Consortium for Educational Research and Evaluation– North Carolina

A Preliminary Cost Analysis of North Carolina's Race to the Top Initiatives

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Preface: Study Context and Limitations

With nearly $400 million over four years dedicated to funding twelve state initiatives and multiple local initiatives that serve over 1.4 million students, nearly 100,000 teachers, and over 5,000 administrators, North Carolina's Race to the Top (RttT) grant is a broad and extensive undertaking. The RttT grant is intended to allow North Carolina to develop and implement innovative education policies and practices, but as the end of the grant period approaches, decisions must be made as to which policies can and should be continued. In making these choices, it is imperative that decision-makers understand the costs as well as the outcomes associated with each initiative. The state RttT proposal included a commitment to an independent evaluation of all of its grant-funded initiatives, and this report provides a preliminary cost analysis of seven of the state-level RttT initiatives to help inform that understanding.

The report presents preliminary cost analyses rather than full cost-effectiveness analyses (CEA) because several temporal factors limit the availability of data on the actual impacts of individual RttT initiatives on student achievement. These factors include: the amount of time early in the grant period that was required for effective start-up of many of the initiatives; the time required for initiatives that directly affect schools, administrators, teachers, curriculum, and practices to extend that impact to students; and the time necessary for expenditure data to reflect the full implementation of the initiatives:

- *Implementation timelines*—The most significant of the temporal factors is the current unavailability of outcome measures that reflect the outcomes of fully implemented initiatives. The most important outcomes of interest are initiative impacts on student outcomes (for example, student achievement and graduation from high school); however, because at the time that data had to be collected in order to conduct this study most initiatives had been fully implemented for only a relatively short amount of time, meaningful measures of outcomes from fully implemented programs were not yet available.
- *Indirect effects on students*—Many initiatives were designed with the overall goal of improving student outcomes through successful accomplishment of other, often different, intermediate goals (for example, Regional Leadership Academies prepare administrators who take positions in low-performing schools and then work to improve student performance in those schools). Accordingly, given the time required for these intermediate outcomes to affect student outcomes, a CEA after only one or two years of implementation of initiatives of this kind would provide only limited insights about the actual cost-effectiveness of that initiative.
- *Expenditure data*—Documentation and categorization of expenditure data make it difficult to differentiate expenditures in certain areas. Accordingly, this analysis must rely on both the actual expenditure data and the working budgets of each initiative to provide a basis for projecting costs for the period after the RttT funding has concluded. This approach requires an assumption that the implementation of a given initiatives has been in accordance with

projections from that initiative's working budget. More years of expenditure data will reduce the reliance on this assumption.

The current analyses rely primarily on state expenditures from 2010-11 through 2012-13 and thus provide only a preliminary assessment of the projected costs and potential benefits of several RttT initiatives in their post-grant state. However, by summarizing research on the impact of student learning from related non-RttT projects and by examining expenditure patterns to date, these analyses do lay the groundwork for future evaluation work that can provide more complete cost-effectiveness analyses using student achievement data from the final year of the RttT period.

Initiatives for which initial cost analyses have been completed for this report include:

- Turning Around Low-Achieving Schools;
- STEM Schools Network;
- New Teacher Support Program;
- North Carolina Teacher Corps;
- Regional Leadership Academies;
- Professional Development; and
- North Carolina Virtual Public School STEM Blended Learning.

Three initiatives for which CEAs have been conducted previously are not included in this report:

- Pay-for-performance incentives for District and School Transformation schools;
- State strategic staffing incentives; and
- Local-level RttT spending—including local spending associated with the North Carolina Education Cloud Computing initiative, local professional development, and local strategic staffing[1]

As more outcome data become available, future evaluations will be able to include CEAs that incorporate estimates of initiative impacts on both intermediate outcomes (such as changes in educator behaviors) and student outcomes. Similarly, more years of expenditure data will support improvements to the initial cost projections included in this report. Thus, one goal of the final overall RttT evaluation report will be to provide a more complete cost-effectiveness analysis for each initiative, though actual final expenditures, as well as accurate estimates of initiative impacts, will not be available until after the funding period ends (June 30, 2015).

[1] Executive summaries and the most recent and past reports for each of these initiatives are available at http://cerenc.org. There are no direct, measurable outcomes associated with another RttT initiative—the expansion of the North Carolina Educator Evaluation System—that would allow for a meaningful cost analysis, and the implementation timeline of the RttT-funded Home Base initiative did not allow for inclusion of meaningful cost analysis in this report.

Introduction

Purpose of the Report

North Carolina's RttT proposal included a commitment to an independent evaluation of all of its grant-funded initiatives.[2] The roles of the RttT Evaluation Team are to (1) document the activities of the RttT initiatives; (2) provide timely, formative data, analyses, and recommendations to help the initiative teams improve their ongoing work; and (3) provide summative evaluation results toward the end of the grant period to determine whether the RttT initiatives met their goals and to inform future policy and program decisions to sustain, modify, or discontinue initiatives after the grant-funded period.

For summative evaluations to provide a useful basis for decision-making, many experts consider it optimal to provide information on costs and/or expenditures, in addition to estimating the effects of the initiatives (Rossi, Lipsey, & Freeman 2004). This report represents an initial step toward accomplishing the goal of providing actionable cost information at the end of the RttT funding period. The report provides a preliminary analysis of the costs associated with the seven state-level RttT initiatives for which meaningful preliminary cost analyses could be completed and that have not been analyzed in previous reports,[3] along with factors for consideration when making final estimates of the relationships between effects and costs for individual initiatives during the final year of the RttT period.

The analyses in this report include expenditure data through the third year of RttT implementation (the 2012-13 school year). The implementation timelines of the individual initiatives varied considerably and many of the initiatives were not scheduled to be implemented at scale until the second or third year of RttT funding. Therefore, data limitations required that assumptions be made about each initiative's ultimate outcomes and overall costs.

At this point in the implementation of the RttT initiatives, the Evaluation Team cannot provide solid data about impacts on student achievement for individual initiatives. This limitation is due to a combination of three factors: (1) the start-up time required to fully implement the initiatives; (2) the time required for initiatives that directly impact schools, districts, administrators, teachers, curriculum, and instructional practices to impact student performance; and (3) the time lag between student assessments and when data from those assessments become available to the

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[2] The evaluation is being conducted by the Consortium for Educational Research and Evaluation–North Carolina (CERE–NC), a partnership of: the SERVE Center, University of North Carolina at Greensboro; the Education Policy Initiative at Carolina, University of North Carolina at Chapel Hill; and the Friday Institute for Educational Innovation, North Carolina State University.

[3] Three RttT initiatives for which cost analyses have been conducted are not included in this report: Pay-for-performance incentives for District and School Transformation schools; state strategic staffing incentives; and local spending—including local spending associated with the North Carolina Education Cloud Computing initiative, local professional development, and local strategic staffing. Executive summaries and full evaluation reports for these initiatives are available at http://cerenc.org. In addition, there are no direct, measurable outcomes associated with another RttT initiative—the expansion of the North Carolina Educator Evaluation System—that would allow for a meaningful cost analysis, and the implementation timeline of the RttT-funded Home Base initiative did not allow for inclusion of meaningful cost analysis in this report.

Team. Therefore, at this point in the implementation process, it could be misleading to either estimate preliminary impacts or project impacts of the RttT initiatives.

In addition, the effects of individual initiatives or the combined effects of multiple initiatives potentially could be underestimated since at the time the analyses in this report were conducted some of the initiatives had not yet been implemented at the scale that they will reach by the end of the grant period.

Furthermore, RttT consists of many initiatives that may affect schools, teachers, and administrators in different ways. It was the intent of the RttT plan that these initiatives might complement one another and enhance their individual effectiveness, and it is entirely plausible that they will; however, it is also plausible that initiatives may compete with each other for the set amount of time and resources that are available, or that educators may suffer from initiative fatigue.[4] Since we do not yet have information that would enable us to quantify the interactions among initiatives, this analysis assumes that the effects of each initiative are independent—that is, that they are neither positively nor negatively affected by any other initiatives.

With these issues considered, and to better frame a program sustainability discussion, we chose to summarize prior evaluations of the impact of similar or related non-RttT projects on student learning. While these summaries are not included for the purpose of making direct one-to-one comparisons to the RttT initiatives, they do provide a point of reference for estimates of effectiveness.

Finally, the analyses provided in this report focus on each individual North Carolina RttT initiative's costs and potential outcomes, without the explicit intention of implying initiative-to-initiative comparisons. Only after the RttT funding period has closed (June 30, 2015) will it be possible to provide a summative evaluation of all of the initiatives that includes estimates of their effects on students, teachers, and schools, as well as an analysis of the costs associated with the initiatives.

Structure of the Report

For each of the seven initiatives included in this report, the Evaluation Team describes the initiative, provides contextual information about potential impacts based on previous analyses of related programs as well as information about actual implementation of the RttT initiatives that may affect outcomes, and information on costs. For consistency, each analysis is presented as follows:

- *Description*: This section provides a brief description of the initiative.
- *Initiative Design and Implementation*: This section is presented using two subsections.

[4] Reeves (2010) suggests that there are three essential resources available to educators—time, money, and emotional energy—which are all fixed. As the number of new initiatives increases—regardless of how well conceived—each successive initiative will receive less of each resource.

  - The first subsection, *Evidence from research literature*, discusses the potential impacts of the initiative on various outcomes. These impacts are based on evaluations of the effects of programs that, while not identical, are the most similar to the initiative in question that are available. The primary impact measure is student achievement; however, there are many other intermediate outcomes and, to the extent possible, these outcomes also are discussed.
  - The second subsection, *Preliminary implementation findings*, summarizes key findings from reports prepared by the RttT Evaluation Team (where available) to address the extent to which the design and implementation of the initiative may affect outcomes. The subsection specifically addresses questions such as: Does the initiative share a similar design to programs that have been shown to have positive impacts? Were there difficulties in implementation that may affect either intermediate or long-term outcomes? Looking forward, are there anticipated implementation issues that may affect outcomes?

- *State Expenditures:* This section summarizes state expenditures for each initiative for the first three years of the RttT grant (FY 2010-11, FY 2011-12, and FY 2012-13). The life-to-date projected budget also is provided for comparison. From these data, an expected initiative cost for the first year after RttT funding ends is projected.
- *Local Expenditures*: To get a more comprehensive understanding of potential costs moving forward, it is necessary to understand the degree to which local education agencies (LEAs)[5] may have to provide additional funding to support statewide initiatives. However, the Evaluation Team is unable to quantify these costs accurately since the local expenditure data do not allow for an indication of whether or not a given local expenditure was in support of a specific statewide initiative. Thus, for each initiative, these sections discuss the types of costs LEAs may have incurred.

[5] LEA is North Carolina's term for traditional school districts and charter schools.

Data Sources and Methodology

The financial data used for these analyses consist primarily of budget and expenditure information provided by the North Carolina Department of Public Instruction (NCDPI); in a few cases the analyses supplemented these data with information from the program or from other CERE-NC reports to provide sufficient detail to conduct the analyses. The Evaluation Team took the data from NCDPI and grouped expenditures into categories based on definitions used by the Team. Evaluation reports produced by CERE-NC[6] provided information on initiative implementation and, in some cases, initial outcomes. The analyses also utilized data gathered from reviews of high-quality research, as defined by the What Works Clearinghouse (WWC).[7]

Definitions and Measures

For this report, costs are defined as actual public sector expenditures for the initiative, and they comprise only the direct costs of the initiatives, thereby assuming no social or opportunity costs.[8] Costs are totaled by year since most of the costs associated with the initiatives recur on an annual basis.

The estimation of initiative costs moving forward is not a simple transference of actual costs. Rather, the estimation of costs must consider implementation issues, possible initiative scale-up or scale-down, and significant program changes. However, the actual expenditure data can be used to help inform investment, variable, and fixed costs so that, to the extent possible, a post-RttT yearly cost can be estimated. It is important to note that, due to the timing of data collection and the method by which expenditures are aggregated into expenditure categories, there may be slight variation in reported expenditures when compared to state expenditure reports. Specifically, although this report uses the audited financial data from 2010-11 and 2011-12, for 2012-13 the report uses data as of June 30, 2013, which does not include the audited financial data for fiscal year 2012-13 reported by the state in August 2013.

For the purpose of this report, three different types of expenditures are summed to calculate the total expenditures: capital costs; costs that vary by program size; and costs per year that are needed to implement the initiative. Capital costs are defined for the purpose of this report as expenditures for assets that are expected to last for longer than one year. Costs that vary by program size—or variable costs—are typically related to the number of participants in the

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[6] http://cerenc.org

[7] This What Works Clearinghouse designation is "the middle possible rating for a group design study reviewed by the WWC. Studies receiving this rating provide a lower degree of confidence that an observed effect was caused by the intervention" – retrieved from http://ies.ed.gov/ncee/wwc/glossary.aspx on June 16, 2014. Also see the WWC Procedures and Standards Handbook (Version 2.1) at http://ies.ed.gov/ncee/wwc/pdf/reference_resources/wwc_procedures_v2_1_standards_handbook.pdf

[8] The absence of social or opportunity costs is unlikely, but this assumption greatly simplifies the analyses. For example, although the direct cost of travel is included in the analyses, the social costs of travel (such as impacts of traffic congestion) are difficult to quantify accurately. Accounting for opportunity costs is equally challenging, since we cannot accurately identify the alternatives foregone in favor of the respective initiatives.

initiative. Per-year costs—or fixed costs—are expenditures related to implementation of the initiatives that are not sensitive to the number of participants.[9]

As mentioned above, implementation timelines vary by initiative, as some initiatives were more developed than others at the time of this report. More importantly, these analyses are meant to be forward-looking in the comparison of initiatives. Where appropriate, the analyses also make further distinctions in the number of possible participants in the estimation of variable cost.

This report also relies on effect estimates from high-quality evaluations of programs that closely resemble the North Carolina RttT initiatives examined in this report. The analyses include as many effect estimates as possible, but the availability of information about the impact of similar programs varies by initiative and is often limited. Also, in an effort to make the effect estimates more meaningful, they are reported in terms of days of student learning and standard deviation units. To provide a benchmark for expected student achievement without intervention, the key assumption is that student gains in math and reading of one half of a standard deviation represent one year of education. Given the standard 180-day school year, we estimate that one additional day of student learning is equivalent to a 0.3% increase in student achievement.[10]

In addition to the impact on student achievement, the RttT initiatives are expected to affect other student outcomes, as well as other educational outcomes. To the extent possible, these outcomes are considered and discussed as they apply to each initiative. Actual estimates of initiative impacts will not be available until at least the final year of the funding period.

[9] The Appendix includes the technical specifications for the general formula for calculating initiative cost per year. The formula does not include startup or sunk costs, which are not expected to recur.
[10] These estimates are approximated from Hill et al. (2008).

Findings

Turning Around Low-Achieving Schools

Description

As a key part of the RttT grant, the state committed to turning around the lowest-performing 5% of its schools. The District and School Transformation Division (DST) of NCDPI identified 118 schools and 12 low-performing LEAs for intervention. In many cases, the targeted schools were located within the targeted LEAs. Consistent with US Department of Education (USED) policies governing RttT grants, low-achieving schools in these LEAs have implemented one of the four USED models (Turnaround, Transformation, Restart, or Closure). Of the 118 schools, 12 closed; a majority of the remaining 106 schools chose Transformation, which includes 12 components:

1. Determination of whether the principal should be replaced;
2. Implementation of a new teacher and leader evaluation system;
3. Identification of and rewards for staff who are increasing student outcomes; support and then remove those who are not;
4. Implementation of strategies to recruit, place, and retain staff;
5. Selection and implementation of an instructional model based on student needs;
6. Provision of job-embedded professional development designed to build capacity and support staff;
7. Continuous use of data to inform and differentiate instruction;
8. Provision of increased learning time;
9. Provision of an ongoing mechanism for community and family engagement;
10. Development of partnerships to provide social-emotional and community-oriented services and supports;
11. Provision of sufficient operating flexibility to implement reform; and
12. Provision of ongoing technical assistance.

DST provides school-level professional development and LEA-, school-, and classroom-level coaching to help assure that all model components are addressed. Each school also developed a Framework for Action that serves as a guide to improvement activities and is centered on similar components but tailored to each school's specific needs and circumstances.

Initiative Design and Implementation

Evidence from research literature. Unlike many of the RttT programs, DST was built around a preexisting program, NCDPI's School Turnaround Program (2006-2010). Estimates of effects from the School Turnaround Program can be used to approximate the probable benefits of the RttT-funded turnaround efforts. These estimates are the best available source of outcome measures for DST because there are very few similarly structured programs and those that exist

have not had high-quality evaluations. The evaluation of the prior DST efforts in high schools found average increases of 4.7% of a standard deviation on both mathematics and English End-of-Course tests, or roughly 16 days of student learning for each subject (Thompson et al., 2011).[11] The same evaluation found no significant increase in middle school test scores and generated no estimates for elementary school. The DST Evaluation Team suggests that the findings of no significant increases among middle school students in schools served by DST could be related to the later implementation start date in those schools (DST did not provide services to middle schools until the 2007-08 school year), since changes in outcomes may be delayed. Moving forward, the final DST evaluation will provide more specific estimates of initiative impacts, which will be used in the final cost-effectiveness analysis.

Preliminary implementation findings. In addition to turning around measured student achievement in the lowest-achieving 5% of schools at each level, DST also seeks to raise graduation rates in conventional high schools that had a 4-year graduation rate below 60% in both 2009-10 and either 2007-08 or 2008-09. According to NCDPI-reported data, by 2012 only two of the original 29 high schools with low graduation rates still had rates under 60%. This, plus the general trend of improvement in graduation rates statewide, suggests that DST will meet its goal for the improvement of high school graduation rates.

As indicated in the previous section, the DST program builds on and shares several central features with the earlier School Turnaround Program (STP). However, there are three main differences between STP and the RttT-funded DST program that may result in different impacts for the latter. First, STP contracted with the Leadership Group for the Carolinas for school-level coaches and some of the associated support for these coaches; after RttT support became available, DST hired and supported these coaches directly, a change that program leaders saw as a way to acquire more person-power per dollar expended. Second, while STP did work with elementary and middle as well as high schools, its initial and primary focus was at the high school level; DST's work has been distributed across the lowest-achieving 5% of all three levels from the outset as well as districts and schools with the lowest graduation rates. Finally, in response to RttT mandates, STP's central functions—school-based planning and implementation structured by a Framework for Action, along with professional development-sustained coaching to support implementation—were complemented by the other components enumerated in the *Description* section above. In light of these complex changes from the STP to the DST initiative, it is difficult to predict how similar DST student achievement outcomes may be to those observed for STP.

[11] Difference-in-difference estimates were used to estimate the improvements in test scores in DST schools compared to other similar schools.

State Expenditures

Table 1 provides a summary of the expenditures for DST from fall 2010 to spring 2013.

Table 1. Summary of Costs for DST across the First Years of RttT Implementation

	2010-11	***2011-12***	***2012-13***	**Total through 2012-13**	**Total Budgeted**[12]
Personnel Services	$865,771	$6,433,046	$6,970,644	**$14,269,461**	**$21,624,125**
Travel	$43,529	$575,085	$709,845	**$1,328,458**	**$1,709,497**
Purchased Services	$345,558	$66,493	$71,840	**$483,892**	**$1,579,836**
Supplies	$1,905	$7,985	$19,488	**$29,378**	**$230,846**
Property, Plant & Equip.	$65,891	$0	$38,067	**$103,959**	**$208,008**
Other Expenses	$0	$0	$150	**$150**	**$1,000**
Total RttT Expenses	***$1,322,654***	***$7,082,609***	***$7,810,035***	**$16,215,298**	**$25,353,312**
Indirect Expenses	***$141,640***	***$1,057,397***	***$1,168,348***		
Total Expenses	***$1,464,294***	***$8,140,006***	***$8,978,383***		

Description of expenditures:

- The primary costs for DST are personnel expenditures for coaching and travel expenses for coaches to reach the schools they serve.
- Because the expansion of the DST program under RttT was delayed during the 2010-11 school year, this analysis will use only the 2011-12 and 2012-13 school years to estimate the expected yearly cost of DST at service levels supported by RttT funding. Much of the difference between the actual expenditures to the total budgeted is due to the delayed implementation in Year 1 of the grant period.
- The overwhelming majority of DST costs during the RttT grant are recurring annual costs. Therefore, the analysis uses the actual total costs for 2011-12 and 2012-13 to estimate the projected cost going forward.

Costs per student, teacher, and school:

- In 2011-12, the 106 schools in the turnaround program served 51,668 students and 4,031 teachers. With a total cost of $8,140,006, the cost per school was approximately $76,793, the cost per student served was approximately $158, and the cost per teacher served was approximately $2,019.
- In 2012-13, the 106 schools in the turnaround program served 52,416 students and 4,086 teachers. With a total cost of $8,978,383, the cost per school was approximately $84,702, the cost per student served was approximately $171, and the cost per teacher served was approximately $2,197.

[12] According to the Race to the Top Application (2010).

- The small size of the difference in the cost per student and cost per teacher across the two most recent years of implementation suggests that the cost of the program is fairly stable.
- Projected Costs: Using the average total cost per year across the two years, the expected yearly cost looking forward is estimated to be $8,559,195.

Local Expenditures

Local districts would have borne all of the costs of implementing the plans they developed within the structure of the Framework for Action, including but certainly not limited to the costs of sending teams to DST-provided professional development sessions. But they also provided or arranged to provide additional professional development to support improvement, and some hired instructional coaches of their own. They also may have purchased or contracted for new instructional programs or for help in implementing organizational changes.

STEM Schools Network

Description

The purpose of the STEM Anchor Schools and Network Program is to build a network of high schools with a STEM focus to aid in the development of STEM initiatives in the state. The network consists of four anchor schools, intended to serve as laboratories and sites for professional development, and16 affinity schools.

The RttT-funded STEM network is supported by North Carolina New Schools (NCNS), a public-private partnership that provides support for a larger network of STEM schools and Early College High Schools, as well as the North Carolina School of Science and Mathematics (NCSSM). NCSSM developed course content while NCNS helps each anchor school to develop lessons and a professional development model around a particular theme, which can then be scaled up to affinity schools with the same theme, and eventually to other schools in the state.

Initiative Design and Implementation

Evidence from research literature. Due to the delays and time required to fully implement the program, there are no reliable estimates of the impact of the RttT STEM initiative on student test score outcomes, so this analysis draws on the effects of STEM schools in other states for outcome measures. Although STEM schools are becoming increasingly common nationwide, there are very few high-quality quantitative assessments from which to draw outcome estimates. However, a similar network of STEM schools exists in Texas and has been evaluated by SRI International.[13] In their evaluation of the four-year impact the study reported an increase of 8.4% of a standard deviation on mathematics test scores (or approximately 28 days of student learning) and no effect in English, due to the focus on STEM content. Once fully implemented, the RttT STEM initiative could lead to a similar increase in mathematics test scores for the 11,259 students who attend schools in the STEM network. Beyond test scores, the RttT STEM program also may have impacts for student outcomes such as graduation rates and improved post-secondary outcomes.

Preliminary implementation findings. As stated in NCDPI's original RttT proposal (2010) and most recent Detailed Scope of Work (2012), the objectives of the NCNS component of the RttT STEM initiative are: (1) to work with partners to support the development of a small set of anchor/model STEM high schools that will serve as laboratory schools and sites for professional development around project-based learning; and (2) to develop a set of STEM "cluster" high school networks. "As the hub of each cluster, the anchor school will accelerate the development of a fully articulated and coherent curriculum, instruction, assessment, and professional development model consistent with the NC vision for STEM education" (Arshavsky et al., 2013).

[13] SRI International (2011)

Based on analyses of RttT STEM initiative activities to date, the RttT STEM Evaluation Team concluded that structures for networking, professional development, curriculum development, and partnerships are in place to support anchor and affinity schools, as intended. While all four areas of implementation have received attention from the Implementation Team, some progressed more than others. In many cases, there are components within each area that developed more quickly or less quickly relative to other components. Additionally, staff and student surveys reveal that after one year of implementation, a subset of the affinity schools (the comprehensive schools) lagged behind the anchor schools and the other affinity schools (small new schools and STEM Academies) in all four areas of implementation (Arshavsky et al., 2013).

State Expenditures

Table 2 summarizes all expenditures for the RttT STEM initiative for the 2011-12 and 2012-13 school years. The text below the table provides a description of the expenditure categories, as well as an analysis of the cost to sustain the program in future years.

Table 2: Summary of Costs for STEM across the First Years of RttT Implementation[14]

	2010-11	***2011-12***	***2012-13***	**Total through 2012-13**	**Total Budgeted**[15]
Purchased Services	$0	$1,880,559	$2,513,178	**$4,393,737**	**$6,818,588**
Supplies	$0	$0	$68	**$68**	**$514**
Transfers	$0	$112,507	$1,233,131	**$1,345,638**	**$5,332,212**
Total Expenses	**$0**	***$1,993,066***	***$3,746,377***	**$5,739,443**	**$12,151,314**

Description of expenditures:

- The primary expenditure for the STEM Program is a contract with NCNS to develop, administer, and analyze the program as well as NCSSM to develop course content. The NCNS contract includes significant professional development for STEM school personnel as part of the NCNS network.
- The second significant expenditure for the program is supplemental funding for LEAs to support the conversion of some teachers into 12-month employees and to purchase technology for classrooms.
- Because of the delay in finalizing the list of participating schools in 2011-12, some of the expenditures initially intended for schools in that year were shifted to 2012-13. For that reason, to project the costs of the program going forward, the analysis combines the costs of the more recent two years for *Purchased Services*.

[14] Based on the Evaluation Team's analysis of expenditure data.
[15] According to the Race to the Top Application (2010).

Projection of costs to sustain the program:

- *Purchased Services* represents contracts with NCNS and NCSSM. Specifically, the NCNS contract includes $1,380,599 and $1,990,102 for 2011-12 and 2012-13 respectively, and the NCSSM contract includes $500,000 and $520,000 for 2011-12 and 2012-13 respectively.[16]
- The analysis assumes that there will not be a need to contract curriculum development in future years.
- In the budget for the first two years, professional development accounted for 75% of the amount budgeted for the NCNS contract.[17] The professional development budget was much higher than it will be in future years. For example, after its initial training, the budget for NCNS assumed that only a quarter of the number of personnel who received initial training would receive training going forward. This continued training accounted for the need to train entering staff and occasionally retrain existing staff. In keeping with this estimate, this analysis for RttT STEM also assumes an ongoing annual cost for professional development that is one quarter the size of the initial investment made in each of the first two years, or $632,006. The remainder of the amount spent on the NCNS contract is recurring costs and, looking forward, is estimated to be $842,675.
- *Transfers* consist of costs related to 12-month compensation for extended summer employment and equipment purchases. Equipment was purchased in 2012-13 at a cost of $660,000. To estimate the cost of equipment going forward, the recurring cost is estimated at 20% of the price of the initial equipment, or $132,000. This number represents a median estimate of time-to-replacement for computers and other types of lab equipment classrooms may use.[18]
- After purchases of equipment are accounted for, it is assumed that the rest of the expenditure on supplemental funding for the LEAs is on recurring personnel costs of $685,638 for extended employment.
- Projected Cost: When all projected costs are combined, the estimated annual cost for maintaining the network of twenty schools comes to $2,292,319.

Local Expenditures

While LEAs can incur costs in support of the STEM initiative, it is difficult to differentiate costs associated with support from those associated with regular operational expenses. Additionally, in at least one LEA (Duplin), RttT funds from other initiatives were used to fund LEA-level coaches involved with STEM schools as well as other schools.

[16] The $3,036 difference between the NCNS and NCSSM contracts for the two years and the reported budget is assumed to be temporary contracted work.
[17] Percentage as determined by the RttT Evaluation Team's STEM evaluation.
[18] The replacement time for computers and lab equipment is based on IRS guidelines. http://www.irs.gov/irm/part1/irm_01-035-006.html#d0e1025

New Teacher Support Program

Description

Providing comprehensive induction support to increase the effectiveness and retention of beginning teachers was identified as a high priority in the North Carolina RttT proposal. To address this need, the University of North Carolina General Administration (UNC-GA) and NCDPI partnered to develop the North Carolina New Teacher Support Program (NC NTSP). UNC-GA is primarily responsible for implementation and focuses on providing induction services to beginning teachers in the lowest-achieving schools in the state. These services included three main components: 1) an intensive five-day Summer Institute before the start of a teacher's first year[19]; 2) six full-day follow-up professional development sessions in each year of the first two years; and 3) mentoring and at least one classroom observation per month by an instructional coach for the first three years.

Initiative Design and Implementation

Evidence from research literature. A series of studies (Glazerman et al., 2006; Glazerman et al., 2008; Ingersoll et al., 2009; and Glazerman et al., 2010) using a randomized control trial design provide effects estimates of a similarly structured induction program on student achievement in reading and mathematics. These studies suggest that induction programs have no statistically discernible effect on student outcomes in the first years but provide evidence that there are statistically significant and positive effects on both mathematics and reading achievement by the third year of teacher participation. The studies provide eleven model specifications that provide the point estimates and sample sizes used to calculate the per-student outcome of exposure to a participating teacher.[20] The mean point estimate effects for mathematics and reading are 13.1% and 6.6% of a standard deviation, respectively. These estimates are equivalent to approximately 44 days and 22 days of student learning in mathematics and reading, respectively.

Beyond the effects on student achievement, the NC NTSP program also can have positive effects by reducing teacher attrition. This reduction can have direct impacts on costs, depending on the rate of reduction and the cost of replacing a teacher. Research suggests that induction programs similar to NC NTSP can result in a 30% to 50% decrease in teacher attrition (Moir, 2005; Smith and Ingersoll, 2004), and that the cost of replacing a teacher can range from $10,500 to $16,000 (Villar and Strong, 2007).

Preliminary implementation findings. Although the NC NTSP program experienced implementation delays, the 2012-13 data suggest that the current program implementation is commensurate with initiative plans. The program's use of the three-component approach is similar to that of other successful induction programs. Additionally, Villar and Strong (2007), in an evaluation of the Beginning Teacher Support Assessment (BTSA) program, determined a per-

[19] Teachers who enter the program after the Summer Institute session ends attend Winter Institutes, which are the same in content as the Summer Institutes.
[20] For a complete list of the point estimates and sample sizes see Table V.7. in Glazerman et al. (2010)

teacher cost of $11,428.[21] This is fairly close to the estimated per-teacher cost of $10,786 of the NC NTSP program (see below). However, the BTSA program is a two-year program, while the NC NTSP program is a three-year program.

State Expenditures

The costs of NC NTSP for 2012-13 are summarized in Table 3 based on the Evaluation Team's analysis of expenditure data. The text below the table provides additional information and an analysis of the costs to sustain the program.

Table 3. Summary of Costs for 2012-13, NC NTSP[22]

	Fall 2012	Spring 2013	Total through 2012-13	Total Budgeted[23]
Personnel Services	$824,636	$1,032,470	**$1,857,106**	**$0**
Travel	$94,568	$118,402	**$212,970**	**$0**
Purchased Services	$75,223	$94,183	**$169,406**	**$2,596,789**
Supplies	$7,205	$9,020	**$16,225**	**$0**
Property, Plant & Equip.	$19,379	$4,582	**$23,961**	**$0**
Other Expenses	$134,384	$168,253	**$302,637**	**$0**
Total Expenses	***$1,155,395***	***$1,426,910***	**$2,582,305**	**$2,596,789**

Description of expenditures:

- The costs of NC NTSP are widely recurring on a per-year basis, but are listed by term since participation in the program and the number of instructional coaches increased as the 2012-13 school year progressed. *Purchased Services* include costs associated with the summer and winter institutes.
- We assume that all costs are variable except for *Property, Plant, & Equipment* and $300,000 of *Personnel Services*. *Property, Plant, & Equipment* expenditures are for computers for coaches, which are expected to last for three years providing a yearly replacement cost of $7,987, and the portion of *Personnel Services* is considered fixed, as it accounts for the leadership staff of NC NTSP.
- Because NCDPI contracted with UNC-GA to implement the program, the financial data provided by NCDPI only include purchased services. Additional data were collected from UNC-GA to provide more detailed expenditures and the number of participants. There are 418 teachers whom we identified in a program cohort.
- Of the 353 teachers for whom there are program entry data, approximately 80% started the program by the beginning of the 2012-13 school year, 16% entered the program by

[21] The reported estimate above subtracts the private costs that the authors use, where private costs are the opportunity costs of the teachers' time.
[22] Based on the Evaluation Team's analysis of expenditure data.
[23] According to the Race to the Top Application (2010). The projected budget used is only for the 2012-13 school year because the NC NTSP program was delayed in implementation. According to the life to date projected budget the estimated expenditures are $5,721,840.

November of the 2012-13 school year, and the remaining 4% of the teachers entered by January 2013. Although it is uncertain that this pattern holds for the remaining 65 teachers for which we do not have entry data, to calculate the first-year per-teacher cost of NC NTSP, this analysis assumes that they are similar. Therefore, in estimating the first-year per-teacher cost, this analysis assumes that 335 teachers participated for the full year, 67 participated for half of the fall term and all of the spring term, and the remaining 16 teachers participated in only the spring term. Using these proportions, and the remaining $2,258,344 in variable costs, the variable cost per teacher in the first year is estimated to be $5,070.

- With these above assumptions and the data provided, the estimated per-teacher cost of NC NTSP in the first year is $5,807.[24]

Projection of costs to sustain the program:

- Perhaps the most significant issue in developing a yearly total cost measure for NC NTSP from this single year of data is that the program is administered over a three-year period with a new group of beginning teachers entering each year. In other words, the analysis needs to determine the amount of scale-up necessary to accommodate the Years Two and Three treatments while also inducting new cohorts.
- Clearly, because of the nature of the program, the first year of participation has the highest per-teacher cost and decreases in each subsequent year. As described above, the Institutes are not conducted for participants in their second or third year, and the professional development activities end after the second year.
- Only the mentoring persists over the three years but the frequency of contact likely wanes as teachers rely less on direct NC NTSP support during their second and third years. Assuming that 400 new teachers enter each year, certain activities are not repeated, and that each year teachers need less mentoring support, the estimated per-teacher variable cost for Years Two and Three are $3,747 and $1,233, respectively.[25]
- Projected Costs: Using the above estimates for investment costs, fixed costs, and variable costs for each year, and assuming a 5% yearly rate of attrition for the 400 initial participating teachers, the estimated total yearly cost of NC NTSP is $4,084,399.

Local Expenditures

The responsibility for the direct costs of the NC NTSP program is limited to the state. However, LEAs may incur costs in support of the initiative. These may include costs associated with additional professional development, substitute teachers, or travel.

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[24] This figure is consistent with research suggesting high-quality teacher induction programs range in cost from $6,000 to $7,000 per teacher per year (Villar and Strong, 2007).

[25] These figures are calculated by assuming 16 mentors will need to provide support for teachers in their second year, 5 mentors will need to provide support in the final year. These figures assume that in Year Two a teacher would see a mentor twice a month, in Year Three a teacher would see a mentor once a month, and a mentor can provide 13 visits per week. Furthermore, the assumed cost per mentor is $89,000 (which includes salary and fringe benefits) and the number of participating teachers decreases by 5% each year.

North Carolina Teacher Corps

Description

The North Carolina Teacher Corps (NCTC) is a RttT initiative intended to support a more equitable distribution of effective teachers statewide by providing lateral entry teachers to hard-to-staff, high-need schools that are not served by Teach for America (TFA). NCTC intends to recruit high-achieving, in-state college graduates to serve as teachers in these schools. NCTC provides training for their corps members through a summer institute, followed by ongoing support through instructional coaching and various professional development opportunities. The summer institute is a three-week intensive training, during which corps members spend the majority of their time completing a teaching practicum during which they work with practicing teachers in year-round schools.

Initiative Design and Implementation

Evidence from research literature. Due to the late implementation of the program, this analysis draws estimates of student outcomes from the literature on other alternative entry programs. NCTC is most similar in structure to TFA in the current program literature, although TFA draws from a more selective pool of candidates (as described in the *Preliminary implementation findings* section below*)*. In a study on the effects of TFA, using data from North Carolina between 2001 and 2007 and with 7,678 students, results for mathematics teachers suggest a positive effect on students of having a TFA teacher (relative to other teachers of similar experience) of 13.2% of a standard deviation (with a standard error of 3.7).[26] Another study of TFA teachers in a different region, in North Carolina with 1,692 students, found that the impact of TFA teachers was about 15.3% of a standard deviation in mathematics (with a standard error of 4.6).[27]

Since TFA is more selective than NCTC[28] and not identical in structure, this analysis also considers results from other alternative entry programs. One study of the New York City Teaching Fellows program, with 623,482 students, found no significant difference in effectiveness between Teaching Fellows and traditionally prepared teachers.[29] A study of Florida alternative certification programs found that, among 719,245 students, the American Board for Certification of Teacher Excellence Passport (ABCTE Passport) preparation is associated with, on average, an 8.4% of a standard deviation improvement in mathematics test scores (with a 1.6 standard error),[30] equivalent to approximately 28 days of student learning in mathematics.

One of NCTC's primary goals was to provide effective teachers to LEAs and schools not served by TFA. State legislation in 2013 transferred the leadership and administration of NCTC to Teach for America; it is important to note that, going forward, most NCTC LEAs located outside

[26] Xu, Hannaway, & Taylor (2011)
[27] Glazerman, Mayer and Decker (2006)
[28] Stallings et al. (2012)
[29] Kane, Rockoff and Staiger (2008)
[30] Sass (2011)

of TFA's Eastern North Carolina region of support no longer will have access to the NCTC program. However, TFA is expanding to include LEAs in the Piedmont-Triad region of the state.

Preliminary implementation findings. While details about specific implementation strategies may differ, as noted above, for the most part, NCTC operates in a manner that is closely comparable to TFA: college students with content-area specialization in fields that relate to public school curricula but who typically did not pursue education training are selectively recruited and trained to teach in low-performing North Carolina schools, with an expectation that they will remain in those schools for at least two years. They are provided with a summer training experience (albeit one that is somewhat shorter than TFA's and is local, rather than national) and similar in-school coaching and mentoring. One notable exception (also noted above) is the pool from which NCTC draws its corps members: while TFA's pool is national and is largely from the highest-achieving segment of the post-secondary student population, NCTC's pool is intentionally local (with the intent of recruiting corps members with an affinity for the state who are more likely to stay in teaching beyond the two-year commitment). Localization of the recruitment pool impacts the quality of the candidates (as measured by their undergraduate grade-point averages and the selectivity of their undergraduate institutions) to some degree (Maser et al., 2013).

State Expenditures

The annual expenditures for 2011-12 and 2012-13 are summarized in Table 4 based on the Evaluation Team's analysis of the expenditure data. The text below the table includes a description of the expenditures and information about the future of the program.

Table 4: Summary of Costs for the NCTC Program

	2011-12	***2012-13***	**Total through 2012-13**	**Total Budgeted**[31]
Personnel Services	$91,226	$236,889	**$328,115**	**$473,809**
Purchased Services	$9,792	$175,372	**$185,164**	**$1,652,858**
Supplies	$1,012	$14,661	**$15,673**	**$40,375**
Property, Plant, & Equip.	$3,487	$844	**$4,331**	**$31,914**
Total Expenses	***$105,517***	***$427,766***	**$533,283**	**$2,198,956**

Description of the expenditures:

- It is important to note that NCTC implementation is approximately a year behind the original timeline. No spending for the program occurred for the first year, and in the second year the expenditures reflected the projected first-year expenditures.
- The 2011-12 expenditures were for initial program development, so only the 2012-13 expenditures are used to project costs going forward. These expenditures largely consist of recurring expenses that are variable, with the exception of the *Property, Plant, & Equipment* category.

[31] According to the Race to the Top Application (2010).

- Since the amount expended in *Property, Plant, & Equipment* is negligible, the analysis assumes the total cost of $427,766 is comprised entirely of variable costs. At the beginning of the 2012-13 implementation period, 30 corps members originally enrolled. Of these, only 19 secured employment in a public school; however, five more corps members were subsequently enrolled and employed mid-year. This analysis counts those final 24 corps members as the first-year cohort.
- Using the above number of final corps members, in the first year of operation, the cost of the initiative was $17,824 per employed corps member, which is 11% lower than the budgeted cost of $20,000 per corps member, in a start-up year with a small, non-scale-efficient group. It is important to note that these figures may be upwardly skewed, since they include some recruitment, summer institute, and pre-institute event costs for the subsequent cohort.[32]

Future of the program. Recent state legislation has turned the administration of NCTC over to TFA, beginning in the 2014-15 school year. This is pursuant to a contract between TFA and the State Board of Education.[33] If TFA assumes operational responsibility for NCTC, the most notable changes to the program will be in the summer training provided, as well as in the placement of NCTC members. Corps members joining the 2014 cohort will receive the same continuum of research-based programming received by all TFA corps members (TFA's summer training is seven weeks in length, with five weeks in another state). Following the 2013-14 school year, new NCTC members will be placed throughout TFA's Eastern North Carolina region, which includes 15 LEAs and five charter schools, as well as across the Piedmont Triad region as part of a new North Carolina TFA chapter.

Local Expenditures

No additional local costs (other than those normally associated with beginning teachers) currently are imposed on LEAs that choose to hire NCTC members. However, as NCTC transitions to the TFA teacher placement model, LEAs will be assessed a TFA per-teacher administrative cost for each new corps member employed. According to TFA, these costs are estimated to be between $3,000 and $4,000 per year per corps member.

[32] This report does not include comparisons of costs to costs for related programs (such as TFA or New York City Teaching Fellows) because variations in the implementation of these programs are broad enough to make such comparisons questionable, and because reliable and unbiased estimates of the per-unit costs of many of those programs are not readily available.
[33] The total TFA contract with the state is $5.1M for the coming year, but that is for several items in addition to the possible assumption of management of NCTC.

Regional Leadership Academies

Description

The policy objective of the Regional Leadership Academy (RLA) initiative is to increase the number of principals qualified to lead transformational change in low-performing schools in both rural and urban areas. North Carolina RttT funds support three RLA programs that serve three very distinct regions of North Carolina. One RLA (Northeast Leadership Academy, or NELA, a two-year program culminating in a Master's in School Administration [MSA] degree and principal licensure) was established one year before RttT funding was available. Two others (Piedmont Triad Leadership Academy [PTLA] and Sandhills Leadership Academy [SLA], both of which are one-year programs culminating in 18 to 24 graduate credits towards an MSA degree and principal licensure) were created following the awarding of RttT funds. Cohort I members (n=62) graduated June 2012 and Cohort II members (n=62) graduated June 2013. Most (90%+) of these RLA graduates are currently serving as educational leaders in partnering LEAs. Cohort III members (n=62) are scheduled to graduate June 2014 and are currently serving as full-time principal interns in partnering LEAs.

Initiative Design and Implementation

Evidence from research literature. The amount of research pertaining to principals has intensified over the last decade and generally evaluates their impact on student achievement, the characteristics of effective principals, and more recently the effects of principal preparation on principal effectiveness. However, there is little research evaluating programs similar to RLA. The evaluation of one program, the Aspiring Principals Program (APP) in NYC (Corcoran, Schwartz, and Weinstein; 2012) suggests that, like the PTLA and SLA programs, APP provides alternative certification and does not include the completion of an MSA. Furthermore, principals in the program tend to sort into lower-performing schools and have a negative impact in their first year. However, in subsequent years they improve, and the gap in achievement between their schools and the comparison schools narrows.

Dhuey and Smith (2014) and Branch, Hanushek, and Rivkin (2009) provide estimates of measures for principal effectiveness that can be leveraged to support the notion that programs such as RLA make participants more effective principals than non-participants, in terms of increases in students' test scores. In both studies, the size of the effect was approximately one standard deviation. While this strategy does not directly address the effect of an RLA program, it does provide a basis from which program impacts can be estimated. It is estimated that principals who are more effective by one standard deviation increase school mathematics performance by 7.12% of a standard deviation and reading performance by 5.23% of a standard deviation.[34] These increases at the school level are equivalent to approximately 24 days and 17 days of student learning in mathematics and reading, respectively.

[34] These estimates are lower for both math and reading than what is reported in a meta-analysis conducted by Leithwood and Sun (2012). However, their analysis included studies that did not meet WWC standards and evaluated dimensions of effective leadership as opposed to overall effectiveness.

Another potential impact of the RLA program is reduced principal turnover, which can lead to many other benefits. Beyond the obvious reduction in financial costs associated with turnover, research has shown that reduced principal turnover can have a positive impact on student achievement (Fuller et al., 2007), and teacher turnover (Béteille et al., 2011). Ronfeldt et al. (2011) suggest that these impacts are particularly pronounced in low-achieving schools like those targeted by the RLA program. Finally, reduced principal turnover can positively affect the way in which large-scale and lengthy reform efforts are implemented by providing consistency in leadership (McAdams, 1997).

Preliminary implementation findings. NELA is a two-year program that involves part-time study during Year 1 and full-time study—including a full-time, year-long paid internship—during Year 2. Successful NELA candidates are granted North Carolina Principal Licensure and an MSA, conferred by North Carolina State University.

PTLA is a one-year program that involves a full-time, year-long paid internship. Successful PTLA graduates are granted North Carolina Principal Licensure and can earn up to 24 credits toward a University of North Carolina at Greensboro Post-Master's Certificate in School Administration or an MSA degree from the Department of Educational Leadership and Cultural Foundations.

SLA is a one-year program that involves a full-time, year-long paid internship. Successful SLA graduates are granted North Carolina Principal Licensure and can earn up to 18 graduate-level credits at the University of North Carolina at Pembroke or Fayetteville State University.

State Expenditures

The yearly expenditures for RLA are summarized in Table 5 based on the Evaluation Team's analysis of the expenditure data. The text below the table includes information on fixed and variable costs and project costs by cohort.

Table 5: Summary of Costs across the First Years of RttT Implementation, RLA

	2010-11	***2011-12***	***2012-13***	**Total**
Purchased Services	--	$433,736	$942,272	**$1,376,008**
Transfers	$147,244	$4,648,638	$4,733,843	**$9,529,725**
Total Expenses	***$147,244***	***$5,082,374***	***$5,676,115***	**$10,905,733**

Description of program costs:

- Although costs are broadly defined, a review of the projected RLA budget suggests that, in the first two years, consulting and start-up costs account for the majority of expenditures.[35] However, moving forward, all costs are variable and depend upon the number of participants.

[35] Start-up costs primarily consist of personnel expenses related to program development.

- Participants are provided funding for tuition, books, and a laptop, as well as salary and fringe benefits for their residency year. Other variable costs associated with the number of participants include pay for substitutes for MSA student release days associated with field work, stipends for principal mentors, and coaching costs.

Projection of costs to sustain the program:

- The costs associated with a given cohort vary significantly by year, which presents an issue when attempting to identify the per-participant actual cost using the cost data above, since only the 2012-13 year includes two cohorts. To address this issue, the analysis uses *projected* expenditures per cohort year and verifies the alignment with actual costs given the number of *actual* participants in each cohort. The estimated cost per participant is $96,561.
- The number of participants in Cohort I, accounting for participant attrition of four candidates, is 58. The number of participants in Cohort II is 62. Using the projected cost per participant by cohort year and the actual number of participants, the projected cost is $5,638,722, which is close to the actual total cost of $5,676,115. Accordingly, the analysis uses the yearly per-participant cohort cost figures above, as well as the estimated coaching cost in year three of $1,600 per participant, to estimate the first post-grant year total costs.
- Projected Costs: Assuming that attrition rates moving forward are similar to Cohort I's rate, and that 62 participants will be recruited into Cohort IV, the estimated total annual cost used for the analysis is $5,731,522.

To further verify the estimated costs of the RLA program moving forward, the analysis also compares these estimates to those provided by the preliminary cost-effectiveness report provided by the RLA Evaluation Team (Hall, Brown, and Smith, 2012). Their analysis estimates $116,500 per NELA graduate, $110,500 per PTLA graduate, and $100,000 per SLA graduate. The estimates provided through the current analysis of the expenditure data provide similar, albeit somewhat lower, estimates. However, the differences in the two could be attributable to participant attrition and the inability of the current analysis to differentiate expenditures between cohorts.

Local Expenditures

The cost of the RLA program is covered through RttT funding as administered by the respective regional agencies. To the knowledge of the Evaluation Team, no explicit support costs are provided by LEAs.

Professional Development

Description

The Professional Development Initiative (PDI) is the second-largest RttT project in terms of allocated funds, behind only the DST initiative. Driven by the pillars of RttT reform and the new North Carolina Standard Course of Study, the PDI addresses several key priorities—with the ultimate goal of improving student outcomes—by updating the knowledge and skills of the state's public education workforce, which includes about 100,000 teachers and 5,000 administrators. These priorities include the use of data to inform class and school decision-making, the use of technology for teaching and learning, understanding the teacher and leader evaluation process, the use of formative assessment to improve instructional decisions, and differentiated professional development based on educator needs. Also, as part of its plan, the PDI is expected to provide an infrastructure that can be sustained after the RttT grant period by developing LEA-level professional development teams through implementation of a train-the-trainer model.

The PDI consists of three main components; statewide face-to-face professional development, online professional development (OPD), and the Distinguished Leadership in Practice (DLP) program. While the costs and outcomes of these components can be taken as a whole, each represents a distinct policy strategy; consequently, this report includes a separate analysis for each. Conducting these separate analyses presents some challenges in terms of calculating each component's costs, as expenditures are reported for the PDI as a whole without designation of the component(s) to which each applies. Accordingly, the analyses leverage the projected PDI budget to help inform these designations, which are summarized in Table 6 (following page).

State Expenditures

Each line item requires a separate procedure for allocating expenditures to the respective programs. While the projected PDI budget provides useful information for developing these procedures, some categories do not provide information that allows simple program differentiation. Accordingly, this section explains the procedure used in this analysis for allocating expenditures to the various professional development programs.

In Table 6 (following page), *Personnel Services* consist mainly of salaries and fringe benefits paid to the additional staff of the Educator Effectiveness Team at NCDPI. The PDI budget requested the creation of 19 positions, with six focused primarily on web-based professional development. Therefore, the analysis uses the projected proportional costs to designate the allocation of *Personnel Services* to the statewide face-to-face and OPD programs.[36] DLP was a contracted service funded by NCDPI but administered by the North Carolina Principals and Assistant Principals Association (NCPAPA) and did not have direct NCDPI expenditures associated with these *Personnel Services* expenditures. However, as part of the PDI, staff members did coordinate with NCPAPA to align DLP with major state initiatives. Therefore, the analysis allocates a small set amount of *Personnel Services* to DLP to account for this time.

[36] These proportions are also used in estimating costs.

However, this amount comes from the A2 Management budget and not the PDI budget, but is included for reference. Accordingly, the total for *Personnel Services* does not reflect the expenditures for DLP.

The costs of the RttT Professional Development initiative for 2010-11 through 2012-13are summarized in Table 6 based on the Evaluation Team's analysis of expenditure data. The text below the table provides details about each line item cost.

Table 6: Professional Development Expenditures by Category and Program, 2010-11 through 2012-13

2010-11

	Statewide	***Online***	***DLP***	**Total**[37]
Personnel Services	$456,136	$118,274	$5,647	**$574,410**
Purchased Services	$56,405	$6,267	$591,750	**$654,422**
Supplies	$3,032	$332	--	**$3,364**
Property, Plant & Equipment	$24,086	$6,022	--	**$30,108**
2010-11 Total	***$539,659***	***$130,895***	***$597,397***	**$1,262,304**

2011-12

	Statewide	***Online***	***DLP***	**Total**
Personnel Services	$1,485,658	$375,316	$5,647	**$1,860,974**
Purchased Services	$2,362,620	$262,513	$591,750	**$3,216,883**
Supplies	$20,607	$2,259	--	**$22,866**
Property, Plant & Equipment	$38,420	$9,605	--	**$48,025**
Other Expenses & Adjust	$211	--	--	**$211**
2011-12 Total	***$3,907,516***	***$649,693***	***$597,397***	**$5,148,959**

2012-13

	Statewide	***Online***	***DLP***[38]	**Total**
Personnel Services	$1,996,012	$502,866	$5,647	**$2,498,878**
Purchased Services	$3,659,015	$406,557	$591,750	**$4,657,322**
Supplies	$37,816	$4,146	--	**$41,962**
Property, Plant & Equipment	$40,059	$10,015	--	**$50,074**
Other Expenses & Adjust	$64	--	--	**$64**
2012-13 Total	***$5,732,966***	***$923,584***	***$597,397***	**$7,248,300**

2010-11 through 2012-13

	Statewide	***Online***	***DLP***	**Total (Actual)**	**Total (Budgeted)**[39]
Total	***$10,180,141***	***$1,704,172***	***$1,792,191***	**$13,659,563**	**$24,550,238**

[37] Totals do not include *Personnel Services* for DLP.
[38] The amount for *Purchased Services* reflects the invoiced amount which was actually paid in the 2013-14 budget year.
[39] According to the Race to the Top Application (2010).

Description of program expenditures:

- The *Purchased Services* category consists primarily of costs associated with administering the PDI Summer Institutes, Regional Education Service Alliance (RESA) face-to-face sessions, and developing online modules.
- The PDI projected budget itemizes these costs so that the program to which they apply is more easily identified than is the case for other expenditure categories.
- With these designations, the analysis uses the projected proportion of total spending for each program and applies it to the actual expenditures.
- The *Supplies* category includes costs associated with office supplies, training materials, and software. Office supplies and software costs are designated for the PDI staff, so the same proportion is used as was used for *Personnel Services*.
- Training materials are allocated only to statewide face-to-face professional development. It is assumed that these costs are included in the DLP contract with NCPAPA.
- *Property, Plant, & Equipment* costs are associated primarily with computers and printers for PDI staff use and are allocated to the various PDI programs based on the same proportion used in *Personnel Services*.

I. Statewide Face-to-Face Professional Development

Description. The statewide face-to-face professional development plan consists of strategies focused on preparing local teams, made up of teachers and administrators, who serve as professional development leaders in their LEAs. These teams then design, develop, and implement local professional development focused on facilitating their teachers' transition to new education standards, along with other RttT professional development priorities. The intent is to provide access to high-quality professional development for all teachers and administrators in the state while recognizing the differing needs of LEAs.

Initiative design and implementation.

Evidence from research literature. There is a vast literature that evaluates many dimensions of professional development. Much of this research focuses on the components of effective professional development by observing teacher perceptions and practices, but these studies fail to inform how those components are related to student outcomes. Except for a handful of studies, only recently has the research begun to look at the impact of professional development on student achievement, and has generally shown that professional development can have positive impacts. However, relatively little is known about how that translates into large-scale professional development initiatives where settings are less controlled, multiple trainers administer the training, and the content of the professional development varies.

A meta-analysis conducted by Yoon et al. (2007) identified over 1,300 studies of professional development. Of these, only nine evaluated the impact of professional development on student achievement and satisfied the WWC conditions for high-quality research. All nine studies evaluated elementary school teachers and their students and found an average professional

development effect size of 54.0% of a standard deviation in standardized test score gains. The studies involved a small number of participants in well-controlled environments where the professional development developers conducted the training. Wayne et al. (2008) caution that the size of this effect may be misleading when taking into account the delivery of the professional development. For example, a program that includes only a few teachers and that is taught by the developer may have difficulty replicating results as the program is scaled up. A more recent meta-analysis by Blank and de las Alas (2009) finds average professional development effect sizes of 31.0% of a standard deviation, but presents similar limitations for generalizability. Other studies, (Garet et al., 2008; Garet et al., 2010; Harris and Sass, 2011) have failed to find systematic effects of professional development. Given the variability in the research findings, the effects from professional development may range from zero days to 103 days of student learning.

Preliminary implementation findings. The implementation requirements of the RttT professional development plan are being fulfilled, with participants generally rating the activities as directly their professional development needs and as providing valuable professional learning opportunities. Some progress has been made on developing local and regional professional development capacity well, but further progress is needed; ultimately, direct benefits will depend on the extent to which educator practices change in response to the training.

Professional development in North Carolina can vary immensely in content, length, trainer effectiveness, and many other dimensions, all of which may affect its impact. Given that it is likely that these same factors will vary from LEA to LEA in the local administration of the statewide component of the PDI, it is difficult to speculate, based on extant research, what an expected effect might be. NCDPI currently does not have a statewide participant registration system for professional development that tracks individual educator participation (e.g., via a single electronic system with unique educator identification numbers) in every professional development event offered through the state or LEAs. Such a system would allow researchers to evaluate the systematic impact of professional development on teacher practices—and potentially on student achievement as well—via follow-up surveys about the quality of professional development and about knowledge gained, as well as via analysis of data related to participation rates, dosage, amount, and type of professional development—all of which could be linked to individual educator data in the North Carolina Educator Effectiveness System. In the absence of such linked data, the Evaluation Team has attempted to collect other data that can support evidence-based conclusions.

Expenditures. As stated previously, one of the goals of the statewide professional development plan is to create an infrastructure that can be sustained after the RttT grant period.

- While there will be a continued need to implement statewide education reforms as they develop, if local professional development teams become adept at implementing local professional development, the need for large-scale statewide professional development interventions may diminish.
- If it is assumed that the number of participants in the state-wide professional development in 2012-13 fully represents the total number of local professional development leaders, and that they will not need to participate in the statewide professional development each year, then the total cost in future years will not reach the level of total cost in 2012-13.

- However, while the magnitude of expenditure may not be the same, it is reasonable to assume that the cost per participant will be fairly stable if services are continued at the current level.

Projection of costs to sustain the program:

- According to the 2012-13 data, the estimated cost per participant is $563. To estimate the number of expected participants per year in future years, the analysis assumes that teachers will participate yearly and that past participants who leave the field will be replaced by other participants.
- Therefore, an estimated 10,095 participants will take part in the statewide professional development face-to-face activities each year.
- Projected Costs: Using the estimated cost per participant and number of expected participants, the estimated total cost of one year of implementation will be $5,683,485.[40] This figure accounts for costs associated with conducting face-to-face sessions, administration, and program development.

Local expenditures. LEAs incur a significant amount of costs for RttT professional development activities. Not only do LEAs expend funds in support of state RttT professional development, but they also expend funds in support of professional development related to their LEA-level RttT Detailed Scopes of Work. These expenditures include contracted services, substitutes, travel, and other miscellaneous expenses. Barrett and Houck (2012) provide a more complete analysis of local expenditures related to professional development. They suggest that one of the difficulties in determining the exact level of expenditures related to local professional development is that costs can be apportioned to various parts of the budget. Even so, their report estimated approximately $12 million of local expenditures related to RttT professional development over the first two years of the grant period. However, after discussions with NCDPI about the professional development expenditure coding related to RttT, revised estimates for local expenditures on RttT-related professional development suggest that the spending may have been as high as $30 million per year. Per-LEA, per-year costs ranged anywhere from no expenditures to almost $3 million, with an average cost of almost $260,000 per LEA per year. It is important to note that these costs are directly related to RttT PD but also may be supplanting funds traditionally spent of professional development activities not associated with RttT.

II. Online Professional Development

Description. According to the RttT proposal, a major component of the professional development initiative is the focus on "the use of e-learning tools to meet the professional development needs of teachers, schools and districts." There are several goals of the OPD component of the PDI: ensuring that professional development that addresses priority content is available statewide; providing alternative learning modes for educators; providing opportunities to interact with mentors and experts when face-to-face meeting are not possible; and enhancing local professional development programs. In addition, it is anticipated that in the future these

[40] This cost estimate does not take into account local implementation costs.

online professional development opportunities will be available to educators via RttT-funded NC PowerSchool and Home Base and are anticipated to provide differentiated professional development opportunities focused on educators' needs and backgrounds.

The RttT online professional development activities and resources include a collection of online modules (the North Carolina Education Online Learning Modules), a series of ongoing webinars, state and regional wikis, and additional web-based resources. NCDPI initiated the development of online activities and resources to harness the potential of online learning and help build capacity for educators across the State. To help support the effective integration of the Phase II Modules into local professional development efforts, NCDPI created http://rt3nc.org. This site provides a brief description each module, a chart of alignment to North Carolina standards for professional educators, and the Phase II Phase II/III Online Module Implementation Guide 2012–2014.

Initiative design and implementation.

Evidence from research literature. As discussed as part of the statewide professional development analysis, there are many issues associated with generating an estimate for the likely impact of professional development. Given that many of these issues also relate to OPD, the ability to speculate on the effect of online professional development is limited. However, if online professional development is administered in a way that replicates the characteristics of high-quality professional development in general, it is likely that online professional development can have similar impacts. This assumption is supported by Fishman et al. (2013), who suggest that there is no statistical difference between the impacts of the two modalities in terms of student achievement when characteristics of effective professional development are met.

Preliminary implementation findings. During the first two years of implementation, of the 100,000 North Carolina educators, over 70,000 educators enrolled in one or more RttT OPD modules, and roughly 10,000 have attended one or more OPD webinars. Despite variations in local implementation, the majority of educators surveyed have responded positively to post-experience survey items related to the quality and relevance of OPD, though responses are slightly lower than those for other forms of RttT professional development.

LEA utilization of OPD offerings has varied in implementation format and quality. The data also suggest that variation in local implementation has impacted the quality of the experience, particularly in the extent to which recommended resources and supports were provided locally. Though modules were designed to be utilized with local teams or Professional Learning Communities, the data suggest the bulk of educators are completing the modules independently, many without feedback and support from a facilitator and/or peers.

Expenditures. The primary costs associated with OPD are *Purchased Services* associated with the development of the online modules, and *Personnel Services* associated with web design and module development.

Projection of costs to sustain the program:

- Moving forward, the cost structure will change somewhat in the post-grant period. The OPD team will consist of eight staff (six fixed positions and two contracted positions). The estimated staff cost is $632,964.
- In addition, in 2014-15, the OPD team plans to develop 10 new mini modules, six new full modules, and at least two new facilitated courses, thereby extending the total number of all module types available to over 50.
- Another significant cost related to OPD—contract for hosting the online content—is estimated to be $119,680, based on available data.
- Projected Costs: Using the projected cost of staff and the cost of the contract for hosting the online content, the total yearly cost is estimated to be $752,644.

Local expenditures. Similar to the statewide face-to-face professional development, LEAs incur a significant amount of costs in support of the OPD. These costs are primarily associated with the time spent completing the modules and technology related expenses. However, these costs are less than those associated with more traditional face-to-face professional development.

III. Distinguished Leadership in Practice

Description. As part of the RttT grant proposal, NCDPI partnered with NCPAPA to develop the Distinguished Leadership in Practice (DLP) professional development program, which is focused on high-quality leadership. DLP is a year-long program that utilizes a blended approach consisting of six face-to-face sessions, online modules, and small-group sharing sessions.

Initiative design and implementation.

Evidence from research literature. While the literature on the effects of principals and their preparation has increased over the last decade, there is a general lack of studies that evaluate principal professional development. As with the RLA analysis, this analysis makes certain assumptions that allow the literature to help inform the estimate of expected impact. As noted above, it is estimated that principals who are more effective by one standard deviation increase school mathematics performance by 7.12% of a standard deviation (approximately 24 days of student learning) and reading performance by 5.23% of a standard deviation (approximately 17 days of student learning).

Design and implementation. The implementation of the DLP program began in the first year of the RttT funding, as planned. Evaluation of the DLP program suggests that the face-to-face and online sessions were of high quality and that participants developed specific leadership knowledge and skills (Kellogg et al., 2012). The program's hybrid face-to-face plus online model provided participants with access to expert facilitators as well as to their colleagues. Analysis of North Carolina Educator Evaluation Rubric data shows that, over the course of their DLP year, DLP Cohort 2 experienced similar change in self-reported leadership ratings overall compared to other North Carolina principals.

Expenditures. The costs associated with DLP are entirely contractual, except for a small amount of staff salary dedicated to project coordination with NCPAPA (see Table 6).

Projection of costs to sustain the program:[41]

- The average *Purchased Services* yearly cost of DLP is consistent with the projected budget for 2010-11 through 2012-13.
- Therefore, the analysis uses the contractual cost and the portion of staff salary to estimate cost going forward.
- Projected Costs: The estimated yearly cost of DLP is $597,397.

Local expenditures. Currently there are no direct costs to LEAs for principal participants. This includes travel expenses; however, after RttT, LEAs may need to pay for travel-related expenses.

[41] These projections include costs for DLP's sister program, the Future-Ready Leadership (FRL) program for assistant principals, launched in January 2012. FRL is designed to build the capacity of assistant principals by preparing them to become "future-ready" school leaders

North Carolina Virtual Public School STEM Blended Learning

Description

The North Carolina Virtual Public School (NCVPS) has been offering virtual courses since 2007. As part of the RttT initiative, NCVPS began offering blended learning STEM courses in fall 2012 in three LEAs to augment STEM courses available locally. One goal of the initiative is to help equalize STEM educational opportunities for students in LEAs that struggle to attract and retain an adequate number of teachers with broad STEM content expertise. The blended learning courses are taught jointly by an onsite teacher and a virtual teacher, with the goal of training onsite teachers in new subjects to allow for expansion of the STEM offerings at their schools. The initiative's theory of action is that increasing local STEM teacher capacity will enable an increase in the availability of STEM courses and effective STEM teaching in high-need schools. A total of nine sections of the three initial NCVPS STEM blended courses (Earth and Environmental Science, Integrated Mathematics I, and Forensics) were offered in four schools across three LEAs in 2012-13, serving 147 students in the fall and 135 in the spring; three more courses are to be introduced by the end of the 2013-14 school year.

Initiative Design and Implementation

Evidence from research literature. Due to the late implementation, there are as yet no distal student achievement outcome measures available for the program that can be used to project potential impact. There are, however, some intermediate student outcomes that may be observed if the initiative moves forward, including: increased student interest in STEM high school courses and tracks, as well as in access to college, STEM majors, and STEM careers. In addition, the program offers the opportunity for local teachers to expand their content knowledge. Successful elements of the program also can have spillover effects to other teachers and students in the schools that offer the RttT NCVPS STEM courses. For example, some teachers in non-blended classes have expressed interest in the initiative and might incorporate some of the online resources from initiative teachers into their own teaching.

Because the primary goal of the RttT NCVPS STEM program is to train teachers to teach a wider array of STEM topics, the benefits of the program should be most comparable to other teacher professional development intended to increase teachers' knowledge of course material. In addition, because this is a well-defined treatment similar to the professional development programs evaluated in the meta-analysis by Yoon et al. (2007), impacts similar to the ones identified in that study could be assumed.[42] Also, this analysis assumes that the program will continue to develop and expand, (see section below on *Local Expenditures*) and that it will reach more teachers and their students as it does.

Preliminary implementation findings. The greatest challenge to implementation to date—and as a result, the greatest challenge to the initiative's ability to meet or exceed its original intended impact—has been the high number of new elements introduced by the initiative into participating LEA settings. The Evaluation Team has identified five separate new elements (new

[42] See the discussion in the Professional Development analysis.

content/courses, new course structure [blended learning], incorporation of new standards [Grand Challenges of Engineering], inclusion of a new device [iPad], and incorporation of a new pedagogical strategy [Project-Based Learning]), which, when taken together, have increased the likelihood of implementation difficulties—even leading in some cases to ineffective implementation. Delays in rolling out new courses and in revising existing courses have made implementation challenging and have made it difficult to assess the potential impacts of a well-implemented version of this program. Limited teacher use of the provided voluntary professional development has made implementation challenging as well, and it is not clear how that will be addressed going forward, especially with initiative-level leadership changes at the end of the 2012-13 school year. Another major finding of the evaluation has been that the students themselves often need orientation to project-based learning in order to get the most out of the courses; until the NCVPS STEM program is able to provide adequate student preparation for participation in the courses, the program is less likely to meet its full potential. Finally, NCVPS experienced challenges and delays on several occasions related to navigation of the state's contracting process (Stallings, et. al, 2013).

State Expenditures

The expenditures for the RttT NCVPS STEM initiative for the 2011-12 and 2012-13 school years are summarized in Table 7 based on the Evaluation Team's analysis of the expenditure data. The text below the table includes additional information about expenditures and projected future costs.

Table 7: Summary of Expenditures across the First Years of RttT Implementation, NCVPS

	2011-12	***2012-13***	**Total through 2012-13**	**Total Budgeted**[43]
Personnel Services	$203,943	$394,336	**$598,279**	**$1,649,555**
IT Services	$18,017	$107,822	**$125,839**	**$528,448**
Other Purchased Services	$20,106	$47,656	**$67,762**	**$105,426**
Research/Education Supplies	$111,928	$80,867	**$192,795**	**$435,363**
Other Supplies	$232	$0	**$232**	**$800**
Property, Plant & Equip.	$287,043	$58,765	**$345,808**	**$1,541,811**
Total Expenses	***$641,269***	***$689,446***	**$1,330,715**	**$4,261,403**

Description of program costs

- Although the original RttT grant projected NCVPS STEM to begin implementation in 2010-11, planning did not begin until 2011-12 with the first courses offered in 2012-13.
- The comparison between actual and projected expenditures does not include planned expenditures for 2010-11 in the projected figures; even so, there still remains a significant disparity between the two. This is due primarily to implementation issues discussed above, as well as procurement and Human Resources delays.

[43] According to the Race to the Top Application (2010).

- Because the actual blended learning courses did not begin until the 2012-13 school year, the expenditures for 2012-13 serve as the primary basis for projecting the costs of the RttT NCVPS STEM program in future years.
- However, some of the investments made during the 2012-13 school year will not be annually recurring investments. For example, the *IT Services* costs associated with a conversion from the Blackboard platform to the Moodle platform will be a one-time expense.

Projection of costs to sustain the program:

- The RttT NCVPS STEM initiative includes significant annual costs for personnel as a result of supplying a virtual teacher to serve alongside the current onsite teacher for each course as well as NCVPS administration.
- Significant up-front costs for IT services, curriculum development, and equipment will recur less frequently in subsequent years
- Costs associated with licenses for the use of the Moodle platform will be recurring, which is estimated at $25,500, based on the original budget for the initiative.
- The *Research/Education Supplies* cost is primarily the cost of developing curricula for new courses. This full cost will not recur annually; therefore, only 20% of the cost is included in the projection to account for the need to refresh curricula periodically.
- The equipment purchases made in both 2011-12 and 2012-13 primarily for iPads, which will be due for replacement every three years.[44] Therefore, a third of the total cost of equipment across the two years was included in the projection.
- Projected Costs: All other expenses from the 2012-13 year that are not noted above were included in their entirety. The initiative as implemented during the RttT period reflects start-up costs for LEAs new to the blended learning model. After these start-up years, LEAs can transition to an online-only model or a face-to-face-only model, neither of which incurs the same level of costs as the full introductory model, and both of which would be supported by existing cost structures (see *Local Expenditures and Non-Monetary Costs*, below). Thus, projected cost estimates calculated for this report reflect estimates for LEAs that are in the first two years of the program—i.e., LEAs that did not participate in the initiative during the RttT funding period. Accordingly, the analysis projects an estimated annual expenditure of $606,974 moving forward,[45] or about $2,023 per student enrollment.[46]

[44] The replacement time for computers is based on IRS guidelines: http://www.irs.gov/irm/part1/irm_01-035-006.html#d0e1025

[45] This estimate is based on three course sections per LEA across three LEAs—the original size of the initiative—and thus assumes that the program will not be scaled up as it is introduced in new LEAs but instead will be limited to three new LEAs at a time.

[46] This estimate is based on the number of student enrollments in the three original courses across the three pilot LEAs for the 2012-13 school year; changes in enrollment size, number of participating LEAs, and number of courses offered will change this per-student enrollment cost estimate.

Local Expenditures and Non-Monetary Costs

Schools are responsible for the cost associated with each face-to-face teacher's time to teach in this program, which is the equivalent of about 0.2 FTE per teacher. This cost burden is not entirely in addition to regular staffing costs, since these teachers would have taught students in non-blended classes if no NCVPS STEM program were present, but the relatively smaller class size of the NCVPS STEM courses means that participating teachers or other same-subject teachers in their schools likely are taking on slightly larger classes for other sections of the same course to compensate—a burden that is not reflected in costs per student, but that may have an indirect impact on working conditions for those teachers. In addition, local participating teachers also have to contribute uncompensated time beyond their traditional school time, because their partner online teachers contractually are not available during school hours. The RttT NCVPS STEM initiative recommends direct contact (phone calls, etc.) rather than emails, and that communication appears to be happening, which means these local teachers are working during unpaid overtime to do so. On-site program and IT support and coordination also are local responsibilities. For example, there is some student processing expense, in the form of identifying students who meet the targeted population for the courses, and on occasion, student iPads need to be updated by school personnel.

Of note for cost projections in terms of where the burden of costs will fall, after RttT ends, are NCVPS's plan is to offer these courses on an *à la carte* basis, with LEAs picking up the expense. Course materials will be offered for free to any LEA, and courses offered online-only will be offered at the same cost as other NCVPS online-only courses. In addition, there is the potential that hardware costs will shift to LEAs in the future: If an LEA wants to increase the number of courses offered beyond what has been offered so far, there may be additional hardware costs not included in the per-course cost NCVPS will charge (e.g., funds for iPads, etc.).

Next Steps

Moving forward, as more outcome data become available, future evaluations can seek to generate estimates of initiative impacts on both intermediate and student outcomes. Additionally, such analyses will benefit from the availability of another year of expenditure data to help inform cost projections. The goal for such a report should be, to the extent possible, a complete CEA for each initiative based on implementation expenditures and available outcomes estimates through 2013-14.

References

Barrett, N., and Houck, E. (2013). *Local Education Agency Race to the Top Expenditures: An Analysis of Fund Use and Expenditure Patterns*. Consortium for Educational Research and Evaluation–North Carolina. Retrieved from: http://cerenc.org/rttt-evaluation/local-level-implementation-and-spending/.

Béteille, T., Kalogrides, D., and Loeb, S. (2012). Stepping stones: Principal career paths and school outcomes. *Social Science Research*, *41*(4), 904-919.

Boyd, D., Grossman, P., Lankford, H., Loeb, S., and Wyckoff, J. (2006). How changes in entry requirements alter the teacher workforce and affect student achievement. *Education Finance and Policy* 1(2):176-216.

Branch, G. F., Hanushek, E. A., and Rivkin, S. G. (2009). *Estimating Principal Effectiveness*. Working Paper 32. Washington, DC: CALDER, The Urban Institute. Retrieved from http://www.urban.org/uploadedpdf/1001439-Estimating-Principal-Effectiveness.pdf.

Corcoran, S. P., Schwartz, A. E., and Weinstein, M. (2012). Training your own: The impact of New York City's Aspiring Principals Program on student achievement. *Educational Evaluation and Policy Analysis*, *34*(2), 232-253.

Dhuey, E., and Smith, J. (2014). How school principals influence student learning, IZA Discussion Paper, No. 7949. Retrieved from: http://hdl.handle.net/10419/93329.

Fullan, M., and Ballew, A. C. (2001). *Leading in a Culture of Change* (Vol. 1). San Francisco: Jossey-Bass.

Fuller, E., Baker, B., and Young, M. (2007). *The Relationship between Principal Characteristics, School-Level Teacher Quality and Turnover, and Student Achievement*. Working Paper Series (Federal Reserve Bank of Atlanta).

Glazerman, S., Mayer, D. and Decker, P. (2006). Alternative routes to teaching: The impacts of Teach for America on student achievement and other outcomes. *Journal of Policy Analysis and Management*, 25: 75–96.

Glazerman, S., Senesky, S., Seftor, N., and Johnson, A. (2006). *Design of an Impact Evaluation of Teacher Induction Programs*. Washington, DC: Mathematica Policy Research.

Glazerman, S., Dolfin, S., Bleeker, M., Johnson, A., Isenberg, E., Lugo-Gil, J., and Britton, E. (2008). *Impacts of Comprehensive Teacher Induction: Results from the First Year of a Randomized Controlled Study*. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, US Department of Education (No. 5666). Mathematica Policy Research.

Harris, D. N., and Sass, T. R. (2011). Teacher training, teacher quality and student achievement. *Journal of Public Economics*, *95*(7), 798-812.

Hill, C. J., Bloom, H. S., Black, A. R., and Lipsey, M. W. (2008). Empirical benchmarks for interpreting effect sizes in research. *Child Development Perspectives*, *2*(3), 172-177.

Isenberg, E., Glazerman, S., Bleeker, M., Johnson, A., Lugo-Gil, J., Grider, M., and Britton, E. (2009). *Impacts of Comprehensive Teacher Induction: Results from the Second Year of a Randomized Controlled Study*. NCEE 2009-4072. National Center for Education Evaluation and Regional Assistance.

Glazerman, S., Isenberg, E., Dolfin, S., Bleeker, M., Johnson, A., Grider, M., and Jacobus, M. (2010). *Impacts of Comprehensive Teacher Induction: Final Results from a Randomized Controlled Study* (No. 6811). Mathematica Policy Research.

Kane, T. J., Rockoff, J. E., and Staiger, D. O.. (2008). What does certification tell us about teacher effectiveness? Evidence from New York City. *Economics of Education Review,* 27(6):615-631.

Kellogg, S., Booth, S., and Corn, J. (2012). *Race to the Top Online Professional Development Evaluation: Year 1 Report*. Consortium for Educational Research and Evaluation–North Carolina. Retrieved from: http://cerenc.org/wp-content/uploads/2011/11/RttT_OPD_Revised_FINAL_12-20-2012.pdf.

Leithwood, K., and Sun, J. (2012). The Nature and Effects of Transformational School Leadership A Meta-Analytic Review of Unpublished Research. *Educational Administration Quarterly*, *48*(3), 387-423.

Maser, R., Smart, A., Stallings, T., Stanhope, D., and Townsend, T. (2013). *North Carolina Teacher Corps: Year One Implementation Report*. Consortium for Educational Research and Evaluation–North Carolina. Retrieved from: http://cerenc.org/wp-content/uploads/2011/10/FINAL_NCTC_Second-Annual-Report_11-07-2013.pdf.

McAdams, R. P. (1997). A systems approach to school reform. *Phi Delta Kappan*, *79*(2), 138-42.

Moir, E. (2005). Launching the next generation of teachers. *Teacher Mentoring and Induction: The State of the Art and Beyond*, 59-73.

Reeves, D. B. (2010). *Transforming Professional Development into Student Results*. Alexandria, VA: ASCD.

Ronfeldt, M., Loeb, S., and Wyckoff, J. (2013). How teacher turnover harms student achievement. *American Educational Research Journal*, *50*(1), 4-36.

Rossi, P. H., Lipsey, M. W., and Freeman, H. E. (2004). *Evaluation: A Systematic Approach*. Thousand Oaks, CA: SAGE Publications, Inc.

Sass, T. (2011). *Certification Requirements and Teacher Quality: A Comparison of Alternative Routes to Teaching*. Atlanta: Georgia State University. Retrieved from: http://www.learningfront.com/media/alternative_certification_and_teacher_quality_11.pdf.

Smith, T. M., and Ingersoll, R. M. (2004). What are the effects of induction and mentoring on beginning teacher turnover? *American Educational Research Journal*, *41*(3), 681-714.

SRI International (2011). *Evaluation of the Texas High School Project: Third Comprehensive Annual Report*. SRI International.

Stallings, T., et al. (2012). Executive Summary of: *North Carolina Teacher Corps Start-Up and Teach for America Expansion: Initial Findings on Recruitment, Training, and Employment*. Consortium for Educational Research and Evaluation–North Carolina. Retrieved from: http://cerenc.org/wp-content/uploads/2011/10/NCTC_PreliminaryReport_10-29-2012.pdf.

Stallings, T., et al. (2013). *North Carolina Virtual Public School Blended Learning STEM Courses*. Consortium for Educational Research and Evaluation–North Carolina. Retrieved from: http://cerenc.org/wp-content/uploads/2011/10/ES-NCVPS-blended-course-impact-FINAL-4-3-13.pdf.

Villar, A., and Strong, M. (2007). Is mentoring worth the money? A benefit-cost analysis and five-year rate of return of a comprehensive mentoring program for beginning teachers. *ERS Spectrum*, *25*(3), 1-17.

Wayne, A. J., Yoon, K. S., Zhu, P., Cronen, S., and Garet, M. S. (2008). Experimenting with teacher professional development: Motives and methods. *Educational Researcher*, *37*(8), 469-479.

What Works Clearinghouse. (2011). *Procedure and Standards Handbook, Version 3.0*. Washington, DC: United States Department of Education. Retrieved August, 1, 2013, from http://ies.ed.gov/ncee/wwc/pdf/reference_resources/wwc_procedures_v3_0_standards_handbook.pdf.

Wholey, J. S., Hatry, H. P., and Newcomer, K. E. (2010). *Handbook of practical program evaluation, 3rd edition*. San Francisco, CA: John Wiley and Sons, Inc.

Xu, Z., Hannaway, J. and Taylor, C. (2011). Making a difference? The effects of Teach For America in high school. *Journal of Policy Analysis and Management*, 30: 447–469.

Yoon, K., Duncan, T., Lee, S. W. Y., Scarloss, B., and Shapley, K. L. (2007). *Reviewing the evidence on how teacher professional development affects student achievement*. National Center for Educational Evaluation and Regional Assistance, Institute of Education Sciences, US Department of Education.

Appendix. General Formula for Calculating Initiative Cost

The total cost of each initiative is calculated on a per-year basis using the following general formula:

$$TC = \sum_{i=1}^{n} \frac{IC_i}{y_i} + \sum_{j=1}^{n} VC_j * n_j + \sum_{l=1}^{n} FC_l$$

where $\frac{IC_i}{y_i}$ is the investment cost of any capital input i divided by the number of years the input is expected to last. In the context of the analysis, these expenditures are typically for equipment (e.g., computers) or training for personnel. The term $VC_j * n_j$ is the per-year variable cost of any given input j multiplied by the number of participants. The data provided for the analysis typically report these costs in aggregate and need to be deconstructed to provide per-unit cost, which allows the analysis to then project changes in the total variable cost that result from changes in the projected number of participants. Common variable costs can include travel expenses and some staffing. The term FC_l is the yearly cost of any fixed input l. These costs do not depend on the number of participants but are instead made on a yearly basis and can include facilities, contracted services, and some personnel costs. To estimate total cost, the analysis uses cost information obtained from NCDPI and initiative implementation information obtained from Evaluation Team members who are tracking each of the initiatives.

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