studies of mentoring programs for beginning teachers that can provide legislators, educational administrators, and program leaders with the kind of economic information they need for informed decision making. Benefit-cost analysis is an analytic tool used by economists to measure the life-cycle costs and benefits of competing alternative approaches, expressing value in monetary terms. Gramlich (1998) notes:

> "Benefit cost analysis is a framework for organizing thoughts, or considerations: nothing more nothing less. For any real world choice, there will always be some considerations that cannot be easily enumerated or evaluated, where the analysis becomes quite conjectural. Benefit cost analysis does not, and should not, try to hide this uncertainty."

Benefit-cost analyses, simply stated, estimate the financial benefits of a given course of action against the actual costs, and use the resulting balance to guide decision making. Costs are either one-time, or may be ongoing. Benefits are most often received over time. In its simple form, benefit-cost analysis is carried out using only actual financial costs and financial benefits. A more sophisticated approach attempts also to put a financial value on intangible costs and benefits, a process that can be highly subjective.

In this paper we do not intend to contribute to arguments regarding the morality of adopting benefit-cost practices. Rather, we take the perspective that one may employ the economic practice of benefit-cost analysis to enable educational decision-makers to evaluate the merits of an intervention (in this case comprehensive mentoring support for beginning teachers) with regard to its potential return on investment, under the assumption that no moral or ethical principle is violated. Most people, if asked whether teachers should receive the support of a trained mentor during their first two years in the classroom, would probably vote in favor. This paper provides the analysis to demonstrate whether it also makes financial sense to society.

2. Background and Literature Review

(Omitted to conserve space)

3. Setting for the Study of a Comprehensive Mentoring Program

3.1. State Setting

In 1992 California's legislature created and funded with SB1422 the Beginning Teacher Support and Assessment (BTSA) program. The initial funding of $4 million allowed for 29 programs serving about 7% of California's beginning teachers. Subsequently SB 1266 increased the funding to $11 million covering 72 programs. In 1998, SB 2042 allotted $66 million, which increased to $85 million the following year, thereby funding 120 programs serving 85% of all beginning teachers. In 2004, all credentialed beginning teachers are eligible to receive support from the BTSA system.

Administered jointly by the California Commission on Teacher Credentialing (CCTC) and the California Department of Education, BTSA proposes to provide an effective transition into teaching, improving students' educational performance, increasing teacher retention rates, and generally ensuring teacher professional success according to the California Standards for the Teaching Profession. The California BTSA programs vary in organizational design and include individual districts, districts in collaboration with one another and with colleges and universities, and large consortia in which districts, colleges, universities, and county offices of education work together. BTSA programs use a variety of methods to provide targeted support, based on performance data, to beginning teachers. These programs use The California Formative

Assessment and Support System for Teachers (CFASST) or an approved local assessment system, training experienced teachers in the relevance and methods for working with beginning teachers in a way that fully integrates support and formative assessment of teaching practice. Support providers assist beginning teachers in collecting and interpreting evidence of teaching performance, in reflecting on their teaching, and in identifying meaningful professional development activities that are targeted to their individual needs. The guidelines for programs are comprised of 20 standards set forth by the CCTC (2002), but allow flexibility within those standards so that there may be considerable variability throughout the state in how they are operationalized.

3.2. The Local Intervention

The new teacher mentoring program under investigation provides direct, comprehensive support for teachers during the first two years of their careers. The program is ‘comprehensive’ (see Figure 1) because it releases veteran teachers full time from the classroom after a rigorous selection process, provides on-going mentor training, and restricts caseloads to 15 new teachers per mentor. Mentors meet with their mentees at least once a week for two hours, during which time they observe and coach the new teacher, offer emotional support, assist with short and long-term planning, design classroom management strategies, teach demonstration lessons, provide curriculum resources, and facilitate communication with the principal. Mentors and new teachers keep an interactive journal to enhance communication, problem-solve and reflect. Additional monthly seminars are designed to build a support network and ongoing professional dialogue among beginning teachers, and are developed to assist teachers with meeting the needs of culturally and linguistically diverse student population. Each seminar provides teachers with an opportunity to learn about the California teaching standards in the context of effective teaching strategies and to reflect with other beginning teachers. Release time is provided to new teachers to observe veteran teachers, plan curriculum, attend professional development meetings, and assess their progress. In addition, the a Formative Assessment System is aligned with the beginning teacher’s evaluation process and district calendar, guides the on-going work of the new teacher and mentor, and is informed by content standards and student needs.

Figure 1 displays this information in a flow chart. While the final outcome concerns teacher retention, the preceding one, ‘to produce highly effective new teachers…’ is primary, since that will influence whether teachers stay or leave, be it as a result of their own or of the district’s decision. In other words, the principal goal of the program is to create the conditions under which new teachers are most likely to choose to continue their careers in the teaching profession.

A program with these features is consistent with Smith and Ingersoll’s (2004) highest level of induction support (“basic induction + collaboration + teacher network + extra resources”), a level that is enjoyed by less than one percent of the new teachers in their sample. The program has been in operation since 1989 using this comprehensive level of induction support, and boasts high retention rates for its teachers (Strong & St. John, 2001). It also appears to be associated with gains in student achievement, since the student achievement of students taught by this program’s teachers has been shown to be equal to that of veteran teachers in the same schools (Strong, Fletcher, & Villar, 2004).

4. Economic Analysis

The question remains whether 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. This paper presents the findings of a benefit-cost analysis and calculates the rate of return for such a program. Most studies of educational interventions investigate the comparative costs of two or more programs, often assuming a similar level of service delivery. The purpose of this study is not to compare the costs between or among programs, but to specify and measure the benefits of a comprehensive program and weigh them against the costs in order to arrive at a measure of net benefit.

There are practical reasons for studying a comprehensive delivery model in isolation, as opposed to comparing alternative models with different components. First, there are constraints on the delivery of services. As induction models move from full-release time on through to no-release time, mentors are forced to organize the hours spent with new teachers in a variety of ways. Some mentors continue to teach and are subject to their own deadlines that constrain their work with new teachers. Second, the population of mentors across induction delivery models is likely to vary. In a full-release setting prospective mentors will compete for positions that may offer increased chances of promotion and new leadership possibilities. In non-release settings, teachers often must be cajoled into taking on mentoring responsibilities as a second job imposed on top of running a full-time classroom. Even though no-release mentors receive a small remuneration and recognition, they are, in effect, volunteers who cannot be held accountable to the program in the manner of the full-time, professional mentor. Given these complexities, we find it more straightforward to work with one model and assume it to have been consistent across all cases. Thus we provide here a strategy for assessing programs, recognizing that the monetary estimate of benefits is the most challenging part of the comparison. We ask the question: *What is the rate of return after five years of a comprehensive model of new teacher induction?*

Since education may be considered, in economic theory terms, “both a consumption good that confers immediate benefits and an investment good that confers personal and social benefits well into the future

(Becker, 1964; Haveman & Wolfe, 1984)" (Masse & Barnett, 2002), we feel that, following the "fundamental principle" of benefit-cost analysis outlined by Gramlich (1998, p. 41), a mentoring program for beginning teachers should be assessed for its net value as a social investment. An analysis of this nature requires three kinds of information: a description of the educational intervention (see above), a listing of program costs, and an estimation of program benefits. We obtained actual cost information from the local county office of education, from program leaders, from the school district budget office, and from the State of California, Department of Education. Benefits and program effects were generated where we were able to construct monetary estimates, using data we had previously collected regarding teacher retention, student achievement, and mentor effectiveness. Other benefits that cannot be expressed in monetary terms are also discussed. We set an arbitrary time parameter of five years for this evaluation. This is not meant to imply that the program's impact ends after the fifth year. From a sociological and public policy perspective the benefits of the intervention extend out to the entire career of the teacher and well into the earning years of students.

5. Evaluation Design

5.1 Mixed Models

A mixed model is required for addressing the three different kinds of data collected: attrition, achievement, and satisfaction data. The questions associated with the three areas are: a) What is the level of new teacher effectiveness that results from a comprehensive induction program? b) What are the changes in new teacher attrition as a result of instituting a district wide induction program for all new teachers? and c) How well prepared are mentors to contribute to new teacher development? Each question draws on a different data source, is associated with a different counterfactual question, and calls for a different method of analysis. This has implications for the strength of the design and the validity of the outcomes.

5.1.1. Regression Discontinuity

The counterfactual question associated with new teacher effectiveness, expressed in terms of student achievement gains is: 'How effective would new teachers be in the absence of the induction program?' Because the program reaches all new teachers, we do not have an available non-supported group of new teachers for comparison. Alternatively, we can compare the effectiveness of the new teachers with that of more experienced teachers in the district, by looking at their respective student achievement gains. Using four years of test data, we constructed a counterfactual comparison with mid-career teachers (three to nine years) and veteran teachers (ten or more years of experience), who are not part of the induction program. The assignment strategy for the program allows us to use a more rigorous impact design, known as a regression discontinuity.

Regression discontinuity lies somewhere between experimental and quasi-experimental designs. Like both the alternatives, it assigns participants to the treatment centrally. Experimental designs are superior to quasi-experimental designs because they assign randomly, avoiding several threats to internal validity. While regression discontinuity designs do not assign treatment randomly, they preserve internal validity by imposing strict cut-off points on some measurable variable to separate the treatment group from the comparison group[1].

The induction program under study imposes selection criteria on the teacher population that function like the strict cut-off points regression discontinuity designs require. Without exception, all teachers in the first or second year of their practice are assigned to participate in the district induction program, and all teachers with three or more years of experience are not. In effect 'years of teaching experience' becomes the measure for assignment.

The justification for the validity of these comparisons is as follows. New teachers are assigned to the induction program if they are in the first or second year in order to compensate for their lack of teaching experience. New teachers have induction as a condition, and no experience. Veterans of ten years or more not only are not eligible for the induction program, but also did not participate in one in the past, since the program has existed in its present form less than ten years. Veterans, therefore, have had experience but no induction support. Mid-career teachers, with three to nine years of experience, likely participated in an induction program and also have some experience. Thus they register positive for both conditions. We have, therefore, two comparison groups and a way of asking how participation in a comprehensive induction program compensates for lack of experience. As can be seen from Table 1, the regression discontinuity analysis pertains to two benefits measured and valued from student SAT9 achievement scores, and represents a low threat to internal validity.

5.1.2. Comparative Change

The second counterfactual question, associated with teacher attrition, may be posed as follows: 'What would the attrition rate of new teachers be, in the absence of the induction program?' Ideally, in order to address this question, either we would need to know something about past attrition rates, or we could compare the target group with a comparison group that does not receive the intervention. However, because the program had been in existence for many years, and because the program serves all new teachers in the district, neither of these

[1] See Mohr (1988) for a discussion of the advantages and logic of regression discontinuity.

options was possible. The best alternative available to us was to impose a form of elementary quasi-experimental design known as the comparative posttest. We combined district and state attrition data, extrapolating where necessary, to construct a counterfactual comparison. Because the district induction program is comprehensive and state induction programs typically are not, we felt the comparison would still yield meaningful differences that could be valued monetarily. The counterfactual in this instance is represented by the state attrition rate. As seen in Table 1, comparative change analysis is applied to three questions on the benefits side of the ledger related to attrition differences between the state and the induction district.

5.1.3. One-shot case study

The last counterfactual question asks: How effective would mentors be without access to the mentor training and support provided by the induction program?' Ideally, a previous measure of mentor capacity or a comparison group would strengthen our ability to answer this question. In this instance, neither of those options is practical. The available alternative was to refer to the year-end data the program collects for formative evaluation purposes. This provides one-time satisfaction ratings of the mentors' contribution to new teacher practice from the point of view of the teacher. The counterfactual is constructed using low ratings of mentors and non-response groups. Of the three forms of measurement used to value benefits, this is the one with most threats to its internal validity.

6. Results

6.1. Costs

Table 2 summarizes information on the cost categories, the sources of data, and the operationalization of the cost streams.

6.1.1. Mentor Salaries

A figure for the cost of mentor salaries was obtained directly from the County Office of Education's BTSA budget for the district. The average salary including benefits was $66,282, which, divided among the mentor's caseload of 15 new teachers, amounts to $4,419 per teacher.

6.1.2. Travel Costs

These costs come directly from the district budget for travel. The district allotted $22,000 for 40 mentors and spent the total amount. When distributed among the beginning teachers in the program, this amounts to $37 per teacher.

6.1.3. Administrative Overhead, Mentor and New Teacher Training

These expenditures are those left over in the BTSA budget after the mentor salaries are accounted for. Divided among the teachers, the administrative, indirect, and training costs amount to $1,371 per teacher.

6.1.4. BT private time

This cost reflects the time investment that new teachers have to make outside of normal working hours in order to participate in the program. This is based on the assumption that new teachers meet with their mentors two hours per week in addition to their regular teaching work, and on a discounted hourly rate for new teacher salaries of $12.22 per hour. The discount reflects the fact that economists value private time at 50 to 60% of pre-tax wages being the imputed value of leisure time that shows up in studies of commuters and how they implicitly value time savings. It also fits the fact that marginal tax rates (including Social Security and Medicare as well as federal and state income tax rates) are about 40% for most people (see Rosen, 2005). Thus two hours a week

per beginning teacher over 36 weeks at $12.22 per hour amounts to $880 per teacher.

6.1.5. Summary of Costs

Most of the costs are represented by mentors' salaries and benefits (66%) in this full-release model (see Figure 2). Private time costs (13%) are not usually taken into account by program planners, but represent a significant hidden contribution on the part of the teacher. Having a mentor requires teachers to devote time after school hours to meet and communicate with their support providers, and this must be taken into consideration as cost to the program.

6.2. Benefits

Table 3 summarizes information on the benefits categories, the sources of data, and the operationalization of the benefits streams.

6.2.1. Savings on Credential Investment

A teacher obtaining a credential through the University of California teacher-training program invested an amount of $15,900 in tuition and expenses over 18 months. If this amount is multiplied by the number of teachers who left (i.e. 2% of 171 or about 3.5 teachers) and divided among all the teachers in the program, the resulting figure of $327 represents the annual return on investment per teacher that is saved by their remaining in the profession and extends out as long as they continue teaching, diminishing over time when discounted for net present value. Credential investment savings accrue to the new teacher rather than the district.

6.2.2. Savings on Reduced Attrition[2]

[2] We use attrition (i.e. leaving the profession) as opposed to turnover (i.e. moving schools or districts) to

From two studies of retention rates of beginning teachers in the comprehensive mentoring program, we determined that 88% were still teaching after six years (Strong & St.John, 2001). Averaged across years this represents an attrition rate of 2% per year. Comparison data for the state of California published by the California Council of Teacher Credentialing (CCTC, 2002b) showed an attrition rate of 16% after four years, extrapolated to 24% over six years, representing an annual attrition rate of 4%, or double that of the graduates of the program under study. National data show 44% attrition after six years (Ingersoll, 2002). These data are displayed in Figure 3. This difference can be translated into a monetary savings, realized at almost $360 per teacher per year (assuming that the replacement cost of a teacher is about 50% of a new teacher's salary), totaling $1,667 per teacher after five years. Of relevance here is a report by Fuller (2000) who examined teacher turnover costs in Texas. He notes that turnover costs vary according to the experience of the teacher leaving, the school district in question, and the rate of turnover in a district. Some estimates put this cost as high as 150% of a leaver's salary, while a more conservative number could be as low as 15%[3]. For the purposes of sensitivity analysis we assigned turnover costs of 15%, 30%, 50% and 100% of a new teacher's salary (see Figure 4). As is apparent from the figure, the net present value of the program is positively related to the cost of attrition. Districts with high attrition costs benefit proportionally more on a per teacher basis from a comprehensive induction model than districts in a context of low attrition costs.

6.2.3. Increased Teacher Effectiveness

This benefit is estimated by measuring teacher effectiveness in terms of the gains their students make in annual achievement test scores, gains that represent the value added by their teacher. We collected reading achievement data over a four-year period, measuring the gains obtained by classes taught by all teachers in the district's elementary[4] schools. We aggregated the reading gain scores for all students of new teachers while they were in the program and compared them with the aggregated scores of the students of more experienced teachers. We found that the classes taught by the new teachers in the comprehensive mentoring program realized reading gains that were equivalent to the gains of classes taught by more experienced teachers.

Having obtained this finding, we then set out to create a method for representing it in monetary terms. First we established a rank order of effectiveness for all teachers, both beginning and experienced. We created Z-scores of the classroom gains ($z_i = (x_i - X/s_g)$ and established a rank for all teachers in the sample. We divided the teachers into three groups according to experience: New Teachers (1-2 years), Mid-Career Teachers (3-9 years), and Veterans (10+ years). Using analysis of variance, we compared the three groups of teachers according to their classes' three-year average reading gain scores and whether they beat the district mean (see Table 4). On both measures the New Teachers were comparable to the Mid-Career Teachers. The Veteran Teachers group, however, was significantly lower than the Mid-Career group. In order not to inflate any observed differences, we chose to take the more conservative approach of comparing the New Teachers with the Mid-Career Teachers.

With the Z-scores as predictors of student achievement along with other variables, namely, previous student achievement, student ethnicity, student gender, student English Language Learner status, free or reduced-price lunch status, class size, and teacher years of service, we attempted to predict reading gain scores using a step-wise regression analysis. The striking result is that when teacher effectiveness scores were included in the model, most of the other variables dropped out of the equation, the only significant variables remaining being previous student achievement and English Language Learner status. We then analyzed the data by teacher group, obtaining separate equations for New Teachers and Mid-Career Teachers. Setting these equal to one another in order to estimate where each group's regression line crossed, we determined that the two regression lines intersected at the fourth year of teacher practice. This being so, we were able to assign a monetary value to the benefit of increased teacher effectiveness by assessing the difference between the salaries of a first-, second-, third-, and a fourth-year teacher. In years four and five of our analysis, this factor, therefore, produced no positive return. For first-year teachers, the benefit amounted to almost $5,000, for second-year teachers about $3,200, and for third-year teachers $1,500 (see Table 4).

6.2.4. Acquisition of Mentoring Capacity

This benefit refers to the fact that veteran teachers are acquiring a new skill by participating in the program and being trained as professional mentors. The program does not assume that veteran teachers are good mentors, but that they must acquire the capacity to mentor. Therefore the program includes pre-training

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represent the loss to society.

[3] The range of estimates is probably this broad because many of the studies were weighted to account for lost human capital in the form of lost effectiveness or ability in the tradeoff between replacing more senior teachers with a more novice ones. Because we measure teacher effectiveness directly and can account for it, our estimate of the real cost of teacher attrition leans toward the more conservative figure of 50%.

[4]We study data only from teachers in the elementary grades, since any gains made by their students over a given year can reasonably be associated with just one teacher.

and ongoing training for mentors that continue as long as they work in this role. The estimated value of the return on this training is based on the difference between the average mentor salary and the salary of a first-year teacher who would be hired to take over the mentor's classroom. That difference is distributed across the caseload of new teachers and discounted by the satisfaction ratings of the new teachers when they are surveyed for their opinions about the program and their mentors. On average, 95% of new teachers rated their mentors as "very effective", the highest rating. However, the survey response rate was only 60%, and so, accounting for the missing 40%, we adjusted the effectiveness estimate to 77%. The average salary difference approached $22,000, 77% of which, distributed among a mentor's caseload of 15, amounted to $1,140 per teacher.

6.2.5. Student Academic Returns due to Assignment

This category measures benefits that accrue to students from having a high performing teacher, such as an increased interest in school, better attendance rates, reduced dropout rates, access to AP courses, access to college, and, ultimately in the workplace, access to higher salaries. While none of these is measured directly, we know from other research (e.g. Masse & Barnett, 2002; Sanders & Horn, 1994) that effective teachers have an influence on these factors and that investments in human capital are often realized much later in life. Because we assume that not all new teachers are highly effective, we attribute this benefit only to new teachers whose students' gain scores as a class that are one standard deviation above the district mean. Seven out of 49 beginning elementary school teachers (14.4%) registered one standard deviation above the district mean, indicating that their classes showed average gains of at least 5.5 NCEs on SAT9 reading. In order to attach a monetary value to the effectiveness of this proportion of teachers, we searched for an education program with known investments and targeted objectives similar to induction programs for new teachers to serve as a proxy. We identified the state class size reduction initiative for elementary grades K-3. Like induction, class size reduction is organized in a way that benefits all students in those classrooms with the goal of increased achievement gains. We need not assume that the state of California spent this money for class-size reduction well. For mentoring to be worthwhile, all it has to do is give the same or higher benefit per dollar spent as the class-size-reduction initiative gives.

In 2002 the state spent $14,605 per classroom in that school district for class size reduction. Based on the percentage of elementary-level new teachers registering one standard deviation above the mean (14%), this totaled 24.4 teachers when extended to all grade levels. When 24.4 is multiplied by the classroom size reduction investment ($14,605) and divided by 171 new teachers in the program, the resulting return is $2,084 per teacher.

6.2.6. Other Benefits

The California BTSA legislation mandated that induction support programs should establish working communities of learners. In this setting, teachers and mentors can exchange ideas through sanctioned networks and thus derive added support for their work. In the program under investigation mentors met weekly and new teachers bi-weekly with mentors as a group. No monetary value was assigned to this benefit, but we know the structure is in place and, from focus group interviews of mentors, were highly valued by the group.

One might presume, and anecdotal reports from mentors substantiate, that experience as mentors leads to improvement in the mentors' own teaching ability. We had no way of measuring or quantifying this potential indirect benefit, but recognize that it probably exists. Related to the possible enhancement of mentor teaching skills is an increased readiness to take on other leadership responsibilities once the mentors return to their school sites. This may be in the form of formal administrative roles such as assistant principal work, department chairmanship, or any number of committee responsibilities. We are presently researching these kinds of outcomes for former mentors but as yet have no empirical data that could be used as a basis for calculating monetary benefits.

6.2.7. Summary of Benefits

A summary of all monetized costs and benefits is portrayed in Table 5. Subtraction of per-teacher costs of $13,000+ from the benefits of almost $20,000, shows that each investment in a new teacher yields a little over $6,500. The implication from Fuller's (2000) study on the cost of turnover is that reducing teacher turnover represents the most important saving earned by a successful new teacher support program such as the Texas Beginning Educator Support System (TxBESS). Our study suggests that increasing teacher effectiveness provides far greater benefits (49% of the total) than does reducing teacher attrition (8% of the total) (see Figure 5). One might reasonably expect beginning teachers to lag behind their peers in effectiveness, but, in this population, beginners resembled fourth-year teachers, thus yielding a substantial return when expressed in salary differences.

7. Conclusions and Implications

Most discussions of induction benefits and costs focus on the savings from reduced turnover to justify program investments (see Fuller, 2000). By measuring the full range of benefit streams accruing to induction, we were able to show that induction returns extend far beyond mere retention questions. The influence on new teacher practice is by far the most important benefit and potentially extends farther if we consider the benefits to children assigned to effective teachers over the course of their K-12 careers. Savings from new teacher attrition amount to only 8% of the total benefits the program yields.

While we valued as many theoretical effects from the program as possible, we could not include those that accrue far into the future. For example, assignment benefits were limited to two years, but properly analyzed, could extend out to include valuations on increased access to colleges and universities, or on increased earnings by the time the students are ready to join the work force. Another item not valued in this design is the benefit represented by a fully trained mentor returning to the classroom. It is highly likely that the mentoring experience adds value to the teaching skills and raises the pedagogical level of the veteran teacher. Nonetheless, we captured what we believe is the most important impact of new teacher induction, the change in classroom practice and its effect on students.

From an administrative perspective, the program is a clear winner. Assuming the costs of hiring a replacement represent 50% of a new teacher's salary, an investment in an intensive model of new teacher induction in a given district pays $1.50 for every $1 spent. Another way to state the impact is, after five years the induction program saw a fifty percent return to society. From a public policy perspective, it may be argued, the program would have been considered a winner had it simply broken even. That is to say, public policy does not assume a profit margin on public spending in order to make the investment in the first place.

While mentoring programs of support for beginning teachers have become more visible during the past ten years, no rigorous analysis, to our knowledge, has been performed to assess the potential return on investment for such programs. The analysis described here provides educational decision-makers, either at school district or policy levels with information that may guide them in how to spend education dollars.

References

Barnett, W.S. (1985). Benefit-cost analysis of the Perry Preschool Program and its policy implications. *Educational Evaluation and Policy Analysis, 7*(4), 333-342.

Becker, G.S. (1964). *Human Capital*. New York: Columbia University Press.

Belfield, C.R. (2003). Estimating the rate of return to educational investments: A case study using the Big Brothers Big Sisters mentoring program. New York, NY: National Center for the Study of Privatization in Education, Teachers College, Columbia University. Retrieved on 9/17/2004 from http://www.ncspe.org/publications_files/bbbs.pdf

California Commission on Teacher Credentialing (2002a). *Standards of quality and effectiveness for professional teacher induction programs*. Retrieved on 5/15/2004 from http://www.ctc.ca.gov/educator-standards/Induction-Program-Standards.pdf

California Commission on Teacher Credentialing (2002b). *Preliminary report on teacher retention in California.* Retrieved August 1 from http://134.186.81.70/reports/PrelimRptOnTeacherRetInCA.pdf.

Colbert, J.A. & Wolff, D.E. (1992). Surviving in urban schools: a collaborative model for a beginning teacher support system. *Journal of Teacher Education, 43*(3), 193-199.

Daneshvary, N. & Clauretie, T. (2001). Efficiency and costs in education: Year-round versus traditional schedules. *Economics of Education Review, 20*, 279-287.

Education Week (2004). Retrieved on 8/1/2004 from http://www.edweek.org/reports/qc04/reports/17support-tl.cfm

Fideler, E., and Haselkorn, D. (1999). *Learning the roles: Urban teacher induction practices in the United States.* Belmont, MA: Recruiting New Teachers, Inc.

Fraser, J. (2003). *Investing today for tomorrow: The costs and benefits of early childhood care and education.* Special Report, University of Pittsburgh Office of Child Development, 4 pages. Retrieved on 11/1/2004 from http://www.education.pitt.edu/ocd/publications/sr2003-06.pdf

Fuerst, J.S. & Fuerst, D. (1993). Chicago experience with an early childhood program: The special case of the Child Parent Center Program. *Urban Education, 28* (1), 69-96.

Fuller, E. (2000). *The cost of teacher turnover.* Report prepared for the Texas State Board for Educator Certification (SBEC). Austin, TX: Texas Center for Educational Research.

Gramlich, E.M. (1998). *A guide to benefit-cost analysis (2nd edition).* Prospect Heights, IL: Waveland Press.

Grossman, J.B., and Tierney, J.P. (1998). Does mentoring work? An impact study of the Big Brothers Big Sisters program. *Evaluation Review, 22*, 403-426

Haveman, R. & Wolfe, B. (1984). Schooling and economic well-being: The role of nonmarket effects. *Journal of Human Resources, 19*(3), 377-407.

Heaton, C., & Trhosby, D. (1998). Benefit-cost analysis of foreign student flows from developing countries: The case of postgraduate education. *Economics of Education Review, 17* (2), 117-126.

Herrnstein, R.J. (1997). *The matching law.* Beverly Hills, CA: Russell Sage Foundation.

Hummel-Rossi, B and Ashdown, J. (2002) The state of cost-benefit and cost-effectiveness analyses in education. *Review of Education Research, 72*(1), 1-30.

Ingersoll, R.M. (2002). The teacher shortage: A case of wrong diagnosis and wrong prescription. *NASSP*

Buletin, 86(631, June), 16-31.
Kelman, S. (1981). Cost-benefit analysis: An ethical critique. *AEI Journal on Government and Society Regulations*, Jan/Feb, 33-40.
Lambur, M., Rajgopal, R., Lewis, E., Cox, R., and Ellerbrock, M. (2003). *Applying cost benefit analysis to nutrition education programs: Focus on the Virginia Expanded Food and Nutrition Program.* Publication Number 490-403, Virginia Tech. Retrieved from: http://www.ext.vt.edu/pubs/nutrition/490-403/490-403.html
Masse, L.N. & Barnett, W.S. (2002). A benefit cost analysis of the Abecedarian early childhood intervention. New Brunswick, NJ: Natioanl Institute for Early Education Research. Retrieved on 9/17/2004 from: http://nieer.org/resources/research/AbecedarianStudy.pdf
Mishan, *E.J. (1976). Cost-benefit analysis*, 2d ed. New York: Prager Publishers.
Munoz, M.A., & Munoz, M.D. (2000). *Evaluating training: Return on investment and cost-benefit analysis.* ERIC document ED 471 457, 24 p.
National Commission on Teaching & America's Future. (1996). *What matters most: Teaching for America's future.* New York:NCTAF
Mohr, L. B. (1988). Impact analysis for program evaluation. Dorsey Press: Chicago, IL.
Nussbaum, M.C. (2001). The costs of tragedy: Some moral limits of cost-benefit analysis. In Adler, M.D., and E.A. Posner (Eds.): *Cost-benefit analysis. Legal, economic, and philosophical perspective*s. Chicago: University of Chicago Press.
Odell, S.J., & Ferraro, D.P. (1992). Teacher mentoring and teacher retention. *Journal of Teacher Education, 43*(3), 200-204.

Pearson, M.J.T., and Honig, W. (1992). *Success for Beginning Teachers.* Sacramento, CA: California Department of Education.
Posner, R.A. (2001). Cost-benefit analysis: Definition, justification, and comment on conference papers. In Adler, M.D., and E.A. Posner (Eds.): *Cost-benefit analysis. Legal, economic, and philosophical perspective*s. Chicago: University of Chicago Press.
Rosen, H. (2005). *Public Finance, 7th Edition.* New York: McGraw Hill.

Sanders, W. L., and Horn, S. P. (1994). The Tennessee value-added assessment system (TVAAS): Mixed model methodology in educational assessment. *Journal of Personnel Evaluation in Education, 8*, 299-311.
Smith, T. M., & Ingersoll, R.M. (2004). What are the effects of induction and mentoring on beginning teacher turnover? *American Educational Research Journal, 41*(2), forthcoming.
Solow, R.M. (1981). "Cost-benefit analysis: An ethical critique: Replies," *AEI Journal on Government and Society Regulations*, March/April.
Strong, M. & St. John, L. (2001). A study of teacher retention: The effects of mentoring for beginning teachers. *Working Paper # 3.* Santa Cruz, CA: New Teacher Center at UC Santa Cruz.
Strong, M., Fletcher, S., and Villar, A. (2004). *An investigation of the effects of teacher experience and teacher preparedness on the performance of Latino students in California.* Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA, April 14.
Whalen, T. & Wright, D. (1999). Methodology for cost-benefit analysis of web-based tele-learning: Case study of the Bell Online Institute. *The American Journal of Distance Education, 13* (1), 25-43.

Table 1
Benefits and Test Design

<table>
<tr><th>Benefits</th><th>Counterfactual Data</th><th>Test Design and Diagram</th><th>Threats to Validity</th></tr>
<tr><td>New teacher effectiveness returns</td><td rowspan="2">3-year achievement gain differential by teacher group</td><td rowspan="2">Regression discontinuity
Ae T Ye
Ac Yc</td><td rowspan="2">Contamination possible only if assignment to treatment and control is not strict</td></tr>
<tr><td>Student academic returns</td></tr>
<tr><td>Returns on original credential investment from reduced attrition</td><td rowspan="3">Attrition differential: district to state average</td><td rowspan="3">Comparative Change
Xe T Ye
Xc Yc</td><td rowspan="3">Possible selection –Q; Possible contamination from divergent events, maturation, attrition, and regression</td></tr>
<tr><td>Savings from reduced attrition</td></tr>
<tr><td>Savings on induction training investments from reduced attrition</td></tr>
<tr><td>Mentor effectiveness returns</td><td>Average new teacher</td><td>One-shot case</td><td>Without comparison</td></tr>
</table>

	outcome ratings of mentor effectiveness discounted for non-response	study T Y	group, not a valid design for impact analysis

Table 2
Cost Streams, Data Sources & Operationalization

Who Pays	Costs	Data Sources	Operationalization
District	Mentor salaries	District BTSA budget and salary schedule	Cost of mentor salaries distributed per beginning teacher (BT)
District	Professional development, admin overhead, supplies and indirect costs	District BTSA budget and expenditures	Costs of providing ongoing professional development for both mentors and BTs distributed per BT
District	Mentor travel expenses	District professional development budget	Cost of mentor travel distributed per BT
New Teacher	BT private time	Project design; BT salary schedule	BT private time invested in the program calculated at half of hourly pay rate

Table 3
Benefit Streams, Data Sources & Operationaliztion

Who Benefits	Benefits	Data Sources	Operationalization
District	Savings from reduced attrition	California State retention and induction district retention rates	Difference in retention rates valued per beginning teacher (BT)
District	Savings on induction training investments	District expenditures on professional development	Savings calculated based on retention difference and distributed per BT
District	Beginning teacher effectiveness returns	SAT9 student achievement data; district salary schedules	Individual student SAT9 achievement scores; achievement organized by classroom; BTs compared to more experienced teachers and valued per BT
District	Mentor effectiveness returns	Induction program survey; district salary schedules	Teacher ratings of mentor effectiveness valued against difference between mentor salaries and replacement teacher salary distributed per BT
Student	Student effectiveness returns	SAT9 student achievement data; state investments in class-size reduction for the district	Identify proportion of BTs one standard deviation or more above mean, value at the rate of class-size reduction investments, and distribute per BT

Table 4
Comparison of Student Achievement Test Score Gains by Teacher Career Status

Career Status / Test Score Gains	New Teachers	Mid-career Teachers	Veteran Teachers
3-Year Average SAT9 Gain Score (NCEs)	2.27	2.5	1.69
Beat the District Mean (%)	57.14%	56.36%	50.00%
Approaching Average Growth or Better (%)	69.38%	69.09%	62.50%

Table 5
Net Present Value of Induction Over Five Years Calculated at a 4% Discount Rate and Attrition Costs Estimated at 50% of a New Teacher's Salary

NPV of Returns over 5 years	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Savings* From Induction						
BT Savings on Credential Investment/BT	$327.00	$314.42	$302.33	$290.70	$279.52	$1,513.98
Attrition Savings/BT	$360.00	$346.15	$332.84	$320.04	$307.73	$1,666.76
Savings on Investment in Induction Training /BT	$119.00	$114.42	$110.02	$105.79	$101.72	$550.96
Returns on Training Investment						
BT Effectiveness Returns/BT	$4,968.00	$3,184.62	$1,531.07	$0.00	$0.00	$9,683.68
Mentor Effectiveness Returns/BT	$1,139.00	$1,095.19	$0.00	$0.00	$0.00	$2,234.19
Student Academic Returns/BT	$2,084.00	$2,003.85	$0.00	$0.00	$0.00	$4,087.85
Total Benefits						$19,737.41
NPV of Costs over 2 years						
Program Costs						
Mentor Salaries/BT	$4,418.00	$4,248.08				$8,666.08
Trainings, Admin Overhead, Supplies, Ind. Costs/BT	$1,371.00	$1,318.27				$2,689.27
Mentor Travel Costs/BT	$37.00	$35.58				$72.58
Private Costs						
BT Private Time/BT	$880.00	$846.15				$1,726.15
Total Costs						$13,154.08
Total NPV	$2,291.00	$610.58	$2,276.26	$716.53	$688.97	$6,583.34
* Savings Compare District Rates to State Rates of New Teacher Attrition Using 2% Differential						

Figure 1
Outcome Line for Comprehensive Model of Induction

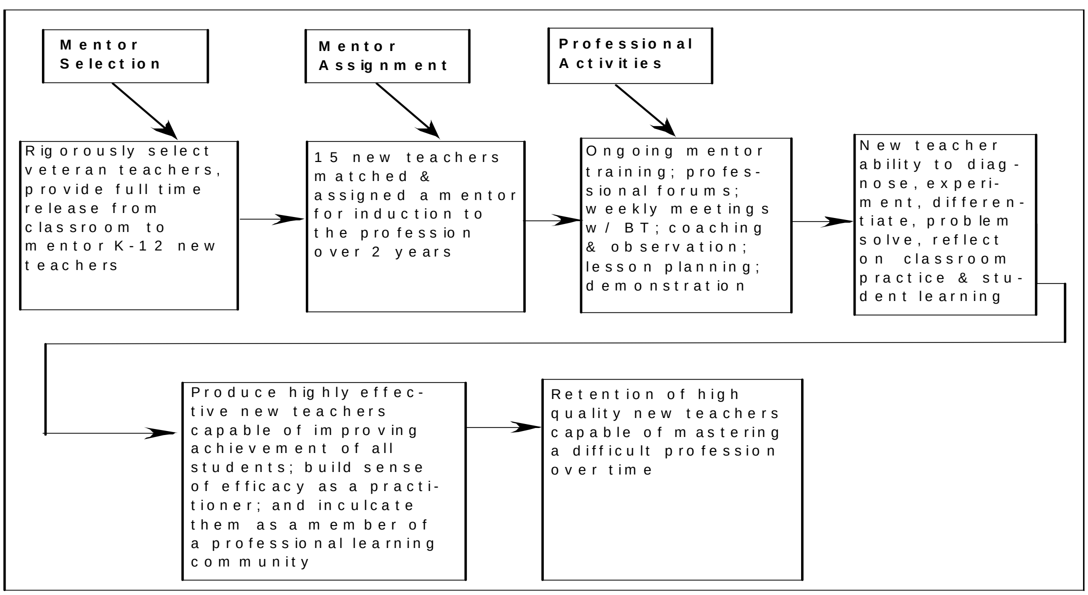


Figure 2
Distribution of Costs

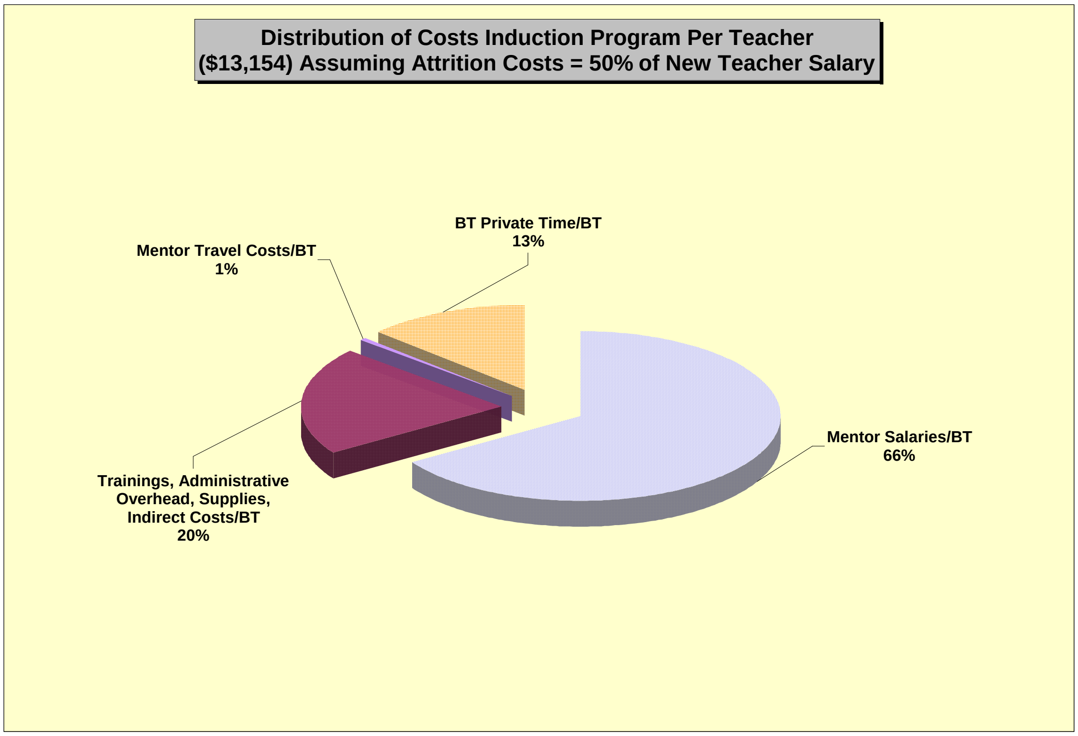
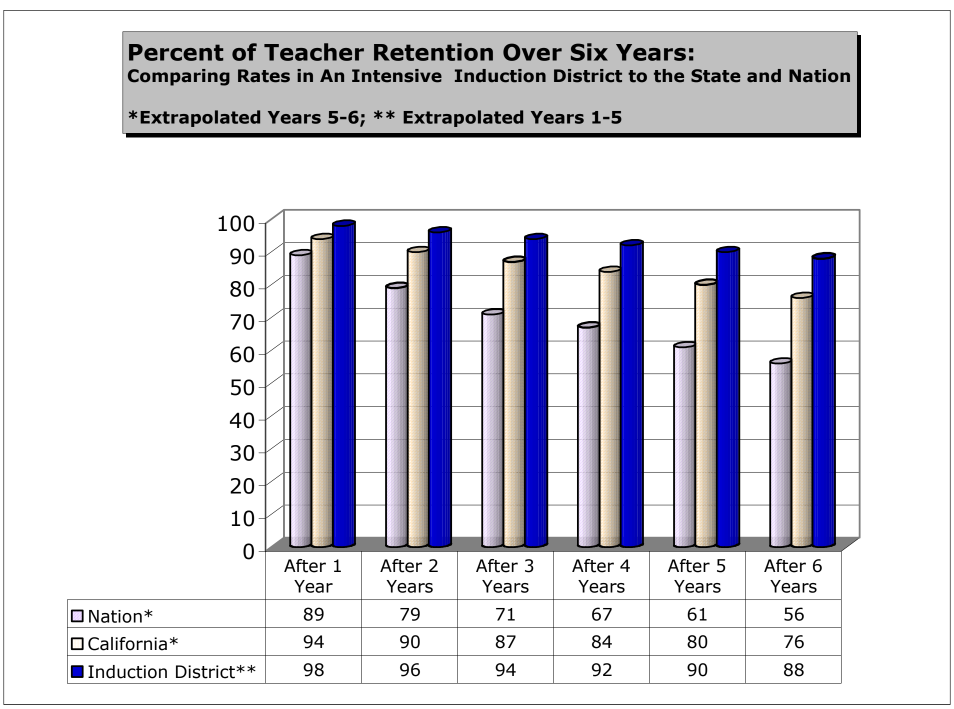


Figure 3
Teacher Retention Rates Over Six Years:
Comparing the Induction District with California and National Figures



	After 1 Year	After 2 Years	After 3 Years	After 4 Years	After 5 Years	After 6 Years
Nation*	89	79	71	67	61	56
California*	94	90	87	84	80	76
Induction District**	98	96	94	92	90	88

Figure 4

Net Present Value of Induction Varied by Attrition Condition

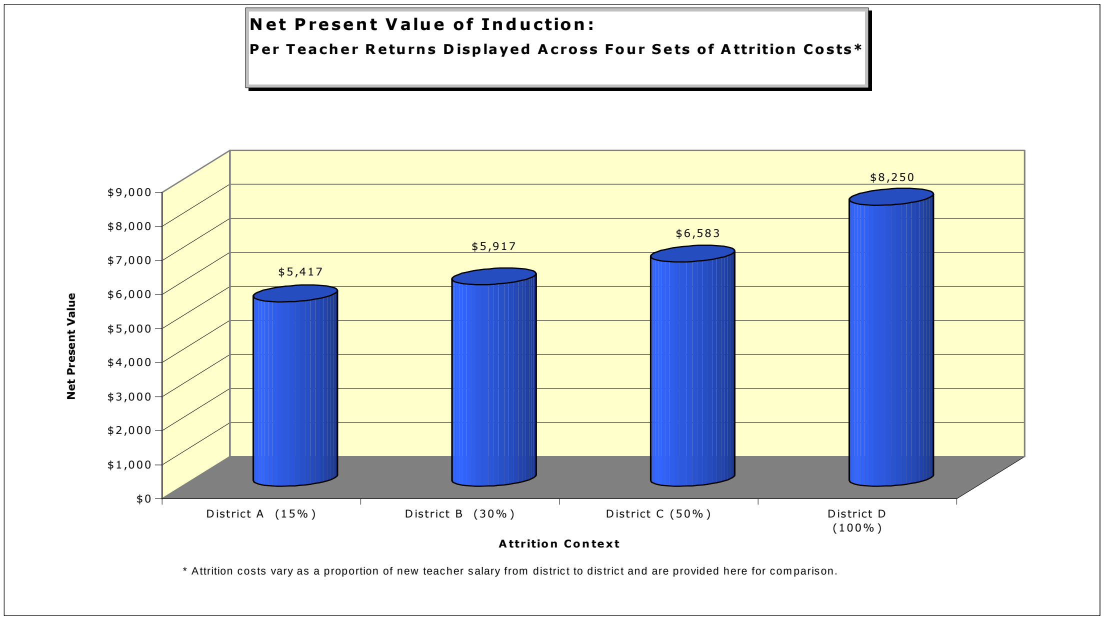


Figure 5
Distribution of Benefits